

Dana Roth, 2008

DANA L. ROTH
(b. 1935)

INTERVIEWED BY
DONNA WRUBLEWSKI

January and February 2015

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CALIFORNIA INSTITUTE OF TECHNOLOGY
Pasadena, California



Subject area

Chemistry

Abstract

An interview in four sessions, January and February 2014, with longtime Caltech chemistry librarian Dana L. Roth.

Roth received his undergraduate education at Pasadena City College and UCLA (BS in chemistry, 1962). In 1965, he received master's degrees in chemistry from Caltech and in library science from UCLA; that summer, he became Caltech's chemistry librarian. After consolidation of Caltech's division libraries in Millikan Library in 1967, he undertook various administrative responsibilities at Millikan over the years, along with his continuing duties as chemistry librarian. Active in the chemistry division of the Special Libraries Association. In 2008, inducted into the SLA Hall of Fame. That year he also received the Thomas W. Schmitt Staff Prize, presented to a Caltech staff member whose contributions "embody the values and spirit that enable the institute to achieve excellence in research and education." Retired April 2013.

In this interview he discusses his initial education as a chemist, including his graduate education at Caltech, and his switch to library science. He traces the development of library science in general and at Caltech—from the card-catalog days to the growth of the electronic Caltech Library system and the present state of online access and databases.

Administrative information

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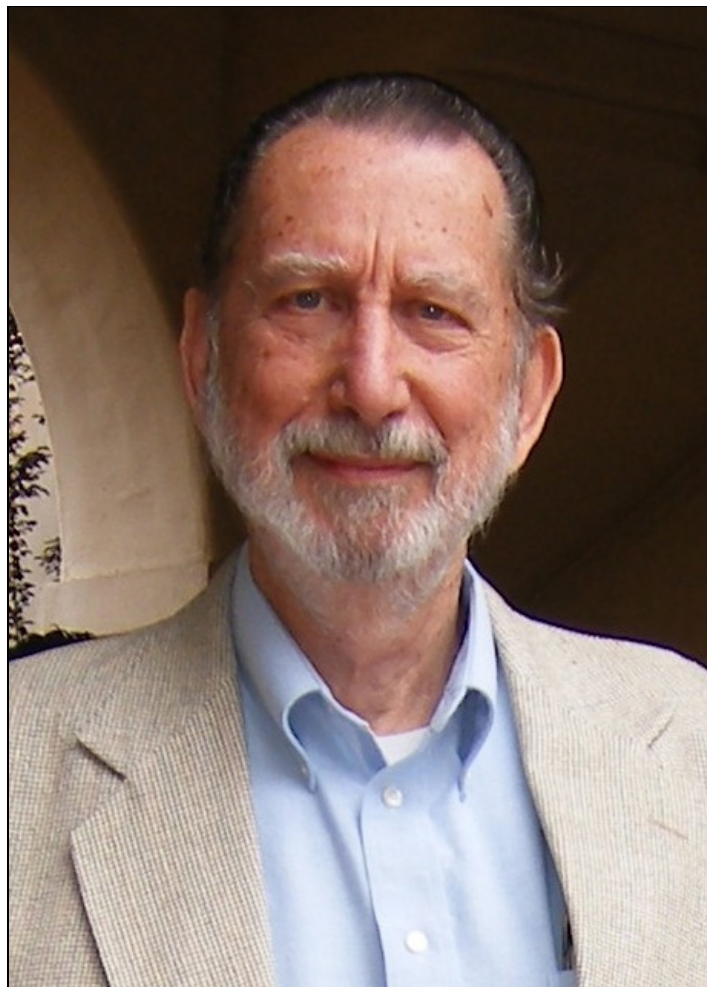
ORAL HISTORY PROJECT

INTERVIEW WITH DANA L. ROTH

BY DONNA WRUBLEWSKI

PASADENA, CALIFORNIA

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CALIFORNIA INSTITUTE OF TECHNOLOGY ARCHIVES
ORAL HISTORY PROJECT

Interview with Dana L. Roth
Pasadena, California

by Donna Wrublewski

Session 1	January 23, 2014
Session 2	January 27, 2014
Session 3	January 31, 2014
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WRUBLEWSKI: We're here with Dana Roth, legendary Caltech chemistry librarian, to record his oral history, so take it away.

