CHEMICAL HERITAGE FOUNDATION

MADELEINE M. JOULLIÉ

Transcript of an Interview
Conducted by

James J. Bohning

at the

Chemical Heritage Foundation

on

23 April 1991

(with subsequent additions and corrections)

CHEMICAL HERITAGE FOUNDATION
Oral History Program
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Oral History Program
315 Chestnut Street
Philadelphia, Pennsylvania 19106

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MADELEINE M. JOULLIÉ

1927 Born in Paris, France, on 29 March

Education

1949 B.Sc., chemistry, Simmons College
1950 M.Sc., chemistry, University of Pennsylvania
1953 Ph.D., organic chemistry, University of Pennsylvania

Professional Experience

University of Pennsylvania
1953-1957 Instructor
1957-1959 Research Associate
1959-1968 Assistant Professor
1968-1974 Associate Professor
1974- Professor

Honors

1972 Philadelphia Section Award, American Chemical Society
1978 Garvan Medal, American Chemical Society
1984 Faculty Award, American Cyanamid Company
1985 Scroll Award, American Institute of Chemists
1991 Lindback Award for Distinguished Teaching
1991 Class of 1970 Endowed Chair
1991 Philadelphia Section Award, AWIS
1994 POCC Award, Philadelphia Organic Chemists Club
1994 Henry Hill Award, American Chemical Society

ABSTRACT

The interview begins with Dr. Joullié's description of her early life and education in Brazil. Her father sent her to Simmons College in the United States, where she received her undergraduate degree before obtaining her master's and doctoral degrees in chemistry at the University of Pennsylvania. Her mentor, Dr. Allan R. Day, advised her to teach at Penn, where she met and married fellow professor Richard E. Prange. Here Joullié describes Day's teaching and mentoring skills, along with her own views on educating students in the scientific fields and Penn's educational climate, mentioning Charles C. Price. In 1953, Joullié became organic chemistry instructor at Penn. Early on, she overhauled and ran the chemistry laboratories and stockroom. She conducted research on fingerprint reagents for the U. S. Secret Service and is now focusing on cyclic peptides. She reminisces about some of her former students. With Mildred Cohn, Joullié implemented affirmative action guidelines that led to more hiring of women and minorities in tenure-track positions at Penn. Also, she helped institute professional guidelines for chemists through the American Chemical Society. While on a Fulbright scholarship in Brazil, Joullié wrote a book in Portuguese on heterocyclic chemistry. Later, she acted as consultant for Western Electric and Shell. She is collaborating with Paul B. Weisz on angiogenesis research and is also working on a cholinesterase inhibitor for Alzheimer's disease. The interview concludes with a discussion of trends in chemistry textbooks, highlighting *Organic Chemistry*, which Joullié co-authored with Day.

INTERVIEWER

James J. Bohning is Professor of Chemistry Emeritus at Wilkes University, where he was a faculty member from 1959 to 1990. He served there as chemistry department chair from 1970 to 1986 and environmental science department chair from 1987 to 1990. He was chair of the American Chemical Society's Division of the History of Chemistry in 1986, received the Division's outstanding paper award in 1989, and presented more than twenty-five papers before the Division at national meetings of the Society. He has been on the advisory committee of the Society's National Historic Chemical Landmarks committee since its inception in 1992. He developed the oral history program of the Chemical Heritage Foundation beginning in 1985, and was the Foundation's Director of Oral History from 1990 to 1995. He currently writes for the American Chemical Society News Service.

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INTERVIEWER: James J. Bohning

LOCATION: Chemical Heritage Foundation
Philadelphia, Pennsylvania

DATE: 23 April 1991

BOHNING: I know you were born on March 29, 1927, in Paris. Could you tell me something about your father and mother and your family background?

JOULLIÉ: Yes. They were both French, from the South of France. My father was a very unusual Frenchman. I don't know where he got his genes from. I think most French people—and in fact, all his classmates—never left France, but he left when he was very young. First he went to Morocco, then he went to Colombia, and finally he settled in Brazil. That's when he sent for my mother and me. I was quite young when we left France, so I really have no recollection of France. Other than being born there, I have never been in Paris very long. In fact, my husband [Richard E. Prange] knows Paris better than I do. I don't know much about Paris. It's not my favorite city, although it's a very pretty city. I am a Brazilian at heart. I like sunshine, and I just could not live in a place where the sun doesn't shine. In Paris, it does not shine too often. So I don't have any real recollections of my childhood in France. I vaguely remember having a grandmother, but my real recollections are from Brazil.

BOHNING: How old were you when you moved to Brazil?

JOULLIÉ: About three.

BOHNING: Wasn't your father in the military when he was in Morocco?

JOULLIÉ: He was in the military in Morocco. I don't know what kind of a job he had in Colombia, probably some sales position. He traveled all over Colombia by train and even on a mule. We still have pictures of him looking like a native. He couldn't do that today. He was in every well-known Colombian city. I guess that's where he learned Spanish. Also, my father, being from the South, has a dark complexion, and he looks Spanish. My mother doesn't. But my father has assimilated South America very well.

My brother was born in Brazil. We first went to Rio, and then we went to São Paulo. I really remember my early education in São Paulo in an institution called Liceu Rio Branco. It was a very good school. I really feel that my Brazilian background laid the ground for the rest of my education. These were schools where you had to work hard. I don't remember disruption in class. We respected our teachers. I'm not really familiar with American education at this level, but in retrospect, I think our teachers made us think that accomplishment is important. They convinced us that we should strive to learn. The standards that they set we accepted pretty easily in those days. That's why I don't really understand today's problems, but they could very well be due to the teachers more than to the students.

My brother was born when we lived in São Paulo. In those days, I think São Paulo was a town of around two million persons. Today, it's sixteen million persons or more.

BOHNING: Yes, I was there just a month ago.

JOULLIÉ: We lived downtown at that time, near the municipal theater. I was often asked to play a little French girl when the Comédie Française was in town. [laughter] I remember that. But I was never very gifted on stage.

BOHNING: You were in private schools, then, rather than in public schools.

JOULLIÉ: I don't know that in São Paulo they even had public schools. When we went to Rio, they had one public school which set the education system for all the others. It was the Pedro Segundo. To be admitted, one had to take a very hard admission test. They only took three hundred students. It was one of the best schools around. The stuff they did in high school there was more advanced than what is done in college today.

I had what you would call an elitist education, even through high school. We had small classes. When we went to Rio, I went to the Lycée Française. My mother tried to make me pass the French Baccalaureat, but it turned out to be too much with the already heavy Brazilian curriculum—I had to go to school from 8:00 a.m. to 5:00 p.m. But I did take some French courses. A lot of our teachers taught both in high school and at the university level, so I think we had very good teachers. At that time I didn't realize it, but looking back, I think that excellent teachers had a big influence on my life.

BOHNING: What was your father doing at this time?

JOULLIÉ: By that time, he had settled down in Brazil. He was with a big pharmaceutical firm. In fact, he's worked in pharmaceuticals since we moved back to Rio, but he was a businessman.

BOHNING: Which company did he work with?

JOULLIÉ: It was called Millet & Roux at that time. Then he started his own company, Laboratories Lessel. Millet & Roux was a big company at that time; they had subsidiaries in Argentina and Brazil.

BOHNING: What about Lepetit?

JOULLIÉ: I think Lepetit came in later. They had large pharmaceutical companies, but I can't remember their names. But the pharmaceutical business has changed totally. They didn't have American firms when I was growing up.

BOHNING: Was your father's background in science, or was it in business?

JOULLIÉ: It was totally business. He was a good businessman in his day. My brother always worked with him. I don't think he inherited his talent, and neither did I. I could never sell anything in my life. [laughter] My father was a very energetic guy and very gutsy, I guess. He wasn't afraid of the future, which is a good thing.

My mother was a teacher. She was very different from my father. I think my mother always had a very sheltered life, and it is amazing how naïve she was—although when I talk to young kids these days, I feel pretty naïve myself. [laughter]

I was talking to my colleague, Ralph [F.] Hirschmann. I don't know if you know him. He was director of research at Merck for many years, and now he's at Penn. He's a wonderful guy. We shared a male secretary who decided to live with another female secretary. He asked me, "Do you think they're going to get married?" I said, "No, no. It's just an arrangement. They're going to share an apartment." [laughter] So he said to me, "What's the point?" [laughter] I said, "Well, they want to save money." I think we are not always aware of how society changes, especially if we live sheltered lives.

My mother was not really strict, but she always gave us plenty of unsolicited advice. She told us so much that sometimes, when I'm about to do something, I can hear her say, "That's not very nice, Madeleine. I wouldn't expect that of you." [laughter]

BOHNING: Do you feel you were sheltered when you grew up, then?

JOULLIÉ: Oh, yes, I was sheltered. You've been to Rio now, and you know how it is. I cannot understand how a city could have changed so much in a relatively short time. I never went downtown by myself until I was eighteen. We always had to be accompanied by an adult.

I think the first time I was by myself was when I came to the States. By that time, my father had decided that I needed to expand my horizons, so he decided to send me to school in the States. He had a friend who worked for Givaudan, a large essence company in New York. His friend said, "Oh, send her to Simmons College. That's a good school for girls."

Simmons College, in those days, was considered a more professional type of college than liberal arts schools such as Wellesley and Smith. Its students were mostly commuters. I imagine Simmons has changed a lot, too. But when I went there they didn't have any room in the dorms, so I stayed in a place called International House. They had girls there from the Fine Art Museum, Katharine Gibbs Secretarial School, New England Conservatory of Music, and other schools. It turned out it was much better than the dorm, because you got to know students from different backgrounds. The director did a wonderful job. In those days, you had to sign out and sign in. She really kept track of your comings and goings.

But I hated Boston. It was so different from Rio, especially the weather. It was a real cultural shock; it was a cultural shock in many ways. I'm sure I was also a cultural shock to the people I met, but I didn't realize that at the time. [laughter] This was in the 1940s, and I found most people rather hypocritical. I wasn't too happy with the way they did business. The blue laws got to me. You couldn't do your laundry when you wanted; for me, that represented real interference with my personal life. [laughter]

My best girlfriend is now a well-known mural painter living in Vermont. She was an artist, and we did many things together. We went to museums, and we talked about art and politics. She was stimulating company, but I found some of the other girls not to my liking. I thought they were pretty stupid, but they just had different aspirations. I worked very hard at Simmons, even on weekends. I remember one time on a Saturday, some girl was crying in her room. I asked, "Why are you crying?" I thought something was wrong with her. She said, "Because I don't have a date." I was pretty surprised that one would cry for something like that; it never occurred to me that I should have a date on Saturdays or any other day.

I was still pretty isolated from the real world. I didn't realize that there were better schools like MIT and Harvard just around the corner. I had no comprehension of what was going on at that time. It's amazing that I could survive, considering how stupid I was—maybe not stupid, but totally isolated from the real world.

BOHNING: What year did you go to Boston?

JOULLIÉ: It was in 1946. I graduated in three years, in 1949, and this was very unusual in those days.

BOHNING: You were in Brazil during World War II. Did you have any particular experiences during the war?

JOULLIÉ: No, no. We didn't really feel the war much. I grew up during the Gétulio Dornelles Vargas regime, a benign dictatorship. That's why when we talk about graduation, I say, "You know, I've never gone to one except my own." The idea of marching is still distasteful to me after those early years, when I had to march year after year during the national holidays.

BOHNING: When did you develop your interest in science? Was that still in Brazil?

JOULLIÉ: Yes, it was in Brazil. Actually, I took the entrance exams in chemistry at the university, and I probably would have gone there if my father hadn't decided to send me away to the USA.

BOHNING: Were you back in São Paulo when your father decided to send you to the United States, or were you still in Rio?

JOULLIÉ: In Rio. I was only in São Paulo for three or four years, around the time my brother was born. I had most of what they call the *primarío* in São Paulo, which I think was very important to my subsequent education.

It's funny, because when we were in school we had to learn poems and recite them. One of these was about São Paulo and the Tietê, a river which goes through town. As a child, it seemed to be a big river. Fifteen or twenty years ago, I drove to São Paulo with my brother. I said, "Oh, I've got to see the Tietê." My brother said, "Madeleine, the Tietê is a sewer." [laughter] When we found it, it was so small, and I remembered it as so big.

I don't really like São Paulo as a city. Paulistas are viewed as different by Rio inhabitants. Once, my husband was in Rio at some physics meeting. They served tea and he said, "*O chá esta na mesa*." A Brazilian physicist corrected him and said, "*No, o chá <u>fica</u> na mesa*." There is a very subtle difference between the two verbs. So my husband came home and said, "You taught me wrong." I said immediately, "I bet you met a Paulista. [laughter] Only a Paulista would correct a foreigner on such a small point."

BOHNING: When your father sent you to Simmons, had you decided by that time that chemistry was what you wanted to study?

JOULLIÉ: Yes. I majored in it; I took all the chemistry courses they offered. I took food analysis, and I loved it. I took quantitative organic. I loved the lab. I took all the labs in analytical chemistry. In those days, Dr. Allen [D.] Bliss was in charge of analytical chemistry. He was editor of *Chemical Abstracts* for many years. He was a real New Englander. I think he had seven or more kids. He never got excited. I still remember him with his little glasses, and he was a little heavy. He would type on an old typewriter all the time. He did everything by himself and a student assistant in those days. That shows you how things have changed.

We went into the lab and did the work on our own. Occasionally, I would go up to him and say, "Dr. Bliss, this step did not work." He would stop his typing, look over his glasses, and say something which usually didn't help very much—but the moral support was important. [laughter] He was a pretty dull lecturer, but he was a very nice person.

BOHNING: Were there a lot of chemistry majors?

JOULLIÉ: About eight.

BOHNING: That's a good number.

