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Interviewer: Victoria A. Harden, director of the NIH Office Historical

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HARDEN: Dr. Bowman, let's begin with your early life. Could you talk about growing up, about your parents, and about your education?

BOWMAN: I was born in the Bronx, in a part of the town that is now the dregs of the old Bronx. At that time, it housed a reasonable Bronx population. I lived in a low, multi-family house and had many acquaintances in the apartment house and surrounding areas. I went to an elementary school just across the street. It was a former Catholic school that had been taken over by the city. I went only to about third or fourth grade at that particular location. People have asked me several times, "When did you get interested in science"? I think I was *always* interested in science. I did science probably from the earliest days, and I remember making one discovery before I was in the fourth grade. That was the time when everybody had battery radios, and so everybody had batteries. Batteries wore out quickly and were discarded in great profusion. I started out picking up junk at an early age in the form of old batteries. I discovered that if you put old batteries in parallel, you reduced the internal resistance so that you could use old batteries--use up more of the power in the old batteries than was available. I learned how to hook things up, I think, from my older brother. He was eight years my senior and he

experimented with radio reception. At that time, everybody built radio receivers, using a coil wound on an oatmeal box and a crystal detector--solid state, you realize. You used a cat's whisker to explore this crystal, looking for a sensitive point. It was a detector that worked with a tuning device. My brother had built one of these things in our bedroom. We shared a common bedroom, so part of my bedroom was my brother's ham shack--well, he didn't transmit so you can't call him a ham--he was an amateur radio operator--but he was building receivers. I had some tools around, and he was fairly receptive to my fooling with his stuff, and I would help him to some degree. But, going out on my own, I had a particular cabinet, as I remember, in the corner of the living room. It was a corner cabinet--a kind of China cabinet above and a base cabinet with a couple doors below, and in there I used to store old B batteries. Old B batteries were the large batteries--45 and 90 volt batteries that were used to get the high voltage for the typical high grade radio receiver that we had in the living room. It was one of these super-regenerative radios with many dials to tune it in--you got tuned in with squeals and squawks, and, finally, you got powerful stations very well. We had an antenna strung out of the bedroom window that went up to the roof so we could get distant stations. At that time, if you tuned in on somebody from Australia, you reported it to the neighbors--it was an achievement to tune in some of these things. This was a headphone and single crystal sort of thing. Later we bought one of the early DeForest audions--my brother bought it in a DeVega Sporting Goods store for seven dollars. Seven dollars was a lot of money. It was

a DeForest audion, which had pigtail leads--no socket. You just screwed it on to a board; screwed the leads down; put power on it by local wiring.

Anyway, doing this kind of thing created an environment that was inspiring. I guess my brother's interest was transferred to me.

HARDEN: Let me interrupt you for a minute. Was your brother your only sibling?

BOWMAN: Yes.

HARDEN: Could you state his name?

BOWMAN: Yes. My brother was Richard--Dick, to everybody. He shared my interests and was very good to me. He treated me well, and I liked him very much. He was very busy, though, with other things and was not home too much. I think that he had already discovered women--or girls--and was preoccupied most evenings. But we spent a fair amount of time together, and he always had some good books on radio and science and electricity. I asked him a lot of questions and learned a lot about things that enabled me to hook up batteries. I discovered that if you hooked up batteries in a series parallel combination; you could get both high voltage and relatively decent amounts of current. In the darkness of the corner cabinet, if you touched the wires together right, you could make nice sparks, and you could entertain people by letting them see how a shock feels. Mainly, it was just a few local smaller children. There was an Italian boy, who was a good friend. And directly across the hall I remember a little Jewish girl. She was very Jewish; her mother was very Jewish and they took kosher precautions of all sorts. She was bedridden. They said she had leaking valves of the heart. Currently, we

would say she was a blue baby. She was bedridden, and I would visit her, because she could not function adequately to walk around. She was quite blue and very pale, and she was my favorite little girl friend. My mother admonished me that I was over-straining her by arguing with her and that I wasn't nice to her, etc. All the things I ever did, it seemed, were criticized as being mean to the little girl next door who was so sick. I even remember her name. She was Mae Hampf. She lived right across the hall, I visited her regularly, and we played together a great deal. And one day I woke up and she wasn't there anymore. All of a sudden, there was a great change in the household next door. As is done in a death in a Jewish family, all of a sudden, she just disappeared. It created an emotional effect that stayed with me a long time.

HARDEN: Did it have an impact on why you decided to go into medicine?

BOWMAN: I never quite was sure of that, but I got very interested in what happened. I was not acquainted with death and its consequences until it suddenly was thrust upon me. I looked up her disease. I remember reading more about it. But I think it was just too soon. I don't believe it was at that time, at that early age, that I got interested in medical things. But I think it might have contributed to stimulating me later. In this particular part of the Bronx, there were a couple of strongly emotional things that happened. That particular place had a hole in the sidewalk with dirt in it, and my contact with Mother Earth was through the hole in the sidewalk. We'd sit around the hole in the sidewalk and dig in the earth with the small kids around. The hole in the earth that we used to dig in was occupied by

one of my little friends one day when the coal truck delivered coal to the house across the way. That was the end of my little friend. I have nothing but these unpleasant memories for that particular area. I also remember the man coming to cement the hole. I wonder how much of those incidents had to do with my interest in science.

HARDEN: Would you state your parents names, and tell me what they did and how they might have fostered your interest in science and medicine?

BOWMAN: My father was a very successful businessman in the trucking business. He was the first motor truckman in New York City. His name was Roy George Bowman. He had a brother who was a partner in his trucking business, but he was a silent partner, and he was "Uncle Russ" as far as I knew. Uncle Russ was avuncular--tended to give out dimes freely. He was older than my father, and had come to New York earlier. He was a hoisting engineer on a steam engine crane that built big buildings, and, I think, that influenced my father to come to New York. My father was born in middle Pennsylvania, in the little town of Mount Union. And, where he married my mother, whose maiden name was Gertrude Norris. Both families were second generation Americans. My parents had been born and raised in America, but their parents had come from England. My mother had two sisters, but I never got to know much about them. My grandparents on my father's side, I never knew. My grandparents on my mother's side--the grandmother was a very Pennsylvania, prim little old lady when I knew about her, and her husband was a blacksmith. The blacksmith was very intriguing to me. My uncle--my mother's

brother--was also a blacksmith. When I went to visit there, I loved blacksmithing. I was fascinated at how my grandfather would work the hot iron, and he gave me a few chances to get in a few licks with the hammer. He made sparks fly and things pop, which was fascinating. I only visited occasionally and for relatively short time, so I really never got much experience with him. I just learned about it and liked the idea. It stayed with me all my life, and I still have a hammer and anvil and forge in the back yard. But making a smokey fire is not very practical these days in the back yard. You have to have a dish of hot dogs around to say you were frying hot dogs or something. Anyway, at that early age, my fascination for mechanical things was obviously manifest. My father was uneducated. He went to only a few grades in some kind of a little red school house. I think he was some kind of a naughty boy, because my mother would tell stories about how he was not often in school--he tended to play hooky a good deal. I guess he didn't go fishing as much as he went searching for some kind of crazy work. He loved machinery, obviously, and his older brother, as I said, was a hoisting engineer and was able to run machinery at an early age. I think that influenced my father, probably competitively, and he took jobs around the brickworks. One particular part of Mount Union was dedicated to making bricks from Ganister rock, which, I remember, they called it. It was obtained from a local mountain by a miniature train that ran on narrow gauge tracks up to the top of the mountain, where they chipped off the stone. I think that my father's ambition was to run the dinky engine. He got his opportunity as an early teenager. From what he said about

what he was doing at what age, it seemed like he was just out of his diapers when he ran this dinky engine, but it must have been some time later than that. But it was probably pretty early in his school years when he went off and got jobs of that sort. He took me up to see the train, and it was so fascinating that I would have loved to do that, too--to run a little train on tracks that were only about two and half feet wide or thirty inch gauge. It ran on unbelievable bridges and cut-outs in the side of the mountain, teeter-tottering on the edge of things. To make this kind of temporary railroads, they just laid the track. They ran the track to some place convenient to use and then tore them down to move them some place else. My father said that he got going pretty fast one time near the end of the track, and he ended up with the train in the middle of the cornfield. Apparently they didn't fire him. They always wanted a good engineer, and I think he wanted to be able to run that little train. I don't remember much more about tales of his--but the one thing that was obvious was that he had great mechanical ingenuity. His trucking business came out of contact with the building industry. His brother was a hoisting engineer who would run derricks to hoist the structural steel into buildings. It was difficult to bring the steel into the area where it could be picked up by the derrick. It was all done by horse drawn conveyers in which the heavy steel items were rigged and hung underneath the wagon. It was a high thing that looked very much like what we call a horse, made of lumber with four legs and had wheels on the legs and the steel was hoisted up in the space under the belly of this horse and was conveyed to the place where it had to be lowered off this thing.

After the horse was taken out of the way, the hoist would bring the steel up into the building. I think my father's brother convinced him that the motor truck was a better way to do it. At that time motor trucks were quite scarce, but he bought a Manominee truck and established the trucking business to carry steel. In the New York City building area, they were building a lot of rather good sized-buildings, and running the derrick was a pretty good art. Shortly after he got here he also got a license to run the hoisting engine with his brother--this probably preceded his trucking business. Getting heavy steel through the city streets and into the place where you could build it into a building required some ingenuity. He got a lot of fame or notoriety, as you please, by the fact that he had this capability of hauling anything. He developed means of dragging, pushing, and whatever was necessary to get the steel through the streets. It was very impressive and got some publicity in the newspaper when they hauled a piece--a single piece--that weighed over 100 tons. It was part of a structure that I think he called the level club. I don't know what the level club was or what the level club building was, but this huge piece was delivered in the Hudson River and hauled up the hill--which was a very steep hill--up to the Riverside Palisades on the New York side of the Hudson River. I think the hill was called the 96th Street Hill. The steel was delivered to this dock, because my father said he could get it up the hill. There would be no problem in delivering it. And he made a very ingenious arrangement of two trucks going forward and two trucks going backward. All of them drove in unison with what they call a bolster between. It had swivels and things so that they could steer.



And this huge girder--I think it was a main roof support of something that had a large clear space underneath it. I think there were two of them. I remember having my picture taken standing between the gusset plates on the hundred-ton piece. The newspaper man took the picture of this thing going up the road, which was in all of the newspapers around town. It was hailed as quite a feat, and benefitted the Mack Truck Company, which, at this time was the brand of trucks that he had in his fleet. He had maybe ten or eleven trucks, at that time. These were the good days in the '20s. The building boom was going hot and heavy, and my father was making money very well. I think he would--he gave me the impression that he made on the order of \$100 a week, or something like that. And that was a fabulous sum compared to the people in the neighborhood around the area. He had a couple of cars--he had one car at a time, but he had a couple of cars in sequence, of one sort or another. He was kind of a hot-rodder, it seemed to me, and he drove too fast a good deal of the time, at least for my mother's comfort. We used to go on outings to Rye Beach in New York. That was the place to go at that time. There was no question that my father had a strong influence on me about mechanical things. I recognize the ingenuity of it, and I liked the idea. It became suddenly apparent to me that he was proudly saying that he had a good business ready for the children to take it over. My brother used to drive one of the trucks as soon as he was at the age that he could have a chauffeur's license. It became very apparent to me that that was an ambition that I really was not looking for. We would go down to the docks, and the steel would

come in on these lighters. A derrick would pick up the steel in a great bundle and hoist it onto the trucks. Then men called loaders would jump on and off the truck, run across, go to the boat and then back to the truck, and so on, under these loads of steel. They would manipulate by hand the cables around the thing, and it was a very common thing to have a load shift a little bit while somebody had his hand on the load. It nipped a few fingers off here and there, but it seemed like this was a source of entertainment for the men who did this. They were unconcerned about losing a few fingers here and there and it just seemed like that was a terrible thing, and I had great feelings about it. I was not old enough to drive, but a couple of times I served duty as a loader, at which point I decided that I was never going to do it again, that I didn't want to see any more of it in any way, shape or form. I also didn't really take to the idea of being either a truckman or a truck driver. I was not pleased with the kind of people I met in the trucking business, although the people responsible for the big building business were very entertaining and obviously successful businessmen. They were frequently visited my father and consulted with him on how to bring this kind of stuff or that kind of stuff into the city.

HARDEN: I want to ask you now about your high school period.

