Frank Taylor: We are at the Redfield Building in the Woods Hole Oceanographic Institution to start our oral history with Dr. John Stegeman. I just talked to Dr. Stegeman before we started and told him that I was going to break this series of interviews down into four or five major areas, because his curriculum vitae is so long that we would be here for several years, trying to get everything that this gentleman has done in his field. But we are going to hit the main points. Dr. Stegeman, to start off, could you tell me a little bit about your early history, where you came from, and your mom and dad?

John Stegeman: I was born in Quincy, Illinois, which is, as we were speaking earlier, an area that we think of today as being the heart of the heartland. It's on the Mississippi River, just fifteen miles north of Hannibal, Missouri, where Mark Twain came from. So, the context of Mark Twain and the Mississippi is the way we feel in Quincy as well. So, there was always the river. From the very earliest days, there was always the river. Still, in my heart, there is the river. The family had a long history there, in fact, on both my mother's and dad's sides. They were present in the community when it was established as a city in the state of Illinois in the 1830s. My mother's family arrived as the first German family to come to Quincy, Illinois, in 1834, to a community that later became so endowed with German heritage that there were three German-language newspapers published in the city. That's one feature of it. It was a very German community, and a community that grew large in the latter part of the 19th century, so that it rivaled Chicago as the number one city in the state of Illinois. Of course, this was all due to the commerce that went up and down the river. It was, and still is, about a hundred miles radius to any community that's larger. So, it was like the center of the universe. Growing up there was – idyllic, I think, is the word I would use. I was born in 1945, just before the Second World War ended. So, from the age of being able to get around and have some freedom, in the mid-1950s, as you know, the country was not at war. The prosperity was increasing, and it was an idyllic childhood.

FT: You bring up a couple of really interesting points here. One of them, when you talk about the area being Germanic, there is kind of a line that you could draw that would go from Missouri all the way up to Northern Illinois where there was a really strong German influence. Three or four years ago, I stopped in a town in Missouri called Hermann. The German influence is so heavy there that after the regular school day ends, they have German schools for the youngsters.

JS: Still?

FT: Still, to teach them the language, to teach them the traditions, and so on. Now, as I mentioned to you, my wife was from further north than you came, from up in Des Plaines. But names like Brown were spelled B-R-A-U-N. A lot of great old German butcher shops and things like this. So, there was a real influence. So, I am going to ask you to draw kind of a word picture of what Quincy was like. I can recall crossing over the river going west and having Hannibal sitting down on the left-hand side of the road. It was very different-looking area than I might have pictured, the Illinois area or that particular area. I always thought of flat cornfields kind of thing. There were a lot of bluffs and irregular topography and so on. What was the area like that you lived in that kind of a picture of it?

JS: Well, Quincy is built on one of the bluffs, in fact. After the last glacial period, the riverbed

of the Mississippi – what became the Mississippi – was seven, eight, ten miles wide, and you have bluffs on either side of this ancient riverbed. The river today sits in the flatland between these bluffs, and it meanders along in that flatland. At several points, the river itself is right up against the bluffs on one side. Quincy is built on bluffs at one of those points where the river is excursing east. The eastern bluffs, that's where Quincy sits. In fact, for a while, it was called Bluff City.

FT: So, it is a place that has some real topographic identity and –

JS: Oh, sure. It's very hilly, and with the bluffs and lots of trees. It's the center of a farming community also. There was a lot of industry there – still is. Motorola was started in Quincy, Illinois. I can tell you that story another time, because it's very interesting, the local people and how it got started. So, with this distance from other communities, and the center of a large farming area, and industry and the river and then the railroads, it was a bustling place. The city itself went through several phases, as all cities do, it seems, as they grow. Some parts of the city are more prominent at one time, and then they fall into disfavor, and others grow up. So, the prominent people lived in one part of the city, and then that moved and that moved and whatnot. But in the course of this, there was a lot of attention to architecture. It has an extraordinary collection of residential architecture. It's something that the whole city prides itself on. Whether people have any connection to the residential architecture that is so beautiful or not, the city, as a whole, prides itself on this architecture. There was an article in *The New York Times* about Quincy, Illinois' architecture at one point. The title of the article was "A House-Proud Town." One of the intersections in the historic district was called by *Architectural Digest* as perhaps the most significant residential architectural intersection in the country. So, I would recommend you go and see it, actually.

FT: [laughter] But you were bringing up another important point in terms of how things develop over the years. When I was a kid, the South End of Boston was where the poor kids lived when I went to school. Now, a condo there would cost you well over a million dollars. It has bumped up. When you talk about architectural kinds of issues, Cape May in New Jersey was an old community, but over the past twenty, thirty years, has become very famous for what they call their Painted Ladies, all these old homes with a certain style that have been redone, repainted in bright colors. It is something I do not think they want to lose. What did your mom and dad do?

JS: Well, I'll tell you that in a minute. But while I'm thinking of it, since my memory is not what it used to be – my parents had a lot of friends, and my friends were children of those friends of my parents. The town grew from 1830s until about 1870 from a town of five-hundred to a town of forty-thousand, and has stayed at forty-thousand in the succeeding 120 years. There was not a lot of movement in and out of the community. So, the friendships and relationships go back for generations. So, my friends and their parents and my parents were friends. Our grandparents were friends. Our great-grandparents knew one another and were friends – and in some cases, great-great-grandparents. So, it was a community that you grew up in, and you knew you were known, I guess, is what I would say. You were known by people all over the town. You couldn't go anywhere and do anything untoward without having somebody call your mother and say, "I saw John out in such-and-such." So, it was a very comfortable place. My mother's family was a very prominent family in town that ended with The Depression. But it had been involved

with a lot of industry and commerce and banking and whatnot. My grandfather, her father, went to boarding school in New York and later went back. She had won a scholarship to college after she graduated from high school but was unable to take it because of family needs. My dad's family was also prominent – not wealthy, but influential. He did go to college, to Quincy College, which is a Franciscan Catholic college in the city. But he didn't graduate. He was not able to graduate because he had to contribute to family issues. So, mother worked briefly before she was married. When she was married, she stopped working and stayed home, and did what many – perhaps most – of the women in the town at that time did, and took care of home and family.

FT: That was the national norm then.

JS: That was the national norm then. It's one that I relish because I think we benefited immensely from having mother there. Well, she was not there on bridge days. But generally, she was at home.

FT: What was mom's name?

JS: Mildred Vandenboom Stegeman.

FT: Dad, what was his name?

JS: (Floyd Karl?) Stegeman.

FT: What did he do for a living?

JS: Well, he worked at a couple of jobs. He principally was in sales, and he wound up, for most of his life, working for Moore Business Forms, Incorporated, as a traveling salesman, basically. He did very well. He was very successful at it.

FT: It is interesting. You hear terms – and you used one of them, heartland – of putting down roots. I am not sure if people understand really what putting down roots is all about. But when you talk about your ancestry, you were talking about significantly before the Civil War, significantly before we started the real western expansion with Custer's Seventh Cavalry and all that sort of thing – all in the same area, and growing with the community and all that. Do you think that gives you certain kind of values?

JS: Yes, I do. Well, I think the values come from the family interactions as you're growing up, certainly. But you knew so many relatives who shared the same values that our parents, my parents, had. You learned that your grandparents had certain values and ways of behaving and viewing the world, and that your great-grandparents had certain ways of viewing the world. So, industry, hard work, attention to detail, responsibility, care for one another, generosity, and faith, I guess, were all part of the mix that you grew up with, and that you saw as your history as well.

FT: So, values just is not the word to you. It is the way that you have developed.

JS: Right.

FT: Brothers and sisters?