ROTH: Well, growing up in Southern California in the late thirties and early forties was really an ideal time, because there wasn't much worry about children; kids could run off and do whatever they wanted, even at a very young age. I remember actually walking home from kindergarten—when I was five years old, obviously.

After that, my folks moved around a little bit. We lived near Occidental College for a while, and we lived at the top of Mount Washington. And there again, I can remember walking to school every day, and I still remember my first-grade teacher, Mrs. Lusted. She had a house there, and the bottom floor of her house was built into the side of the hill and was a little branch library for L.A. Public, which was kind of nice too. In the evening, I can remember taking off on a bike and just going anywhere, doing anything. It was still pretty undeveloped up there, so there were a lot of vacant lots to play on. Then we moved to Vista—that would have been in the '42-'43 school year, I think—and lived down there for a year. Although my dad had a job teaching there, he also worked Saturdays on an avocado/citrus farm. I remember one day going out and helping him pick lemons; we only got ten cents a crate for picking those things. There were some Hispanic guys working there—it was the *Bracero* program [temporary contract laborers from Mexico] they had during the war which brought those guys in—

and we were all still picking by hand, too. We would get up there and grab hold of a lemon and feel it to make sure the stem popped off just right; if it didn't, you'd wait until the next day and come back around. That was kind of fun.

And then we moved to Whittier, and again, I can remember just riding a bike all over the place, and I went to the YMCA pool, swimming almost every day during the summers.

WRUBLEWSKI: When was this?

ROTH: This must have been 1944-45 through 1946-47 school years. We were there about three years. I had a nice time there, a very good time at school and everything. It was pretty racially—what's the word—not racially unique, but racially isolated. I don't have any memory of African-Americans until I got to high school in Pasadena, but I know there were Hispanic kids who went to school with me.

After three years in Whittier, we moved out to El Monte for the '47-'48 school year, and we were there about a year and a half. There again, we kids were pretty much free to roam. It was still undeveloped, so there were a lot of fun places to go. My dad was an itinerant schoolteacher, and we moved around for a variety of reasons. Finally he got a job he really liked, at [John] Muir [Junior] College [in Pasadena], and so for about a half year we were still in El Monte and he had to commute. The winter of '48-'49 was the year it snowed here, and up in Altadena the snow was on the ground for three or four days. So it was really a terrific novelty, and that was the weekend we moved to Altadena from El Monte. When we left El Monte, there were a few little snowflakes in the air which melted before they hit the ground, so it was kind of fun to go up to Altadena.

I went to junior high school in Pasadena. At that time, they had what they called the six-four-four system: six years of elementary school; four years of junior high school; and then two years of senior high school and two years of junior college, all on one campus, basically with the same teachers. In high school, I remember that the same guy who was teaching the junior college courses in English was teaching the eleventh graders, too, so it was really a nice setup. Muir was a wonderful place; it was integrated nicely and everybody got along. There was a spirit up there that was unique, a once-in-a-

lifetime sort of thing; it was really a wonderful place to go to school. It's the one up in northwest Pasadena that's John Muir High School now; it had been there maybe fifteen years or so by then.

And then during the Korean War, a lot of guys joined the National Guard and were sent to Korea, because the California National Guard was the first military force sent to Korea. Most of those guys ended up getting killed, as a consequence of being poorly trained and not very well supplied, in the very initial stages of the Korean War. This was in 1950. And the reason, supposedly, was because the California National Guard had occupied Korea at the end of the Second World War, so they were supposed to have had the necessary experience. And the clown who was the head—the general in charge of the California National Guard at that time—basically volunteered: “Hey, we know that place, and we'll go over to take care of those guys”—that kind of mentality. It was really a bad situation for the poor guys who got called up. As a consequence, the enrollment of the school went down. My dad was laid off because of the declining enrollment. Within a couple of years, they closed the junior college portion and got away from this six-four-four plan and went back to a more traditional schooling. So then you had John Muir remaining as a high school, and then later, in 1960, they moved Pasadena High School off the PCC [Pasadena City College] campus, out to east Pasadena.