BOWMAN: Oh, that was the greatest period in my life.

HARDEN: You went to a special high school, I believe. How were you selected for it? Did your parents encourage it? Tell me about it.

BOWMAN: Let us forget about the trucking business for a while and just summarize that my

father was very ingenuous with levers and forces and so on. Given a crowbar and a large hammer or something and a couple of rollers, he would move the earth or anything you needed using these leverage principles and a system of designing things at how much wood and how heavy to make it and what you could get away with and so on. He designed well without any engineering skills of any sort. He had a natural feeling for it. Probably with his experience, he knew, for example, what kind of tracks would bend if you'd run over them too much with a locomotive and would be able to translate that into practical use. But, I didn't particularly like the idea of staying in that business. We were making money hand over fist--the business boom was going strong in the early '20s. That would make me--I was born in 1916--in the early teen-age, and I think I went to elementary school when I moved to Huntspoint. Huntspoint was the outreaches of the Bronx in the uptown, oh, I guess not only uptown but eastward extension of it. Huntspoint was a point that ran into the Long Island Sound--into the East River, right near Hellgate, in New York. At that time, my brother was already in high school. He went to school early in the morning and got through in the afternoon rather early. He was taking courses in science in high school, and I took to his books a good deal and found them exciting, to say the least. I read books that were out of my age group interest, and I shunned sports with a vengeance. To this day, I don't think I ever paid admission to go to any sports event, including baseball games, and football games, even though I was in New York City, and that sort of thing went along with growing up there.

HARDEN: Why do you think you didn't care for sports?

BOWMAN: I don't know why. It just seemed to me that they were always so unnecessarily competitive. Who cares about the score, and what difference does it make? If you have fun knocking the ball around, that's all right, but it seemed like every game that participated in ended up in an argument or disagreement or some other silly thing about the scoring. That was very uninteresting. I was not athletic in any way, shape, or form, but I was strong and tall. It was no problem to take care of myself, and I was not bullied or ostracized in any way. But I was, I suppose, a loner mostly because of being interested in things I could do by myself. When I moved to Huntspoint, one of the first things I got was a place to work. You might call it a laboratory--it was chemistry sets and that sort of thing. About that time my brother started taking analytical chemistry, qualitative analysis, in high school. He brought the books home, and I thought that was the greatest thing in the world. I analyzed everything. I got to the point where I just analyzed things for the hell of it and played detective or something of that sort. Somewhere along in that time period I also got a microscope. I usually had a few people around who came to accompany me in my collection jaunts. We'd collect junk of some sort or another. I was interested in analytical procedures, But my chemical set was inadequate. I soon spent my time going to Eymmer and Ammend at 18th Street and Third Avenue in the City. We had access through the subway to all of the city. For only a nickel, you could go to 18th Street and Third Avenue. It was a little difficult to convince the clerks there that you were buying bona fide chemicals for analysis

and not for some devious purpose. They were always suspicious of young people buying chemicals. Finally, I got a little rapport with some of the clerks, and they seemed to be fairly cooperative. I mostly bought stuff for doing analytical systems. I just liked to do analysis. I would read about how you could analyze milk or how you could analyze for wood alcohol in your liquor. This was during Prohibition days. Huntspoint was the end of the road before they built the Huntspoint Gas Works, a tremendous gas works. It is now one of the landmarks you see as you come into La Guardia Airport. At one time the large gas holder at Huntspoint, was one of the largest in the world. It supplied gas for New York City. That area, fronting on the East River, was the place where boats would come up the East River from docking vessels unload their hooch. There was a rum-runners area in there. Also they made some liquor in the area, which you could obviously smell in some of these places. They were very obviously making hooch, and there was a need for protecting themselves from people who would dilute it with wood alcohol, which is perfectly reasonable and non-toxic up to a certain level. But toxicity soon takes over, and you've got to be careful; if you put too much in, you poison people. Bootlegging was an important industry. It was perfectly obvious to everybody what was happening in these places. It was obvious to the police, certainly, and also provided the source of their protection money. But I didn't get involved in that. My father in the trucking business had to give out a certain amount of liquor during Christmas time. The police in the Manhattan area would come up and remind my father that they had seen his trucks

and that they hadn't bothered them and had more-or-less fixed it so they could park easily and had facilitated his business and it was Christmas time. So he had to buy a certain amount of this bootleg stuff and distribute it to the police. He was very concerned that he didn't poison any of the policemen. And I said, "Well, I could analyze it and find out if it contains any wood alcohol". I proceeded to make checks on his supply. At one time, one supply very obviously had a lot of wood alcohol in it, and I advised him not to distribute it. He actually destroyed it all, even though only a few of the bottles were contaminated. This was one of the name brands, which we considered very good. These bottles were all capped and sealed, and solving the problem of getting a sample and not spoiling the seal or making it obvious that you'd been in there became one of the arts in which I became specialized. I learned about spinal needles, how you could get long, thin needles and insert them in a cap in through the letter "o" or something like that. I developed a sampling system that was adequate. My father told one of the large contractors in the steel business that he had all good stuff; it had been checked and analyzed. Mr. Victor, I think, of the Taylor-Victor Company, was the person. He said that he had a much bigger problem than my father and that he would like me to analyze for him. So I said, "Why, sure. I'd be glad to." This started the sort of thing where a car loaded with liquor to the gills would go into my garage in the back of my house. I would have hundreds of bottles of bootleg liquor in the place to sample and to analyze. It was very lucrative and paid for my chemicals and all sorts of things that my father was very much

concerned with. He said, "Make your own money and then be self--sufficient."

However, I was very much of the impression that it was not a good idea for somebody to know that I was the guy who was analyzing the hooch. I was impressed with the way people disappeared who were doing things of this sort. It was also very seasonal; only around Christmas time did I get this windfall. I only did it for two Christmases that I remember. But it got worse rather than getting better. They would bring more stuff. The wood alcohol test was a very simple test. It involved nothing more than heating up a copper wire to red heat and plunging it into the material. This would oxidize the wood alcohol to formaldehyde, and then you would test its ability which involved fischer dye. It was one of these inside-out tests where you convert the alcohol to formaldehyde; then you use the formaldehyde test. At any rate, it was successful, and the analysis business got more and more interesting. A man who ran a milk plant came to me and wanted to know if I could analyze the milk. They wanted to do several tests which were approved tests. One of them was freezing point depression, and in my later years I developed a freezing point depression apparatus for very tiny samples. My earliest contact was to be able to detect dilution of milk by freezing point depression and also by fat content. One was able to tell who had been skimming off the cream. A local grocer would give me a sample and I would analyze it to see how much of the milk had been adulterated. Now this was the time when milk was delivered in thirty-gallon cans with a friction top lid. A driver could take 25 cans of milk for delivery but easily deliver 40 cans by judicious dilution of

the milk. This was the game that I was supposed to detect.

HARDEN: How old were you at this time?

BOWMAN: I'm not sure. High school, I guess. Maybe before high school.

BOWMAN: These things came so easily; they were thrust upon me. I just played around a little bit and all of a sudden they blossomed. Being connected to the bootleg business bothered me, though. They were not nice people to deal with. I decided I didn't really want to pick up the samples at the store, so the plant man picked up the samples and delivered them to me. I also had the impression that the man who was adulterating the milk was not pleased with having somebody do this, either. It didn't seem like a good idea to be too well-known, so I kept my mouth shut about it. I did the Babcock method by using butter fat and freezing point depression, but mostly what I remember was that I came to hate the milk work because every time I went to this milk place, it smelled like sour milk something terrible. They had cans sitting all around in the summer time. Then they would steam clean them, and the steam cleaning would make the whole place smell like rotten milk. I found that very discouraging. At any rate, the analysis business was blossoming, and I liked to do it, but it seemed like I got into places that I felt were awkward, to say the least. I didn't want the milk delivery man gunning for me, or the bootleggers, so I did as little as possible of that sort of thing. I then went into analyzing industrial materials. I came to know a little bit about new products of one sort or another. People who heard that somebody got some analysis done very cheaply would come to me. I remember that somebody had a silk stocking



treatment that would prevent runs, and they wanted me to analyze it. I sniffed it and identified the solvent as being nothing more than cellulose nitrate or something of that sort--nail polish added to a dilute solution. With this you could anti-run your stockings. I did that with nothing more than a sniff and a quick test of the flammability. I told him what to do, and he made up his own solution for it. He sold some of that for a while. That started bringing in other sorts of things. People had solutions that they were buying and wanted analyzed. They ranged from cleaning fluid to photographic materials. The analytical business was going great guns. It was very entertaining, and I enjoyed it a great deal. Sometimes people would come for identification of a fabric, and I used my microscope to see what kind of fibers they were. My reputation spread among people just word of mouth. They were not friends, particularly, of the family; I didn't know who they were; they just told me somebody had recommended me. About that same time, I was hot for photography. I was developing my own pictures and doing a certain amount of camera work just before I got into high school. There was no stimulation by any of the elementary school science teachers. I remember distinctly that, when I changed to the elementary school, which I think was P.S. 52, at Huntspoint, I understood they had general science there. I found that my encounters with science there were somewhat on the negative side. A motherly-type woman taught nature studies--I don't think the course was called nature, I think it was general science. About that time, I got into insect collecting. I made a couple of butterfly collections that I mounted in a big frame, under glass with

cotton behind them. They were, oh, 18x20 frames--something like that. I had two or three of those quite solidly filled with butterflies, cocoons, moths, and various parts of the life cycles of insects of one sort or another. I had mounted them up in these frames very carefully and nicely. I took them in to show to the science class and to Mrs. Corssin [sp?], I believe, was her name. And every time I wanted to take them home, she felt that we ought to leave them just until something or other. This went on, and I finished that class. A Mrs. Shea, as I recall, was my next science teacher. She was also a music teacher, and she felt that music was much more important than science. And whenever we came to the science class, she said that we hadn't done well enough in music and ought to rehearse a couple of things before we got into science. Science was always preempted by music. She didn't know anything about science, and it was very obvious. I felt that I knew a lot more about it than she did. I think it was really true. I think she covered up her lack of knowledge in science with the music. The point was that I never got my collection back. I actually had my mother come to school to see the principal about why the teacher wouldn't give me back my collection. Well, they finally returned them; I did get them back. I had them on the wall for a long time, but I didn't have them adequately preserved so that mold grew and insects or other things came in and ate them up. They turned into the usual debris that animal matter ends up as if you leave it long enough some place. At any rate, that was about as much science stimulation as I got from that particular school. They were happy to have the collections and stuff of that sort; but I don't remember anything

I ever learned from any of the classes or any interest being shown in anything I had done that was true interest. So I looked forward very much to going to high school, especially because my brother had gone to Stuyvesant High School, which was at 16th Street and 3rd Avenue in Manhattan. This was roughly three-quarters of an hour ride on the subway from the Huntspoint area.

HARDEN: Did you have to take a test to get in?