JS: Yes, of course. I have one brother, three sisters. I'm just thinking of it. I have one older sister and a younger sister, a younger brother, and a younger sister. So, it's girl, boy, girl, boy, girl. My older sister is three years older than I am, and then it's about a three or four years spread between each one.

FT: Now what were their names and what did they end up doing?

JS: Well, very interesting. My older sister was Carol (Ann?). She graduated from Illinois State University with a degree in special education. She taught in a deaf school north of Chicago for a while. Then when she married, she went to Germany with her husband, who was in the service for two years. When she went back to work, she worked as a translator – a deaf translator, American Sign Language. So, she and her family live in Baltimore. She was the one who we, the rest of us, called the saint, because she was seemingly flawless. She did deaf translate for the president, Clinton, and the first lady and the pope.

FT: That is a wonderful experience.

JS: I think so. My younger sister, my kid sister, her name is Mary Kay, referred to as Kay. She, after high school, went into the convent. Never took final vows and opted to teach school instead, first to the Catholic school, and then at public schools in St. Louis, an decided that her financial future was not in teaching, although she was named teacher of the year in the state of Missouri. She taught biology. She got a master's degree in biology and later got an MBA. Yet, she went into another occupation. She started selling steel for Ryerson Steel Company in St. Louis – and unfortunately, just when steel was taking a downturn. But she had something that they saw. While others were laid off, she, although last hired, was kept on. She later became the sales manager at Ryerson Steel. They needed somebody to manage the credit union at the same time, so she did both jobs. But she hated selling steel, she said, so she quit that. Bought a small business, ran that for a while, and then sold that and went to work for a computer peripherals outfit, which she now is present at.

FT: [laughter] So, the kid sister did okay.

JS: She certainly did. She learned a lot about sales, which she's been in from dad. Then my brother came along. He graduated from St. Louis University and then went to Southern Illinois Medical School, and is a physician practicing in Springfield, Illinois. He was president of the medical society and of the hospital board at St. John's Hospital in Springfield.

FT: Now this is a highly accomplished family you are talking about. So, that makes me curious as about having you recall some of the parenting methods of your parents, things like, did you sit with a TV tray and watch TV during dinner, or did you sit down together as a family? How did all that work with you?

JS: Well, it worked out. We sat down as a family and had dinner every night. I mean, that was expected that you show up for dinner. It was expected that you did not miss dinner without good reason. We ate every evening meal together. Breakfast was something different, and lunch was always – people are everywhere. But dinner, I mean, it was just routine, a part of life.

FT: So, it was bringing the family back together at that point. Did you kind of relive the day then, or –

JS: Well, yes and no. I've thought about that in the past. I don't know that we relived the day so much. It was a lot of humor at mealtime, as much as anything. I remember laughing a lot. In fact, when it was just my older sister and I, she had a tendency to have to run to the bathroom when she started to laugh too much. I remember that happening on a regular basis, that I would make her laugh, and she would –

FT: So, the subject matter then was not so important. The community –

JS: Oh, yes, I think that's right.

FT: – was the thing.

JS: Yes. It wasn't that there weren't those things that were important that were said, but I don't recall that as being the major part of it. It was just having fun being together.

FT: That is something I think many families have lost over the years, this community. You remember your mother being home, and that was important to you. I can recall my wife – that would turn out to be a very great financial sacrifice for us when we had two children – saying that she was not going to work. She wanted to be home. To this day – and they have just both turned forty – they talk about the fact that they were so glad there was someone there when they came in through the door, for whatever reason.

JS: Oh, absolutely. Absolutely, yes.

FT: I am only mentioning it because some people devalue that as a role in life, but it is a huge role.

JS: I think it's very important. So, we talked about my brother, Jim. You didn't get his name. His name is James Robert. His wife also was a physician, and they have five children. Then my youngest sister is Sharon Jane, referred to as Sherry. She was born when mom was forty-two, I think. So, she was there as a baby, and going through school when they were in their sixties. Still, she was in college when they were in their sixties. They maintained that she kept them young, and I don't doubt that. She then graduated from Illinois State University with a degree in computer science and went to work at General Electric in Cleveland. Decided she didn't want to – well, she had friends in Chicago, and she wanted to move to Chicago. She tried to get a position at GE in the suburbs of Chicago, but they didn't have something for her. She went to a headhunter to find her a position, and the headhunter said, "Well, we'll look for you," after having talked with her. "But we want you to know that we'll match whatever offer you get

anyplace else, because we want you to come to work for us." [laughter]

She didn't do that. She went to work for Touche Ross, and then very soon, was commuting weekly to Los Angeles because she was involved in revamping the communication system at LAX, at Los Angeles Airport. Then she came back and got married, and she and her husband moved to Hartford. He's actually from Massachusetts. So, she now sells commercial real estate in Hartford and does very well.

FT: It sounds like a very strongly rooted family with a long history in the area. Now, as a young fellow, what kinds of things would you do in town? How did you amuse yourself? What was your life kind of like then?

JS: Oh, well, the whole town was your play yard, basically. After you reached the age at which you could ride your bicycle safely, you were pretty much free to go. So, you developed some friendships all over town. In a way, it's a very hard question to answer, because there are so many little things interspersed with the big things.

FT: Well, were you into the kind of things that you might think of as nature? Up into the bluffs and things like that, or river activities or –

JS: Everything. We did everything. So, my friends and I had a very good friend who lived two doors away, and a number who lived within about a two-block area. Well, at an early age, one of the things that was prominent was going out after dinner to play in the summer. The neighborhood kids would play hide and seek or something after dinner until dark, when you didn't have school work and whatnot, and you were not burdened with chores. There would be thirty kids outside from all around the neighborhood playing hide and seek – people climbing up trees and going into barns and sheds or garages, I guess, is more appropriate. I remember that as being just wonderful. The hard part was, when you were young enough, that you had to come in and go to bed, even though it wasn't yet dark. [laughter] Then we would ride our bicycles all over town, as we got a little older, and explore. It was a lot of exploring.

FT: Were you a reader as a youngster?

JS: Yes, loved humor books. Sure, I was one of those who sat under the covers with the flashlight, reading.

FT: [laughter] Well, I always ask that for two reasons. Number one, I have a wife who was a school librarian. Number two, if someone asked me to name my five most valuable possessions, my library card would be one of those five. I can remember, as a very small kid, finding that there was a library, and there was actually a children's section there. I can remember myself standing there and becoming an avid reader.

JS: Well, there was a library in town. It was a wonderful, older Richardson Romanesque building. Still there, it's no longer a library. It's now a museum of architecture and design. But on Saturday mornings, we would go to the library because they would have reading and kid things and the like. On Saturday mornings, we basically had run at the library. But there was, I

would say, a lot of exploration, just discovery, what the town was like. I'm talking up to the age of ten or twelve. That included river activities. It included playing ball. It was a very full life.

FT: So, when you got a set of wheels that you could move out, kind of thing, the area was considered safe enough so that mom and dad did not worry when you went to the other side of town?

JS: That's right. It was very safe.

FT: What was schooling like in a –

JS: Well, schooling was fun, I think. So, I started out at St. Francis School. It's a Catholic school at the parish where we were parishioners. My brother and sisters all went to the same school. There was some stability in the school as well. I remember having Sister (Maurizi?) for second grade. My dad had Sister Maurizi for second grade. [laughter]

FT: That is wonderful. It really interests me how much some people focus on what their elementary school was like. Doing these oral histories, there are people that have come from Woods Hole originally, and are still here, but they all talk about the Woods Hole School. I mean, people come from literally all over the world when they have a reunion. I thought, "Well, gee, that is a different kind of experience than I had." What was high school like for you? Could you talk a little bit about favorite subjects? Do you remember any teachers that were particularly – maybe inspiring is the word.