So then Pasadena City College became the only junior college in town. I had done fairly well academically in high school, but I didn't really stand out. As a consequence, I felt I probably ought to go to work. At that time, 1953, there were only two people in my graduating class at Muir High School who went off to a four-year college. It was very unusual to go off to a four-year college from high school at that time; almost everybody who did go to college went on to PCC—or stayed at Muir, which was still there for one more year after I graduated from high school. So I went to work for two years, and then my mom worked on me to go back to school. She'd gone to UCLA and dropped out to get married, so I think she always had the feeling she'd missed out on something.

WRUBLEWSKI: What was she studying?

ROTH: I don't remember now, but it was probably in the humanities. My dad was a philosophy major, so it was probably somewhat related to that.

So she came after me, and finally I caved in, as it were, and went to PCC in '55 and started off as a history major. I'm not sure why I did that. I'd had a difficult time with geometry in the tenth grade, so I didn't take any math classes after that, and as a consequence I was thinking more about doing a humanities-based kind of thing, like history. But by the time *Sputnik* came around [1957], I realized that employment opportunities in the humanities weren't going to be all that good anyway and this science thing was really opening up. So I switched over, and obviously I had a lot of catching up to do. I had two years at PCC and got an AA degree in '57, but then I stayed on for two more years to make up for math and take the science classes I needed. I soon took a chemistry class, and that was pretty good! I had a lot of fun, so I kept going with that, you know, and took all the other courses that were required.

WRUBLEWSKI: What kind of chemistry was it?

ROTH: Well, I had to start out with a "chemistry for nurses" type of course, which I took for a year. They allowed that to substitute for Chem 1A, and I then took Chem 1B the next summer, one class at summer school. With that out of the way, I was able to take the analytical course the next year, and obviously I had to catch up on algebra and calculus at PCC as well. At first, I thought of being a science teacher and I was planning to transfer to Cal State LA [now CSULA]. But then one of my teachers at PCC said, "Don't go there. You're going to hate it if you get stuck in some junior high trying to teach science to kids who probably couldn't care less." So I went to UCLA and talked to them, and found out that my grades were good enough to transfer out there, which was a godsend, even though I had to commute from Pasadena every day. So I was able to get in, and things worked out, and I actually did very, very well at UCLA—good enough to get a scholarship to come here for graduate work.

WRUBLEWSKI: Now, at UCLA, what sorts of classes did you take? Did you do any extracurricular research or anything like that? What was UCLA like?

ROTH: The first term I was there, things went pretty well. I had an organic chemistry class with a guy named [Theodore A.] Geissman, who was a natural-products chemist, and I did very well at that. But by this time, the draft board had figured out that I'd been spending a little bit too long in school and hadn't been making the progress they would really like to see, so on a Friday I got a postcard saying that my deferment had been canceled. But I had gotten to know some guys who were in the National Guard, so the next day I went down and enrolled for a six-month stint in the California National Guard—fortunately, because on Monday I got my draft notice. But by having joined the National Guard, I avoided the two-year enlistment in the Army.

WRUBLEWSKI: This was your first semester at UCLA?

ROTH: Yes. I finished the first semester and then went immediately into the California National Guard. I spent the second semester and most of the next summer in the National Guard, at basic training up at Fort Ord in Monterey, and then at signal school at Fort Gordon, near Augusta, Georgia. It was an experience—I wouldn't recommend anybody spending a summer in Georgia [laughter]—but it was a really good experience. I think that's one thing that kids nowadays are missing out on: Everybody, no matter what your status is—race, religion, social class, economic class, education—you're all mushed together in this unit and you've got to make it work and learn how to get along with people from all kinds of backgrounds and all kinds of experiences. It was really a very, very good experience.

WRUBLEWSKI: So you went to Georgia, and you came back to—?

ROTH: I came back to UCLA for the fall semester. I had missed the spring semester of 1960. I was at UCLA for two and a half years. My wife, Eileen—we'd gotten married in 1959, before I went to UCLA the first time—worked full time, first at San Marino Public Library and then in the Archives at UCLA. The last year at UCLA, we moved out to Westwood—well, actually Culver City—and Eileen worked at the UCLA Archives. But all this time, I was only taking about ten units a term, so I was able to work too.