BOWMAN: Yes, you had to take a test. You could go to any high school that you wanted in the city, if you could get there. But to go to Towns and Harris and Stuyvesant, you had to take an entry examination. I think it was mostly mathematics and physical science. My brother was enthusiastic about the shop courses there. He said that it was such a good school, that he enjoyed it 100 percent. He became an aeronautical engineer, and he got to be a big wheel. He pretty much designed the Thunderbolt aircraft--Republic Thunderbolt aircraft interceptor fighter used in World War II. He was chief design engineer, or something of that sort. It wasn't the chief engineer. The chief engineer oversaw the whole shooting match, but he was chief of the design engineers. He designed the P47 Thunderbolt--it was his main thing there. During the time that he was in school after high school, he worked in the aeronautical laboratory at Guggenheim laboratories. At NYU he did a lot of testing of air frame structures and test machines, and operated the wind tunnel there. As an assistant, I went to the wind tunnel with him and helped him build jigs and frames that would be used in the test procedures. I also got the job making pictures of the test procedures. When they made a test run and a

particular part of the aircraft started to wrinkle, they would take a picture of the wrinkle to show where the failure was beginning to come from. My activity was to take the pictures. I got very much involved with photography and had several cameras. I did the development and enlarging and so on. I built my own enlargers and things of that sort that were part of the game. But that was while I was in high school and he was in college. That was very interesting science, too, and the engineering was also very interesting. I think my brother was a very smart and capable engineer. He explained a great deal of things to me and frequently was the source of a book or a publication that I could read. I was an avid reader. I wanted to know everything about everything. I had a reasonable number of friends that I met mostly in Stuyvesant High School. I had a ball at Stuyvesant High School. I thought that was the greatest part of my life, really. Enjoyed it a hundred percent. The enjoyment was mostly based on the person who was the principal. The principal was a Dr. Vonnederuff [sp?], and he, apparently, had made some kind of a deal with the Board of Education in the City of New York. I think that he was exempt from any rules that applied to anything in New York Board of Education. He ran the school the way he wanted to run it. He was imported from--I forget where. But he had a heavy German accent. Not a heavy-- a moderate German accent. He was a great round beer bellied-type of fellow, a picture of German royalty. But he was not very pompous at all. He was not the Herr Geheimrat timeless-sort of person. He was a very fatherly fellow. His impression of how to run a high school was that they would not lock the doors;

they wouldn't keep the students in; there were no monitors posted at the doors like in every other high school in New York, where you couldn't have free egress without having a pass. At Stuyvesant, you could come and go as you pleased, and you didn't have to march and run from place to place. Everything that we had to do in the other schools, you didn't have to do there. It was a very college kind of atmosphere. When somebody would leave the school and not come back, he said, "There's something wrong with the teacher. If you don't have it interesting enough to keep this guy in here, it's wrong." With Stuyvesant, he had accomplished quite an educational feat. He'd taken this school, which was apparently very poor--it was in the lower East side, with mostly Italian and Jewish neighborhoods, with a certain amount of friction between the two. But they all came to the school from the neighborhood, because if they were in the neighborhood of the school, they had free access to the school without the examination. He wanted it that way because he said he wanted to mix inspired students with students who needed inspiration. It worked very well, and he got awards for what he had done. When I graduated in 1938, he retired from the school system. I presume it was not because of me! He was a great guy, and he had a special laboratory of physics that was open to the students. You could go in there and do what you wanted, use the apparatus. There was a certain amount of apparatus that was student apparatus. One of the great things that happened to me in relation to Dr. Vonnederuff [sp?] was that, in using the physical apparatus, I wanted to do something with interferometry. I said that I thought I could make an

interferometer. This was the Michaelson configuration of the interferometer, which required great precision in aligning glass plates and mobilization in of them. They had a machine shop, and I had taken machine shop courses. I also had excess time--if you finished your assignment early, you could do as you pleased. If you attended the morning session, you could also come back after noon, so the idea was to get in the morning session so you could come back to the afternoon session and spend the rest of day there. It required some attainment of grades to get into the morning session as well as some time, and I got into the morning session as soon as I could so that I could spend the afternoon in the physics lab or in the shop. It was a wonderful place to be, and I made friends there who stayed with me throughout their lives. I still maintain contact with some of those high school friends, although most of them have died off for some reason or another. When I said I was going to make an interferometer, I had indicated that I wanted to do a particular experiment. I don't know what it was but it wasn't a new invention or something. It was just something described in a book that I wanted to see. Dr. Vonnederuff [sp] said: "Let me show you something. Maybe you could use this." He brought out this beautiful Michelson interferometer. Beautifully made, an unbelievably well-made, high-class optical instrument. He said: "I will let you use this one. I made it personally in school, and I'm very proud of it, and I would only lend it to somebody who would be very careful with it. You may use it and bring it back to me." I did the experiment with the interferometer and it worked beautifully. I was so impressed that he would

entrust me with this piece of scientific apparatus. At the time, it was probably worth a thousand dollars or more. A thousand dollars was a lot at this time-- remember, it was during the Depression. All of a sudden, everything focused on the Depression, and about that same time, the Depression hit my father, who lost about half of his business. He and his brother sold off about half of their trucks and kept their heads above the water by selling off items that were all paid for. He was very frugal and kept his bills up to date and had no debts. When the crash came, he sold off what was necessary and he had survived the crash. The analytical work helped me over that hump and gave me pocket money to buy more things.

HARDEN: What year did you graduate from high school?

BOWMAN: I guess that's 1934.

HARDEN: 1934. And from there you went to New York University. Is that correct? New York University.

BOWMAN: NYU.

HARDEN: Oh, pardon me. Columbia College.

BOWMAN: Columbia College.

HARDEN: I was thinking of medical school, let's we stop here today and pick up with college and medical school tomorrow.

HARDEN: This is the second session on Friday, December 13, 1991. Dr. Bowman, we've been talking about your high school career, and before we move on to college and medical school, you said that you wanted to summarize a bit.

BOWMAN: Yes. I think that my high school experience was probably the most important thing in influencing my scientific choices from then on. As I mentioned before, my brother had gone to this school eight years earlier he was eight years my senior. He brought things home, books and things that I used to introduce myself to subjects that I was interested in. I was anxiously awaiting an opportunity to get to this school. I took the examination and got in and found it to my liking. It was a school that had morning and afternoon sessions. I think you had to go two years before you got into the morning session. The major reason for getting into the morning session was that you could stay all day and into the afternoon session. It allowed you to go to clubs and things of that sort that were part of the school's important social activities. During this time, I made lifetime friends in several branches of the sciences. Even when I was in the afternoon session, you could go in early and take advantage of some of the shops, but it was usually more difficult to get in time in the morning. All the activities, such as clubs, and so on, met in the afternoon. Club activities were very important in my life. There was a Biological Club; there was a Chemistry Club; there was a Medical Club; and all of these clubs had advisors that were dedicated to seeing that the students got what they wanted. They pretty much left us alone in making our own decisions, but



they assisted us in carrying out what we wanted to do. It was very cooperative. And some of the societies made up a great deal of my life activity at that time because I was president of about three societies at once during the time that I was there. Seemed like every time I went to one of these clubs they elected me president. I was president of the Biology Club, the Medical Club, and the--oh, gee, I don't know what else. At different terms, there was changing back and forth between myself and my friends.

HARDEN: I'm going to stop you here before we run out of tape. We'll go on to the next tape now.

HARDEN: This is tape #2 of the interview with Dr. Robert L. Bowman. Dr. Bowman, you were talking about the clubs in which you were involved. Perhaps you can tell me some more about the people. I get a sense that you're beginning to shift from your earlier interest in analytical chemistry and engineering and adding medicine and biology more and more and more. Is this correct?

BOWMAN: Yes. I think a decision to go to medical school was the sort of thing that you had to have in your life plan about the time you went to high school, because you had some opportunity to select courses that would be more appropriate into entrance to college courses that were prerequisites for medical school. And the decision was made to undertake a program for medical school, but not with the intent of practicing medicine. That was what I was advised to do if I wanted to get into a research position.

HARDEN: Who advised you?

BOWMAN: I think there were several people. One person who advised me the earliest was B.O. Dodge, who was the head of mycology at the Boyce Thompson Institute in Yonkers, which was dedicated to study of plant diseases. It was one of the places that we would visit on hikes up along the Bronx River, because it had a big preserve for growing trees, which you were not suppose to trespass on. When we got caught for trespassing, they took us to the man who was concerned about it, and when we showed him that we were collecting fungi and were interested in fungi, we got acquainted with B.O. Dodge, who made it possible for us to visit freely. At that time, I had been collecting myxomycetes and fungi in general, and my friend, Carl Berkeley, was doing that sort of thing. This was all under the direction of the high school Biology Club. We asked our advisor, Mr. Shure, I think, who taught biology, to write us the letter that would give us permission to go on the property freely. We met Dr. Dodge, who was the director, and we became great friends with Dr. Dodge. We brought him specimens, and he identified things for us. I had made one culture out of a red mold that I happened to see on a piece of moldy bread in the trash can as I came to school. It had so overgrown the wrapper that it had grown through the waxed paper wrapper in an unopened bread box. I took it along and cultured it and typed it out. This particular organism was Neurospora, which is of considerable use in all kinds of genetic experiments. They have a polyglots sexual system. They are hybrids of one sort or another, and they were all catalogued in the literature. This one got a new catalogue number because it was not described previously. Dr. Dodge

showed me that he had classified it with my name tacked on to this organism.

Dr. Dodge was an older person who recognized our interest in research and told us that the road to research was to get into medical school. You always had something to go back on, you had a greater opportunity to negotiate for money, and you would be paid much better if you were an M.D. than if you were a Ph.D. in the sciences. I think his advice has proved true. I probably would not have finished medical school as an M.D. without taking an M.D.-Ph.D. program if the war had not interfered. If I had wanted to go on to the Ph.D. program, I first would have had to take a little diversion in the Army as an enlisted man. If I stayed in medical school, however, I could get into the Medical Administrative Corps, which would hold me for a year until I finished my internship. That seemed like the better way to go. But, to get back to the Biology Club at the high school, Mr. Shure was one of my favorite people. Many, many years later, he came to see me at NIH. He heard that I was here and came to visit my laboratory here in the Heart Institute in about 1955 or '60. He came just because he was curious to know what I was doing. We hadn't corresponded very much but had exchanged a few reprints. We also had a Medical Club at the school that was sponsored by a mathematics teacher. He said that he was dedicated to trying to make sure that people who thought they wanted to go to medical school would really like it. He had gone to medical school and obtained his M.D. degree, but he really wanted to be a mathematician all his life. He didn't like much of what was involved in medicine, and, even though he completed medical school, he decided

that he would much rather be a math teacher. His goal was to have people who think they wanted to get into medicine to have enough exposure to it to realize what it was really all about. He had a friend in the Health Department, who arranged for us to visit hospitals on our field trips. About once a month for a couple of years, we visited the operating rooms, morgues, and sanitation departments, including the New York City Health Department and the bacteriology lab that was run by Dr. Park, an author of the book on bacteriology. Park, Williams and Krumwied, I remember, was one of my books from which I learned about bacteriology and isolating organisms and so on. We met Dr. Park, and he as I recall, also had some influence on my decision to attend medical school. I had some contact with medical things through this club, and it all seemed pretty good to me. I couldn't see any reason why you wouldn't want to go to medical school, even though I enjoyed the laboratory part of it more than anything else. We also had a physics club and a chemistry club. The Bunsen Chemical Society was a chemical club to which I never got elected president. The presidency was occupied by Sidney Benson, a real sharp fellow, who later became professor of chemistry at Stanford. Over the years I saw his name in the literature and I think he saw mine, and we sent an occasional comment back and forth, but we never really got close. The distance was too much, I guess. I remember the name of the club so well--we called it the Bunsen Chemical Society and Benson was the president. We almost decided to change it to Benson Chemical Society. A small group of us vied for membership and presidency and so on of the various

societies. One very close, life-long friend was Carl Berkowitz, who had changed his name to Carl Berkeley, which I think reflects a little bit of the anti-Semitic atmosphere of the '30s. Carl was a very dear friend. He and I visited back and forth all his life. He died about ten years ago, and I've missed him since. The high school has a very good reputation, and several alumni have won Nobel Prizes. Arthur Kornberg was a Stuyvesant High School alumnus, and several other people of great renown came out of the many I hadn't known personally, but they were a year before, a year after, my class. At any rate, the high school had its hey-day under the leadership of the German master, Vonnederuff [sp], who retired just about the time I graduated. It maintained its reputation and the principles that he had established for many years. I think it still has a very high reputation for producing good students. It certainly made it very easy for me to get into medical school. As I said, the Biology Clubs were very active. The Chemical Society visited the gasworks in the City and the sewers. We were privy to the water pipes underground, the electrical system, the sewerage system, the powerhouse, and such things, which the faculty advisors took seriously because of Vonnederuff's influence. It was under the Physics Society that we went to powerhouses; under the Medical Society, we visited operations and hospitals. We saw all the facilities of the city from a technical standpoint on outings of the societies. They really made very strong impressions on me.

HARDEN: Were there literary clubs also?

BOWMAN: I didn't have much to do with the literary clubs, but they existed. They were quite

active, but I didn't give them much attention at all.

HARDEN: How did you decide to go to Columbia University?