JS: Right. To lead into how I got to where I am, I mean, there is a connection. There is a thread. The St. Francis School was right next across the street from Quincy College, now Quincy University. We would frequently walk through the college grounds, and indeed, through the college buildings on the way home from school. It was an eight-block walk home from school. I did walk to and from school most days. I distinctly remember going through one of the lab rooms in the main Quincy College building, and there were all of these specimens in formalin. I was intrigued by all of those. I distinctly remember that.

FT: Dr. Stegeman, before I had to turn the tape over, you were talking about Quincy and walking home through school grounds and going through the buildings and being very intrigued with seeing specimens in formaldehyde. You can go on from there.

JS: Yes, and then you asked about high school. So, started in a high school that my mother had gone to and that all of the others went to. It was a Catholic school run by the School Sisters of Notre Dame. It was called Notre Dame High School. I went to that school for the first year, freshman year. At that time, a teaching order of brothers, the Christian Brothers, or Brothers of the Christian Schools, came to town and started a boys' school. So, from sophomore, junior, and senior, it was at the Christian Brothers High School. These were not large schools. Although there was a large Catholic community in town, not all of them could go to the parochial schools because of the cost, I guess.

FT: Was there also an academic requirement in terms of a certain grade level?

JS: Who knew? [laughter] I wouldn't pay attention to things like that. I've never been big on paying attention to requirements. But they were strict, though. I guess it was at Christian Brothers when I began to develop an interest in the sciences. While I did develop that interest, it wasn't something that I initially followed. I had a very strong English teacher in high school. I guess it was probably junior year. So, when I went to college, I started out as an English major. I'm thinking back to high school now. So, in high school, I did things that I remember. I did sing in the glee club. I still sing. I had the lead in the high school senior class play, which was *Stalag 17*, which you now know.

FT: Oh, no, I do.

JS: But a lot of others won't, of course. So, it was the English teacher that led me to start college as an English major. After the freshman year in college as an English major, I had decided that this wasn't for me, that I really wanted to be a biology major. So, I hadn't taken any science course in the first year in college. So, I went to the chair of the biology department at St. Mary's College in Winona, Minnesota, which was a Christian Brothers college. You can see the thread here. I asked for permission to come in as a prospective major, and he said okay. I'm probably getting ahead of myself here. You may have had some other questions along the way.

FT: Well, one of the things – and this actually is going to answer a question that I have myself, because this is something I have discussed with my wife quite a lot. I very often ask what kind of teacher was sort of mentor or something like this to you, and courses of interest, naturally, is an ex-chemistry, physics, et cetera, teacher. I assume that the majority of people were going to tell me, "Oh, the chemistry teacher got me so excited." I found out that so many of people like yourself told me, English, fine arts, literature, generally. I was a little perplexed by this, and I kept discussing it with my wife at home at dinner. She said, "Well, that does not surprise me at all, because," she said, "basically, in order to be a really good scientist, that is a very creative field. Those are the creative subjects you are talking about, and I can truly understand how they would have an interest in this area." So, I get that part of it. Can you remember at all your thinking process when you – you did a year of English. Was the biology always in the back of your mind?

JS: Yes, I think it was. I remember distinctly, when I was a sophomore in high school, telling my friends that I was going to be a biochemist. I didn't know what the word meant. It sounded pretty neat. [laughter] Lo and behold, that's what happened. They have these tests for aptitude, right? Now, I don't know if they still do them in the same way today, but I went back and looked at the results of the test which I took sometime in high school. There were two areas that stood out far above all the rest, and they were science and music. I continued with science and music. So, my friends and I in high school, we all sort of went into separate areas and separate ways, as happens. But I've maintained connections to many of them who were my very good friends in high school. They were friends in grade school and high school, and I still see them today. So, anyway, I don't know exactly how I got to where I am, to that thread in science, but I can see it in the early days.

FT: Well, another big decision you had to make then, from what I hear of the family, I guess

there was no thought that you would not have gone to college. I mean, college was on the books in your family.

JS: Right.

FT: But you had to make a decision where you were going to go. We just talked a little bit about what you were going to take. How did you make the decision of where you were going to go to college?

JS: It wasn't really a struggle, nor was there much question in my mind. The connection between the Christian Brothers High School and a Christian Brothers Catholic College is an obvious link. I guess, certainly, the Brothers talked up Brothers schools. The concert chorus from St. Mary's College came to the high school in Quincy, and I was taken with that too. Although, I never did join the group once I got to college, because I just – well, for a number of reasons. But it just seemed like the logical thing to do. I didn't apply to any other schools, just to the one school. I think, at that time – and I think, still, today – they had a reputation and a gift for bringing forth success in students, enough so that at one time, after I got here to the Oceanographic some years later, looking through records of various undergraduate institutions, and leading to undergraduate colleges that contribute to the doctoral pool in the country. I think, however they do the ranking, it's based on some normalized approach to students pursuing an advanced degree for population of the student body or whatever. Anyway, St. Mary's College in Minnesota, the small school, fifteen-hundred students, was number one among all Catholic colleges and universities in the country in the ranking for contributing to advanced degrees.

FT: Had you already been thinking about an advanced degree?

JS: I didn't ever think otherwise, actually. So, it was only a question of what. A number of things entered my mind. So, it was either law or medicine or dentistry or graduate school. I was most torn between medicine and graduate school and the life sciences. Here is where the thread that has continued in my science career really did come out. As a senior in college, I became most interested in wanting to understand what happened inside the active site inside of an enzyme. What was going on there? What did it look like? How did it work?

FT: It is fascinating that you were treating an enzyme in the same way that a physicist would treat the universe. What was it like? How did it originate? What goes on in there? The era that you were being trained in was still, to a large part in biology, a taxonomic kind of situation. The others were coming in, but they were not as strong back then. I ca not remember people – and I predate you by about ten years – but thinking in terms like, "What was this like, how did it act," trying to get kind of a sense of this thing that was there. I will ask some more questions on it as we go along, because this will develop into the rest of your interest. Was the idea of the Catholic school something that was really important in terms of going from one place to another? When you come from Illinois, you have several nationally and world-renowned institutions. I can remember one of the big shocks of my life was when my wife took me to the University of Illinois. I was judging what I was going to see by what I see here in Massachusetts, and was really shocked to see a state university that had all of the traditions of the great Ivy League schools, and these beautiful grounds and all that sort of thing. So, I guess I was just looking for

another little thread of – I mean, you could have done University of Chicago. You could have done Northwestern, done Illinois.

JS: Well, probably not, because my grades were not all that good in high school. But it didn't really matter. I never did spend a great deal of time trying to figure out where it was the right place to go in order to succeed with this particular kind of career track. That never did sort of drive me. I was never looking for or trying to determine the very best thing for any particular reason, just, "Well, this seems like a good thing to do, so I'll do this."

FT: [laughter] When I was nineteen or twenty, I thought I had the answers to everything, and did not realize that I was kind of like a feather on the wind bouncing from here to there. Decisions were just being made, because it was the simplest, easiest road to go at that particular point.

JS: Right. I think a lot of people today spend just too much time trying to figure out what is exactly the right thing to do, and they obsess about things, whereas I think there's a great deal to be said for just doing it. Just do it.

FT: Nike has T-shirt.

JS: You're right, says, "Just do it."

FT: Just do it.

JS: Right. So, when my grandfather – when he was eighty-five and approaching his last days, he was in the hospital, and my dad took me to see him. I was fifteen at the time. He said, "Pop, do you have any advice for John as a young man?" He said, "Well, yes, just decide what you want to do and then do it." I didn't really decide at the beginning. Well, okay, I'll decide I'll go to St. Mary's College, and I'll do it and then worry about the next step when the next step comes.