JOULLIÉ: Yes, it's quite good. I almost got expelled once because my friend, who was an art major at the Museum of Fine Arts, told me that Rembrandt [Harmensz van Rijn] made his own pigments. She got this old book out of the library that described how Rembrandt made his own pigments. I said, "Hey, that's no problem at all. We can do it, too." We went to the laboratory on a Saturday and dug out a large amount of linseed oil. I started heating this in a large evaporating dish. It smoked and stank up the whole place. It was our bad luck to have the president [Bancroft Beatley] in his office that day. He was a very mild man. He came in and said, "What are you girls doing? You shouldn't be working without supervision." [laughter] So we stopped. We never made our own pigments, but we made a mess.

Simmons was fun in many ways, although I didn't especially like it at the time. We had good teachers there, and I think they were supportive. They didn't know a lot about graduate school, so how I got from there to Penn was a total accident. I met a Greek once when I was at MIT doing something or other. I think he was more of an engineer. I asked him about getting a Ph.D. He said, "Why don't you go to the University of Pennsylvania? It's a good place." The people at Simmons had recommended Haverford, but they didn't take girls, and they didn't have a graduate program. I went to Bryn Mawr, too, but at Bryn Mawr I got lost. It rained like mad that day. I was caught in the middle of campus in a storm. I had real long hair, and I was soaked; when I walked into the building, there was this trail of water behind me. I was already in a bad mood, and I didn't like anything. I decided, "I'm not going there."

When I went to Penn, it was summer. I went to the old Smith building. When I walked in there, Allan R. Day was in his office, and I guess I slightly amused him. [laughter] He seemed friendly. I decided to go to Penn. That's all, without any real planning.

When I came to Penn, they had huge graduate classes. They had like fifty students in one class, because everybody had to take organic, physical chemistry, analytical, and inorganic. So I had mostly men in my classes. They all said, "Oh, girls don't do well," and that kind of stuff. But it didn't turn out as predicted.

BOHNING: That's an interesting comment, because even today you still hear that attitude about women—that women don't do well in science or mathematics. I'm curious that it was that prevalent when you came here.

JOULLIÉ: Oh, yes, it was. I think part of it was envy; men feel insecure. The only time their prediction was true was in the analytical chemistry course. I worked very hard in the course. In fact, I had a good background in analytical chemistry. I remember Dr. Wallace M. McNabb was teaching it. I mean, I loved Mac, even though the analytical chemistry majors said, "Mac will never give an A to a girl." "No," I said, "that's not true." Well, it was true; he didn't give me an A. But that's okay; I forgave him anyway. [laughter]

BOHNING: Before we talk about your long experience here at Penn, though, let me go back to Simmons for a little bit. Can you tell me something about the other women who were with you at Simmons and what they went on to do?

JOULLIÉ: A lot of them got married. I think one of them is a librarian. Another one worked for a while at DuPont. Most of them have not pursued a career, except for the one who is single. I think she's the librarian. It's not a lab position, but it is a chemical position.

BOHNING: Doing graduate work wasn't the norm, then.

JOULLIÉ: No, it wasn't. The student who went to DuPont had a master's degree from Oklahoma. She went to Oklahoma University, got a master's there, and then went to work for DuPont. She worked for quite a while. Then she got married and had three or four children.

BOHNING: At the point that you were leaving Simmons, had you given any thought as to what you were going to do before you made the decision to come to Penn?

JOULLIÉ: Not really. But when I graduated from Simmons, my feeling was, "I don't really know anything." I didn't feel comfortable with what I had learned, so I decided to go learn some more. That's why I first got a master's degree. When I went to Penn, they told me that they did not like master's candidates. I said, "No, I'm going to get a master's degree, and then I'm going to go back to Brazil." I had the idea that I was going to do great things for Brazil.

I didn't have a clear idea of what I would do. I guess I had no idea of what life was all about. It took me a long time to be aware of the real world, because I watched too many movies of Madame [Marie] Curie or [Paul] Ehrlich—you know, Paul Muni doing wonderful things for the world. [laughter] I just assumed that's what I was going to do—make the world a better place and discover all kinds of useful things. It's funny now, but I guess I really believed it. So that's the only thing I had in mind.

After I obtained a master's degree, Allan said, "You really should go on in chemistry." He didn't have to try too hard to convince me. He also wanted me to teach, and that's when things weren't quite so easy. I told him, "I don't want to teach. I don't like people." I'm afraid Allan was very, very understanding. I said, "I detest people. I don't need the money anyway, because my father will pay," like a typical Brazilian. [laughter] But he managed to convince me that it would be very beneficial. Once I started teaching, I realized its importance.

BOHNING: Let me come back to the time when you first arrived here. You met Allan Day even before you started, when you came down to look at Penn.

JOULLIÉ: Yes, but I started laboratory work in the summer.

BOHNING: You started right away in the summertime, then.

JOULLIÉ: Right away, yes.

BOHNING: Did you work for him from the very beginning?

JOULLIÉ: Yes. During that summer, nobody else was around, so I began doing some sloppy work in the lab. I remember I had an accident once with acetic anhydride all over the place. But Allan was a very nice person. I'm sure I wasn't the worst student whom he had to deal with. He had a lot of teaching experience.

In those days, in the old Smith Hall—I spent twenty-five years of my life or more in there—when you went up the stairs, there was a window. That used to be his office, and then it was my office for many years. It's a room right off the lab. In that lab, the left bench was for

graduate work, and the undergraduates were on the other three benches. So for many years, we had graduate and undergraduate students working in the same lab, which in a way was good, but in another way, not so good. If you made a mistake, then all these undergraduates would see it and make derogatory remarks. [laughter]

[END OF TAPE, SIDE 1]

BOHNING: Were there any other women at Penn when you started?

JOULLIÉ: Yes. Allan had one other woman student, Florence Meshkov. Her brother [Sydney] is a physicist; I think he's at Maryland. Florence married one of Allan's graduate students, Ebenezer [D.] Williams [Jr.], who went to work at DuPont. Florence was a little slow in finishing, because she was a part-time student. She came in at night to do her lab work. I think she finished after me; I don't know. She had been there for a while. I think she was the first or second woman who ever graduated in chemistry from Penn. In those days, there just weren't any women. There was no ladies' room in that building for a while. The summer I was there, you had to go to another building.

BOHNING: What was the attitude of the other graduate students toward you when you started?

JOULLIÉ: At first they tried to discourage me and make fun of me, but when they realized that I was doing well, then they wanted to copy my class notes. [laughter] They were always borrowing my notes; that's all I remember about them. I didn't find my colleagues too interesting, either.

BOHNING: Did you make any contact with other Brazilians while you were here?

JOULLIÉ: There were none. We haven't had any Brazilians until recently. Brazilians, like the French, are people who don't normally go out of their country. They don't emigrate; they like it where they are. But the situation in Brazil is such a disaster these days that everybody is trying to get out. We had a very smart boy the last six years, from Santos. He was an electrical engineer. He came here very eager and did extremely well. He got a dean's fellowship. You did not meet too many Brazilians in those days. You find more now, but they were really something rare. I had a Brazilian student in the 1960s. He did very well; he is now director of a polymer institute. But otherwise, there are very few Brazilians, and I guess that's why I was pretty much isolated in some ways. I was always very busy anyway, so I never had a big social life.

My brother lived with me for four years. That must have been in the 1960s, also. He attended Villanova. However, my brother was never a scholar.

BOHNING: Your parents still are in Rio, though.

JOULLIÉ: Yes, they are, unfortunately. I was there over Christmas, and I just can't believe what's going on there. The crime, the dirt, and in general, the society attitude has totally changed. One of my nephews lived with this girl without being married. They're not married, and they think it's fine. That's a big change in attitude.

Everybody seems to accept this situation. I don't find it that great. I got the Garvan Medal some years ago. I always go to the luncheon at the ACS meeting. This year, the award went to a professor at a prestigious university. In the program, there is always a biography of the winner. The biography claimed that she had two children, that she was divorced, and that she kept company with another man, a chemist. I do not know why this marital situation has to be publicized. Today, people like to brag that they're divorced. But why brag about it? At the very least, it reflects poor judgment. That's the way I look at it. I also think that today's attitude of not wanting to get married represents a lack of commitment. I don't have too many friends. I have enough, probably, but I consider friendship a commitment. You stick with your friends for better or for worse. I think today, people just don't believe in commitment.

In the Sunday *Philadelphia Inquirer* about four or five weeks ago, they had a story about a woman who had lost her job. She couldn't stay with her kids because they had a dog, and she was allergic to dogs. She had to move on and then went to California. The thing that impressed me about the story is that if my mother wanted to stay with me and I had a dog, and she were allergic to the dog, I would certainly get rid of the dog.

I don't understand people who don't have any attachment to anything. I feel sorry for them. That's a terrible way to live. But that's the way it is for many people.

BOHNING: You got married.

JOULLIÉ: Very late.

BOHNING: Wasn't it around the time you got your Ph.D.?

JOULLIÉ: Oh, no, it wasn't. It was much later.

BOHNING: Much later?

JOULLIÉ: At least six years later. It was in 1959. I've been married over thirty years now. I can never remember. I used to have a secretary who remembered all those things, and my mother-in-law. [laughter] I wasn't planning on getting married.

BOHNING: You had one of the early commuting marriages, as I understand it.

JOULLIÉ: One of the earliest. I see people writing about this situation like it's something special. When we did it, nobody had heard of it. My husband's chairman tried very hard to get me a job in Washington. He kept telling my husband, "When are you going to end this stupid commuting situation?" [laughter] I figured it was none of his business. The marriage has worked out pretty well, although it is expensive because we maintain two homes, and the commuting is also an expense. But in other ways, I think it works well. I like to have the week to myself. I don't think that how much time you spend with somebody is important. You cannot spend all your time with the same person. It's the quality of time that counts, and when you have little time, I think you are more careful not to waste it. My husband makes me mad sometimes, but I tend to control my temper because if we have a few hours together, I don't want to spoil them by fighting. In a way, I think I'm more aware of our relationship than most people are. I don't take it for granted.

BOHNING: As you said before, the term commitment certainly applies, in your case, to the way you have this arrangement and how important it is to you. Many people wouldn't be able to survive in that situation.

JOULLIÉ: Yes, I know. I think it's important. That's why I feel very committed to the people whom I know—my parents, my husband, and my brother, although we don't have a lot in common and I think he has spoiled his children. But I don't want to fight with him, because he's my only brother. I just wish for his sake he did things differently, but there's nothing I can do. I also am committed to my students and Penn. To me, that's important.

Today, new graduate students come and tell you, "You do wonderful research," and "I'll do this." I don't try to pressure people into working for me. I never did. Now, I don't know; maybe I won't take any more graduate students pretty soon. When I picked my advisor, I picked him because I thought he was a person I could work with, and he was good. I think that's the way a student should pick an adviser. Why should I tell students, "This research is wonderful." I put a lot into my relationship with my students, and I work very hard with them. I think it's a fifty-fifty relationship. If they work for me and they want to, it's wonderful. But if they don't, I'm not going to be any poorer for it. It's less work for me—that's the way I look at it.

Today, we attract students with all kinds of promises. It's very hard today, with the funding situation as it is, to make promises. We now recruit students like we do football players. However, you can see a football player play. You don't see a graduate student in the lab until you have accepted him or her. If you judge students by their grades, with today's grade inflation, it doesn't mean much. An A student may not measure up to his or her grade.

BOHNING: I noticed at the ACS meeting in Atlanta that the University of Tennessee actually had a booth in the exhibit area to recruit students. That's the first time I've seen that.

JOULLIÉ: Yes, I saw that. I think it's sick. I don't think that's the way it should be. I think you should let people make their own decisions. We have a big student attrition, and unfortunately, they are mostly women. Students say they want to go on, and then they get disgusted with the whole thing and give up. Chemistry's a big investment, especially these days. We put a lot of money into the students, not only paying their tuition, but also paying for their research. The research costs a fortune.

You keep a student for two years; you try to teach him or her to do well in this and that subject. Then they decide to quit, and sometimes they won't even work in chemistry. It's a big waste of money and time. I don't think we should attract people into a field where they may not want to stay.

I have misgivings also about pushing so many people to become scientists. I think we should have people in science. It's very important, since we are already behind the Japanese. But more important than just training students for being chemists is to train them to understand science, to look at the scientific method. I think that's actually more important, because people who want to be scientists will only do science. But other people are going to be involved in controlling the science.

Look at our present Congress. You don't have one scientist; all the members are lawyers. They don't think the same way. Today, many students are illiterate in every subject. We tell students to take English when they come to college, but we don't tell them to take any science. The result is that we have actors going in front of Congress to talk about chemicals they put in an apple. They really are not qualified to discuss matters about which they know nothing. [laughter]

That's all because we haven't spent any time educating non-majors. That's why I spend a lot of time with my premed students. These students are going to be doctors, and I really want to make sure that they can think, that they can make judgments, that they can do more than just memorize facts. I think that if we don't educate all students, we're in big trouble, because the people making decisions don't have the ability to do this rationally. You have certain data; you analyze it; you do the best with what you've got. Most people can't even do that. Everything is based on appearance; it's television and it's the way someone looks.

You take our present vice president [J. Danforth Quayle]. He may be president someday, and if he is, it's only on his looks. This is because of television. That's another thing. People who read the news, which actually is a moron job, essentially get millions. You can spend your life working very hard to be a scientist, risking your life, and get paid nothing. Our system of reward is based on the lack of understanding of what it takes to be a scientist.