BOWMAN: Well, Columbia University seemed to be a good place to go. It was accessible to me if I lived at home. I took one subway ride down to 96th Street, changed for the uptown train and go went back to 120th--oh, whatever it is, 116th Street, I guess. That was actually a shorter ride on the subway than I was taking to get to high school. So, I lived at home and went to Columbia University, which, I thought, was going to continue the same sort of things I did in high school. I had good rapport with all of the faculty at Stuyvesant and enjoyed working with them. When I got to Columbia, it seemed like it was such a big organization that you got buried in it rather than joined it. I didn't hit it off very well with any of the professors. Possibly I was a little bit too snoopy for them. One of the things I was doing about that time--remember, this was during the Depression and money was hard to come by--was building apparatus for people. I'd go in to see somebody doing something in the laboratory, and I would ask them what they were doing, and find out their problems were. Then I would make them some kind of an instrument that they couldn't do without and sell it to them. I don't think I got into any trouble with that sort of thing. But it wasn't very successful for the first couple of years, and I seemed to have nothing but trouble from the faculty. The first thing that happened related to my analytical chemistry requirement. I didn't take analytical chemistry in high school because I thought I was pretty good at it any way, but when I went to college, it was clear that I had to have qualitative

analysis as a medical school requirement. So I took qualitative analysis, and it produced one of the black spots on my college marks: I flunked analytical chemistry. I flunked analytical chemistry for a straightforward reason, which was that the professor didn't approve of cutting classes. It said in the catalogue that the student was not required to attend classes if his grades stayed up, but in fine print it said "with the approval of the head of the department." I found it very convenient to not go to the lectures but to go to the laboratory and do things. But the first laboratory that I did, I did all my unknowns so quickly that the instructor got suspicious. He thought: "There's something wrong." He said, "Well, you give me some more of some of them." And I did them again and he'd say, "You're not doing that right." And I'd say, "Well, this is a short cut I learned; so-and-so, you don't have to do this particular group if you, you know." And he'd say, "Well, that's right." So the laboratory instructor immediately said, "Well, I'll give you a special set; instead of analyzing the regular stuff, I'll give something interesting to analyze." He dreamed up more and more complicated things and made it actually it much more enriching to me. I knocked them off pretty effectively. I was very familiar with a lot of the chemicals--for example, I could recognize the color of a precipitate. I made out famously with the laboratory instructor, and I think we even did a little spectroscopy. The laboratory work for this class thing, and the book was good and effective. I made A's in the laboratory and A's on all of the examinations. The professor flunked me because I did not attend his lectures. He said: "Nobody passes this course without attending my lectures." He was an

Italian count who was at Columbia as a "dollar-a-year man" who had an office that would probably have been satisfactory for Mussolini. As an Italian count, he did not take to any discussion with a student about anything of this sort. I was sure that if I appealed to the dean, the dean would see that this got straightened out. But the dean offered no support whatsoever. He said: "He's the boss; it has to be that way; that's all there is to it." The laboratory instructor said: "I give the course in the extension, program which is an evening course. You can register for my course, and when I give the exams I'll send you a postcard. You come by take the exams, and I'll see that you get through." I did this with the result that I finally got through. I had missed enough exams, however, because the postcards sometimes came at a time when I couldn't go back in the evening. A couple of times I missed exams, and I ended up with a "C" in analytical chemistry. I went to the dean again and told him about how the whole thing had gotten mixed up. I thought it was absolutely ridiculous to have this sort of thing go on. I had a much better record all around, and I said, "In the very course I'm most proficient in, I end up with a "C," and I flunk even though I got "A's" in laboratory." He was very unsympathetic about this, and I got so mad about the whole thing that I told the dean what I thought of Columbia University. I told them not to look for any alumni contributions from this quarter. I slammed the door; I was afraid I broke the glass but I didn't. He and I became--not very friendly. The other faculty advisor that I had trouble with was the organic chemistry professor--an associate professor. He was also the faculty advisor for medical students, who determined



what kind of courses you could take. I was carrying extra points in science because I had the extension course that made my science weighing excessive. I had to take more culture. This professor insisted on that. He said, "Your only recourse is to go to the dean and see what he says about it." I didn't think that was going to work out so well. He asked the dean about it, and the dean said, "No. He has to conform to the system." Instead of taking one of the biology courses I wanted to take--I think it was cytology--I had to take Greek and Roman civilization and religion instead. I felt it never did me a bit of good, nor did it interest me greatly. I had to take it, and I did perfectly well. It was one of those courses in which you sit and listen to music and talk about Orpheus and Eurydice, and things of that sort. The only thing I learned was how to pronounce Eurydice, which I don't think is right still. Finally I took my course in cytology, where I met Professor Pollister, who became great friends with me. He also made it very clear that he was a very good zoologist, in a first-class university, but that all his friends who were M.D.s made twice as much money and had the mobility to go any place in the world. He had to wait for somebody to die off to get named Professor of Zoology in a college. I got to be a very expert at cytology and even was the first person to stain a centriole and centrosome in the same preparation with the Galgi apparatus--centriole and centrosome in the same structure so that they could be seen in their relationship to one another. Previously, they could only be seen individually in a special stain. You then had to infer where they were with relation to the other parts. He gave me a line or two in his paper on the subject. I

stained a particular part of the thing in a silver fish--Lepisma--which is a primitive organism that has caused great problems in cytological unravelment due to its strange relationship to the insect world. Professor Pollister, who was very concerned with it, was also one of the people for whom I developed an instrument. One of the things that cytologists do is to stain things. They stain them for two hours here and two hours there and then ten minutes in this and then fifteen minutes in that and then two hours in something else. Usually, they run these things through the night, and they try to schedule their lives around changing the slides for these special staining procedures. I built an erector set type of structure that automatically transferred these things into solution during the night on a time schedule which was available and adjustable. I made several of these instruments for other people, and he told other friends about them. I sold the instrument to them as well. I didn't patent it and many years later one of the regular companies, Technicon,, produced an apparatus, which was either conceived exactly with this same thought in mind of how to do it, or it was suggested or copied from my instrument. I never got any royalties. I asked the question about where their idea came from a couple of times, but Technicon wasn't very interested in discussing it with me. I certainly had no legal claim on it, but it struck me how similar the embodiment of the idea was to my instrument. It was just a kind of a carousel that went up and down and moved around. It was the sort of thing that anybody in his right mind would think of how to make it, anyway. But, it's one of those things which, if you get in first with it, you get

there. They sold a lot of those, but it might have never been made that way if I had patented. They would have done it some other way and avoided the patent, anyway, I think. I don't believe it would have made much difference. At any rate, in cytology, in the staining procedures and so on for the cytologic elements, I got to be very effective, and I even did a few things for Professor Pollister in later years. In the cytology of cells there comes a point where you want to be able to separate intercellular elements. The ultracentrifuge was invented, and Dr. Beams, who was in the aeronautical business in Texas, was famous for his high speed ultracentrifuges. He was the first person to attain speeds which were so high--millions of revolutions per minute--that they would sediment molecules very effectively. The design of this thing was rather simple. It was designed by Beams, but the embodiment of it was not difficult to do, so I made a couple of them. Beams had taken solutions of molecules and of polysaccharides and stratified them. They would spin and produce a density gradient and then you could put a cell in the density gradient and the density gradient of the cell would distribute itself along the density gradient of the medium. You'd get a spectrum of the density of the different elements inside the cell, all in stripes down the cell. The fat would be all on one end and then all of the heavy material in the other end. You could introduce markers and gain some idea how the molecular weights were distributed. I built several of these air centrifuges, which, at the moment, are popular items in the laboratory. This was shortly after Beams had demonstrated this top and another company started making them. Actually, I think Dr. Pollister

bought one from a commercial company. I had shown him and offered him one that I had made, but the commercial one came with the proper protection that would prevent the exploding rotors from making shrapnel in your laboratory.

HARDEN: Now this was later? Or this while you were an undergraduate that you made this?

BOWMAN: In college.

HARDEN: You said you had continued to work with him, so I wasn't quite sure.

BOWMAN: Oh, no, no. I just very superficially continued to work with him. I visited him a couple of times and brought him a couple of centrifuges and things of that sort. Arthur Wagg Pollister was the professor. He was very excited about my staining procedures and was very complimentary of work. I felt that this indicated that I had some talent in research. It was perfectly obvious that what I had made would work as well as the instrument he had bought, and he referred me to several people for whom I made centrifuges. I just sold them the basic instrument and let them take care of protecting themselves. It was their own business what kind of blocks they put around it. I had been concern about the possibility of exploding steel rotors at many million rpm. One of the advantages of having a father in the trucking business was apparent at this point. He had large compressors that we used to fill truck tires. I took my centrifuges down to the garage and piled a little scrap iron around them to protect them, and ran them up to speed. I found out that we, indeed, could explode a steel rotor of cast iron or other materials that had very high density. But if you used aluminum rotors, aluminum alloy rotors, they would be hot, but strong enough to stand these several million rpm. There was also the

challenge of making this instrument timed so you could see through a little window in the rotor while it was going around I tried a little bit to work this out, but I never had very good success with it. It required a lot of very high speed optics and so on to shutter synchronized with the speed of the thing. It required a pretty elaborate apparatus that I never got around to making--mostly because nobody was anxious to pay for it. But Beams and his people had done this sort of thing in other centrifuge laboratories. Now this was not the ultracentrifuge used in the laboratory for many years for protein analysis. It was a micro-instrument. The rotor was only about an inch in diameter and was spun on a cushion of compressed air, air bearings, air suspension. It made was a very convenient device to experiment with. I had a lot of fun setting it up and sedimenting different cells. You could fix them and stain them with each component stratified. I looked for some of those cell stains, but I've got so many boxes of stained slides that I don't know where anything is any more. It's very tedious, especially when you put them in a box and you knew at the time what was in the box, but 20-30 years later you see that they all look alike and you have to find out what you've done by looking at the microscope. It gets very tedious to document them unless you have a lot of records with them, and I was no great man for records. I had a lot of records for the staining procedures but not very many for the other work.

HARDEN: What was your major in college? Was it chemistry?

BOWMAN: No. It was pre-med. That is all they called it.

HARDEN: So, it was a broad range of pre-med courses.

BOWMAN: I enjoyed taking cytology because I liked it and I had some experience in staining beforehand and I wanted to go on with it. Organic chemistry was another good course that I liked, of course, in spite of the fact that the faculty advisor made me take Greek and Roman civilization.

HARDEN: You finished then in 1938.

BOWMAN: Yes, in 1938 I went to medical school.

HARDEN: And you enrolled in medical school at New York University.

BOWMAN: Right.

HARDEN: Well, you still living at home at this point?

BOWMAN: Yes. I still lived at home and I went to medical school by subway for the first year. It was also on a relatively convenient line. At some point I got an old car and would drive down East River Drive--when they got East River Drive finished. That made a quick trip to the Bronx. Changed it from a long, tedious ride.

HARDEN: We must stop at this point since we're almost to the end of the tape. This will be the end of the second tape, side A.

HARDEN: This is a continuation of the interview with Dr. Robert L. Bowman. This is side B of tape 2. Dr. Bowman, we were just about to launch into your medical school career. Perhaps, you'd like to talk about your medical training.

BOWMAN: Medical school was something that I had looked forward to. I found that I felt at home in the anatomy laboratory and had no great difficulty with dissection. In the first few days that I was there, I was approached by another new student, who was probably ten years my senior. He was an organizer. He said to me: "We have to

team up in groups of four to do dissection." He said, "I understand you know a little bit about anatomy and have done some dissection." I said, "How did you know about that"? And he said he asked some people and found out that I would probably be good at dissection. He needed somebody who would be able to do it right. He said he had been a newspaperman for a few years and he wanted to go to medical school. He was a little older in age, so he wanted to get all the advantages he could to get things done efficiently. He also said "I've picked out two other people for our groups. One of them is a completely innocuous person, who will be easily led, and he will not object to anything you want to do. We'll let him smolder on the back burner while we do things effectively." Then he said, "And then I chose a girl who has a sister who is a secretary, a legal secretary, and can type like mad. We have to make a lot of reports, and we'll get this girl and this fellow for our team, and we'll be able to get the reports out because she'll be able to type them." I was very concerned about anybody who was so organized! But it seemed like he was perfectly reasonable about the whole thing, and the other seemed to be perfectly decent people. I thought, "Oh, well, I am willing to do that." I felt that if I had to do a dissection I would prefer to do it myself and not have somebody else fiddle around with it and spoil it. So we made up the team. The girl who the legal secretary, who was such a high speed typist, is now my wife.

HARDEN: So it was her sister who went to school with you.

BOWMAN: Her sister was the person who was in medical school. And Dr. Fagan, the guy

who did all the organizing, married the girl who had the sister.

HARDEN: The medical student.

BOWMAN: Yes, the medical student and Fagan. My wife is still with me, and she can still rattle the typewriter pretty fast, although we don't use it much anymore. She remembers all those autopsy reports, what they were all about. Occasionally, we will see a movie and she will comment, "It's just like so-and-so."

HARDEN: Did her sister graduate from medical school and practice medicine?