FT: Well, ultimately the next step did come, and you had to make a decision again. I guess the decision to go on had already been made, but where you were going to go on and what you were going to focus on – because in those first four years, basically, you will learn a lot of terminology. You will learn a lot of –

JS: Yes, yes, and you enjoy doing that. I mean, I remember memorizing things and enjoying being able to have committed things to memory. Well, that was great. Well, when I graduated, or when I was about to graduate, I didn't automatically decide on graduate school. What I really wanted to do, as I told my parents, was to be a Navy pilot. I wanted to fly jets and I wanted to take off from an aircraft carrier. I thought that would be about the neatest thing going. They said, "Well, John, you've done very well. You really should consider this avenue." I said, "Okay. Well, I'll consider that avenue." So, I did.

FT: In hindsight, how do you feel about that?

JS: Oh, I think it was the right thing to do, although I still would like to have flown a jet.

FT: Well, sometimes, parents can be so ultimately practical in terms of where a career is going to go. Sometimes, some others might say, "Hey, give this other thing a try and see if that is it.

JS: Right. Well, I think the practicality that my parents had and the view of it was borne in part from the experiences of going through the Depression and from all of the things that had happened to the family along the way, having, for example, been very well-to-do, and then winding up not so well-to-do at all. When my mother and dad were about to be married, my grandmother, my mother's mother, had had tuberculosis and was in a sanitarium for a number of years. During that period, my mother's father had passed away, and my grandmother was in the sanitarium. My mother basically was left in charge of her two younger brothers at the age of sixteen. Mother is ninety-two. Her younger brother, Bob, who is eighty-two, wrote her a letter recently saying, "Millie, I remember you parceling out sheets of toilet paper to Bud and me, because we couldn't use too much. It was too expensive." So, the practicality was born of necessity, I think, in their minds. I don't regret that advice at all. I think it was wise. I think the wisdom they had reflected having come through periods of need, having seen what things were of real value and what things were passing.

FT: It is a shame every person at that particular age does not listen to their parent and perhaps be more accepting of some of the advice that is coming down.

JS: Right, I think so, being a parent and knowing how advice is accepted or not. [laughter]

FT: For a lot of people, there is a certain amount of wisdom that comes with a certain amount of years on Earth.

JS: Certainly is true. I think so.

FT: Well, you gave up the idea of being a Navy pilot. We have two of them in the family.

JS: Oh, do you?

FT: Yes. [laughter] I can truly understand where the excitement about something like that would come from.

JS: Well, I liked speed as a kid.

FT: But you decided to listen to what your parents had to say. It sounds more like rather than just accepting it blank, you gave it due consideration, kind of thing. So, then you decided you were going to go on in this field. Let us go back just a little bit. You used the term, "I want to be a biochemist," and it sounded really neat. By that time, is that the area you had actually decided to go into?

JS: By that time, meaning when I was a sophomore in high school or when I graduated from college?

FT: No, no, when you were graduating from college and planning the next step.

JS: Yes. So, I was at this juncture of medical school or graduate school.

FT: Because, see, there is a real commitment there. For a lot of people that finish the baccalaureate and then go off looking for a job, they go in all kinds of directions. But when it is going to be an academic kind of thing, there is some real decisions that have to be made because it is going to happen in a couple of months.

JS: Right. There were decisions to be made, but there was, again, not a conscious effort to try to sort out a career path. I was really just more interested in doing something because I was interested in it, not for career reasons. It was only later that that sort of came up. But one of the values of the biology department at this small school in Minnesota was that we had to do a research thesis for the senior year as part of the graduation requirement for the degree in biology. So, I did do a research project in collaboration with another student. We got permission to do it together. It was sort of biochemistry as it was in those days, looking at something called – well, looking at a process, a technical process that was employed extensively in those days called electrophoresis to separate different kinds of proteins. So, we looked at differences in protein composition using electrophoresis to separate proteins on a gel in a small protist, tetrahymena rostrata, a unicellular micro, eukaryotic micro. So, we built the apparatus to do this from scratch, and did the treatment of the – it was fed or not fed, basically, or fed with a different diet – and then did an electrophoretic resolutions of proteins in these tetrahymena. In the course of doing that, plus my question about enzymes, I found a person who was at Northwestern University who seemed like somebody that would be fun to work with, because the questions were being addressed about enzymes and using this procedure of electrophoresis. So, in thinking about graduate school, I applied to several, but did manage to get a fellowship at Northwestern. I'm glad I did, because it turned out to be the right thing. In three weeks, I will go back to Northwestern for a celebration of this individual's forty-five years of research at Northwestern.

FT: I think one of the great joys of a career like yours is to be able to go back to a person that you worked with as a student and celebrate part of their career where you were in the same field yourself. It is just kind of neat.

JS: It is. I'm looking forward to it. So, I graduated from college when I was seventeen and – excuse me, graduated from high school when I was seventeen, graduated from college when I was twenty-one, and started graduate school. There's another element. The reason I mentioned that is that I think a lot of people today, a lot of kids I see in graduate school and in college as well, they take forever. There's just so much to be said for getting on with it and not deciding, "Well, I have to take a year off to find myself." Whenever I get the opportunity, I recommend to kids, "Don't do that. Just do it, and don't worry about it if it's the right thing or not. You'll find out if it is. If it is, great. Oftentimes, you discover that whatever you embark on becomes your passion, even though you knew nothing about it beforehand. So, just go out and do it."

FT: Yes, that phrase, "Take a year to find yourself," is something that goes clang in the middle of my head.

JS: Oh, yes. Mine too, right.

FT: But there was a period where that was a big keyword for an awful lot of big-named colleges and universities. "Take a year."

JS: Yes.

FT: I was always willing with my children to help them find the correct path without their needing to find their own way. Now, that is kind of a different experience to go to a place like Northwestern from where you had your undergraduate experience. Was that any kind of culture shock to you?

JS: No, not really. I don't think it was. First of all, it was in Evanston, but in the Chicago area. While I wasn't really familiar with Chicago – I'd only been there twice, I think, prior to starting graduate school. It was a known quantity, being in Illinois. It's part of the state. Had a lot of friends from undergraduate school who were from the Chicago area. In fact, when I started graduate school, I stayed with the parents of one of my friends for a period of, I think, probably two months while I looked for a place to stay. No, it wasn't. I think that my undergraduate preparation was actually very good for the university.

FT: I was not thinking of it so much on the academic sense.

JS: No, I know you weren't.

FT: Chicago is a pretty wonderful town. There is a lot of things to do there – I think, with all due respect, more to do there than in Quincy.

JS: [laughter] Quite a bit.

FT: When I say culture shock, I probably did not phrase that correctly. I am thinking, what kind of change was this for you?

JS: So, there was a big change going from high school to college that I can recall. That change was discovering that there were so many people in the world who did not have German last names. I was astonished. My siblings had the same experience. So, that just is an interesting aside. So, there was a transition, I think, in education during the 1960s. So, I started high school in 1958, graduated in [19]62, started college in 1962, graduated in [19]66. So, the Vietnam War was, was a topic when I was a senior in college. From [19]66 until 1970 was this transition period with all of the protest against the war, and student activities and liberation movements – and a huge change, much greater than took place in the preceding twenty, twenty-one, twenty-two years of my life. During the period of the next four years, my life didn't change all that much because I didn't get involved in all of the protests and activities and whatnot. So, I was in graduate school, and I had things to do. I was working in the lab, and I would look at it on my way to the lab and not pay too much attention to it. There was a sense of freedom. Now, this may surprise you. There was a sense of freedom that came, of course. Now, you didn't have the restrictions that, even up until 1966, were often imposed by undergraduate institutions. Those were gone, and they disappeared also, largely, during this period of "liberation" from all

campuses. But as an undergraduate, couldn't wear jeans to the refectory, to the dining hall. So, there were big differences that took place.