Now, based on the present rewards, I think twice before I advise a young person to go into chemistry. I know we need them, and if they really love the subject, they should pursue it. But people who encourage young people to pursue a career in chemistry never think about the financial rewards. What's in it for them? Students can go to Wharton, get an MBA, and double their salaries. One of my former graduate students is a professor at Textile. He teaches at Penn in the College of General Studies. His daughter graduated from business school. She's making more than he is. So while the reward system is what it is, why should people go into chemistry? I don't mind other people being paid well. But gosh, these rock types, that really blows my mind. People with no voice and no musical ability can clean up millions, more money than chemists could ever make during their whole lives. It just doesn't make sense. How can you tell people, "Go and work hard for a degree in chemistry," when salaries compared to other professions are not competitive?

You have to think about the future when you advise young people. But there are people who love chemistry, no matter what. If you love a field, you should work in it. That's very important. But you have to know the consequences. The fact that they don't pay chemists well bothers me, because it shows society's lack of appreciation for a profession that takes hard work and some talent. Yet in the entertainment field, people make all this money. I don't think it's right. What do they do with it? Half of them just kill themselves with drugs, anyway. I'm not very conscious of money, and I don't want any more than I can use. I already have more than I can use. But still, I believe people should be rewarded properly.

Also, because of these business schools, the attitude of chemical companies has changed. Industry finds research too expensive and not sufficiently rewarding. Some days, I wonder what kind of a country we are going to be in. I don't know why I should worry about it, because I won't be here to see it. Are we going to be selling insurance to each other, and nothing else? I don't know if you watch "Sixty Minutes." I watch it occasionally. This Sunday, they showed how ninety-five percent of our electronic parts that go into some special plane are Japanese. If the Japanese were not selling them, we would not have them, because places like RCA and GE have decided there wasn't enough money—enough profit—to manufacture these parts. This is this Wharton mentality in which they don't teach long-range planning. It's all, "Make a quick buck and then get out." Look at the savings and loan situation. That distresses me, but I don't know what to do about it.

BOHNING: As long as people pay money to see athletes and rock stars, and the general public continues to approve of that, then it's going to continue.

JOULLIÉ: Yes, but the problem is that the general public is not really capable of logical thinking. That worries me, because we don't work hard enough at educating the general public. More has been done recently, and I think it's a good thing.

I think children are very easily motivated. That is the ideal time to make a lasting impression on their minds. If children believe that life is always parties, drugs, et cetera, they don't have any hope for the future. They will not amount to anything.

BOHNING: Let me return back to when you started at Penn. Did you have any financial support from the university?

JOULLIÉ: They paid me as a teaching assistant.

BOHNING: Then you were a TA from the beginning.

JOULLIÉ: Yes. But my father always supplemented things in those days. Now I realize that it's not proper to be supported, but he could afford it then. I guess I put it to good use.

BOHNING: You said that all entering students had to take the courses in the four areas. Whom did you deal with in the faculty?

JOULLIÉ: There was Ernest C. Wagner; he was an organic professor. He was great; I always loved Dr. Wagner. After he retired, he always used to come and see me in the lab. He was a very nice guy. [Thomas P.] McCutcheon taught inorganic. I think he played the organ; maybe that's already a long time ago. Tom McCutcheon was his name. He was nice. He had worked for Friedrich Wöhler, and he had all these beautiful crystals of inorganic compounds. They had glass cases full of crystals. I think when they tore down the old Harrison Laboratory, which actually was the real historic building, they threw all those compounds away. It's really a shame. Dr. McCutcheon gave me an A. [laughter] But I did very well in inorganic; I liked inorganic.

Dr. Wallace M. McNabb was the analytical chemistry teacher. I liked Dr. McNabb, except he was the world's most boring teacher. He would tell us, "We have this imaginary beaker. Stir it around a little bit like this." [laughter] But he was great. Then Dr. [James F.] Hazel—I took a colloid course from him. I'm sure today this would not pass for a colloid course, but I took the course anyway. Who else? There were Evan C. Horning and Marjorie G. Horning. They went to Texas from Penn. He hated teaching; I think that's why he left Penn. But I took an organic course with him. Dr. Hiram S. Lukens was chairman then. He was an electrochemist. That was it, pretty much.

BOHNING: You said that you took a lot of analytical. You liked analytical at Simmons and you liked inorganic at Penn, but you ended up as an organic chemist.

JOULLIÉ: Yes. I had a lot of organic chemistry in Brazil, and I liked organic. At Simmons, I took qualitative organic. I had a lady teacher there who was wonderful. She was very good, and she encouraged me a lot, so I liked it. Analytical is like exercising. [laughter] Anna Harrison, who was president of the ACS and teaches at Mount Holyoke—which is a good school—was at Penn once.

You know, most schools have done away with analytical chemistry; we don't have it anymore. I thought students who had analytical were much better in the organic laboratory than those who didn't have it, and I said so to Dr. Harrison. She replied, "Our students are so bright. They get very bored when they have to do things more than once." I said, "That never occurred to me, or maybe I'm not bright. What I liked about analytical was the challenge of doing experiments until the results really agreed." I liked that. Apparently some people just got bored. I don't get bored doing the same thing over and over. I think you can keep on doing it better. It's the same principle as exercising; I don't see the difference. I think analytical chemistry gave students a solid scientific basis. Today, most of my students have no concept of significant figures.

BOHNING: That's amazing.

[END OF TAPE, SIDE 2]

BOHNING: How do you find the preparation of the undergraduates entering college today, compared to when you started?

JOULLIÉ: I don't think they're that well prepared. Penn doesn't always get good undergraduates. I think we turn out better undergraduates than we get, in many cases. They may have fooled around in the lab, but today, students tend to impress you because they know a name. They know such-and-such a reaction. You ask them, "What is it? Explain it to me." They <u>can't</u> <u>do</u> it. They know everything, but understand nothing. I think that's a sad situation. I'm not going to complain about it because my colleagues always say, "Well, Madeleine is always complaining"—which is true. I'm always complaining, and proud of it. [laughter]

To talk about complaining, I just went in front of whatever the committee was. There was a provost memorandum that said, "You cannot give exams on religious holidays. You cannot do this; you cannot do that." We've got two days in October of vacation, and now this last thing—Ramadan, the Moslem holiday—whenever it is. They don't know when it is. I was incensed, because I give four exams. The first semester is thirteen weeks. The spring is

fourteen, which is ridiculous and shortchanges fall semester students. We shouldn't have that. It shows the lack of understanding of what a week means in a course like organic chemistry. To schedule four exams into thirteen weeks while avoiding all the religious holidays is impossible.

So I requested an interview with the calendar committee. I said, "You can't do that. What are we here for? How can I do my job? Every year it gets harder and harder because you make semesters shorter and shorter." One of my friends, Alice Cunningham, did this calculation of the number of hours we used to be in school, and the ones that we are now in school. Over four years, we've lost six months. I'll show you the figures, because she gave them to me. That's what it is.

A young professor of religious history was the chair of the committee. He sent me a letter that said, "I didn't know we had more days of class," or whatever. So I thought, "He must be very young." Sure enough, he was very young. [laughter] He came to the meeting with his baby. I said, "Look, nothing personal, but we are paid for nine months, right? Why do you think we are paid for nine months, rather than ten or eleven?" "Oh, I don't know." I said, "Because we're supposed to work nine months. Do you know how many months we work? Eight months." Then he said, "Well, I don't know any professors who want to teach more." I said, "You just met one. [laughter] I don't know what you teach, but for organic chemistry, we have to add more and more material to the course. We don't leave anything out. How do you expect me to cover all the material when the time allotted shrinks a little more every year?" I finally became unpleasant. "Look," I said, "Penn is not a religious school. You want to observe religious holidays? Go to Villanova, go to Yeshiva, go to whatever the Moslem equivalent is. Don't come to Penn. I don't think we should recognize any holidays if they're not for everybody."

The hypocrisy is that when the registrars do it, nobody objects. They had the final exam on Martin Luther King's birthday. I cannot schedule an exam on this day, but registrars can. The Fourth of July in summer school is a class day, which I think it should not be. I think we should observe national holidays.

Finally, I said to the committee, "You know, I don't care about religious preferences. There are two things that do not interest me—your sexual preference and your religion. I think it just promotes prejudice to have people say, 'I am a Catholic,' or 'I'm a Jew,' or 'I'm this or that.' Why tell me? You want to worship? Do it in the privacy of your boudoir. I don't see that we should be responsible for other people's personal lives. Today, professors take time off frequently. I do it to go to meetings or to give lectures. When my colleagues go away, I give the lectures, and they do the same for me. When students go away for interviews at medical school, they get other students to take notes for them. We all make arrangements for our absences. Why should a religious holiday be different from any other day? I don't see it. I don't think it's my business, and I don't think it's anybody's business to know why someone is absent. You want to worship? Sure, do it as often as you wish, but do it on your own time."

I probably made a bad impression on the committee because I was really upset, but that's the way it is. One of my former students who came back on this campus recently said to

me, “Gee, Madeleine, this place looks more and more like a club rather than a university.” [laughter] Now they want to have a new student center, the Revlon Center, which is understandable. I mean, Houston Hall is really inadequate; it hasn’t changed since I was a graduate student. Students do need a better place to gather. But when I heard the vice provost for university life saying, “I see a fireplace with big chairs where we can sit,” I had to laugh. [laughter] First of all, if you had these chairs and the place were open to all, like Houston Hall, they wouldn’t last very long. Second, a fireplace—why do we need all this comfort? I just don’t see it. The administration has this idea that we’re all here to enjoy ourselves. When the president started to say, “The university is a place of learning,” I said to him, “Gee, I’m so glad you said that. I was beginning to doubt it.” [laughter] But it’s true, because everything seems to take precedence over our mission, which is to educate people.

I did something that today is considered historical, although I didn’t think at the time it was such a big deal. That’s why they all make fun of me now. I set my exams ahead of time—four exams. I put the dates down and tell the class, “If you have a problem, let’s take care of it now.” It turned out that one of the Wednesday nights for the exams was the day before Thanksgiving. I had not realized it; nobody said anything at the time. On the Monday before, they told me. I said, “Why do you tell me now? It’s too late. The exam is ready. You’re going to have to take it.” They took it. I couldn’t do anything. So everybody laughed at me. I wouldn’t have done it naturally; it was an oversight. I looked at this pretty carefully; I don’t know why I forgot. I guess I was too busy with the Jewish holidays, and I forgot Thanksgiving. [laughter]

More and more, people act like the university is a club. Probably I’m not, but I used to think of myself as a liberal. Even now, when we’re discussing this issue of racial harassment, I agree we should eliminate it. It is definitely wrong. But I think the administration is going about it in the wrong way by thinking that rules will do it. I said to the committee, “You know, we are a university. It’s our job to educate people so they don’t go and slur other people. If we taught our students to behave properly, then individuals who would not behave properly would feel isolated. They would not have any support. Our job is to educate. You can make all the rules you want, but pretty soon it’s not going to do any good, and eventually, individuals will not be able to express their opinions.” I’m not in favor of some politicians talking about open expression, because they don’t care about it either. On the other hand, I think that taking some abuse is also part of growing up. If you’re going to protect people to the extent that they cannot hear anything they do not like, they are not learning about real life. We all have to hear unpleasant comments. I heard plenty from my early days on, because I happened to be a girl.

This Saturday, my husband got this video. It was a French movie, probably from the 1930s. It’s called *La Fille du Puisatier—The Well-Digger’s Daughter*. It was done by Marcel Pagnol; he’s well-known [a writer-director]. It wasn’t very good, because it’s an old movie. I reacted by today’s standards. Everything in it was sexist. The protagonist said, “Girls don’t think very much,” and “Girls are dumb”—all these really prejudiced comments. This individual had five daughters. Therefore, we’ve come a long way in eliminating these attitudes.

However, that is the way I was brought up. You have to adjust. If you don't have a fairly thick skin, you're not going to survive. It's as simple as that. Originally, I think, I was a sensitive girl because I was very protected, and my mother was also very sensitive. I just had to take a few bumps—but they didn't hurt me. You get over it; you have to. T. S. Eliot had a play in which he said, "You have to learn to survive humiliation until humiliation no longer humiliates you," or something like that. [laughter] It's part of growing up. When you get referees' comments on a submitted manuscript—when you read what they think of what you worked so hard on—you have to handle it. I had some referee reports in the past where they said, "This female doesn't know what she's doing."

BOHNING: Really?

JOULLIÉ: I had to swallow that. But you have to put it behind you and have the satisfaction to show them they were wrong.

BOHNING: I wanted to talk some more about your rise through the ranks here at Penn, but let me come back to that. Allan Day had a strong influence on you.

JOULLIÉ: Oh, yes, definitely.

BOHNING: Could you tell me something about him?

JOULLIÉ: I think Allan was one of the best persons I knew. There are a lot of people who will tell you that. I think he was one of the nicest human beings ever born. I don't know how he got that way. He rubbed a little bit on me—not that much, because I'm more a lot more aggressive than he was. He was thoroughly honest. That's what I admired in Allan. I don't think somebody like Allan could survive today. It's a sad thing to say. He couldn't. He was totally honest in everything he did—in his relationships with people, and also in his work. Allan was brought up maybe in a way that hurt him, but in his days, people didn't have grants. The university paid for everything. Today you couldn't do that because of our instrumentation; it's totally out.

Allan had this idea—in a way it's wrong, and yet it's not totally wrong—that when you went to people and sold your ideas, it was a kind of prostitution. Today, we have to do that because we don't get any other support. It's not totally wrong that selling your ideas is similar to selling your body. One we call prostitution; the other one we don't. But today, it's how we do business, so that's why he wouldn't have survived.

He was totally devoted to his students. He helped people. He helped a lot of minorities way before other people did. I remember one professor used to say sometimes—and bless him, he's dead—"Women and blacks are at the bottom of the list," when he had his TA meeting. You could hear him say that. I did. But Allan was very concerned with minorities, and he helped the underdog. He was devoted to the department. He was a totally good guy. One time, he told me he found this woman totally drunk in the street. He picked her up and then put her in a cab, and gave the guy some money to take her home. He told me this story because the woman said to him, "You must be a Mason." [laughter] He was just a wonderful guy.