WRUBLEWSKI: Where were you working?

ROTH: Oh, just odd jobs here and there, working in somebody's lab, basically cleaning up and stuff. Then the final year at UCLA, for the '61-'62 school year, I became a TA [teaching assistant], as a senior. I was a TA for Chem 1B, so that was kind of sweet. It made things a lot easier, because the pay was a lot better.

WRUBLEWSKI: You liked teaching?

ROTH: It was kind of nice, yes. We had to give a lecture at least once a week—about forty-five minutes. That was when they were doing all that qualitative analysis stuff, and there were always a lot of little things to go along with that.

WRUBLEWSKI: Now, at UCLA, was it a time when the curriculum was shifting?

ROTH: That's right, it was shifting, because when I was an undergraduate they never even mentioned quantum mechanics. That was totally a graduate school course up until the time I left, which would have been the summer of '62, when I came here. And, of course, here, obviously, they'd been doing quantum mechanics for a long time. The analytical coursework at PCC was pretty primitive; we were still using the old balances and method of least swings and all that stuff. [Laughter] And by the time I had gotten used to it all, they got the Mettler balance, and what a godsend that was. But it meant that I had had to take the second-semester analytical class over at UCLA, because PCC hadn't covered electrochemistry or any of a number of other procedures. I was able to tell the faculty at PCC what had happened, and as a consequence they upgraded their curriculum to try to match UCLA's.

When I came back to UCLA from Georgia, instead of continuing with natural-product chemistry I had Donald Cram for the second semester of organic chemistry, so it was all physical organic stuff. Luckily, I did very well in both courses, and that's when I saw myself as an organic chemist. Then I took the advanced physical organic class with Saul Winstein, and the advanced organic lab course. I didn't have any inorganic chemistry, which I think, looking back on it, was probably a mistake.

WRUBLEWSKI: So you had a choice about what—?

ROTH: That's right, it was optional—you could pick whatever option you wanted. So then I did the TA thing, and also did some work for Tom Jacobs. He had an organic-chemistry lab book, and he wanted me to go through it and do some of the lab exercises, just to check them out; it was kind of fun to do that, too.

WRUBLEWSKI: Who influenced your decision to come to Caltech for graduate work?

ROTH: Well, a combination of things. I'd applied only to Caltech and Berkeley. I was admitted at Berkeley as well, but my wife wanted to stay here, as both our families were still here. It was a chance to move back to Pasadena, and she was looking forward to going back to work at San Marino Public Library again while I was going to school, so that pushed the Caltech thing.

WRUBLEWSKI: You mentioned you'd got married in 1959?

ROTH: Right.

WRUBLEWSKI: Did you meet your wife through—?

ROTH: I met her at PCC. They had what they called clubs; they were actually sororities and fraternities. It was a very well developed system. You had a chance to meet an awful lot of people. It was unique for a junior college to have a setup like that.

WRUBLEWSKI: She was studying library science at PCC?

ROTH: She was just doing a general subject background there, and she started working at San Marino Public after she graduated. That's how I got into the library thing; it was a consequence of going to a number of social occasions with her and with the San Marino people I got to know in the library down there. June Bayless, the city librarian, was a very remarkable woman; she'd been president of the California Library Association at

one time, too, and she was really a sharp person. She was egging me on a little bit—when I expressed some dismay at the idea of being a thirty-year-old graduate with a PhD—to think about library work, because at that time there were almost no scientists, or anybody with a scientific background, going into academic libraries. There were a lot of company librarians who had come out of the lab because they didn't want to be in the lab anymore and had begun working in a library, but in the academic area that wasn't the case at that time.

WRUBLEWSKI: In terms of your education at PCC, UCLA, and Caltech, what kinds of interactions were you having with the library or librarians, or just even researchers to a degree, at that time. What was that culture like?

ROTH: That's a good question. I'm not sure how to answer it, because there really weren't that many library requirements, in terms of the curriculum. I remember there was an advanced organic lab class, where you had to go in and do research a little bit in *Chemical Abstracts* and *Beilstein [Handbuch der Organischen Chemie]*, but we were basically just on our own, with no instruction—sink or swim, you know—so you'd sort of figure it out and find a few articles you could read, and deal with it that way.