BOWMAN: Yes. My wife's and her sister's maiden name was Groves. After Dr. Fagan married her sister and they went into medicine together. He went in the Navy and was a flight surgeon for quite a while. He came back, and they did a lot of public health work.

HARDEN: Let me get a couple of things on the record. Your wife's maiden name was Groves and her first name is Alice. What was her sister's first name?

BOWMAN: Esther. She's still alive and going to move up to Oneonta. I guess she's there now. It was my wife's home. She was actually born in Wisconsin and raised through her early school years in the frigid ends of northern Wisconsin, where sub-zero temperatures were everyday affairs in the winter. She had long, hard training at privation, so she's easily pleased. Anyway, medical school was particularly interesting to me, and I had also gotten pretty deep into electronics. I was also a member of the Radio Club, I think they called it, in high school. We did a great number of things in electronics. I had also gotten into photography, as I said, with my brother, taking pictures of his test specimens. I had continued with



that, and at Columbia College I became president of the Columbia Camera Club, which is a pretty prestigious camera club. It's still a very active camera club. One of its alumni wrote a big picture book about the Dust Bowl with pictures of people during the Depression. Oh, what do you call that particular period? What do you call the people who are migrants?

HARDEN: I was thinking of the Okies who went to California. John Steinbeck described them in the *Grapes of Wrath*. This is the period you are talking about.

BOWMAN: Yes. I think the photographer's name was Rosenberg. He published a huge book of these pictures, which became a great historical tome on the Great Depression. Anyway, my presidency of the Columbia Camera Club, which lasted for two or three years, led to some other things. The dark room facilities for the Camera Club were in the astronomy department, which had a telescope on the roof of Columbia University. The Pupian Laboratory Observatory had a lot of mechanical things--clock works and so on--that you could play around with. I got acquainted with all the astronomers and used their instruments. We were pictorially oriented at that particular time, but most of my work was very un-art. I learned art criticism very well and everything that I did was wrong, the art people always pointed out to me. I recognized their wisdom, and I came to appreciate these things because I had made all the mistakes. I could photograph machinery in the dark and make good pictures come out of them, and we were in that business. Photography was a fairly lucrative business, but plain photography--making pictures of weddings and the like--I'd tried, but I recognized that you

were kind of the below the waiters in importance at such functions. It seemed like it was hard to make a reasonable amount of money in a small amount of time because everybody was always late. Weddings were a hazard, it seemed to me, to a photographer. Of course, once you got pictures of the wedding, everybody bought. Also, the events frequently were weekend affairs, so you could be in school and do that kind of work. But it seemed like there were many more things which were more effective. We got involved with a company that made insulating bricks--Quigley Insul Bricks. They wanted to show that their bricks had more porosity and greater resilience than any of the other bricks. They wanted to bring out a new brick at a higher temperature, with better insulation, and they wanted to show the porosity of this brick using photomicrographs. I had never done much of anything in commercial photomicrography, but we pulled it off and made not only the pictures but film strips that were used for advertising. We realized that when industry had things to exhibit and wanted pictures for the filmstrips for advertising, people like the Quigley Insul Bricks would pay \$100 for a picture that you could sell at a wedding for \$10. They wanted the thing on time, and you'd show them a new trick or a new way of doing it, and they'd buy it. They would buy it to see what it was like. So, we made a lot of money out of Quigley Insul Bricks. My friend, who was also a photographer, was a fellow by the name of Stuart Weiner. He had flunked out of NYU, I think, but he was a very good student of photography and a very capable artistic photographer. He took advantage of the fact that my father was hauling structural steel and that we were

analyzing the structural steel man's hooch. We got acquainted with him and Stuart thought he'd like to take some pictures of the steel erection as it was going on. For art's sake, he got permission to go up in the buildings and take pictures of the men building these skyscrapers. He shot colorful red iron against the blue sky and so on. He photographed a man standing out on the end of a girder putting a tang in the hole to line them up. This was very pictorial, and he took a great number of pictures as art. One of the ways of selling pictures is to put them in an agency. We used Black Star Agency, and we put in these pictures in this file. People would come in looking for a picture for advertising. You don't necessarily go out and get a photograph; you go Black Star and say you want a nude descending a staircase, and they look in their file find what you want, and you use it in your advertising. We also took micrographs. One of the pictures we sold the most of was the weave of a silk stocking. It was an interesting challenge to be able to get the depth of focus necessary to get the intricacies of the knot. It was a non-run scheme. We put that photograph in Black Star, and it was in every magazine you picked up for a while. It said Black Star Photos underneath it, of course. We had sold it to them, and every once in a while another check would come from them. It was a nice thing to have that working. The pictures that Stuart Weiner took and put in the Black Star file sold very well. They seemed to express industry and frequently used. He eventually became the photographer for *Arizona Highways* which is a photographic magazine published by Arizona. And he did the photography there for years. I lost track of him when he went from

*Arizona Highways* to Hollywood to do motion pictures. You see I've been in everything of one sort or another. The incentive was to get some money. Another company we worked for was the Heat Exchanger Company. They made materials; they fixed up things that seemed to be impossible to photograph. Everybody that had tried to photograph for them had proved unsatisfactory. Somebody referred them to us, and this job turned out to be one of our great successes. There was a heat exchanger in some kind of an industrial plant that would have pipes going everywhere. They were in the most difficult places to photograph. You couldn't get far enough away; you couldn't get close enough. Something was always in the way. Then there was the problem of getting proper contrast in the picture. It's well known that you can't find a film that has a range wide enough to take a picture of, say, an egg in a coal bin and be able to get detail in both the coal and the texture of the egg. It's because the difference in light intensities is beyond the capabilities of film. What they had for us was a heat exchanger that had just been coated with white magnesite, which is a blindingly bright white insulating material. It was always installed in a cellar where the furnace was. There would be pipes all around going every which way which were frequently painted black. Because it was unnecessary to illuminate a heat exchanger, it was always in a dark corner. We learned to beat the game and always photographed them on Sunday when nobody was there. We took the camera and opened the shutter to a very, very small opening so that the exposure would be maybe 30 or 40 seconds. That would give us depth of focus that would

bring everything into very sharp focus. We had a big camera so that we go very high detail. Then we would "paint the picture in" by taking a small light and going over to the white thing and giving it a short exposure and then going to a black pipe and running down the pipe with a bright light to paint in the pipes that we wanted. There were some pipes that we didn't want, so we'd leave them out. When we got the pictures taken the guy said: "How did you get this? You can't get over there. There's stuff in the way." Usually in a dark background behind the object a dark pipe that doesn't get exposed doesn't show at all. If you take a bright light and illuminate the pipe ten times or a hundred times the illumination that you put on the white object, you can get a picture, which we called "painting them in." That's a procedure that's used occasionally. It turned out to be very lucrative. Every time we took them some more pictures, they would find us another dark hole that they wanted to photograph. They paid very well. We made several thousand dollars at a clip out of this work.

HARDEN: All these various enterprises were supporting your tuition and living expenses, I take it.

BOWMAN: No, I was living at home, but they paid a reasonable amount of the tuition. We'd also buy a camera or a microscope or something like that. Or a special lens for the procedure. We collected some very fine lenses. We would go downtown for such things--New York has an opportunity to have anything. I don't know whether you know about Orchard Street. Orchard Street is a little place just off the Bowery in the downtown in New York. You go to Orchard Street to buy back what you've

been recently robbed of. It's a second hand push-cart market in which you can buy a camera for \$400, with a little under-the-table negotiations. The fact that the serial number is no longer on it is overlooked. Also, it's well known that if you are looking for something that was stolen, you go down there and you buy it back. You can frequently find it, and with a little negotiation you pay your dues and you get it back again. Anyway, you can buy lenses at much less than they would cost at any other place. We spent a certain amount of money getting better equipment. Most of the equipment, of course, we bought and sold through some of the camera stores in New York. This was during the time when people were coming over from Germany, escaping from the Nazis. They frequently brought cameras with them. The German camera manufacturers, Leitz and Zeiss, refused to work on cameras that were marked in metric markings, which indicated that they were made for consumption in Germany. Many of the cameras that came to Abe Cohen's Camera Exchange in New York were diverted to us. When they told him that they wouldn't take them at Leitz and they couldn't get parts, they were diverted to Stuart Weiner, who worked at the Camera Shop on Fulton Street, and to my place where we made substitutions or repairs. We'd go down to Orchard Street and buy up a couple of used or broken cameras for parts. We also bought cameras from people whose cameras couldn't be repaired. We gave them an allowance on them, and we used the parts. When I bought a lathe--this was during my college days--I bought metric threading attachments so I could cut metric threads. I could do machining that was not available any place else. That also

produced a reasonable income for me. I found it possible to go to school well and still keep in business enough for reasonable return. Another story involved buying a lathe in order to make a particular kind of a pulley that was available only through me. You see, my father's trucks had to be converted from gas light to electric light. They had used acetylene lighting on trucks, but a law was passed that they had to have electric lighting to work at night. In order to put together a generator so it would drive on a Mack truck, you had to get a pulley over the shaft past a difficult joint. You had to take the shaft down and take the end off and put the pulley over the end of it. It seemed to me that this was a hard way to do it. It took a lot of time to put it on. I developed a pulley that was cut in half. You'd put it together after it was split. We split the pulley down the middle and clamped it over. This made it a ten-minute job instead of a half-a-day job. My father agreed to loan me the money to buy the lathe if I'd make him the pulleys for his trucks. That's how I got the lathe and the accessories. In the evenings, I machined pulleys part of the time. I soon learned that any manufacturing business is not very interesting after you've made one or two. The repetition was a terrible problem. So I hired somebody to make pulleys while I went to school. I left them with a gauge to measure the size of the hole, but I learned that when a good machinist makes a mistake and a gauge doesn't fit any more, he changes the gauge to make it fit. When he turns in his work, and gets paid for it, he doesn't come back. I was left with a fairly large number of pulleys with too big a hole, which makes them useless. I had to make a special shim to go into them. It was a big nuisance. I

soon learned that you have to hold on to the gauge and check it before you pay the machinist. Don't trust anybody was the idea, so I didn't hire anymore. I made a lot a pulleys in my day, but they were not a very good business. I realized that the salesman who delivered the pulleys to the various places sold them for exactly double what I sold them to him. He doubled the price and cleared more than I was making for nothing more than knowing where to go with them. The salesman made much more money out of this thing than I did, and I had all of the trouble of getting the castings and parts together. The reason why this split pulley wasn't commercially popular, and why I didn't have much competition, was because it was labor-intensive. I probably priced it too cheaply, but there was a limited market that was soon saturated, and it was finished.

HARDEN: While you were in medical school, did you do any research projects?

BOWMAN: Oh, yes. One of the things I did relatively early in the game was to work with a professor of physiology doing neurophysiology. We hit it off well because I had enough experience with electronics to help the professor out. He had an oscilloscope that wasn't right for the function. It was a commercial oscilloscope that didn't have the right times. I re-built it into an electronic oscilloscope specifically adapted for neurophysiology research. I changed many of the circuits and re-built it for that particular job. I did some cat research in neurophysiology with Dr. Pitts, who was a renal physiologist working for Dr. Homer Smith. Dr. Homer Smith is a legend in himself. He's the guy who made kidney physiology what it is today. He was Dr. James Shannon's teacher. Dr. Smith was a hard task



master and, as I recall, every time I talked to him, he asked me some questions that I couldn't answer. That always irritated me a great deal, and I usually looked up those the answers carefully and knew them very well the next time. But he didn't ask again the next time. Instead, he had a new question. I had a strong feeling that Dr. Smith knew all my weaknesses, and I wasn't sure that he would have been the best person to ask for a recommendation. I knew Dr. Shannon a little bit, but mostly I worked with Pitts and Homer Smith. Homer Smith seemed a very unapproachable sort of a guy. He was the demon whom you watched out for as a student. He always asked difficult questions, and he seemed to be the ogre type to the students, but I finally hit it off fine with him. I asked about the spectrometer in the laboratory: who had it and what it was used for. Dr. Smith had bought it because he wanted to do sodiums. A satisfactory way for doing sodiums stood in the way of kidney physiology for a great many years. He had this spectrometer, and I had some experience with the spectrometer. Also, it involved a photographic-plate development procedure. I gave it a few tries, but it was incomplete and didn't jell into anything. But he let me play around with it, and it was perfectly obviously I knew how to use it. I suggested some possibilities that they had already tried. That kind of led to the flamephotometer business, which at a later in time during medical school, I suggested for doing sodiums. I didn't get much done with it, however, because first thing you know I was in the army, and after the war, I came back to Dr. Shannon's office and Goldwater, and he gave me a job right away at Goldwater, where I met Brodie and the crowd who

was doing anti-malarial research. They were interested in doing anti-malarials, and I'd suggested that the fluorimeter that they had--

HARDEN: Now, wait, wait, wait. We're jumping ahead.