FT: No T-shirts? [laughter]

JS: No, of course not. What happened with this freedom, one of the things I remember most was being able to go out and buy a pound of bacon, bring it home, cook the whole thing, and eat it.

FT: [laughter]

JS: There had never been enough bacon at home.

FT: I still do not think there is enough bacon at home. [laughter]

It was a time that was in such turmoil. I used to see all these young people walking around wearing pins that said, "Don't trust anyone over thirty." I had a pin that said, "Don't trust anyone under thirty." People were walking out of class. In some areas of the country, it was very difficult to really get an education during that period because everything was so in-and-out. But at the graduate level, you were able to get through all this?

JS: At the graduate level, I think, certainly, there were graduate students who did get sidetracked in student protests and activities. There was one activity that I did get involved in as a graduate student during the year of [19]69 and [19]70, which was influential in directing the course of my career. I'll talk about that when you want. But arriving in graduate school was not a shock. Coursework was great, loved it. I found, I think, to my satisfaction, that those professors who were the most difficult and demanding and moved the fastest – in other words, provided the greatest challenge – are there ones from –

FT: While we had to stop while I changed tapes, as so often happens in these oral histories, you were kind of thinking in your mind about, "If I said everything I should say about what was going on in your early years," and you just mentioned to me – because I had asked you about taking advice from parents. We talked a little bit about the wisdom having lived through certain kinds of situations like the Depression. You said there was something else you would like to add to that?

JS: Right. Well, you had asked at one point about what parents were like and how they contributed, what did they contribute. I think there may be a couple of noteworthy things. My dad was – as a traveling salesman, he was usually gone out of town one, sometimes two nights a week, but certainly, one night a week. He was very busy all the time. Mother was really the one who imposed the structure on the family. Dad provided the flourishes and the enveloping in love that supported mother and her efforts. I think that was very important, and I think it's something that we children share in our view of how the two had influence on us. She was the taskmaster, and he was the soft touch. Often, from his trips, he would be gone overnight, and then would arrive at home from being away usually around dinner time. That was always a thrill to have him come back home. The first thing was a kiss for mother before anything else. He's ninety-

four, almost ninety-five, and has been in a wheelchair for thirteen years, unable to speak, except for – he can vocalize, but no words, just sounds. Mother is ninety-two and lives now three-hundred steps away from the door of the nursing home – the wing of the nursing home where dad is. She has a condominium that is literally three-hundred steps away, hidden by bushes and whatnot. So, when she comes to see him, which he has almost every day for thirteen years, first thing he does, grab her hand and kiss them.

FT: I am understanding a lot better now in my own mind what the term "roots" means, and I mean that in a very deep sense. If I had to give right now – and listening to you discuss your early years – some key words to explain what they were like, I would say commitment would really be one of them. Correct me if you think I am off the wall here. But it seemed to me, as you described this, that you were the top of a pyramid of a family growth, all of which took something from the layer beneath them.

JS: Maybe so. Maybe that's a good description. Commitment is a good word too, because there is a commitment that mother and dad had for one another that was clear and palpable. It was not just commitment. It was, and still is, quintessential love. They were committed to us, and we are committed to them. So, during the first year when my dad had a stroke that left him in this condition, he was in the nursing home. None of us live in town. None of us live in Quincy, Illinois. But for the first twelve months, we made sure there was not one weekend that she was alone. I still go four times a year.

FT: When my daughter got married, I told her the best gift that my wife and I were giving her, and that her husband's mother and father were giving, was a total between the two of us of pretty close to seventy years of marriage together as committed couples, kind of thing. I said everyone ca not make that same statement nowadays. So, what you were talking about to me is a very, very important ingredient in why I do this early part on your oral history, as to the kind of things that formed you as you went along, the kind of things that made you the person you are. The science is all well and good. But somehow, you had to be molded, if that is the word, into a certain kind of situation where you could prosper in whatever you determined you were going to do. This kind of family background you talk about certainly seems to be part of that. What was your father's territory? Do you remember?

JS: Yes. It was about a sixty-mile radius, I think, something like that, if I can guess. I mean, it was Northeastern Missouri and West Central Illinois.

FT: You were pretty much in and around Quincy. When he would come back, would he talk about these areas and what they were like?

JS: Yes, he loved to talk. He was a great talker. He had a wonderful sense of humor. He was the ultimate optimist – that Midwestern optimism that you may or may not have a sense of. There were never problems, only opportunities. He loved to laugh and he loved to engage people in conversation. He was an eloquent speaker. He frequently was the master of ceremonies at dinners in town, at functions, and various things. He was widely loved, I think, by people in town. Everybody liked Bud. I recall one person saying that – and I think that's true, that when he did have his stroke in the nursing home, unable to speak and walk for thirteen

years, he still has all these people – the young nursing assistants and whatnot who come through – they see him, and they always grab his hand. "Hi, Bud. How are you?" He lights up with a smile. One woman said, "It seems like your dad had been practicing to be in this nursing home his whole life."

FT: What a wonderful statement. Having been in that situation myself, that must have taken a lot of weight off your shoulders, that he seemed to thrive in this kind of –

JS: Well, he doesn't thrive. Well, okay, maybe thrive is possible. But he is accepting, and I think he has been an influence for good, even in this condition, for a long time. There was something I wanted to say about him. Oh, when he retired, he went to work as – from Moore Business Forms, he went to work for a local company who needed advice with their sales operations. Then a good friend of the family – close friends for many decades. The woman was a state senator in the state of Illinois. So, he went to work as a legislative aide for her for a period of time. Then he started a group to aid people who'd had laryngectomies – who'd had cancer of the larynx and had their larynx removed. He discovered that there were these people who were basically housebound because they couldn't talk, couldn't get around. So, he started a group that brought these people out of their shells and would get them together, and they would learn – he was basically helping them learn to speak. He had been involved in establishing chapters of Kiwanis and various organizations like that. So, he had an ability to organize people and to get them going. But he spent a lot of time working to develop these people to get their lives back in order, in a way.

FT: In your field, one of the terms that is used quite often is catalyst. It sounds like your dad was a catalyst for a lot of things happening in your community. You mentioned Kiwanis, and this is something I have wanted to ask, too, and neglected doing that. Were there organizations in Quincy that that was kind of the place to be? In Des Plaines, where my wife was from, the only good restaurant in town was the Elks Club. Everybody became an Elk over the course of the years. It was kind of the social center for a certain class of people in Des Plaines, Illinois.

JS: Well, the Elks Club was important in Quincy too. Dad was not a member of the Elks, but my uncle, June, was. God, we loved him. He was wonderful. He was Italian, and a great sense of humor, so loquacious. He also had an orchestra. We called him the Peter Duchin of Quincy, Illinois. He was an Elk. So, I don't know, Knights of Columbus and various things, Dad didn't have a lot of time for that when he did Kiwanis and he did campaigns for – I'm trying to think of what charity it was. He organized people for them. There were a lot of catalysts in that town, a lot of good, good people.

FT: Well, in terms of your academic career, we have gotten you up into the graduate level. You talked a bit about the particular period that you went through. I can clearly remember it. Colleges and universities were interesting places in those days because you never knew what you were going to walk into the building through, what kind of crowd was going to be out there. But you managed to sail on pretty successfully. Could you talk a little bit about the person who was in charge of you during that period?

JS: Well, you mean in whose lab I did my research?

FT: Yes.