He was a terrific teacher. I sat through many of his lectures, and they were never the same. He always made you look at things differently. I think he stimulated people. One of our trustees, Dr. [P.] Roy Vagelos, mentioned in an interview with a Penn magazine that Allan had a very profound influence on him when he was an undergraduate (1). He wrote this little book that I have on electronic mechanisms (2). He was a pioneer in introducing electronic mechanisms to undergraduates. It didn't just help me; it really helped a lot of students and stimulated them. I think that's the same thing that I said about my early teachers—people who could make you want to accomplish something and make something out of yourself. I think that's very important. Not everybody can do it, but I think it's essential.

He and Mrs. Day were both very nice. Mrs. Day was a very, very nice woman, too. Mrs. Day came to visit me once when I bought this house in Society Hill next to the Towers, when they were first built during urban renewal. Mrs. Day took the bus, and the bus driver said, "Where are you going, lady?" She said, "Well, I'm going to Third [Street]." He said, "Nobody lives there except the rats." [laughter] She told me this story. They were really both wonderful people.

Allan was gifted. Allan was not a businessman. His earlier book could have made money (3); the second could have made money too, but if you can believe it, that book was typed by one secretary. Allan had no business sense at all. I don't have a lot either, but I think I was better. What hurt me a lot with Allan is that as things changed and we had to write proposals, I really didn't have any idea of how to do that. Even if he had wanted to help me, he couldn't have, because in a proposal you have to sell yourself, and so you have to exaggerate a little bit. Allan would not do that. In a way, he was so honest that it's unbelievable; it's amazing.

BOHNING: You said earlier that he had wanted you to teach, but you had objected at the time.

JOULLIÉ: I objected. I told him in no uncertain terms that first of all, I didn't need the money, which wasn't very much. I think in those days, they paid you one thousand dollars a month, or something like that. Then, I kept telling him I didn't like people. I liked to shock him, because he always said, "You have to like everybody." I said, "No, I don't like anybody." [laughter]

BOHNING: After you got your master's, you didn't go back to Brazil. Instead, you decided to stay and get your Ph.D. What were your plans after your Ph.D.? Had you thought about that?

JOULLIÉ: Yes. Actually, I looked for a job. I interviewed at DuPont. They said they only hired women in the library, if you can believe it. [laughter] That sort of turned me off. By that time, they needed somebody at Penn, and in those days it wasn't uncommon to hire your own people. They figured, and rightly so, that I could work very hard—which I did.

BOHNING: Had you interviewed at any other companies besides DuPont?

JOULLIÉ: Yes, I did. There were some companies in the Philadelphia area. One was the Garrett Division. I interviewed there, but it didn't work out for whatever reasons.

Then, I decided teaching was good. I taught that organic lab for God knows how many years. If you wanted to see a health hazard, that was it, except we didn't know it.

BOHNING: Somewhere in the 1960s or 1970s, you went on a campaign to clean everything up in the laboratories and the stockroom.

JOULLIÉ: I didn't even know how to do it. I'm sure that if I have something wrong with me, it must be after all these years. The old Smith building had all the chemicals in the basement there. I swept that floor for years, and God knows how much of that stuff I inhaled. I cleaned all these bottles and relabeled everything. The windows didn't close, so you had to do that every six months because of the dirt getting in. It was filthy in there.

In the labs, the first few experiments were the nitration of benzene and the sulfonation of benzene; everybody was using benzene. I think that lab was a hazard. I redid the lab later, and actually, it was a pretty good lab. By the time the 1970s came, we had one of the best labs at that time of any school. We really did a lot. Then after that, they assigned it to other faculty, but they could not spend the time it required. Running an organic laboratory is really a full-time job. I don't know how I did it. It's a full-time job, and with a research program and everything else, it was too much, so Dave White said I shouldn't do it anymore. He assigned it to some of my male colleagues, but it rapidly degenerated because they could not give it the proper attention. Finally, we hired Dr. Mallory to run that lab, and Sally [Clelia W.] Mallory has been doing a great job ever since. When I was undergraduate chair, I also put in a proposal that requested a complete renovation. We were funded. Sally did more work than I did.

BOHNING: When you started teaching in 1953 after you got your Ph.D. (4), you were called simply an instructor.

JOULLIÉ: Yes, that's right.

BOHNING: It was not a tenure-track position.

JOULLIÉ: It wasn't a tenure-track, but I got tenure very early. I got tenure as an assistant professor, or something like that.

BOHNING: I wasn't clear about when you did get tenure.

JOULLIÉ: Yes. I think I got it as an assistant professor. I was a research associate. I think when I was made assistant professor, I also was given tenure. I had tenure very early, but then, I wasn't promoted for twenty years or so. It was Charlie [Charles C.] Price and Dave White who helped my promotion.

Now, Charlie was peculiar, too. I like Charlie; we're very good friends. But in those days, I remember one time I said, "Well, what do you have to do to get promoted?" Charlie said, "You have to be a scholar, and women usually aren't scholars." [laughter] I'm sure he doesn't remember saying that. But then Dave White came, and of course Dave made it very clear: "You've got to change your research interests." Although my research interests and Allan's were close, they were never quite the same, but people always thought they were the same. So he said, "You'll never get promoted unless you can change." Then, I decided I'd do photochemistry. I knew nothing about photochemistry, but it looked like a good thing. So, what kind of photochemistry? I had done a lot of heterocycles, so I decided, "People know about ketones; I'm going to do photochemistry of heterocyclic ketones." It turned out very well, and I managed to scoop a couple of very good photochemists, totally by accident (5). [laughter] But that earned me some brownie points. That was totally different from my synthetic work, and I felt good. When I got the Philadelphia section award [ACS Philadelphia Section Award, 1972], that's what the subject of my talk was (6). I never did much photochemistry after that; I really didn't like it that much, but it paid.

Then I decided to do other things. I went into ketenes, which I also knew nothing about. They are carcinogenic. But the work went well; we really started a new field and did a lot of very nice work with ketene chemistry (7). Then when the funds dried up for that project, I became interested in sugars (8). I wanted to use sugars to make organic molecules. I remember my first proposal; one of the referees wrote, "How does she want to work with sugars? She doesn't know anything about sugars." [laughter] Carbohydrate chemists are a very, very close little club. I went forward. I made furanomycin and revised its structure (9). I was trying to make muscarine at first, but I never did make muscarine (10). I made some other stereoisomers (11), but people used to say, "Madeleine, why do you want to make muscarine?" I said, "I'm going to poison my colleagues." [laughter]

[END OF TAPE, SIDE 3]

JOULLIÉ: Muscarine was a good target, because you could show the mushroom where muscarine comes from. That was a neat slide I had. Then I made furanomycin. It's an amino acid with three chiral centers. Today people make huge molecules with all kinds of chiral centers, and you're impressed. But if you think logically—which even chemists don't do—if you have a large molecule, you can get chiral pieces already available. You can use amino acids. It's actually much easier, and I have done it, too—that's why I know. To synthesize a large molecule may be easier than a small one. Five-member rings with three chiral centers are a lot harder than a twenty-three-member ring with a few more chiral centers. But the twenty-three-member ring appears to be harder.

So for a while, we used carbohydrates and chiral templates. Then I decided to focus on amino acids (12). In this case, I also went into it without knowing anything about it. But my philosophy is that if you're going into a new area of research, you bring with you some of your knowledge from your other areas. In a way you're ahead, because you don't have the same prejudices that somebody who works in the field may have. For me, it's always worked out very well. We're still doing peptides, and probably it's about time to find another area. Usually I try to be ahead of the competition in the sense that once everybody does it, then you want out, because other chemists may have bigger groups and more money. We've always managed to be a little ahead, do our thing, and then go on to something else.

We've also been working with fingerprint reagents (13). To examine latent fingerprints, the reagent of choice is ninhydrin. But there are a lot of problems in developing latent fingerprints, because the paper and other materials also luminesce, so you need to design some compounds that can fluoresce but also show you the fingerprint. We've done some work on that, although right now I have other ideas on this. This is not my interest, although it's been fun.

I don't know how the investigators from the Secret Service got my name—probably from some other chemist who worked for Allan. When they came in for the first time, I just about died. They said, "We're from the Secret Service." I thought, "My God, what did I do?" [laughter] They wanted us to make improved reagents for latent fingerprint detection, and that we did. It is amazing that forensic chemistry really doesn't have a lot of organic chemists, whom I think they could utilize. But it's a fascinating area of chemistry. I like mysteries myself, so the subject appealed to me.

Our main interest now is in cyclic peptides of two kinds (14). One is a compound that comes from a marine tunicate, which is like a sea squirt. They grow in colonies. It's a powerful immunosuppressive, and that's what we are interested in. We synthesized it very efficiently. Now we're going to try to replace some pieces, to see if we can identify the groups responsible for the activity. The other cyclopeptide is a cyclopeptide alkaloid found in plants. Apparently, they transport large ions from the soil into the plant. But they have been very difficult to

synthesize. We just completed the total synthesis of one natural product, so maybe now we can investigate their chemistry (15).

We still have some other research problems dealing with carbohydrates. My experience is that nothing is trivial in chemistry. But mostly, we have fun. My philosophy for choosing problems has been to pick new areas where there isn't too much competition, at least for a while. It's not a very scientific reason. Or, if there is some funding for a project, as was the case with the Secret Service, then we're ready to work on it. [laughter]

It was actually fun to work with them. We do not develop latent fingerprints, but we learned how to do it. It makes a good demonstration. We all sweat, but some people sweat more. They are good donors, and some people are bad donors. In cold weather, you would be a bad donor because you don't sweat a lot. But you can put your finger in some grease, then spray the stuff on it and show the fingerprint in the different colors. It's a fun thing.

BOHNING: Throughout all of this varied work that you have done, how hard has it been to maintain support?

JOULLIÉ: It's been hard. I spent a lot of time without support sometimes, and just had my students teach. You can spend a few years between grants, and that's tough. Today, you cannot do it anymore. You have to get support no matter what. If you don't get support, you're out of business. That's where it's at now.

I also think that people are measured by the amount of support that they can bring in. It doesn't matter if you're a good teacher. It's sad, but nobody really cares. The administration pays lip service to teaching. When you think about these Lindback Awards, or the [Ira] Abrams Award, considering the competition is the entire SAS school, it's not a big thing. If you do good teaching in addition to everything else, it's fine, but no assistant professor is going to get promoted or tenured because of teaching. I wish the administration would say this more forcefully, because it's true. They also should tell the students. Some faculty may have this idea that good teaching is going to be rewarded, but they will be disappointed.

Of course, how do we measure teaching? We really have no good way of doing it. My idea is that you cannot tell good teaching until you've seen some of the students the teachers have trained, and that takes a long time. I judge a teacher by the students he or she has taught. If a student is very good and says, "Well, so-and-so taught me," you know so-and-so did something right. I don't care what his style was, because the purpose of teaching is to make people learn. That's what many people cannot understand. Our students have the idea that teaching is like entertaining. [laughter] Ted Koppel or whoever else is there, that's what they're looking for—instead of trying to find out whether, when they come out of the course, they're a little smarter than when they came in.

BOHNING: I had long maintained at my institution that faculty evaluations should be done by the alumni.

JOULLIÉ: I think so. In fact, I have a letter, which I started long ago but never finished, to say exactly this. All the other teaching evaluations are irrelevant.

There is a professor in psychology—I forget his name—and one in Russian history, who are great teachers. Allan was a great teacher. But you cannot just try to imitate them. Everybody has a different style, and it's not the style that's important. What counts is, does it produce something? Is it accomplishing what it is supposed to? One year, I was a member of the Ira Abrams Award Committee. In a letter for a professor, this young girl said, "Oh, he's a wonderful teacher. I came in the class because he smiled at me and said, 'Is this the room?'" [laughter] Is the students' idea of good teaching that you smile at them? You can smile at them, but so what? What's that going to do?

BOHNING: I know, from my own experience, of two of my undergraduate professors. I thought my organic chemistry professor was great, but I didn't think my physical chemistry professor was as good. However, when I got to graduate school, I found my preparation was just the reverse. I was much better prepared in physical than I was in organic.

JOULLIÉ: Yes. Yes, that happens.

BOHNING: That's the test.

JOULLIÉ: That's the test. I considered Allan a good teacher for that. He tried to make you think; that's why I went to many of his lectures. I actually enjoyed it because he tried to make you think. He showed things in a different light every time. I think that it was very stimulating. We had a professor who did nothing but tell jokes. His classes were horrendous and his preparation was zero, but students <u>loved</u> him. He also gave eighty percent As. I don't think students are mature enough to pass judgment on what constitutes good teaching. I wasn't mature, and I don't think they are. It's as simple as that.

But the administration is so receptive. Today, we seem to have totally given in to students. I still believe that the faculty has more experience than the students. Again, I don't want them to turn the university into a health club. Although I'm not teaching this semester, I gave some lectures for Bill [William P.] Dailey when he had a commitment. His third exam was an easy exam. The average was around fifty. Do you know why? Because of Spring Fling. Because of this important event, students don't study, and they do poorly.

BOHNING: As I said from my own experience, the person I really appreciated is the one who made me work the hardest, but who also made me think. I didn't realize when I was going through it what my preparation was about. However, when I started getting into graduate work and had to solve complicated problems, then I realized the necessity of it.

JOULLIÉ: Yes, that's right. I forgot to mention my physical chemistry teachers. John [G.] Miller was a tremendous teacher. I remember another professor, Dr. [George] Lucas. He was a good teacher, too. These people made you work, and they made you think. I think that is very, very important. You know, this is the only time you have to learn. When are you going to do it if you don't do it now?