BOWMAN: OK. My point is that the origin of my later work on spectroscopic methods was getting into Homer Smith's spectroscope and doing a few things with him. As I say, I always felt--always--in everything that I started with him, that he knew more about it and he asked me questions about it that I couldn't answer. I knew about what was going on; I told him what I knew about it; and then he'd ask me a question. And I couldn't answer. Some of the times I think he asked me question that he knew the answers to, too. I never was quite sure. Homer Smith knew me as a student, but I had gotten a little closer to him, so he knew me not just as another student. When I went to medical school, I decided that what I would take a Ph.D. in physiology while I was at medical school. I would get a Ph.D. and an M.D. together, and stay in research. But the war changed everything. Everybody was already signed up for something, and it was hard to predict who would be in the department the next year. Dr. Smith only had one Ph.D. student at the time, and I had suggested the possibility that I'd like to be one, also. He didn't immediately pick up on it, however, and he was doubtful--he suggested that it was not a good time or something. I interpreted it as a rejection. He really didn't want me because I really didn't have any suggestions as to how to do the physiology. I had suggestions as to how to do the methods. So, I really was showing my capacity as a technician while asking for a position in research. I probably should

have said something about how the tubule handled the sodium. This would have been much more interesting to him. So I went through medical school, and medical school was a busy time in which I kept my nose to the grindstone. During all this time, I continued to work with photography and in other businesses. My time was pretty well occupied.

HARDEN: I think we're going to run out of tape. This is a good place to stop, so this will be the end of tape #2, side B.

HARDEN: This is a continuation of the Interview with Dr. Robert Bowman. This third tape is being made on Thursday, December 19, 1991. We stopped the last time with your graduation from medical school. As I recall, you did an internship and served in the military during World War II. Do you want talk about this period?

BOWMAN: On my graduation, I had certain obligations to the military. Just before graduation we were offered the opportunity to join the army in the medical administrative corps, which meant that as soon as you got your degree, you would get into the medical corps. In exchange for this arrangement, you were allowed one year of internship. After that, the internships were slightly modified, and you were allowed several years of internship but on a shortened schedule, so I was one of the last ones to be allowed only one year of internship. At any rate, I graduated and got into the army and deferred for a year of internship. I had exactly one year of internship. At the termination of my internship, I was to report at the end of the following weekend to Camp Shelby, Mississippi.

HARDEN: Let's pin down some dates here. Now, you graduated from medical school in

1942, correct?

BOWMAN: Yes, I graduated from medical school in June of 1942, and was permitted one year of internship. Now, I had previously rigged my internship to some arrangements that I had made with the chief of the laboratory of clinical chemistry. He was an old friend, who offered me the opportunity of a little extra time in laboratory medicine at Montefiore Hospital in New York.

HARDEN: You married in 1942, also. Was that right after graduation?

BOWMAN: Yes. Following graduation, I got married. I was married for my internship. I went to Montefiore Hospital with the expectation of doing a lot of laboratory work because it was a chronic disease hospital and had a relatively low load in the internship. I anticipated an opportunity to spend some time in a clinical laboratory. However, by the time I got to the internship, the chief of the clinical laboratory was in the army elsewhere, and several of the other plans had changed. The internship, instead of being a routine, quiet internship, had more obligations than previously, because everybody had left for the army. We were short scheduled, so, my plans to do something in the laboratory were not very effective. I did, however, work on some things in the laboratory but I don't remember a great deal of just what I managed to get done. It was a relatively uneventful internship but, as I say, without a great deal of clinical medicine practice because it was a chronic disease hospital. I don't really know what I got done in the laboratory; I did get something done there, but I just fooled around with some of the instruments that were already there and made some slight modifications, as I

recall. I can't even recall the name of the fellow who was going to work with me in the laboratory.

HARDEN: When you finished your internship, you said you had to turn around very quickly and go into the military.

BOWMAN: Yes. As soon as my internship was finished, I was to report the next working day to the Camp Shelby, Mississippi, which I did. Everything went quickly, and I was in the army rather suddenly. I guess I didn't go to Camp Shelby first; the first thing I went to was medical field training school in Carlisle, Pennsylvania, which made soldiers out of the doctors. We learned all the sort of things that you're supposed to know about soldiering.

HARDEN: Was it like basic training?

BOWMAN: No, it was not like basic training. It included the nitty-gritty of how an army works, such as how to read a map and how to find your way in the dark and things of that sort with some marching and other kinds of training, which are dim in my memory.

HARDEN: Did they give you any kind of overview of the kind of medical problems you might encounter as a military doctor that you probably wouldn't have as a civilian doctor?

BOWMAN: Oh, yes. The theme of the training was what medicine would be like in the army. How it had to be regimented and you had to do what you were told. Its philosophy was greatest good for the greatest number. There was a fair amount of epidemiology and concern for special problems of the military. This was a rapid,

intensive course, which was very well done and very excellently prepared. I think the instructors were all chosen to stay there until they didn't show up properly, at which time they would go overseas. So they were zealously protecting their territory, and they were excellent teachers. It showed what you could do when there was considerable oversight on every course that was given. I remember particularly the course in logistics: how to move a division of 15,000 men overseas and back. I was very impressed at the orderliness and the concern which went into this particular course. I was sure I would never like logistics, but I was fascinated by it. As soon as I got out of that course, I went to Camp Shelby. There we were assigned to a new division, which was just being formed. It was going to be the 65th infantry division, and I was going to be battalion surgeon--that's the man who goes with the infantry out into the field and gets the first contact with the wounded. It seemed like that was not the most desirable place to be, and there was an opportunity to get some additional training to become chemical warfare officer for the division. I volunteered for this duty, which sent me back to Edgewood Arsenal, here in Maryland, where I was exposed to some of the best pharmacologists in the world at the time. I remember Dr. Gilman of *Goodman and Gilman's Pharmacology* that we used in as a textbook pharmacology. There were also several other well-known neurophysiologists and experts in the field of toxicology. I had a most excellent course--it was a superb course. However, they gave you enough exposure to various agents to illustrate what they would do for you. This made it very unpleasant, but, it was very memorable. You learned by

getting gassed and scared, so you really got very good training. I met a couple people in pharmacology whom that I met later in life again, but I don't remember exactly who they were.

At any rate, it was an excellent course, and I was trained as a chemical warfare officer. A division chemical warfare officer was supposed to be an M.D. who would be assigned to a division. I believe the rank called for a major. I was well on my way to becoming chemical warfare officer for the 65th Division, when, suddenly, as the army does, the spinning wheel of fate assigned me to a new outfit that was on its way overseas. I was immediately transferred to a 149th Infantry Division to report to New Orleans for departure immediately to the European theater. I was on my way there; my foot locker was on the dock. I suddenly got a stay of orders and was ordered to report to some place in Oklahoma to be battalion surgeon of an ordnance ammunition outfit that was on its way to the Pacific. I had just gotten into woolen uniforms and obtained the right kind of clothes and the foot locker to go to the European theater. I recovered my foot locker at the port only by the fact that it was painted a slightly different color. I managed to identify it and to get it out of several thousand foot lockers on the dock. I got back to Oklahoma, at which point I became battalion surgeon to an ordnance ammunition outfit that was on its way to the Pacific. Rumors were all about of where we were going to go and what we were going to do. It was the usual confusion that made it obscure to both the enemy and ourselves as to where we were going. After a very

short time in Muskogee, Oklahoma, I found myself leaving on New Year's Eve, 1943. I said good-bye to my wife, and she went east and I went west on a troop train. I understood we would go to California and wait for the ship to take us overseas. The troop train pulled on to the dock stopped within walking distance of the gangplank of a ship, which, the next morning, was on its way out of the harbor. We looked back to see the San Francisco bridge in the dawn, and, I felt I was well on my way overseas. The rumors were we were going to New Guinea and all kinds of other terrible places. Instead, we went to the Hawaiian Islands, and on the Hawaiian Islands, I was stationed at Scofield barracks. Scofield barracks was a beautiful place. It was right off Hickham Field, where the big attack on Pearl Harbor, with so much publicity, had occurred.

HARDEN: Could I interrupt you and ask you one question? You said "New Guinea and all kinds of terrible places." Were people mostly concerned about the fighting in these places or about the environment?

BOWMAN: New Guinea represented all kinds of diseases, it represented cannibals, and there was nothing good you could say about it. We went on to Scofield barracks where I had a little opportunity to see what being battalion surgeon of the ordnance ammunition outfit was going to be like. This particular outfit was an all-black outfit with white officers. All the enlisted personnel were black and the officers were white. And it was manned by a southerner. The commanding officer was a major and the TO called for lieutenant colonel, and he was working to get the proper rank in the shortest possible time. At that time, the ammunition battalion



was making up the ammunition loads for the invasion of the Marshall Islands. They included Eniwetok was and those islands. I was treating aches, sprains, headaches, and minor lacerations of one sort or another, which were occurring in the enlisted personnel handling this ammunition. There was a little bit of stuff that I might be critical about--the racial treatment in the army, at this particular point. Shall I go into that?

HARDEN: Yes.

BOWMAN: It was a remarkable thing to me to be in this black outfit with white officers. The white officer in command was a southern officer who expressed his position in the social world as being commanding officer of the best ammunition battalion. They had first class ratings. They got extremely good ratings in their behavior and in everything else that was measured in the army. He established a hierarchy that resembled the slavery system in the sense that the top sergeant could lick the staff sergeant. Each man could lick the man lower in rank, and all were encouraged to take care of themselves. He didn't want to hear about any fights or difficulties. We would occasionally get somebody with bruises and black eyes and even broken bones at sick call who claimed to have "fallen down the stairs" or who said he had some minor misfortune around the barracks, but the top sergeant or the sergeant of the man above him or the men above him would also have minor wounds in their knuckles or some sort. This made it pretty clear that infractions of the rules were taken care of internally. The major made it clear that that was the way to run an army. At any rate, this outfit handled the

ammunition--fired test rounds, timed the fuses, and things of that sort. It was pretty interesting to know what was going on. They had a few explosions in the ammunition tunnels of one sort or another, which made sick call a very popular way of staying out of the tunnels at that time, that "taken care of internally," as we say.

HARDEN: How did you respond to this? Did it cause you difficulty to see these guys who had been obviously abused? I presume, you didn't have much power to...

BOWMAN: There were absolutely no complaints and no way of getting information from the men, because if they gave information I guess they got beat up some more. They were absolutely the most obedient, excellent performing people I've had an experience with. It was just no question that they were superior, polite, proper all the time, and to the major, especially so. And it looked, from the outside, as though this was a happy outfit that was very happy with its major. They could say nothing bad about him--there was nothing too good to say about the major. He was the man of the hour, and they adored him. And the major took it nicely.

HARDEN: Did you get along with him?

BOWMAN: Well, I got in a little trouble with him. But, about this time, there were two medical officers on this assignment--holding sick call for this bunch of healthy men who were taking care of themselves. We had very little to do outside of taking care of our sick call and going to Honolulu to see the sights. It was an idle existence; it was a gravy spot; it was just the way to spend your war, if you wanted to. We lived in a non-commissioned officers' house that was occupied by two or

three more officers than ordinarily would have lived in that house. We were slightly crowded, but we had a house of our own with the ability to go to town and buy steaks and such things, because there was no rationing in Hawaii. So, everything was pretty good. I had the friend--an older man named Luke Garvin, from Pennsylvania-- who was the other medical officer with me. He had been a practitioner in a small town in Pennsylvania, who had attained a substantial reputation in his area and who was an excellent physician. He was an older man who was at the upper age limit for physicians in the army, although they took physicians a little bit older than they did for other classes of jobs. He was a relatively well-established general practitioner used to a busy, active service, and he was absolutely depressed on the basis that he was doing nothing--he was wasting his life. He took to drinking and having crying spells in the evening, and so on. I spoke to him about it a little bit, but he was perfectly clear that he was in no way ever going to go to a psychiatrist about this problem; it was perfectly obvious what was going on. I took it on myself to see if I couldn't get something done about this. And I thought that the thing to do was to see another doctor. Doctors have a kind of internal agreement that a doctor tries to take care of other doctors as a first priority. I selected as my other doctor the commanding general of the mid-Pacific base command, General Gates. I thought that what would be simple to do was to have my friend transferred to a hospital service where he could do something useful. I thought it all would be straightened out immediately. So, I made an appointment with General Gates--they called him

"Pearly Gates" for a reason which soon became apparent. When I went to see him, I told his lieutenant, who was his adjutant, that I wanted to see him on a doctor-to-doctor basis--not on a military basis. I figured that was something he couldn't refuse, and I did this trick while sitting in the ante room waiting for him. The door opened, and out came somebody who said: "Who is this man looking for? Who is making these rumbles, trying to get through the chain of command by this subterfuge?" And he said, "Come in here," in a voice that was obviously the reason why they called him "Pearly Gates." And he did nothing but ball me out for the first ten minutes, about how important his position was and about how he was concerned with the medical care of thousands of men and how I was disturbing all of this. I told him my story, and when I finished, he balled me out again. I left the place feeling that I was going to make it to New Guinea, after all.