JS: His name was Erv Goldberg. The work that was going on in the lab at the time was studies of what are called isozymes – multiple forms of enzymes. It was a hot topic in those days.

FT: For some youngster that is listening to this, I have to try to simplify it as much as possible. Is this an enzyme that acts like another one but has a somewhat different composition?

JS: That's a pretty good description. So, it was being found that during this period of the late [19]50s – it started in the forties, but certainly, well through the [19]60s, there was. A lot of activity focused on trying to understand different proteins that did the same thing. They were products of different genes, or in some cases, not products of different genes but of polymers – let's say, a tetramer with four subunits – the subunits being products of different genes. They would assort in a random way according to their abundance within a cell. Did they do different things? Why were they at different levels? Why was one subunit made more in one kind of organ than the other one, and more in another kind of organ, et cetera? So, what were they? What did they do? Where did they come from? How were they regulated? That was going on in the lab where I was.

FT: Well, the whole thing was kind of exploding then. I mean, this was after Watson and Crick.

JS: Right, and I remember Crick coming to give a lecture on the genetic code that is the triplet nucleotide sequence that determines the identity of an amino acid in a protein, and found that to be just wonderful.

FT: This stuff really excited you?

JS: It did, yes. So, we were working in the lab. I should say I entered the lab, and here I am, I'm twenty-one years old. Kids are not grown up at twenty-one. They don't know what the hell is going on.

FT: That is young for that level, too, that you were talking about.

JS: In today's world, it certainly is. So, he said, "Well, why don't you do something with these fish over here?" Now, they had fish in the lab. That wasn't what he was working on. He had been working on reproduction in mammals, and he had discovered an enzyme in testes of mice. As most biologists want to do, they were looking for how broadly in the animal kingdom did this enzyme occur, and it was later found to be in sperm. So, they had looked at some birds and they had looked at frogs or something, I guess. They had been looking at fish, so they had some trout in the lab. So, a couple of the graduate students actually – there were three in the lab in addition to myself who wound up working on trout, because they happened to be there. We were all looking at various enzymes in these fish and looking at various multiple groups of the same enzyme that is these isozymes in trout. So, that's how I got started working with fish. It wasn't that I had any particular interest in fish. It was a source of material to ask a question about, whether or not there was a certain enzyme present and what it was doing. So, I can't say that you

were a young man living out in the heartland, on the plains, with corn and wheat waving in the wind, but you saw Jacques Cousteau on TV and said, "Oh, I'm going into this field," kind of thing.

FT: No, not at all. Well, a couple of points. When I took invertebrate zoology as an undergraduate, I was fascinated by some of the invertebrate organisms that do live only out in the open ocean. I did not give it a thought as to, "Oh, would not it be fun to study these?" I mean, you just find things interesting as you study them. But I certainly remembered the first time I saw in living form and living color – or lack of color, as the case may be – those things that had been pictures in books only, and not color pictures, but black and white. Anyway, so starting out in the lab, working with this cadre of people who were working with fish. Well, you do various things, and you learn the technique for addressing the question, for answering the question, and you learn how to ask the question. I remember very distinctly working for quite some time with what I thought was one kind of enzyme. Erv said, "Do something with these fish." Okay. Well, what do we not know about the enzymes in these fish? He said, "Does this interest you?" I said, "Well, I do not know." So, it was an enzyme that was involved in glucose metabolism. I thought, for some time, I had been studying this enzyme using electrophoretic techniques and a stain to see if there were one or two or three, or were there multiple forms of this particular enzyme that you could separate by this charge-dependent migration through a gel. I finally got around to doing the right control and discovered that what I thought I had been working with was not what I was working with at all. It was a completely different enzyme, and something, as far as I could tell from the literature, was brand new – and so it was, until I almost finished, when it then began to appear. Then I found that there were a couple of papers that had addressed this particular enzyme in other species.

FT: When you work on these kinds of problems, everybody not involved with the field tends to think of them as kind of an academic exercise, but there is a hands-on kind of thing with this too.

JS: Oh, absolutely.

FT: Anybody can take a canvas and slap paint on it, but artists paint pictures. I would say the same thing is true for someone in your field. There is the junior high school kid that is going to take and play around with some of these kinds of things. But you really have to do it on a professional level. Where did the techniques come from? How did you go about training yourself to perform these different kinds of – staining is not as easy as a lot of people think staining is.

JS: Well, you learn from the people in the lab. I mean, it's so important. I think probably from the time I was an undergraduate and collaborating with somebody else on this undergraduate thesis that we did, that having two people together who are doing something similar, or maybe doing it together – but if not doing it together, addressing similar questions with a different specific subject, but using the similar techniques or even the same techniques. So, there is this going up the ladder together, helping one another up the ladder of technical skill.

FT: But you said, in that particular case, you also had to develop the equipment yourself –

JS: Oh, at the undergraduate?

FT: Yes.

JS: Yes. The two of us, we did that from a volume of the proceedings of The New York Academy of Sciences – the annals of the New York Academy of Sciences, which had published the results of a symposium on multiple molecular forms of enzymes. One of them was a paper by a man named Oliver Smithies – still around, not long ago, won a Nobel Prize. So, we looked at it, built it from the description of the book.

FT: Had you always had kind of an acuity with being able to do things like that?

JS: No, not particularly. Nothing noteworthy, I would think. I will say I was very fortunate that I had this companion in that effort. [laughter] Anyway, so in the lab, you learn approaches, you learn how to do things from someone else, or from your ability to translate the written word into something at the bench. So, it became interesting. I've said this to a number of people before, but I think that what kept me busy the whole, kept me going, was wanting to know the next thing at the bench. I recall talking to a physician in Quincy when I was trying to decide what direction to go in. He said, "Well, if you work as a physician, you will be with people all the time. It is a very people-oriented life. If you work as a scientist, it can be a very lonely life, depending upon the circumstances." I think that's very true. I did, in early times, as a graduate student, experience a sense of loneliness, which I think helped me in getting through it to guide students through their own periods of down time and the periods of questioning, when I was mentoring students in my own laboratory. But that was right. I still think about the prospect of – having been a physician would have been a great thing, because I do love to interact with people. Yet, what drove me, what still kept me going was, "What's the answer to this next question?" I think, that, I sort of developed in the course of my graduate career. Now, you asked about my mentor. There was a period of time in my graduate career – well, two things. One is, I started with a fellowship from the National Science Foundation, a one-year traineeship, and subsequently wrote a grant application to the NIH, the National Institutes of Health, for a pre-doctoral fellowship, an independent pre-doctoral fellowship, which I did obtain, was awarded one. It was great, a great success. You know how success breeds success, and there's certainly a lot of truth in that. Well, I discovered a couple of things. One is that when you write a grant application, you lay out a plan of research. Then you can go back and see, "Well, was that the right plan? What's the next step? Did I do that step?" I went back and back to that, and I thought, "Those were good questions. That was a really good grant application." I think you learn from doing that. So, I had this period of time – during which, I was doing the research – pursuing the various questions about this enzyme, that after the right control, I had found that I was working with something largely unknown. So, I did lots of things to characterize it genetically – biochemically purified the enzyme from a couple of different fish species and found two different forms of the enzyme, purified them both, and characterized them. I didn't crystallize them and I didn't do sequencing on them, which I should have done, and I would have loved to have done at a later time. But at one point in the course of this, I went to an early organizational meeting of a group called the Northwestern Students for a Better Environment. I am sort of a joiner, so I joined this organization, which was very important in two respects. My future wife was a member of the group, and the friendships made within that group have been important in

my career since – and thirdly, the concern about environmental issues, which has, as you'll hear later, been a feature of the research I've done since then in my life here. All had, I would say, a founding in having joined this group. What the group did was to – well, this was part of the period of awakening of concerns, as we mentioned before. We organized what we call a teach-out. There were teach-ins at the time. You recall the term teach-ins when faculty and students would get together and they would address these issues of importance in the country and society? They pat one another on the back for being so wise and clever, I think, is what a lot of that was. We organized a teach-out, in other words, to engage the community rather than – and it was a large event held during one full day, through the night, to the next morning. We had five-thousand people there. This was before the first Earth Day. We had a number of important scientists at the time addressing environmental issues. So, we had Paul Ehrlich and Barry Commoner and – I can't remember. I can't tell you all of the people.