About three weeks ago, I had to go for another mammogram because I had this trouble. They had to take more film, and then they said, "You've got to see the doctor. You've got to wait." I'd just gotten this [Class of 1970] term chair with the ten thousand dollars, and I was already planning how to spend it. She looked so sad. She made me take more films. I said, "Gee, I'm not going to be able to spend my first ten thousand dollars." That's all I could think of. It's terrible. [laughter]

So I talked to this doctor. She looked real serious, like she was going to say, "Okay, Madeleine. You've got it now. Bad news." She said, "It's an honor to meet you." "Oh, my God, I'm going to die for sure." [laughter] She said, "You don't remember me." The name sounded vaguely familiar. I said, "No, I don't remember you, but probably I taught you organic." Every doctor I go to, I've taught organic, at Jeff [Thomas Jefferson Hospital] and everywhere. I cannot go to a doctor I didn't teach. She said, "Yes, you did, but you don't remember when." Apparently it was in the 1950s. She said, "I was a bio major. I was scared to death of organic, and they told me there was this hysterical woman"—that's me—"teaching the course so hard. [laughter] I came and talked to you, and then you encouraged me. You tutored me on Saturdays." I don't remember any of this. I haven't tutored people on Saturdays for a long time. She said, "You took me to the ACS meetings. You wanted me to be a chemist, but I wanted to be a doctor. You wrote me letters of recommendation. Dr. Day also wrote letters. I'm here because of you." I thought that was really nice. She said, "Also, I want you to know that I was the one who found this lump the first time." I'm glad that she was telling me that. I was beginning to feel like crying. People remember these things. I'm glad.

I know they're going to be doctors, but I think it's important if you spend the time with them. It frustrates me that advisers tell people education is so important, but do not emphasize that education is not limited to the subjects that you think will help you. Anything that you learn, even if you learn it badly, contributes to make you what you are.

I had six years of Latin in Brazil. I don't need Latin for many things, presumably, but I'm sure that in some way, it was helpful. Education cannot be narrow; it must be broad. I love music, but I'm tone deaf. In Brazil, we didn't have a choice; we had to take music. In this course, you had to do musical dictation. It was horrible if you had no musical talent. There were a lot of things we had to do. I hated it, but I did it. If you flunked one course there, you

would flunk the whole year, so I worked hard to pass all the courses. But the fact that I took courses that were hard for me was good.

Also, we had to take freehand drawing. I was awful at it. I think I got a D in that, too. But you had to make an effort. Also, it made you realize that you were not going to be good in everything. I think that's very important, that you know your abilities. If you're no good at something, you work a little harder to be at least average.

Sister [Helen M.] Burke was a former student of mine. She's a chair now at Chestnut Hill College. I gave her such a hard time. [laughter] One time, she was doing a drawing. I said, "Sister, you are terrible. This is awful." She said, "I'll have you know I got an A in drawing." I said, "Well, I got a D in drawing, and I'm better than you." [laughter] But it was true—I'm bad, but I swear she was worse. She had no sense of proportion or anything. You have to know your limitations. You're a much more balanced person.

I have a former student, still a very good friend of mine, who was from New York and had never driven a car. So I taught him how to drive. Learning to drive at twenty-something is probably all right. Well, he did okay. Then he went for his driving test, and I think he forgot to stop at a stop sign. He flunked. He came back to the car and I said, "Oh, forget it. We'll come tomorrow." Then I looked at him, and he was crying. I said, "Come on, it just doesn't mean anything." Then he said, "I have never failed anything in my life." That made such an impression on me. I have failed plenty of things in my life. I think I failed my first driving test, too. [laughter] But you cannot expect that you're always going to succeed. I think it's unhealthy. It's true this person was very smart. But no matter how good you are, you're always going to do something badly, and you have to accept that.

Today, students expect to excel in everything. I had a student last fall who came from Clark College. He was doing C work, and he said, "Well, I had nothing but As at Clark." I said, "It's possible, but maybe there are some things you just have to work harder at." Today, all the students come and say, "Well, I'm an A student."

I had another student who worked for me. She went to Hood College, and then she came to Penn. In those days, she had to take four entrance exams. She was a bright girl. She failed all of them the first time. That girl was shocked. Here she was an honor student, all As, and she failed. I said to her, "You're smart. You can do it. You work at it, and next year I bet you pass them all," which she did.

I think it's healthy to have some disappointments in life. Today, the trend is to see that all students get As. If you work, you get an A. You can work very hard and get a D, because you don't have what it takes or because you are going about it wrong. But at least, it's the work that you put in a course that's going to make you a better person—it's not the grade.

I know this is not a popular idea. I still speak my mind, but I don't insist on converting people as much as I used to.

BOHNING: One of the things I noticed was that many of your early students were women.

JOULLIÉ: I didn't have any students for five years. Then I had only women graduate students. It took me five or six years before I got the men. Dave [David K.] Wald was my first male student. Ron [Ronald H.] Yocum and Wilson [F.] Gum [Jr.] and Jal [F. Munshi] all signed up, Jal a little bit later. They all signed up, and they were the best students I've had probably in my entire life. Ron Yocum is president of Quantum now. I just got a nice letter from him for the Lindback.

These students were so good. I think of that time; it's just another generation. They could take charge of things; they set up their own instruments; they did this and they did that. Once when I went to Brazil, they played golf a lot, but when I came back, they said, "Dr. Joullié's coming back; we've got work to do." [laughter] They were cute. One time their wives went away and they went to see this movie, *Fannie Hill*. By today's standards, it's probably pretty mild. They said, "Gee, we saw this terrible movie." I said, "What movie?" "*Fannie Hill*." I said, "Aha, you guys. Your wives go away, and you go to see dirty movies." [laughter] But they were a joy to have.

BOHNING: Was Penn admitting more women as graduate students at that time?

JOULLIÉ: Yes, they were. Penn always had more women—first of all, because they had a college for women. We were the only Ivy League school to have mixed classes. I like to think this was also because I had so many women students early in my career. Once a semester, we invite graduate students, to recruit them. So I was there, and we had something like ten women come. They said they'd never been in a department with so many women. There are Marsha [I.] Lester and Sally Mallory and myself. We've got at least three fairly reasonable people. They said, "It's so nice to come in a department and see women professors." Even now, there are only men chairs. We have about fifty percent women in graduate school. We have a lot of women graduate students. I like to think that they feel comfortable when there are other women. But my first women students were terrific. They were very good.

[END OF TAPE, SIDE 4]

JOULLIÉ: I did research for five years with undergraduates.

BOHNING: Those early papers are all with undergraduates, then?

JOULLIÉ: Yes. They were all undergraduates. Maybe one of them was a master's student. The early paper was with Sue [Suzanne] Násfay (16).

BOHNING: One of your students who comes to mind is Elinor [C.] Fisher.

JOULLIÉ: Ellie Fisher works here at the Institute for Scientific Information. She was a bright girl. I wanted her to go on and get a Ph.D. She decided to get married. She got a master's degree, but she was a talented girl. I'm sure she is still doing well, but she stopped with a master's degree.

BOHNING: Then there was Dorothy [J.] Rabiger.

JOULLIÉ: Yes, Dorothy was somewhat of a problem. She was an only child. She loved baseball. She taught me all kinds of things about baseball, which I forget now because I don't like it that much. She looked like a boy. She had trouble adapting in industry—she just didn't fit the industrial mold—but she was a bright girl.

BOHNING: Arleen [C.] Pierce comes to mind.

JOULLIÉ: Arleen Pierce. Arleen was a terrific girl. She's still around, and she comes to see me. She lives in Maine. Now, she's an interesting girl. This student finished faster than anybody. She's still that way. If you tell her, "Arleen, this should be done," she will go and do it. She had amazing energy. She did very well. She built a GC all by herself. She loved lab work. She worked for Allied Chemical. She did well there, and then she decided she wanted to teach. She got a job at Douglass College in Rutgers. Then all of a sudden, she decided she wanted to live in Maine. Who would want to live in Maine? [laughter] I don't know. She got a job at Saint Joseph's College. She was chair of the department, doing well. Then the college collapsed somehow; it was just a small college. Then she did some consulting for the farmers, and finally she got out of chemistry. She is now retired, but we talk to each other often.

I also had Laura [L.] Zaika. She is also retired. Laura was a nice girl. She had a Ukrainian background. I had a lot of Ukrainian students in the early days.

BOHNING: Is there any particular reason why they were here?

JOULLIÉ: I don't know. I thought I had Ukrainian appeal, but that's no longer true. [laughter] I think they had a big Ukrainian population here. Dave [David K.] Wald was Ukrainian; Laura was; George [M. J.] Slusarczuk; and Joe [Joseph M.] Bohen, who is a good friend of mine.

BOHNING: Was your first paper with Allan Day your Ph.D. thesis (4)?

JOULLIÉ: Yes. It was an interesting problem, but we picked up on that and did a lot more work. In fact, Ron [Ronald H.] Yocum finally, more or less, solved it (17). That was in 1953. I'm not too proud of my thesis. Compared to my students who have five-hundred-page theses, mine was in the fifties.

BOHNING: Did Day assign you this problem?

JOULLIÉ: Yes. I didn't know enough to get a problem in those days. It was a good problem, but we didn't have the equipment to study it properly. All we had were elemental analyses.

BOHNING: You used the Beckman DU somewhere along the line.

JOULLIÉ: Right. Those were different days.

BOHNING: You continued to work on esters.

JOULLIÉ: Oh, yes. Ron Yocum had what I think is a real nice publication. Arleen also worked on the same problem (18). Yes, this was an interesting paper too (16)—by Sue [Suzanne Násfay] and Laura Rypstat.

Lillian [Li-Yen Wang] was my first Ph.D. student (19). She's still working in Washington for the Food and Drug Administration. She was striking—the most beautiful girl you've ever seen. We would go in an elevator with Lillian, and people just opened doors. She's still very beautiful. She is very bossy—typical Chinese mentality, Madame Chiang Kai-shek. [laughter]

Arleen did a very nice job on her thesis (20). She built her own GC. She really persevered on a problem for which we were ill equipped. Ron Yocum had better instrumentation, and he did a fine job on a similar problem (17). But I didn't do very much in this area after Ron.

BOHNING: Well, you switched over to synthetic problems then, and you worked with the benzimidazoles (21). Why did you do that? Was it just a matter of branching out into something new, or was it more than that?

JOULLIÉ: I don't think I really was cut out for physical organic. I dabble with it a little bit, but I don't like it as an end. I like synthetic work. [laughter] Do you have all my papers?

BOHNING: They're not all here. However, I picked some out that represented your work over the years you've taught (22).

JOULLIÉ: Do you have the new ones?

BOHNING: No, I don't.

JOULLIÉ: In those days, we did IR. Today, we can do x-ray and other spectroscopic methods.

BOHNING: You have commented that the need for total synthesis of natural products in structural elucidation is still important, in spite of all the analytical techniques.

JOULLIÉ: I believe this is true. It's so obvious you'd think all chemists would see it, but they don't. You cannot always get an x-ray. In fact, in many cases, you cannot get an x-ray; not all compounds are crystalline. So how do you know if you have the right structure? The way to know it is, if you assume there is a structure, you assemble the right pieces and you synthesize the structure. If they're identical, you have proven the structure. That's what we did for furanomycin. Its structure was misassigned. We made all the possible stereoisomers, and we showed which one was the correct one by comparing them to the natural product (23). I think that is a powerful, powerful tool. We have a great x-ray facility. You can turn in a compound, and sometimes you've got your x-ray the next day—but, to get an x-ray, you need a good crystal. You need a stable crystal. If you don't have that, you only have one solution, and that's organic synthesis. In my mind, that's the strength of organic synthesis.

Today, we talk about architecturally challenging molecules, and they do exist. However, these architecturally challenging molecules are easier to put together than they used to be, because we know more. Sure, chlorophyll was a tour de force synthetically, but who needs to make chlorophyll? In addition, long synthetic schemes do not often afford large amounts of products, so what is the practical importance of making architecturally challenging molecules?

It's like playing chess. I don't play chess, but my husband plays for hours with himself and with other people. I recognize that it is intellectually stimulating. My intellect is not good enough for it. It is intellectually stimulating, but would you pay people what they pay us just to play chess all day long? No, you wouldn't. I know it's an intellectual exercise; it's very nice and all that. But it's not something that has much practical application, except in developing new methodologies.

My contention is that you cannot do chemistry just to entertain yourself or to show how smart you are. I think that the most important function of synthesis is a good practical application, and structure determination is certainly an important one. First of all, you cannot do x-rays all the time. Two, it's fallible; it's fallible in many ways. It happened to us in the cyclopeptides—you can get the mirror image. In the cyclopeptide alkaloids, there was one x-ray that when I looked at it, all the amino acids were D. I knew they were L. So I wrote to the investigator and asked, "How come?" He said, "Oh well, that's the way it came out." Number three, there was just recently in the *JACS* some chemist using x-rays; he confused oxygen with fluorine. He got the wrong structure with an x-ray because apparently, the coordinates were close together. It's embarrassing, but it can happen.

I think that structure determination is still a strength of organic synthesis. I think it is an important function of synthesis. We revised the structure of furanomycin. We did it again with the didemnins (24). We should try to make structures that cannot be obtained easily from nature. To do that, we cannot just do a synthesis. A good, practical synthesis is needed. It's like process development; you have to work hard. If at the end of a synthesis, all you have is enough sample to run an NMR, you cannot go any further.

You can see that we've come a long way when you look at both structures, but I'm still very proud of furanomycin. We did a structure revision and then a total synthesis.

BOHNING: I grew up with virtually everything being synthesis. But I get the impression today that it's becoming a lost art, to the extent that we teach students now—from early undergraduate days on—that we can solve our problems with instruments and computers. We still need to be able to have manipulation of those molecules in the laboratory.