WRUBLEWSKI: Were the librarians a resource in using these tools?

ROTH: Not at all. You were basically on your own. There was a card catalog, and obviously the professor must have said something about *Chem Abstracts*, so we could sort of figure out what was in there and how we might use it.

WRUBLEWSKI: So even coming to Caltech to do master's research—

ROTH: I came here, actually, to do PhD research. The master's is kind of—what's a good word for it? Sort of, if you don't want to finish a PhD, then they'd give you a master's to get you out of there. The reason I started thinking about something else was that there were two postdocs in the lab I worked in with Carl Niemann. One guy had been teaching at a state college and he wanted to do something else. And the other guy was coming out

of industry; he was about thirty-five or so. There were a lot of layoffs in the chemical industry in the early sixties, and you saw a number of articles in *C&E [Chemical & Engineering] News* every week that made it sound like there was some sort of a recycling process going on. You know, you bring people in and work them for ten or fifteen years, and then there'd be a whole new crop of graduates who'd have a whole bunch of new skills. The old guys would get pushed out in favor of the new guys, and they would have a terrible time getting a job. I think the poor guy from the state college had to go back there because he couldn't find another job; and the guy from industry finally found a job in a small college—a small private college someplace, not at all what he was hoping to find. So it got me thinking, "Wait a minute, I'm getting pretty old here." And having spent, what, four or five years almost, on top of what a normal education would have been, I got to thinking that maybe I'd better find something a little more secure than just going out with a degree in my hands. So that's when I started talking to people in San Marino some more and got to thinking about UCLA. At that time, UCLA library school took only a year, including summer school, so it wasn't that hard to get that done the next year. Fortunately, at the same time I was doing that, there was Jack [John H.] Richards, a chemistry prof here. Jack had been very, very critical of the [Caltech] library, because it was basically just a bunch of books and journals that somebody kept straightened up, and there was nobody there who knew anything about finding anything, and he was very upset about that. I knew him just as the regular chemistry prof here, but after I decided not to go on for the PhD, and got my master's, and was attending library school, he worked it out so that I could come back and work part-time at the library. That would have been the second semester of library school, January to June 1965. Then I started working here in the library full time in July or August 1965.

WRUBLEWSKI: When you started the PhD program at Caltech, back in 1962, what was the campus like at that point?

ROTH: Very small. [Laughter] And the graduate student stipend was \$180 a month. I think they raised it to \$200 the next year or something, which helped out a little bit, but you can imagine. Things were really cheap then. We bought a brand-new Mustang in

1967 for \$3,200. Rents were, you know—a really nice two-bedroom apartment just a few blocks from campus for about \$125 a month.

WRUBLEWSKI: Wow!

ROTH: So it was really nice. I think the reason is because the group I was born with, 1935, there was a dip in the live births in this country. It began about 1935, and it started decreasing after that, because of the Depression, so there was a two- or three-year period when there was a relatively small number of new arrivals on the scene. By the time we were twenty or twenty-five, there were that many fewer people.

WRUBLEWSKI: When you first got to Caltech, you were in whose lab?

ROTH: I was in Carl Niemann's lab. He was an enzyme chemist. We were doing stuff on charge-transfer complexes; he had this thing about them, which I think—I'm not sure—never turned out to be anything in the end. They were starting to think about how the inhibitors bind in the right pocket to inhibit the enzyme. One of the things he was thinking about was the possibility that it could be some charge-transfer thing, so we were doing just sort of general stuff with that. He had a brand-new gas chromatograph that was there for me to use, and we were trying different things, basically doing separations.

WRUBLEWSKI: What types of equipment were in the lab at that time?

ROTH: Well, basically just a vacuum pump and a gas chromatograph. There wasn't a whole lot else. Jack [John D.] Roberts had the NMR [nuclear magnetic resonance] thing; he kept that going pretty well. They had a Beckman UV spectrometer which we used, and I think we had to let somebody else do the IR spectrum. That was true at UCLA, too—you had to turn in your sample and somebody would run the IR for you and give it back to you. It wasn't like these machines were lying all over the place at schools like they are now.