FT: Those are two of the big early names.

JS: Right. So, we, the student group, had arranged all of this. We organized this. There were a hundred simultaneous sessions addressing all sorts of environmental issues. We had people from the state legislature. We had people from the national legislature. Tom Paxton, who was a singer at the time, wrote a song and came and sang it for the group that was on this. So, it was a big deal. Let's see. What year was that? We will be coming up on the fortieth anniversary of that in two years, and I'm sure we'll get together. I'll tell you about some of the people who were involved in this organization as we go on, because I still see them in professional situations today. So, that was a very important thing. But it took a lot of time out of my lab effort. In fact, it took me out of the lab basically altogether for quite some time. Needless to say, my mentor was not too thrilled about it. But a very close friend of his was our "faculty advisor." We did get quite a few faculty involved. We had a lot of the rooms reserved. We were taking up a lot of space and activity at least for one day –

FT: This was a big event.

JS: This was a big event. This was a very big event, so that when I started to write my thesis, this was all over by now. I was married by now. I started to write my thesis, and I had the experience of loving the – it became such that I was just so eager to get up the next morning and get back to the writing, because here was where I could see things coming together. You can express your sense of the question and the meaning of the answer that you found in a way that allowed you to use your language and your insight and your logic. It was just a lot of fun.

FT: When I give tours at the institution, which I volunteer to do every summer – in one day, I give two tours at the institution – when young people tell me that they would like to be in this field, and they say, "What are the important kinds of courses I should take," one of the things – of course, we talk about the chemistries and physics and all that. I said, "Make sure you do really well in English, because you are going to have to write and you are going to have to convince people, along with yourself, that what you are doing is worthwhile."

JS: You just said a very important thing, "Convincing yourself." If you remember, if you make a note to ask me about that later, that's an important part of mentoring that I want to get to. Be

your own strongest critic is what it is. So, anyway, this was such fun. I really enjoyed it. We used typewriters at that time. Well, we used pencils and pens to begin with, and only after you were satisfied was it transcribed with a typewriter. Got the thesis written, handed it to my advisor, and he took it home and read it. He came back and he said, "Well, it's nice to know what you've been up to." [laughter] Yes. So, anyway, I wasn't as frequently seeking advice on things as perhaps I should have been, and he might not have been particularly happy about that during the course of this period with the Better Environment group and the other things.

FT: But for some young person or someone who is not in this field who might have difficulty understanding, or a certain age limitation, the particular period you were going through in your graduate studies was one of huge academic upheaval in this part of the world. There were huge differences between people – professors that would have their kids all walk out and have a demonstration of some sort, and those that said, "Of course, they can go out and demonstrate. It is easier than studying." I mean, it was just a huge upheaval. Certainly, I think someone that was in your age group at that time, it would have been almost impossible not to become involved in some way or some fashion, even if it was just having a very strong opinion about what was going on."

JS: Yes, and maybe it's a reflection that I'm not smart enough to have figured out that, "Well, I can go out and do those things." I don't know. But it just didn't really strike me as something to do.

FT: Well, plus, you were also pretty intrigued with what you were doing.

JS: Yes, I was. Probably the outlet was this student organization, the Northwestern Students for the Better Environment. But there was something that the mentor, Erv Goldberg, did tell me, which I also told students later, and that was that if you want to succeed, what you will find is that it should be this way – that what you're going to do in the lab is going to become your work, but it's also going to become your fascination. It's going to become your leisure activity. It's going to become your fun. It's going to become your occupation. I think there's something very important there that – you hear students, graduate students today – postdocs, in other words – "Well, I have to have a life." But this is life. What you're doing is your life. It's not separate. So, don't worry about trying to make it separate or even think about it as being separate. Think about it as one whole. It is your fun. Why is it that people do it until they're ninety years old, if they can? Why is it that they come in at 2:00 a.m.? It's not just me. I mean, at that time, students were there all the time – day, night, Sunday, Saturday, whatever, holidays – because it's fascinating; because it is your enjoyment, your life, your work. So, that was a message that he gave me. Thinking back, this triggers another thought back to undergraduate school. There was a botany professor who was a Christian brother, Brother Charles. He'd gotten his PhD at the University of Chicago. It was a very brief dissertation that he wrote describing a new species and all of its features. He was a man who was old, wore a heavy brace on his back. He had a congenital, I guess, deformity that he had to have braced – a very frail-looking man. He would take us on treks through the Minnesota woods and hills around Winona, which had the same hilly feature on the edge of the Mississippi, as was in Quincy, Illinois. In fact, Winona was on the Mississippi side. We kids who were eighteen, nineteen, had trouble keeping up with him going through the woods. Then we would bring material back, and we would section it and stain

it and look at the morphology of plants. He said, "You want to look and just see how it is." Well, to see how it is means that you really look into it so that you can understand it, and how it is in the fullest sense. I'm thinking of some president who said what the meaning of is is. But the fullest sense of its nature is in that – look and see how it is. You want to do that in science. You want to look and see how it is. You want to look with perception from every different angle and try to understand its nature by turning it around and looking at it this way and that way and the other way. This gets, again, to the question of being your own critic and examining every feature of what you are studying to make sure that what you say you think you have is what you have. So, anyway, it did become the fascination and the life and the fun and the work.

FT: A couple of comments. Three weeks ago, in conducting a tour, a woman said, "You said you could have retired fourteen, fifteen years ago. Why are you keeping on with this? This is supposed to be a time in your life when you can go off and do something totally different, non-related whatsoever to what you have been doing." I am saying to myself, "Lady, you just do not get it." My granddaughter, who is only ten kind of put that in a certain kind of perspective, because she was talking about soccer, which she loves. She just happened to say with all sincerity, "It is my passion." That is what you were talking about here.

JS: Yes, that's right. It becomes your passion.

FT: Yes, and it is interesting, too, that we both come from a generation where people that we acted with in one way or another went on to some greater things. I can remember when I graduated from college, I was so disappointed that our speaker was a classmate – granted, he was getting his doctorate while the rest were getting our bachelor's degree. We really wanted to have someone famous, someone notable. Who the heck was Martin Luther King?

JS: [laughter]

FT: When you mentioned Commoner and people like that, that is the kind of thing you were talking about. It is interesting to me how a number of things were really starting to come together with you. That going into college as an English major, to start out with, that has to be something about a love of writing, or at least a familiarity with what it is supposed to be doing. You had difficulty making the decision between medicine and research. Yet, as I look at your career as it has developed, and starting way back then, the two really were kind of coming together. What you were missing out on here is the day-to-day contact with people, which you fulfill later with a lot of students that you work with.

JS: That's right.

FT: We will come into that. You also met a soulmate at the time, who you married. Tell me a little bit about her.