JOULLIÉ: Oh, you do, you do. It's disgusting in a way. My students cannot do a recrystallization. I'm sure you are familiar with this old gray book by [Arnold] Weissberger (25). When I taught recrystallization, I emphasized the theory of recrystallization—why you do it as you do it. Today, my students have no concept of the principle of recrystallization, balancing the solubilities. They have no concept of distillation or drying. The theory of drying is very important. They have no concept of the theory, and so they do things without understanding why.

I don't know if you've seen our organic lab. It's a beauty. If you ever want to see it, Sally Mallory will show it to you. But students have less hands-on experience. They do more

with GC; they do a little NMR. But they really don't do many multistep syntheses, and they can't. I had an honor student in my lab who had to do a distillation. He set it up totally wrong. But today, you've got to be prepared to see the unbelievable. It's not stupidity; it's lack of exposure. We did away with analytical chemistry; we did away with several syntheses. As I said, learning is gradual. Chemistry is not like physics. My husband always says, "If you haven't done your major work by twenty-three, you won't do it." That's okay for theoretical physicists. For us, what counts is every little bit that you learn. Today, we give students less time to learn. Time is important for everybody. The more time you're going to spend in the lab, the better you are going to be.

Labs are expensive; everything is expensive. I understand that. But still, we're not training people properly, because you cannot solve everything with computers. Sure, we do molecular modeling and all of that. You go in the lab, and if things don't work as predicted, your modeling was no help. Right now, I'm encouraging my students to learn more modern NMR techniques, because the advances in this field are fantastic. I said, "You have to learn the new techniques. But you have to remember that they are no better than your understanding of the NMR instrument." What is a good spectrum versus a bad one? Even in my days, there were people who had IR spectra that looked like UV spectra. They had no concept of what an IR spectrum should look like. That's the kind of knowledge we're not emphasizing. It's the same thing that I've said—people get mad, but it's true—"Today's generation knows it all, but does not understand anything." That's very disturbing, at least to me. I wish students knew less, but what they knew, they knew well.

BOHNING: I wanted to ask you some questions about your university activities. You have certainly been involved with a number of things here.

JOULLIÉ: Oh, yes. Too many.

BOHNING: You were on a number of committees.

JOULLIÉ: Yes, safety. I was the one who put signs on the doors in the old days. We had a big safety meeting with all the safety experts. That's when they suggested we close all the doors and leave only one open. It goes way back. I had safety signs in all the chemistry buildings. Now, you know, the university has a safety department.

[END OF TAPE, SIDE 5]

BOHNING: You were on the Committee on Open Expression and Demonstration on Campus.

JOULLIÉ: It was a fun committee to be on. Now, it's a namby-pamby committee. I complained about it and they didn't even listen. I think that the new guidelines should be sufficiently flexible. Instead, they want a little rule to cover every possible incident. I think that's a big mistake. But I enjoyed that committee; that was fun.

BOHNING: That was during the Vietnam War, wasn't it? You signed a paid ad in the *New York Times*.

JOULLIÉ: Probably.

BOHNING: I think I have a copy of it here (26).

JOULLIÉ: Yes? I forgot. You see, a lot of the things I do, I tend to forget. [laughter] Yes, I'm sure I did.

BOHNING: What was Penn like during that time? Was this committee an outgrowth of campus unrest?

JOULLIÉ: Yes, it was related to it. Frankly, we didn't have a lot of campus unrest. Penn is a pretty sedate place. What they consider campus unrest here is nothing. I went to Columbia University in those days, and I can tell you what student unrest was there. We never had anything like that. Penn students are pretty conservative in the long run, even in those days. Do you know Ira Harkavy? He's an administrator here. He was one of the agitators in those days. With a bunch of people like that, you're not going to get a lot of agitation. I consider myself an agitator too, as you can see. Penn never really had many problems. They just think they had problems, but they didn't. The Open Expression Committee was made to control some of them.

Helen [C.] Davies seems to remember the story, which I forgot about, where somebody was saying, "Madeleine, what would you do if a nude man came into your class?" That was the question. Helen claims that I said, "Well, it would depend on what he looked like." [laughter] I don't remember that story. I could have said it.

We worked very hard on these guidelines. There was this professor from Wharton and some other conservatives. I think it was a pretty good committee, actually. I sort of enjoyed it, although I don't remember it too much. I also chaired the Open Expression Committee for a couple of years, and that was no joy. We had trouble with the trustees meeting once where the students were making noise.

BOHNING: You were also on the Committee on the Status of Women at the university.

JOULLIÉ: Yes, that was an important committee. I think it started things. Mildred Cohn was on that committee, and Phoebe [S.] Leboy, and Helen Davies. I think that committee did a lot. I don't think I was one of the most active members there. I did my job, but I didn't do anything extra. I think Phoebe and Helen were tremendous, and Mildred had the reputation to put the report together. We couldn't have done it without her, although Mildred is very conservative.

She's a good friend of mine, but you wouldn't call Mildred a feminist. You probably wouldn't call me one either, but I'm more of a feminist than she is. She's like every woman who has been very successful—you forget how hard it is for other women. She had three children, and she had a great husband. [Henry] Primakoff was as nice a husband as you could have. She had a full-time housekeeper. There is no question she is a bright and very hard-working woman, but she's had it all. She's not a feminist in the sense that Phoebe or Helen or I would be, but she added the credibility to the document. Without Mildred, we couldn't have made it.

BOHNING: You then became involved in affirmative action for a long time, about five years.

JOULLIÉ: Yes, that's a funny story. No, it was more like seven years, probably; it was a long time. If you want to know the truth, that was totally accidental. I regard that as one of my most important contributions to the university, again, in retrospect. The way I got involved in that was that Vartan Gregorian came to me before a faculty meeting, put his arm around me and said, "Madeleine, I'm making you my Affirmative Action Officer." I said, "What is this?" [laughter] I didn't even know what he wanted. So I said, "No. I've got to find out what this is first." In true Vartan form, he went into the meeting and announced it.

What was I to do? They had a little blue book from NIH that told you what to do. I read the book, and I got ready to do that. I just followed the directions. Then we said, "We're going to design some forms," which we did. They have been modified with time. At that time, Eliot Stellar, then Provost, wanted to establish a Council for Equal Opportunity. Every school had to have an Affirmative Action Officer, and I guess because I had been the most active, I chaired this Council for Equal Opportunity. The council was very successful. The Affirmative Action Officer for the university was Jim [James H.] Robinson. I don't know if you ever knew him. He was the administration representative; he organized the meetings. We had very good meetings. There was Leonard [D.] Miller, who was from the medical school; he was very good. Some of these Affirmative Action Officers were not as efficient, but the council brought the university schools together.

What I did when I became SAS Affirmative Action Officer was to talk to all the chairmen in SAS [School of Arts and Sciences]. In those days, the English department didn't have any women. Some departments still don't. Mathematics, in spite of my trying, twenty

years later they don't have any women. I talked to the chairmen, and that was good. I showed them what we had to accomplish. They had to advertise, and they had to invite women candidates. They had to make extraordinary efforts to look for women. I emphasized that we did not want to hire potential candidates just because they were women or minorities; rather, we should look for excellence in women and minorities.

Most of the chairs were pretty nice, except mathematics. They brought three people there when I went to talk to them, and they tried to give me a hard time—which of course they couldn't do, because I'm not a shy violet anyway. [laughter] They did their best. They told me that they couldn't do this or that.

Finally, departments did advertise, and the faculty made an effort to recruit women. You can say, "Well, so they wrote to women." But it was an education, and it eventually produced results. English brought in a lot of women, as did many other departments. This job involved a tremendous amount of work. I had no secretary. I essentially did it all by myself, but I don't regret it.

I had a few problems. In one department in those days, a very smart woman who was right for the position advertised applied. But the buddy system prevailed. There was this other candidate who had worked with somebody in the department, and they wanted him. The woman was much better. I wouldn't sign the form. So the faculty of the department signed a letter saying that I didn't know what I was doing, and if I had my way, their chairman would resign. So Vartan said, "Look, Madeleine, look." I said, "Let him resign. [laughter] I don't care. I'm not signing." I didn't sign the form, but Vartan, in his own political way, must have allowed the hire. However, this person was not satisfactory and was let go.

I had a few other problems like that, where I wouldn't sign the forms, but they usually got through. Although I had plenty of grief, the job was rewarding. Once at a cocktail party, there was a reporter from *Science*. I heard a faculty member telling this reporter, "Oh, yes, we advertise, and we invite women." He was telling her all they had to do to recruit women and minorities, with a very serious face. I overheard the discussion, and I felt very good about it, because I thought I had educated some of the faculty. Even though I was told that I was crazy, that I would cause faculty to resign, and that I didn't know what I was doing, I think I made the faculty aware of affirmative action.

I felt that during this period, I was really educating the faculty. For me, it was a very rewarding time. Maybe I'm bragging, but I think it made a difference. I think that what made a big difference was that I could get away with saying some things to my colleagues that an administrator could not have. I think that period was a very good one for affirmative action.

BOHNING: Those were the principal areas I wanted to cover.

JOULLIÉ: Yes, that's about it. Safety was also one of my activities.

BOHNING: Was that a campus-wide safety activity?

JOULLIÉ: Yes, it was. But chemistry was the worst.

BOHNING: It would have included engineering and biology, as well.

JOULLIÉ: Yes. We invited specialists, and we had a big conference on how to proceed. That worked out pretty well.

BOHNING: How did the Penn scientific community react to that?

JOULLIÉ: Naturally, people had the usual complaints, especially about the doors. But it didn't last too long. When I chaired the safety committee in chemistry, I had unannounced inspections. They were not very popular. But I think chemistry is better now. As a disgrace, one of my labs burned down in January. That was the supreme humiliation for me.

BOHNING: Oh, was that your lab?

JOULLIÉ: That was mine. The student had worked for another professor and was new in our lab. He claimed I never told him not to do that. He had left a mechanical stirrer on all night, and not in the hood. My students don't do that. Whatever, it's still my fault. I was really devastated. It was just two days after I came back from Brazil. I was so depressed. I had to go to Cincinnati right away because they had a woman lectureship, something I had to go to. I felt like hiding my head. Surprisingly, people were nice about it. I thought my colleagues would kill me, but they were supportive and I appreciated it.

BOHNING: I remember that morning because I turned on the radio and they said there was a fire at 34th and Walnut Streets, which I thought was this building. [laughter]

JOULLIÉ: No, it was 34th and Spruce. That was me. They were supposed to start work this week on fixing the lab, but they didn't. That was one of the low points of my career. Now I cannot brag I never had an accident.

BOHNING: As a graduate student, I was in a lab with a benzene fire.

JOULLIÉ: That's a bad one.

BOHNING: We had one door. It was a square room. The door was in one corner, and I was back in the other corner. There was a table in the center. I turned around and saw a wall of flame from floor to ceiling, but I managed to come out around the other side of the table and find the door.

JOULLIÉ: Scary. Benzene goes on for a while, too.

BOHNING: Yes, and it has a lot of soot, so it gets black in a hurry. You can't see anything.

JOULLIÉ: You should have seen this lab. The telephone melted. It was lucky that it happened when nobody was there. It was bad enough, but if somebody had been there, maybe we could have stopped it. You should have seen this big rotary evaporator. It looked like a [Salvador] Dalí painting. I tell you, when I saw that I was sick—and the smell. Actually, my chairman [Amos B. Smith III] gave me a raise shortly after—not because of this, but because when they do their little business, I'm still underpaid. [laughter] So I said, "Amos, I'm going to tell everybody that to get their raise, they need to burn their lab down." [laughter] No, that was sad. But nobody got hurt, so it was not as bad as it could have been.

BOHNING: You wrote an article called "A Community of Sexists" in 1971 (27).

JOULLIÉ: Oh, was that in the *DP* [*Daily Pennsylvanian*]? I loved that. The dean used to live next door to me; in those days, I lived in the suburbs. I can't remember his name. I always liked his wife and children, but I didn't like him. That was an early feminist manifesto. It didn't get me very far. I loved the title, "A Community of Sexists." In fact, I don't have a copy of that.

BOHNING: I have one.

JOULLIÉ: You have one?

BOHNING: We can get a copy made if you want.

JOULLIÉ: It was in the *DP*, right? I liked that title.

BOHNING: What kind of reaction did you get to that?

JOULLIÉ: I didn't. They all thought I was a fool. I don't know what I said anymore. Well, that's true. "The average university intellectual does not consider himself a racist." I got a lot of grief because I had a joke about the English department, that they only hired two women and one died, or something like that. Yes, I really got heat from the English department at the time. They said, "Would you stop perpetrating jokes on that basis?" [laughter] Three hundred and eighty men. I wonder how much that's changed. That's interesting. Yes, I'll make a copy to compare it with what we have now. Yes, that's amazing. That was 1971, and there was no woman as a full professor. What a fine speech. That's the one they objected to. "When you give women tenure, they either die or become alcoholic." [laughter] They didn't like that very much. No, they didn't like that. Yes, I'd like to have a copy.

BOHNING: All right. We've been going about three hours. Why don't we take a break.

[END OF TAPE, SIDE 6]

BOHNING: Here is a copy of that paid ad in the *New York Times* (26).

JOULLIÉ: Dorothy [Dorothea J.] Hurvich and her husband Leo [M.] were my neighbors for many years. They sold their house some time ago. [H. E.] Caspari is dead. I know [Sidney A.] Bludman. I know a lot of these. Allan Day signed it, too. Primakoff was a great guy; I always liked Henry. That's why I tell my own husband, "How come you're not like Henry?" Henry adored his wife. [laughter]

BOHNING: These are just some things from your awards. I was at Chestnut Hill the night you received the AIC award. You were there with Claude [K.] Deischer.