WRUBLEWSKI: Within the Caltech chemistry division there were plenty of notable personalities around at that time.

ROTH: That's right. I think Linus Pauling had just left [1963]. He was basically kicked out, I think. His wife—really more, I think, than him—had gotten involved in a lot of political things right after the war, and that was hurting the funding here, and I think they were really upset about, in particular, his ban-the-bomb stuff. That kind of thing was having—at least [Caltech president Lee A.] DuBridg e felt that it was having—a negative effect on fund-raising. I read some stuff in the [Caltech] Archives that he was upset about this, and that their funding, particularly government funding, had been taking a hit.

WRUBLEWSKI: So was it mostly government funding, as opposed to industry funding?

ROTH: I'm not sure, but I'm pretty much guessing that there was a lot more government funding than industry funding. There was a lot of carryover from the war. Pauling, I think, still had an Office of Naval Research grant right up to the end. One of his people who worked with him was here after he left and was still on an ONR grant. So maybe that was what they were worried about—that they were beginning to lose those connections.

Pauling was pretty much gone by the time I came here, but there were the others. Ernest Swift was here, one of the original guys in chemistry here. He was an analytical chemist and he was pretty vitriolic about Pauling. I remember one time sitting in his office and he just kind of went on. [Laughter] He felt like [Pauling had] betrayed the division by getting involved in some of these political things. I think there generally was a concern about that: Nobody really got into politics here, as you would expect. Not that you *would* expect it here, but as you would expect it on other campuses where the professors were a little more politically active. That was pretty much not done here. Of course, I think that's probably because there aren't that many humanities people.

WRUBLEWSKI: Right. I was going to say that. Was there any reason you think that was the case?

ROTH: I think mainly because people were more focused on their research and just didn't get into it. It may have something to do with the fact that Pasadena at that time was a very, very conservative town; it was pretty much a Republican bastion for years—until fifteen to twenty years ago, maybe. It was settled by well-to-do people from the East Coast, with their summer trek to the West Coast, as it were. That was the original settling; it was always a very Republican town until relatively recently.

WRUBLEWSKI: Were there any other notable figures around Caltech around that time, anybody you have stories about?

ROTH: Not really. Jack Roberts is still here. He was a very strong force in the division all the time I was here. And Jack Richards. I'm trying to think—some of the physical chemists left. They went through an upheaval here, too, in terms of the curriculum, and that came about after Harry Gray [Beckman Professor of Chemistry] was here for a while and they changed over from that old traditional Chem 1A, introduction/Chem 1B, qualitative analysis kind of thing, which had been the standard for a long time—got away from that and got into a more regular kinetic-structure approach to teaching beginning chemistry. That was in the late sixties, early seventies. There was another guy, Jürg Waser, who inherited Chem 1. Pauling had been the one who taught introductory chemistry for a long time, and then Jürg Waser took over from him, and then poor Jürg got pushed out the door when they wanted to move in this other direction.

WRUBLEWSKI: Now, was that on the undergraduate level?

ROTH: That would be the freshman level.

WRUBLEWSKI: What about the graduate curriculum? Did you have to take classes when you started the PhD program? What were the classes like?

ROTH: We had to take Chem 125, which was a quantum mechanics course, which was a real bear. That was one of the problems I had: My math skills were not that good. I had done really well that first year of calculus at PCC, but the second year at UCLA wasn't as

good. There really hadn't been any math after that, so getting dumped into the quantum mechanics course [at Caltech]—that was a struggle. The other ones were pretty much optional. I can remember taking Jack Roberts' NMR course, and I took a course with Walt [Walter A.] Schroeder on peptides and amino acids and stuff, but that's sort of faint.

WRUBLEWSKI: But there wasn't a set curriculum for the grad students?

ROTH: There probably was, but I can't remember what it was now. In the PhD program at the time, I think you had to have a minor, or you could take a minor. I was still interested in history and stuff, so I was thinking about doing a humanities thing with Ned [Edwin S.] Munger [professor of geography, d. 2010], and I talked to him a little bit about doing something like that, but it never materialized because I decided to get the master's and it pretty much terminated that discussion. And they had a language parameter at that time: two for the PhD and one for the master's.