JS: Right. Well, her name is Betsy, Elizabeth Annette. Good German or Dutch last name, (Schlothauer?), from Colorado Springs. So, we got married in Chicago in June of 1970. I think it was pretty much destined. There were a couple of things about it that I think were important. One is, we had met before when I was a new graduate student. She was an undergraduate at

Northwestern. The graduate students had had a party. This was, I guess, our first year – our cohort that came in 1966. In the fall of 1966, we had a Halloween party at one of the students' apartments and our houses. In this cohort was a woman named Marilyn Getchell. I've forgotten her maiden name. She married Tom Getchell – both graduate students in biology. She was from Denver, and she invited a friend of hers from Denver, who was an undergraduate, to come to this party. He brought a girl with him who was from Colorado Springs who was Betsy. She, at the time, said, "Oh, I couldn't –" she recounted later that her thought at the time was, "This is a strange group of people, these graduate students." [laughter] I still remember what she was wearing, and that she seemed a bit standoffish.

FT: How long have you been married now?

JS: Thirty-seven, Thirty-eight years? Let's see. 1970 to 2000, thirty-eight years.

FT: Thirty-eight years. Children?

JS: Three children.

FT: Names?

JS: Peter James, Susan Elizabeth, and Joseph Hill.

FT: Could you give me a little thumbnail of each one of them?

JS: Well, yes, I can. Peter is thirty-one. They all three went through public schools in Falmouth. Peter is very bright and will come up to his potential. He is a very easygoing and wonderful guy to be around, very perceptive. He went to school at Kalamazoo College in Michigan, but he had some problems with the faculty there. He didn't agree with a lot of the things that they were – he reached his senior year and stopped for a period of time. Went back later and eventually did get his degree in history and political science at UMass Dartmouth. He lives in Woods Hole, in fact, and is manager of an estate, the Larches, which is a very large estate here in Woods Hole. It's one that you don't know exists because it's so hidden. It has a very interesting aspect to it because of the people in the estate. It's a compound with four houses, and he manages the whole thing. The family's name is Day, the Day family – not from "Father Reads My Mail," Day, but perhaps related, same spelling – includes Ambassador Pelletreau in the family who is the ambassador to Egypt and Syria. He enjoys it, and they enjoy him. Susan is also living in Falmouth, and she and her partner have a three-month-old son. She has her degree in sociology from UMass Dartmouth, and is right now being a mother, but intends to go on to nursing school. Joseph graduated from Loyola University in New Orleans. He did have that hiatus during Hurricane Katrina, which happened in his senior year, and he went back and finished. He subsequently moved to Boston and got a job working at the Investors Bank & Trust. Then a girl who he really became friends with in Boston, who he had met once in New Orleans – she graduated the same year from Tulane – there was this group of friends that he had that sort of went together like a group in various places – to camp in Colorado, to Loyola and Tulane, both in New Orleans. He came back to Boston and had discovered he had met this girl at one time in New Orleans. They became an item. She is now at a graduate program at Nova

University in Fort Lauderdale. He decided, "Well, I better go to Fort Lauderdale." So, he's now working for Prudential Financial Services in Fort Lauderdale.

FT: What was the title of your thesis? Do you recall?

JS: It was not an earth-shattering discovery. They seldom are. Let's see if I can remember the title. You have it in my CV.

FT: Yes, I do. [laughter]

JS: Something like the occurrence and characterization and something else of hexose-6-phosphate dehydrogenase in trout.

FT: At that point, you went through all the other things – the examinations, and all that – and gained your PhD. Then you had to make another decision. "What am I going to do with that?" You have got several possibilities here. One of them is you could have gone into a straight academic career, and thought you could have been a researcher. You had a lot of options. You were married at the time. You also had the pressure of needing to be able to finance a family, a place to live, and all that kind of thing. What kind of decisions were you making back then, what I am going to do with all this? How is everything going to come together?

JS: There were decisions that I think were secondary to – I was going to say secondary to fear. I think fear is an underappreciated factor in what people do, or at least people don't talk about it. I'll talk about it later. So, I was interested in this enzyme that I had thought I had discovered, and then there were a couple of other papers by important people that had dealt with this enzyme. But it was still misunderstood – or I shouldn't say misunderstood. It was not understood as to what its function was. But there were multiple forms of it. I had done some population genetic work and purification characterization of its functions and properties and whatnot. As an aside, it's only been in the past half dozen years, if that, that it seems that its function has been finally uncovered. So, one of the people who had worked on a variety of different isozyme groups, and who was one who had worked on this particular enzyme, was head of the medical genetics unit at MD Anderson tumor institute. I had arranged a postdoc with him, and there was funding for it. There was an NIH postdoctoral traineeship which was available at MD Anderson. We had arranged that I would go there after I finished my degree. I should say we would go there. A traineeship is an interesting thing, different from a fellowship at that time. NIH postdoctoral support could be in the form of money from a large grant given to a university or an organization for the purposes of training. So, there was a pot of money that the university could distribute to people that they found qualifying. These were called traineeships. On the other hand, people could apply to the NIH directly and independently for a postdoctoral fellowship. That's the difference between a fellowship and a traineeship. One, you gain yourself, and the other is gained by a university and distributed. The same is true of predoctoral support from the NIH at that time. There were independent fellowships that you would get directly from the NIH, and there could be predoctoral traineeships that you could get in the same way. So, I had had an independent predoctoral fellowship from NIH and was offered this traineeship at MD Anderson. So, I was walking down the hall one day and saw this sign on the bulletin board about postdoctoral fellowships at the Woods Hole Oceanographic Institution. Now, Woods Hole was

not an unknown quantity, because the MBL was very prominent in all kinds of things. I knew about the MBL, no question, from the time I was an undergraduate. I didn't know about the Oceanographic Institution. So, I'm not an oceanographer, and I didn't know anything about oceanography or this institution. There were two items that are important. One is that I did recall seeing an outline of the Quissett Campus property in a small news item in *Science Magazine*, that it had been acquired, and that the institution might – without it stated in the small news item, that the institution might grow was something that passed through my mind. I saw this sign, and I thought, "Oh, gee, postdoctoral fellowships at the Woods Hole Oceanographic Institution. Wouldn't it be great to go to Woods Hole?" I'd never been to Massachusetts. I've only seen the Atlantic Ocean once. So, the deadline for application had passed. So, I called them up and said that I was interested. Would it still be possible? They said, "Yes, it would." They sent me an application form, special delivery, which I filled out, got references from people there – many of whom were known in Woods Hole, because they were at MBL frequently. One of whom was a man named Frank Brown who had been a PhD student of Alfred Redfield's – just as a matter of interest – at Harvard. So, I got the application, filled out the application, got the references, and sent it all back, special delivery. Ten days later, got a telegram. "We're offering you a postdoctoral fellowship. Please let us know by return telegram, will you accept?" So, in the space of two weeks, I had gone from having my eyes set on going to Houston for a postdoc in medical genetics to having to make a decision about something that I hadn't given a single thought to two weeks earlier. I called the guy in Houston at MD Anderson, and he said, "Sure, you should go to Woods Hole for a year." That's what the fellowship was for. We'll just postpone. We'll set this aside, and you can come here when you finish your time in Woods Hole. Oh, great idea.

FT: Oh, that is a good deal.

JS: Right. I said, "Terrific." Here I am.

FT: You said your wife was in graduate school?

JS: No, she was an undergraduate at Northwestern. She had just graduated, and when we got married, she worked as a librarian in the math library at Northwestern.

FT: So, I asked that, because one of the difficulties with coming down to Woods Hole was the husband –

JS: She discovered that difficulty. I can tell you, it was not a happy first year because of her not having a job.

FT: The kind of jobs available for an educated person –

JS: Paid less than her job at Northwestern math library.

FT: Yes, that is a difficult situation.

JS: Right.

FT: We are at almost – well, twenty-five minutes to 1:00, and we are right up to starting at WHOI. So, I think that is a good time to stop, and we will continue on.

JS: That's fine.

FT: That okay with you?

JS: That's fine.

[end of transcript]