The next day or so I got orders to report to north sector general hospital--the 204th general hospital on Dahanu, nearby. Dr. Garvin got the same order Dr. Garvin was assigned to the officers' medical service, and I was assigned to the psychiatric service. I soon realized that this psychiatric assignment was the result my talk with the general. He had asked me how I knew that my friend needed this transfer to help his depression--was I a psychiatrist? Did I know anything about what I was asking him? I had told him that I had gone to medical school. He asked where I went to medical school. "I said, 'Bellevue.'" "Ah, that's all I need to know," he said. "You went to Bellevue. O.K. Are you a psychiatrist"? Did you

have courses in psychiatry"? I said, "Of course." That was about all there was to it. Apparently, the general made up his mind quickly, so I was now a psychiatrist. Dr. Garvin was the medical service officer, and he soon became chief of the medical service of the officers' division. He was an excellent doctor, and everything straightened, out and everybody was happy.

At any rate, when I was assigned to the psychiatric service I met a man who was not a trained psychiatrist but who had worked in psychiatry for some time. He was the chief of this section of the psychiatric service at the 204th general hospital which was scheduled to move west very soon. In fact, the hospital was in the throes of final training for movement further west. And the training program there was also excellent, using films in the training. Very soon I got involved in the teaching program and found myself selecting films and doing administration. I selected which films to get from where. I scheduled times and places, and so on. I don't know how I fell into that, but we had excellent films, which we obtained from the submarine base in Pearl Harbor. We used a certain number of Ronald Reagan films in the training programs, so we became familiar with that particular character. He did a lot of those, apparently.

This hospital was scheduled for leaving to go to all kinds of rumored places. We didn't know where we were going. Transportation was the problem; we didn't have anything that could take us all. It was a somewhat confusing arrangement:

The enlisted personnel and the nurses and the officers moved separately. There were no ships that looked ready to go but there was a flotilla which consisted of 25 landing craft infantry in Pearl Harbor. We could see them from the rise as we went up to the road to Scofield barracks. One day one of our medical administrative men said joking, "There's our ships. We're going to go over on them. They will be the things that will take us." Those 25 troop carrying ships were made for short trips and beach-head landings. They were made to hold about a company of men in each ship, which is a couple of hundred. For a long trip they wouldn't do.

I have the best of reasons to believe that somebody suggested this nonsense-- somebody reported this in a nonsense, joking way. Apparently, however, somebody decided, that it might be a good idea. And the first thing you know, we were aboard the landing craft infantry. We went from Pearl Harbor to Guam by way of Eniwetok and around the fortified island of Truk, which was still in Japanese hands. In fact, it was Japanese base. We sailed beyond Truk, which put us between one of the Japanese major bases and Japan--we were in the middle of the enemy territory, it seemed to me. On our trip across waiting to go around Truk, we sailed as a free group until we got to Eniwetok. At Eniwetok we picked up a convoy, a tremendous convoy of that stretched out across the whole horizon. The landing craft infantry is a ship, but it is the smallest thing that's called a ship in the navy. It's only 100 feet long and 20 feet wide, so close quarters were

produced by the relatively small ship. It had a couple of stairways down the front so that you could run onto the beach when you put the ship on the beach. The bow is so shallow that it's flat, and it can run right up on the beach. You beach it by and run down the stairway to make your attack. The depth of the ship in the water at the front is almost nothing, and in the rear it's only six feet or so, when it's loaded. So, it rides very high in the water, and it's just the thing to go across an ocean in, if you want to feel all the bumps and the waves.

At any rate, the ocean trip was relatively uneventful except for one storm. That storm struck when we got to Guam. We were unable to enter the harbor because of submarine precautions--and we were arriving too late in the evening. The storm was a fierce storm. We could hardly keep our stations without running into one another. We were instructed "...to sail around the island until morning and we'll let you in." In the middle of the night we were challenged by gunboats and what not when we didn't know who they were and they didn't know who we were. The storm was so confusing that I expected to get blown out of the water by the harbor defense of the island. At any rate, we survived this storm, which caused bruises and so on from bumping into the bulkheads. We got to Guam unscathed, but it took us 21 days to go from Pearl Harbor to Guam, which is a sizeable trip in a little landing craft. I think I probably have more miles in landing craft than anybody who ever landed. When we finally got there, we were told that the hospital would be in tents. We put our tents up but were given no assignment

right away. They said that we might have some trouble acclimating to the island. That meant that dengue fever was endemic on Guam at that particular time, and that in order for us to have time to get over our dengue attack, we would have a week or so of no assignment.

HARDEN: So, they just expected everybody to get it.

BOWMAN: And everybody got dengue--except me. I didn't get it, for some reason or other.

HARDEN: Is it contagious through the air?

BOWMAN: It's mosquito borne and it's called breakbone fever because it feels like you've broken all your bones. I didn't have any symptoms at all; I survived unscathed from dengue. Several people had a rather mild case, but I had nothing. And I don't know why. I must have had some previous contact. Anyway, we put our tent hospital together--a 2,000-bed general hospital. That's a lot of people and a lot of tents. I was assigned to the psychiatric service, and my chief taught me how to do things in this service. We had a very excellent time treating neuropsychiatric casualties in the troops. This was the heyday of the pentothal treatment, and it was remarkably effective. I did a great number of pentothals, and I had the feeling that I was doing psychiatry. The Pacific campaign being what it was, we would wait for something to happen, then get in lots of doctors, lots of help. All of a sudden, they'd take all of the help away, send them out to some place, and then the casualties would come in. By the time the casualties were evacuated again, we got doctors again.

HARDEN: Maybe we should stop here before the tape runs out. This is the end of tape 3,



side A.

HARDEN: The beginning of tape 3, side B. Go ahead, Dr. Bowman.

BOWMAN: In the tent hospital, we had ward tents that would hold 80 patients per tent. I had two of them and we had unbelievable number of patients. They would fly them in and unload them unbelievably rapidly. Suddenly you had 200 patients, and you would have an opportunity to treat them, as much as you could before they were evacuated. Psychiatric patients had a low priority for evacuation, however, so we had great difficulty in getting them off the island as rapidly as surgical patients, who obviously got first priority for Air Evac. A lot of our evacuations were by ship, and the commanders were very reticent to take psychiatric patients, especially those who were in locked-ward categories. We had some altercations of one sort or another trying to get patients evacuated. This required going down to the dock to see somebody's facilities, asking why they couldn't take more patients, and then going to talk with someone who was supposed to see that they took their share of patients. Many patients who came on ship evacuation from Philippines were in terrible condition. They had been kept in restraint; not fed. They were very poorly handled on shipboard during the long, slow trip. We got a lot of patients, most of whom were in relatively good condition and needed something to do. This was ideal to me. I also had control of the locked ward. We had a lock/open room. One end was a 30' section that was open. Patients could go to this community room to do crafts of one sort or another. They were offered knitting and things of that sort, which came through the Red Cross. Here were all

these battle-hardened people--marines, and so on, who were offered knitting as an activity. I took the opportunity to setup a shop in this room. I instituted a photographic service and a shop service so that they could take pictures and develop pictures. They would develop pictures for other people. I got the supplies from the Signal Corps and various other places, and the Air Force provided tools. At first I got discarded tools. I told the colonel who was in charge of the air field that they were destroying the tools and wouldn't let me take the tools to use in the shop. He didn't stop destroying the old tools, but he issued me new tools. He said there was no reason to use used tools, and so they continued to destroy what they seemed to be pretty decent tools, but he got me new tools, and we had access to all sorts of things. I even had access to the lathe and the machine shop at the hospital repair facility, so I got to do a little bit of did orthopedic instrumentation because I had a roommate by the name of Dr. Abels who was an orthopedic surgeon. He had come to me through a psychiatric service and had been transferred to the hospital as a surgeon when he was supposedly depressed. He was a lonesome character; he never spoke to anybody; he needed psychiatric care. Dr. Abels told me that he had talked to everybody whom he thought had anything to say in the Army and had run out of people to talk to. He had spent his time with books, and he thought that was better than talking to some of the people he met in the Air Force, when he was a flight surgeon for them. Not only did he come into the hospital, but he moved in the tent with me. About this time, the tents were beginning to deteriorate, and we were beginning to get some wooden

buildings built. Dr. Abels became the orthopedic surgeon, and he faced the problem of making splints and devices of one sort or another to hold a patient's hand up at a particular elevation and out in front or slightly pronated or supinated. Without proper cast arrangements, a man's arm would weigh so much that he would be incapacitated and very uncomfortable with the cast in hot weather. I designed several casts--arrangements that provided the necessary traction and support. They were made out of aluminum tubing that was taken from wrecked aircraft and bent to shape and fitted to the patient. Instead of having a cast and wires and such things rigged around him, the patient had beautifully made aluminum tubing fittings that were made to put traction on each finger or something like that. These things were built out of wrecked aircraft parts, which was nice material. It was the greatest material that you could find, and it had these beautiful nuts that would screw together to make fastenings. Not only could you fix them up, you could also fix it so you could unscrew them and take them down make modifications. Dr. Abels and I set up several of these, and we had some excellent examples of how you could really improve splinting. One of the surgeons who reviewed the work of the orthopedic service was General Kirk. He had invented the splint that was used for leg fractures. These splints were very well made and very effective, and textbooks prescribed a Kirk splint for specific fractures. We showed Kirk the splints that we had improved, and he gave us hell for interfering with the progress of the military program evaluating the Kirk splints. For all our efforts, we got nothing but a bawling out and were told not to

do it anymore.

On a few occasions, Dr. Abels said that I was crafty with tools, and invited me to come to surgery and help a him there. I said that I wasn't a surgeon, and I didn't think it was proper to do it. But he said, "If you can use a hammer and a chisel and carve things out, this is what we need." And so, a few times I went to surgery and, under his direction, I would mortise-and-tenon pieces of bone that were exposed to me under the drapes, and I frequently didn't know whether it was an arm or a leg. It became a problem of putting a piece in here that would fit and putting a bone screw in there to fasten some bones together. I did a little of that--very little--under his direct supervision. He said, "Chisel this out nice and square and fit this piece in here. Then wire it together and screw it together, so you can have some support." I did a little bit of that but, as I say, I didn't even know what I was doing. Usually there was no time to find out what you were doing. But it was the sort of work that I could do well, and he liked my work and thought it was a great savings. I worried that the General would to come around and find out that I was helping them in the operating room, and we would both go to New Guinea. By this time I think New Guinea was cooling off a little bit, but it was still not a place to go. There was also the opportunity to be sent to the infantry, of course, as a battalion surgeon.

My most spectacular work was neurosurgery from the Iwo Jima campaign, when

everybody came back from Iwo Jima with a hole in his head. Most of them ascended the mountain against opposing fire from above, so we had an unbelievable number of head wounds. Being in the psychiatric service, I was the nearest to the head that they had, so they pitched a couple more tents in my area and put me in charge of the head ward. I took care of people with holes in their heads in which the packing was big enough to fill a basin and the brain was not very evident. Mostly what I did there was pronounce people dead. My patients were young people--who were very young, pathetic fellows who were in various stages of dying or who had minimum function left from the fact that portions of their brains had been destroyed. It was a gruesome time. It made for great dreams and recollections, but it was a horrible time. That was the only time I really saw much of that sort of thing. Most of the time we had a lot of recreation. Between battles there was nothing to do, then all hell would descend on the place and things would be a bloody mess for a week or so. Then we would Air Evac them out and they would be back in the States.