JOULLIÉ: Right. I gave an address at Chestnut Hill College, which I wish I had kept, but I'm sure I didn't even write it down. It was a feminist address at their commencement, and I remember talking about people burning bras. I wasn't advocating it; I was just saying that there is more to it than that. All these nuns were there. [laughter] Sister [Helen M. Burke] should have known better than to invite me. In the old days, Prince Rainier [III] had a spiritual advisor. So I said to Sister, "How would you like to be my spiritual advisor? I could tell people I have one." She said, "No way." [laughter]

BOHNING: She was an early graduate student of yours.

JOULLIÉ: Yes, quite early. I had one publication with her (28). She was with [Magid A.] Abou-Gharbia in the lab—an Egyptian—and an Iranian. She was trying to teach them Christmas carols. My God, it was enough to drive me out of the place. [laughter]

BOHNING: How did they react to that?

JOULLIÉ: They didn't know what it was all about. "Deck the halls"—they didn't know what it meant. She had to explain it. I don't see Sister here, but I know we published together.

BOHNING: Here it is, number sixty-six on your list of publications (22).

JOULLIÉ: Oh, that early? So she was here in the middle 1970s. She's done well, and so has Magid Abou-Gharbia. He's director of research at Wyeth-Ayerst. He tells everybody when they complain—because he's very aggressive, and I didn't teach him that—"I learned that from my professor." [laughter] Sister's done very well too. It's good to see that.

BOHNING: You were involved in the ACS, both locally and nationally.

JOULLIÉ: Yes, a lot. I never got much credit for it. I remember when I was working on the first professional guidelines. In those days, believe me, that committee was pretty conservative. The first time that we voted on whether we should have guidelines, there were only two people who voted for it—myself and [Warren D.] Niederhauser. Niederhauser eventually became ACS president. We were the only two to vote for it, so it didn't pass—but eventually, it was passed. Now, they've extended guidelines to academics. I really wanted to get on this committee for that very reason. People in industry had no interest in seeing professional guidelines, and the majority of the committee was from industry. I sort of crashed that one. I remember the first time I expressed a desire to be on the committee. I was told, "Well, little girl, you'll have to come back later." [laughter]

BOHNING: Terrible.

JOULLIÉ: That was probably the most interesting thing I did in the ACS. I don't enjoy committee meetings as much as I used to; I guess it's time to quit.

BOHNING: Did you ever get involved with the Women Chemists Committee?

JOULLIÉ: Not too much, because for my taste, there is not much to do. It's just another committee. No, I haven't been active, because there are no big issues. Right now in the ACS, I don't see too much that's really controversial.

BOHNING: How would you assess the change in the status of women during your career?

JOULLIÉ: Amazing. There is still hidden discrimination in some ways—it's very subtle—but we have made tremendous progress. You see women doing anything these days, and that goes back from the days there were no ladies' rooms in the building. I used to say the best thing affirmative action did for women was to put a ladies' room on every floor, which is true in a way. [laughter] But it's really done more than that. I think now, if they really want to, women can, essentially, do anything they want. You're always going to find one person who may not be that helpful and all that, but it's going to be a minority.

I feel very good about the situation for women, for my students. I think in a way it's an advantage today if you're going to get an industrial job. Of course, an academic job is a headache for men or women. We were just talking about that yesterday at dinner. We have such great expectations for young people. It's true that they come with one hundred fifty thousand dollars, two hundred thousand dollars starting money. They get students, postdocs, compared to my days when I got nothing. But still, we make very high demands on them. We want them to be internationally known after six years.

Academia is going to be hard for anybody. Women, if anything, might have a slight advantage, because agencies are supposed to consider them. But outside of that, I think for industry it actually pays to be a woman. If you are a woman and a minority, my God, you have more offers than you know what to do with.

I feel very good about the woman's situation. Of course, I'm not going to say it's perfect. I shouldn't say that; otherwise, we won't get anything else. But it certainly has improved so much from when you read that (27). That was true, and you see what it is now. Women <u>have</u> been promoted. The only thing to notice is—and I guess maybe I knew it anyway—but when you think of all the women who have been in a position of power, my only regret is that some of them really haven't done any better than men. I was always hoping they would. I guess that's the way it's going to be. You're going to find some good ones and some just like men, who have done no better. But it's positive.

BOHNING: Do you think that Allan Day helped you really get started, from the early days, as a woman on the faculty?

JOULLIÉ: Yes. Allan never had a lot of influence, but he must have had some. He certainly wanted me to go on in teaching. I'm sure I owe Allan everything for leading me. In fact, that's what people recognize today. I just went to this talk by a woman professor. She said, "Mentorship—that's where it's at." Certainly nobody could have asked for a better mentor than Allan. He taught me everything he knew; he pushed me in every way he could. So I owe him everything, I'm sure. But that's what is important, and that's what doesn't always happen right now with mentors.

I'm going to tell you a very recent story, but with no names. This young lady is married to a young man. The young man has an academic job. She wanted to interview in industry. Her mentor said, "Why do you want to do that?" "Just to see how it is and get used to it," which you should do. The mentor said, "No, you don't want to get an industrial job. You want to be a post-doc for your husband. If everything else fails, you can go and bring up kids." This is 1990. It happened. It's there.

She asked me what I thought. Of course, I told her what I thought in no uncertain terms. [laughter] She did do some interviewing. They're going away someplace in some other state, and they started proposing that she get a lecturer job there. We have Sally [Mallory] as a lecturer. We treat Sally as an equal, exactly—the same privileges. We don't treat her as a second-class citizen, and she's not. She's more important to us than most of the guys there. We treat her properly. But in many schools they pay people to do a faculty job, and they don't treat them with the respect that they should.

Actually, not being promoted surprised me, but it never really bothered me too much until people started asking me, "How come you haven't gotten promoted?" Then I realized it might hurt my students. I felt very good as I was. I think that's been one of the advantages that I've had—being totally unaware of what was going on around me. That way, you're sort of protected. If people don't think highly of you, but you don't know it, it doesn't bother you. [laughter]

BOHNING: I was going to ask about that, because it was a long time before you received your final promotion. Do you have any indication of why that was so? You certainly had a good track record.

JOULLIÉ: Probably because of Allan. Because I got my degree at Penn, I have been a second-class citizen always. I got the Garvan Medal, which was a national award, before I got promoted. I also got a couple of other awards, and I still wasn't promoted.

Part of it was Allan. Dave White was our chair. I like Dave; I think Dave has a very good heart. Charlie Price, after telling me some politically incorrect statements in my youth, actually worked very hard to see that I got promoted to full professor, which is surprising. He finally decided I wasn't a total idiot after all. [laughter] Once he decided that, he went to bat for me. I think partially this is the way. I was doing a very heavy amount of teaching, which

probably people also regard as inferior. I suppose that's what it was, and it's past. I thought for a while, they would never promote me. But I was prepared for that, too.

BOHNING: Were you teaching the introductory organic course all these years?

JOULLIÉ: Oh, yes. I haven't taken many sabbaticals. I may have taken a couple of them, and then I took one after I was sick. After that, I think I've taught it every year. I used to teach lecture and lab until Sally came. That was a tough job, to teach both. I'm still teaching the lectures. We're supposed to rotate, but we never rotate.

I'm a little sick of first-semester organic. But in a way, what I like about it is that they get good study habits with me, which makes it easier for others. They already know they have to learn things. If I taught second semester, I might get them in a mixed bag, and then they'd resent me more. At least if you take them from the beginning, it's easier. But it's a tough job, especially since some classes are so diverse. You have real bright people and you've got real hopeless cases. Nobody's hopeless, but the difference in ability is great. But I enjoy teaching undergraduates more than graduate students.

BOHNING: Why?

JOULLIÉ: That's a good question. I think they are more enthusiastic. You can really stimulate them, and they can do things. With graduate students, they seem blasé; they know it all. They don't think that something is important. With undergraduates, I have a lot of fun—I always have. Allan was right and I was wrong. [laughter] Again.

I think it's important. If you make an impression on people at an early age, there is a chance that it's going to stay with them. I feel that there's too little of that at every level—at the parenting level and at the teacher level. I think teachers today tend not to talk about other things. Not that I talk about other things than chemistry, but, for instance, I treat them as professionals. I tell them they all are going to be professionals and I expect professional behavior from them. I also say that in my opinion, integrity is the most important quality of a professional. I say I can forgive a lot of things, but I'll never forgive lack of honesty, and they had better know it. At least I tell them where I stand. I pass them a little thing which tells them how to do this or that, because I think you have to go on record. I tell them I expect them to work, because that's what they're here for. I will work very hard with them, but they also have to produce. That's what they hear. I think today teachers are sometimes detached. They go in there and they do their thing. I find that I really care about my students. The smart ones and the less smart, I like to see them do well. I think today teachers go in there because you're paid to do that, and the students get it or they don't get it. But to me, they're people. I like to see them succeed. What else is there?

BOHNING: In that [*The Pennsylvania*] *Gazette* article, there are some quotes from some of your graduate students about how hard you worked them (29). When they were giving a talk, you would have them go over it.

JOULLIÉ: Not hard enough, let me tell you. [laughter] You have to. That's another thing. Allan was a very good mentor, but being a nice man, he never gave anybody hell. We had big arguments about that, because when I was teaching and I had these teaching assistants who weren't doing their job, I wanted to tell them. I think that you have to prepare people. You have to tell them what the world's expectations are. Whatever I did, Allan thought it was always wonderful. Still, you can always look for improvement. I think in that sense, Allan wasn't very pushy at all.

We have this little seminar on Friday when they tell me what they did during the week. Just last week I told them that they weren't doing things right, and the world out there is getting tougher and tougher—which it is. You have to make them aware they've got to prepare themselves. If you don't tell them, nobody else will tell them. They work hard if they're going to do a presentation. I've told them ten thousand times, it doesn't matter where or to whom, you can never go and stand up in front of people without being prepared. No matter how important or unimportant it is, if you're going to talk to an audience, you have to be prepared. You can't prepare too much.

BOHNING: I remember going to a meeting and hearing a very famous chemist, whom I won't name either. I went especially to see him at a symposium at an ACS meeting, and when he got up, he leaned on the podium and said, "Well, what shall I talk about today?" I stayed about five minutes and left, because it was very disappointing.

JOULLIÉ: Yes, it's an insult to your audience. I look at my audience. I like to keep them awake and give people something for their time. You spend a lot of time listening to people. Why listen to garbage?

BOHNING: You had a Fulbright scholarship in Brazil. I guess I don't have to ask why you picked Brazil for a Fulbright.

JOULLIÉ: Yes, because of my parents, more or less. I worked pretty hard.

BOHNING: You wrote a book there.

JOULLIÉ: A little book. It wasn't a book; it was a pamphlet on heterocyclic chemistry—in Portuguese. That was the hard part.

BOHNING: Was this back in Rio?

JOULLIÉ: Yes.

BOHNING: Were you at the university?

JOULLIÉ: Yes. A friend of mine was the director of the school of macromolecules later on, but at that time, she was in the chemistry school. I think she is retired now. I gave a course there and I put it together. She helped me with the Portuguese, because I couldn't write it. I really didn't know Portuguese. They're still changing the orthography. Speaking of that, I can see I didn't proofread that one. That must be the *DP* (27). [laughter] I don't like misspellings. But she helped me. I felt I worked very hard, teaching and writing. In those days, all we had was typewriters. Today, it's okay; it's computers. I can do all these drawings now.

I did all of this for this last paper I gave you (24). I did all the drawings, and in fact, I did the whole paper myself. I typed it. I never thought I could do that. It helps to have a computer.

BOHNING: I know that one of your students is going to be doing some of the drawings for our [Robert B.] Woodward exhibit (30).

JOULLIÉ: Yes. He's the secretary, but he's very good. He uses a MAC and he has experience. I just did the review article. I didn't think I could do it because I had started on the IBM. My husband said, "You're a computer illiterate. You don't understand anything," which is true. But with the MAC, I taught myself, too. That's why it took so long. Now I can use it and I tell you, it changes your life.

BOHNING: Yes, it does.

JOULLIÉ: I remember doing these drawings. This one must have been done that way with stick-ons. Every time, you would think you had it perfect, and then a letter would fall off and you didn't see until it was too late. But the computer really changed our lives. I'm not a typist, but now with computers, I can do it. It's nice. I think that's one thing that I love; it's really made a difference in my life. I was worried because I thought I would never learn. I'm not very

gifted for these things. As one friend tells me, "Madeleine, you have no sense of symmetry," and I'm afraid that's right. [laughter] It allows you to do things you couldn't do. While I curse it and all that, I use it; I use it a lot. It saves a lot of time. I think someday we'll no longer have secretaries also, although right now I have a very good one.

BOHNING: There's a chemistry department I know of that has twenty-seven people and one secretary, because they all have their own computers. As a result, they don't need as much help as they used to.

JOULLIÉ: One thing I haven't learned, because I don't have time, is formatting. I'm not very good at that. [laughter]

[END OF TAPE, SIDE 7]

BOHNING: I use both the Macintosh and the IBM.

JOULLIÉ: The IBM seems so slow. I tried doing things on it, and it was taking me forever. It wasn't that interesting either. The MAC is a lifesaver. It was so hard with the IBM.

BOHNING: You mentioned Columbia earlier when we were talking about student protests. Why did you pick Columbia? Was that a sabbatical leave?

JOULLIÉ: It was a sabbatical. Richard was going to Bell Labs. We lived in Central Park West for a while, in this old movie-star apartment that didn't even have a kitchen sink. I forget which one it was. It was very expensive, and a really terrible apartment. That's New York. That was sort of fun. I enjoyed it. But I haven't gone to New York for years. I used to think New York was the living end. I would go to plays, and if I couldn't go to New York, I would feel frustrated. I haven't been there for I don't know how long now. My friends at Columbia ask me if I'm going to visit, and I just don't know; I don't have the time, the energy, or whatever.

BOHNING: Did you do any teaching there?

JOULLIÉ: No, I just gave some talks. I didn't do any formal teaching.

BOHNING: I remember reading in the papers about some of the student demonstrations at Columbia.

JOULLIÉ: Oh, they were wild. They closed buildings and they jumped through windows, and God knows what. That wasn't a very friendly place. I wasn't there through the worst of it, but I was there through some of it that I considered pretty bad. It's amazing to think that this happened.

BOHNING: We discussed some of your research, but not in any detail. You have already described some of the reasons for your moving into different areas. That's what I was interested in, because of the variety of topics that you've been working on.

JOULLIÉ: Right. Maybe I inherit this restlessness from my father. [laughter] People say we're alike, but we don't get along too well. I shouldn't say that—we get along, but no room is big enough for both of us. [laughter] He wants to tell me what to do. We have this love-hate relationship, because he was very bossy all my life. Maybe that's what I inherited. I don't think it's totally because I want to, although I've enjoyed it. I like changing things, because when you bring new things to another area, you learn something. You have to read about it, so you learn and you do things. I think that that's why.

But there was a reason: I've always had a relatively small group. I've had a bigger group than now, but never like our chair [Amos B. Smith III]—he has thirty-some people. Nicolaou and he are institutes within themselves. There are a lot of these people in synthetic organic chemistry at Yale, at Columbia. You can't expect to compete with them with a group of six. You can't, so you shouldn't try. Today, competition isn't there because we all get, "What's NIH interested in?" So that limits it. I think that's very bad for science; it limits our choice.

The last thing I did, NIH was interested in. That was lucky in a way. We were the first to revise the structure on that one. We weren't the first to synthesize it, but I think we were the best. Once we revised it, there were four groups that synthesized it immediately. We were the fourth.

I think our synthesis is more thoughtful. I can make enough to investigate the chemistry. But that's the kind of thing you face: the competition is there, and they're going to do it. Of course, people say, "Well, you know, it's been synthesized; you've got to show your approach is better." I'm sure I made the point to say that mine was different and mine was better, although not quite in those terms. [laughter] They didn't do a stereoselective synthesis. At the end, they claimed you can separate the stereoisomers, but they didn't give conditions. I always tried to have a different approach. If I didn't do that, I couldn't compete. Today, the rich get richer and the poor get poorer. Funding, I don't have to tell you, is a real headache—plus, with all the young people, they have to stay alive, and they certainly should. I feel very strongly that young

people deserve more of a break. On the other hand, you want to survive. It's a balancing act, that's all.

BOHNING: Did you ever do any consulting?

JOULLIÉ: Yes, but not on a regular basis. I really don't have that much time, although I give seminars at various pharmaceutical laboratories. The only consulting I did was on something I only did once, on a polymer problem. The way I became interested was that one of my former students was working at Western Electric. They used some heterocyclic compounds to initiate polymerization, and they had some problems. I said to him, "I don't know anything about polymerization." He said, "These are heterocyclic compounds, and you should be able to figure it out." I was down on money as usual, so I said, "Okay, we'll take the job." Actually, it was one of the most pleasant things I did, and I thought we did a nice piece of work (31). I liked it, but I wasn't going to do anything else in the area.

Then I got a call from Shell, and the person said he wanted me to consult. I said, "I don't have time. I don't want to go to Houston." He said, "We really need you to come down. Would you do it?" They flew me there for the day. It cost a lot to fly me there. I talked to them. I gave them the thesis, which they kept for six months (32). I'm sure I saved them a lot of money, because they were headed in the wrong direction. What we did was pretty basic, but I think it helped them a lot. They paid me well.

That's the only consulting I did. I was once in a lawsuit here. They wanted somebody who could do organic and French, and they couldn't find anybody else in Philadelphia, so they got me to do it. That was a big job. I had to read Xerox boxes full of French papers, written by hand. I'm sure I didn't charge them enough; I know I didn't charge them enough. Then they wanted me to teach organic to their lawyers, which I did for a couple of sessions for what they needed. This was a real heterocyclic project.

That's about all I can remember doing. I normally don't want to do these things, because my life is full as it is. Money is not really an inducement. Everybody needs it—but I don't need millions, so I don't worry too much. Besides, my husband is still working, and we should be making enough. I'm not driven by money. The only reason I took this project was that the people there seemed to want me, because apparently they couldn't find anyone else. But otherwise, I wouldn't want to have regular consulting.

That's another thing—people do a lot of it. I think the university has a rule which is already pretty generous. But some people do too much consulting, because it does cut down on university time. There's also this question of proprietary information. I figure I don't need that grief. The only reason for consulting, as far as I'm concerned, would be money, and what I don't do for free I usually don't do for money either. That's it. That's why I'm not a businesswoman. [laughter]

BOHNING: Of all the different areas that you've worked in, which one do you think was the most exciting or the most rewarding?

JOULLIÉ: I usually like pretty much what I'm doing at the time. Furanomycin was exciting; reactions of halogenated compounds were exciting at the time. Right now, the didemnins, revision of their stereochemistry, and the stereocontrolled total synthesis has been fun. Normally whatever I'm doing, I like. I don't know that I have any favorites. The new ones are exciting, but when I worked on the old ones, I was excited too. I think if I couldn't get excited about it, I probably would not do a good job. I think today it's more enjoyable to do things, because many things are so much easier. But still, the old days were fun too. I don't know; I guess I can't answer that.

BOHNING: It may not be a totally fair question, either. It's like asking a parent to pick among children who is the favorite.

JOULLIÉ: Sometimes you could, although I'm not a parent; I don't know. [laughter] I think parents have preferences. I think my father preferred my brother and my mother preferred me. I think that was clear. But this is different in a way because while you're doing it is when it's exciting. To a certain extent, it depends on the students you're working with. They make a difference, too.

One of the important things we did, but by no means the most enjoyable, was the collaboration with Paul [B.] Weisz (33). At that time, I had a good student. People pay a lot of lip service to interdisciplinary work. Paul Weisz was very good—in fact, a little too good for my taste—about promoting our work.

BOHNING: In the *New York Times* article, you weren't even mentioned (34).

JOULLIÉ: Yes. That annoyed me temporarily. First of all, it didn't work at all the way he described. But I am not too uptight about who should get the credit. Paul has all kinds of people interested in cyclodextrin sulfate. We are still trying to improve on what we did.

BOHNING: Are you still getting students without any difficulty?

JOULLIÉ: Yes. I don't get too many, but enough. I still have some funding for about four or five years. I may still get funding. If I get funding, I'll get postdocs, but I think I'm going to give up on graduate students. They take a lot of time.

BOHNING: That may be especially because you give a lot to them. There are people who put a graduate student in a laboratory and come back in six months and get the results.

JOULLIÉ: I'm getting too old for it. It's a funny thing. I have this ability to forget about time and age, and even being sick. I was sick for a while and I thought, "I am going to die. It could be serious," and all that. But once that's finished, I don't even remember it; I should, of course. I have this ability to just think, as far as I'm concerned, that I'm still sixteen.

BOHNING: I know that feeling. I understand that very well.

JOULLIÉ: The minute I feel good, I have no concept of it. As my mother would say, "Why don't you act your age?" [laughter]

BOHNING: I've just about reached the end of my questions. Is there anything else that you want to add?

JOULLIÉ: No. Do you need anything special? I guess probably not. You have most of these papers.

BOHNING: I'm not sure which ones we have and which ones we don't.

JOULLIÉ: That's the most recent one, the one I gave you (35). Oh, I published one finally in the *Bulletin* [*de la Société Chimique de France*] (36). It's in English. I had to write the abstract in French. Believe me, that almost took me more time than writing the thing. It's not that great a paper. It's recent. I did it because it was in honor of a friend of mine.

Actually, this is an interesting compound. Let me tell you about this. This could be very valuable. It's a cholinesterase inhibitor for Alzheimer's disease. It's not really been used for that, but it's being used in Bulgaria a lot for myasthenia gravis or some nervous disease. It's essentially nontoxic, which is very good. We made some derivatives, which you know is a very simple-minded thing to do, but one of them was more active than galanthamine itself. Of course, that is not in here. We made a lot of derivatives and tests (37). If we were lucky, that could take off. There is a lot of talk about Alzheimer's these days. But this was just writing some literature things.

This angiogenesis article is in *Science* (33).

BOHNING: I think I have a copy of the *Science* article.

JOULLIÉ: Yes, that's good, because I only have one. I'm not a biochemist. I always thought that *Science* was more or less an ordinary journal, but it isn't really. I never thought it was wonderful, but when we published there, everybody said, "Oh, you've got an article in *Science.*"

Then the cyclopeptides are sort of interesting. We develop a lot of methodology for doing various transformations. We finished the total synthesis of a natural product; this was just the communication. I think this work will make an interesting paper (15). I have to do a few things on it.

[END OF TAPE, SIDE 8]

JOULLIÉ: My main interest is to synthesize compounds that are hard to come by and have interesting biological activity. We also use synthesis for proof of structure, and I think that's very rewarding. That's essentially it.

BOHNING: Well, on that note, I'll say I've appreciated your time. Thank you for spending the morning with me.

JOULLIÉ: I filled your ears?

BOHNING: I enjoyed every minute of it. Oh, there is one other thing. I wanted to ask you about the book with Allan Day (38). This came out in 1960, so you had been teaching the organic for a while. How did you end up coauthoring this book with Day? Was it really based on the lecture notes that you had used?

JOULLIÉ: No. I worked on several things, like the chapter on instrumentation, which I don't even want to look at now. I'm sure it is now out of date. I helped organize the book, and I wrote some of the chapters. It was fairly well coauthored, although we used his notes as a base.

BOHNING: Did he ask you to do this?

JOULLIÉ: Oh, yes. He approached me. I didn't especially want to do it. That was a very big job, especially in those days.

BOHNING: The last chapter does include NMR.

JOULLIÉ: Yes, but obviously, that's what we knew then.

BOHNING: Yes. That was pretty early for NMR.

JOULLIÉ: This was a good book, in that sense. Today you find bigger single organic texts, and they're expensive; I can hardly carry mine. However, there is more chemistry in our old book than you'll find in a lot of newer ones. For instance, in [G. Marc] Louden's book, if you look for simple things like the pinacol rearrangement, it's not there (39). That's basic stuff. It's a very important rearrangement. Many of these big books have hardly any mechanisms.

BOHNING: They don't?

JOULLIÉ: No. There was one by [Seyhan N.] Ege, which I thought was excellent (40). It's more like ours, with mechanisms. Several of the modern organic texts hardly have any mechanisms.

Allan Day was really a teacher. He used this approach: you started with olefins and then went to dienes. He related everything. He didn't separate aromatics. He showed them how they're an extension of the double bond, but of course different because of the higher resonance energy. He always explained things on analogies and differences. He did that with all functional groups, many of which you do not find in modern books. He included quinones. He started with ketones, then alpha and beta-unsaturated ketones. Then he showed how two functional groups interacted, and finally, he discussed quinones.

Do you know that many of the new books don't even mention quinones? Para-benzoquinone? It's not even in this huge book. Quinones are so important biologically, and they are hardly mentioned. There was an article in here on vitamins (39). It's small, and it gives you an idea of how they're made. Then look—nothing. They don't mention anything. Allan discussed derivatives of carbonic acid, which are so important—xanthates, cyanogen, things like that. You don't find these in any of those books.

BOHNING: What do they teach, then?

JOULLIÉ: I don't know. They have big fancy pictures. They have orbitals—which I agree with; I teach orbitals, too. But these take up all the space. Some basic chemistry that you find

in our book, you don't even find in those. Whenever I want to know something, I go to Noller (41). I don't know if you remember that.

BOHNING: Oh, yes.

JOULLIÉ: I still have my copy. I use it all the time. If you want to know something about a functional group, you go to Noller. Noller has it all. I never met him, but once I wrote to him and said his book was the best. I still think his book was the best. It didn't make any money. A lot of the books that make money today don't even compare. Noller certainly had everything that you want in a book, yet nobody liked it. The only other great book I know is by [Donald J.] Cram and [George S.] Hammond (42). Book publishers all claim their books are innovative, but the only innovative book in organic chemistry was Cram and Hammond. I loved that book. I taught by that book. I think I trained my best students using that book, because that was the most stimulating organic text ever written.

BOHNING: Yes, I know the book.

JOULLIÉ: That book never got the credit it deserved. Now, [Stanley H.] Pine has reedited it, but it's not in color; it's not going to make any money (43).

Many books now—and good books—introduce alkyl halides before olefins. That's not pedagogical, because with alkyl halides, you have two reactions to deal with—elimination and displacement—and you have several different mechanisms, not to speak of solvent effects, which are often ignored. The reason most books introduce olefins first is because it is the easiest material to absorb. It introduces simple addition reactions, and then you can go to more sophisticated mechanisms. That's not innovation. It is just changing the order of the chapters. It's a bad change anyway, because students have a terrible time when they first approach alkyl halides.

Innovative books like Cram and Hammond, or thorough books such as Noller, were never popular. Do you want to know why? Because professors don't choose a book for its quality; they choose a book that is easy to teach from. That's the answer. That's unfortunate. I think that the secret of Allan's success as a teacher was that he used a pedagogic approach. He taught in such a way that students could connect the material and relate new concepts to old ones. Chemistry is chemistry. Organic chemistry should not be that different; the same principles should apply. Well, *c'est la vie*. Okay?

BOHNING: I'd like to thank you again.

JOULLIÉ: You're very welcome. I hope I didn't overstate it.

BOHNING: No, not at all.

[END OF TAPE, SIDE 9]

[END OF INTERVIEW]

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