In the interim we had a lot of time to do a lot of things. One thing that I did was to make a "Guam chair" which became a sign of "Dr. Bowman's influence in the Pacific." I designed a chair that could be easily developed out of packing cases. I made a pattern out of brown paper that we could use to saw out the pieces. When somebody saw what I had made, he borrowed my brown paper, and one day somebody came back with a tattered brown paper that was sawed up and tattered

and torn. He said, "This is the only thing I have to work with, and it's getting worn out because everybody is using this pattern to make himself a comfortable chair." It was the only furniture available outside of bomb cases and things of that sort, which were not very comfortable. My chair was used as movie chairs and, for almost everything else. What I'm mostly pointing out here was that I did have some opportunity to do some instrumentation. Also, the fact that I had a lot of experience in photography made it possible to develop a dark room facility for the locked ward. People from the open wards, however, also came over to make things from the materials we had available in the form of a junk pile of broken airplanes. For example, we had great quantities of Lucite from the windows of the damaged aircraft, and these guys were happy about carving out hearts and other things from Lucite, polishing them, and making mementoes to send to their sweethearts. Some crafty woodworkers came along and also made interesting things. We had access to kiawe, a Guam mahogany, a beautiful wood, which we could get in quantities from the Japanese fortifications. They had cut many of these trees down and used them for fortifications, which we carved up into pieces. People carved and figured them--some amazingly expertly and some not so expertly, but the wood was so nice that most anything made out of it--even a polished lumpy figure--was a work of art.

During the off times, we had an opportunity to go swimming in the bay. The bay at Guam had a landing right outside of town, a very nice place where the beach

came in. The Japanese had tied together coconut logs and triangular piles with cables around them--maybe 15 feet long or so--coconut logs of 10 or 12 inches in diameter in bunches of maybe 20 or so logs and triangular things which were made to intercept landing vehicles. Our landing tanks, LS--LCIs--landing craft infantry--apparently took them by storm and went through them with ease, but these large obstructions that the Japanese had put into the bay provided a nidus for all kinds of sea life. They were encrusted with sea urchins and all kinds of sea animals, including octopus, which we learned to catch and cook. A Chinese doctor had a recipe that we used to make octopus sandwiches. I earned a reputation as the guy who served octopus sandwiches in the locked ward. The commanding officer came to find out about octopus sandwiches, so we served them to colonel--I forget his name--who was in charge of the hospital. I shortly found out that he had hobbies and liked to do carvings and so on. So, we found out where his hut was, and we spent time in his back yard carving bowls and other things. In the time spent on his back porch, I got to know him pretty well. I remember that he was a Texan who could shoot coconuts off of the trees with a carbine, cutting the stem without damaging the coconut. Somebody would stand underneath, and the colonel would shoot, and the person under the tree would catch the coconut before it broke. I was very favorably impressed with the colonel.

We stayed on Guam through V-J day, which we celebrated with great enthusiasm

because we had been preparing to move to Japan. We were to be a military hospital on Japan when the bomb interrupted things. There were ships accumulating at the harbor, which were supposedly for the Japanese invasion. It seemed that, indeed, that's what they were figured for because they were smoke ships that made smoke for beach landings. We met somebody from the smoke ship who indicated that he knew pretty well that they were not going to make smoke out in the middle of the ocean, and it seemed like the smoke coverage for a landing would most likely be a Japanese landing. So, when the atomic bomb went off and we heard about it, we were all gratified because we were anticipating a terrible situation.

HARDEN: Could I just ask you more about the atomic bomb from a physician's point of view? Did you all have any hint that it was being developed, and when you first heard about it, could you grasp any of the implications of the radiation?

BOWMAN: Well, we actually didn't know very much about it; but, we knew there was something very secret on the island of Tinian. Now, Tinian and Guam--they're both in the Marianas chain, and with a little fiddling around with the orders, you could get to go to Tinian by aircraft for a day or so. People invented important reasons for needing to get from island to island just to reduce the boredom around the place. One of our first hints of the atomic bomb came when a group of our medical officers who were all majors and colonels were on Tinian. They accidentally encountered a secret installation on Tinian, which was the island from which the Enola Gay took off to make the bomb run. This group of medical



officers, who were all colonels and majors, at least, accidentally got themselves into the base at Tinian. There were so many officers in the jeep, nobody had seen that much high command before, so they let them in. Somebody got in trouble for letting them in, and they were told that they were likely to have to stay there because of the security breach. They said that they couldn't possibly stay there; they were the doctors who had to take care of the casualties and so on. There was the chief of surgery, and there was the chief of everything there at one particular time, and so, I don't know what they did--they didn't give them any medicine to make them forget. But they made it pretty clear to them that they were not to talk about it; and they didn't talk about it until the bomb news came. They said: That's what was in that little package." They had seen the installation--or, actually, they thought that they saw the bomb itself. Then we were told that nobody would be evacuated from there; that we would not take any of them.

HARDEN: These are the Japanese.

BOWMAN: Yes. They would bring no casualties from Japan, obviously, no enemy casualties, and they did not anticipate any difficulty with American casualties. Things happened pretty fast around that time. My wife wrote me a letter saying where to find her new apartment, and that sort of thing. And, of course, that was--what was the date the bomb was dropped? In September?

HARDEN: August. The Japanese surrendered on September 2, I believe.

BOWMAN: O.K. It turned out that she had at least six months to get me the instructions

because we stayed there long after the bomb was dropped and the war was over. We came back from that particular theater of war, in fact, only after some appeal to some newspapers. I think *The New York Tribune* published some story about the troubles of the doctors on Guam, in the sense that we had a few casualties who were still there; they were low priority casualties of one sort or another, some of them neuropsychiatric, and things of that sort. Everybody who had been there for any time was evacuated, and anybody of rank or position went home. Most of the physicians went home, and I was left as chief of the neuropsychiatric service on Guam. And, of course, I wasn't a neuropsychiatrist--I was still a captain in the medical corps. They offered me major if I were to stay in. The medical personnel on these islands had the freedom to be promoted because everybody else was gone. If I would agree sign up, I could be a major immediately, but that did not lure me into signing up again. At any rate, we stayed there some six months or so after the war was over. We had less than nothing to do, and no expectation of anything to prepare for. We were in pretty good shape all around. We had lots of jeeps, and lots of everything. We spent a lot of time going scuba diving--not scuba diving, but mask and snorkel diving--snorkeling--in the Pacific. There was wondrous material to be seen in the bay, a few wrecks and things like that to explore. This experience in snorkeling was entrancing, just remarkable. I could say a lot more about that. I made some collections and saved some things. I wrote for the Bishop Museum's information on the flora and fauna. The Bishop Museum was a museum on Oahu. We also got to meet a few natives and had

some contact there. It was a nice place to vacation, but at that particular time, I was not anxious to continue a vacation without my wife. It seemed like it would be nicer to get home. By the time we got home, they had stopped meeting the trains at the station and the only thing they knew about the military was that when the troops train came through, they bought out everything. They closed all the doors to the places that would cater to anybody--the bakery was closed; the candy counters were closed, and so on; and we got nothing but the Red Cross coffee lady who offered coffee and doughnuts. We came through the mountains, and it was a very, very thrilling return home over the troop train on the Northern Pacific--that trip through the mountains was just beautiful and breathtaking. And it was home.

The first thing I did when I got back was to investigate some possibilities for getting a job. I walked into NYU and found out that Dr. Shannon was at the Goldwater and would possibly have something for me. I saw Dr. Smith at NYU, I believe, and he sent me over to Goldwater. Goldwater Memorial Hospital was on an island in the East River.

HARDEN: At one point, you had thought that you might come back and do a Ph.D. with Homer Smith. Had you already made up your mind at this time that you wouldn't do that?

BOWMAN: Well, time had passed, and I didn't quite know what I could offer, what the opportunities were there. I asked Dr. Smith what opportunities were available,

and he said why didn't I see Dr. Shannon. Smith and Shannon worked very closely together. I went to see Dr. Shannon, and he greeted me enthusiastically and favorably. He said I that could have a job there as soon as I wanted it. It was in the malarial research program from which a great number of people who came down here to the Heart Institute worked.

HARDEN: Could you expand on this? Who was there? Had the program been shut down yet or not?

BOWMAN: The program had more or less come to the shutdown point. I don't know what that means--whether the money had run out or where they stood for finances. David Earle was now going to be chief of the Goldwater Section of NYU and finish up the work that the malarial control program had done under Dr. Shannon. Now Dr. Shannon's group consisted of Dr. Robert Berliner, Dr. Bernard ("Steve") Brodie, Dr. Sidney Udenfriend, the Nobel man--

HARDEN: Axelrod?

BOWMAN: Julie Axelrod, who was Brodie's technician at that time, and a group of Fellows that included Baxter, Tom Kennedy...

HARDEN: Was Jack Orloff there then?

BOWMAN: No, Jack Orloff was not there. Axelrod, Kennedy, Berliner, and Udenfriend were the ones whom I was mostly concerned with. They had been doing malaria research starting with an antisyphilis treatment. It was known that central nervous system syphilis was benefitted by high fever, so they induced fever with malaria and cured it with test substances. They could see what the efficacy of the

antimalarial agents were. During that time, methods for doing blood levels of antimalarials were developed by Brodie, Udenfriend, and Axelrod. Some of the things that they did were done by fluorimetry, using the filter fluorimeter--the Coleman filter fluorimeter with the mercury arc lamp and a filter and a phototube to measure the light. They used a right angle configuration and a filter to block out the exciting light. This allowed the emitting light to go on to the measuring device. Dr. Brodie introduced me to these methods, and part of my job was to work on a program that had been partially completed by a doctor who had left already. His name was Bigelow, and he had a slightly different tack on things. He was concerned with the use of the antimalarials in another disease. There were many drugs derived from quinine. The quinine nucleus was fluorescent and most of these drugs could be determined by fluorescence methods. These drugs worked in some mysterious fashion on myotonia congenita--he had a patient with myotonia congenita--which is relieved completely by quinine. Bigelow's job was to look at some of these quinine--drugs to see how they would influence myotonia congenita which is a congenital disease of the muscles, in which muscle goes into spasm if it's contracted after it's been rested.

HARDEN: This must have been the disease of the man about whom I read in your correspondence. He was trying to be a subway operator.

BOWMAN: Yes, and he had the difficulty not being able to move if he was suddenly startled and contracted his muscles all at once after they were relatively rested. If they were kept in motion, however, they would not be subject to this spasm. My

problem was measuring the spasm and the blood levels of the drug and correlating the blood levels with some measurement of muscular function. I immediately started to make a device in which I could record the muscle contraction in graphic form and have a substantial objective measure of the efficacy of the drug. There was a necessity of measuring the blood levels and correlating them with the contractions. So, I developed a method for measuring muscle contraction. Doing the analysis of blood levels of the drug was also part of the problem, and we used Udenfriend and Brodie's methods that had been pretty well established. But one day I said to Brodie, "This little machine here is great but it's really only looking at the beginning of the world of fluorescence. You just have three filters for this and three filters for that, and you're limited to the wave lengths of light and the mercury light, and, besides, you are only looking at visible fluorescence. There's a whole world of ultraviolet fluorescence that might be looked at." And Brodie, more or less, immediately said that would be the greatest thing in the world for analytical chemistry. He encouraged me to look into that problem as much and as soon as possible. And Dr. Shannon also encouraged me in the same thing, but, by this time, Dr. Shannon was on his way out and Dr. Earle was in charge. We saw Dr. Shannon only intermittently at this time, but at some point I said to Dr. Shannon, "You know, there are a lot of instruments I'd like to make, but I need some facilities to do it. We have a whole shop stashed in my brother's basement-- the lathe, the machine tools, and what not that I could very well put to work in here to make some instruments. Dr. Shannon opened the door to his storeroom,

and said, "How 'bout if we move these three cabinets out of the way, and make you this space back here?" And I said, "Sure." So, I brought my lathe and tools and so on over to Goldwater and installed them in the storeroom, and pretty much started the sort of shop that I still run today. Instead of making things for people, I would teach them how to make them on the machines and let them do what they wanted and use my machines and my tools to do it, because it's very interesting to make one instrument, but when somebody wants a dozen, it's gets much less interesting. People who need a dozen, when allowed to make them themselves, find that they're quite satisfied with two.

HARDEN: This is the end of tape #3, side B.