WRUBLEWSKI: What did you take?

ROTH: I studied German. But I only had two years of it, so trying to read German after that was not very good—so I did French, just by gutting it out. You can do a translation project. One of Christopher Ingold's organic-chemistry articles had been written in French, so I just went through and gutted it out. It actually was not that hard. So I was basically self-taught in French, to be able to do that.

WRUBLEWSKI: For the research at that time, did you find yourself using [your French] looking at the literature? What was the literature percent, in terms of language?

ROTH: Well, it was really important. I know there was one guy in the class who got scooped at the very end. He was working for George Hammond—George Hammond was a photochemist—and he had been working all this time and not paying attention. And someone from Germany had this [paper that] came out about a month before this guy's exam. Basically, everything he had done, *bingo*, was in *Chem Berichte*, and I don't think he ever recovered from that.

WRUBLEWSKI: What would happen in a case like that?

ROTH: Basically, you just flunk out. I mean, what are they going to do with him? He'd spent all this time and had nothing to show for it. So I think he left—that was my understanding.

WRUBLEWSKI: What were the ways to combat that at the time?

ROTH: Basically, it was just to come to the library. We can scan the title pages of the journals that come in. A lot of people were fairly religious about that, and there was apparently enough money here so that most of the professors would subscribe to two or three journals. That was one of the problems in the library, at least initially. There were a lot of little private libraries out there, and each would get its three, four, or five mostly ACS [American Chemical Society] journals and bind them and keep them right there in the lab, you know. I don't remember Carl Niemann doing that, but it was done maybe later. I don't remember seeing that so much when I was a student here, but after I started working in the library I began to see it, so maybe it was more in the seventies when that got started.

WRUBLEWSKI: While you were a student, was there a sense of what the time delay was between research being done, research being written, and research being published?

ROTH: As a student, I don't think I had any awareness of that, particularly. The research fields were narrow enough that you should be able, by reading the most important journals, to figure out if somebody else was competing with you, so you'd know if you had to speed up or do something different. But it really was flying blind. They felt that this guy who basically flunked out—they felt he should have been able to figure out, a couple of years before, that somebody else was working on the same project and was probably going to finish it before he did.

WRUBLEWSKI: So there was an expectation that you would have this awareness, but there was no formal way to teach it?

ROTH: That's right, it was just an expectation. It's funny, because I don't remember having any particular group meetings in our research group. We used to go to coffee every day, which to me was a waste of time, as we were just talking and there wasn't anything particularly about the research, so I'm not sure why. That's obviously been much more well developed now, in terms of the group getting together and talking about what they're doing. But at least in the group I was in, it didn't seem to be the case.

WRUBLEWSKI: So was it a fellow student who said, "Here's where the journals are"? How did that awareness, how did you—?

ROTH: Just stumbled over it, I guess. [Laughter] It was down there in the old Gates [Laboratory of Chemistry] library. It was just there, and you basically had to go and figure out how to use it on your own. The library room that's still there now was *the* chemistry library at the time. They had that room, and the women's restroom across the hall was the library office, and they had the current chemistry journals in there. The bound journals were across the hall in the big room, and then the books were downstairs, in the lecture room on the west side of the stairs going down. And it was a self-checkout honor system. It actually worked out pretty well, for the books. The problem was with the journals; they weren't supposed to be taken out of the library, so people would just steal them overnight. There was a constant battle trying to get people to bring stuff back.

WRUBLEWSKI: There was nobody in charge?

ROTH: There was nobody in charge. Fortunately, when I got there [1965], that helped; we didn't have as many problems then. The guy who was sort of the faculty member in charge of the chemistry library said that two or three years before I started, he and somebody else actually got a couple of big carts and went around the labs about two o'clock in the morning, just scooping stuff up. They found all kinds of things. [Laughter] Because they were so mad at the fact that there were so many missing volumes—missing volumes of *Beilstein* or whatever.

WRUBLEWSKI: That's classic. [Laughter]

ROTH: But that's really pie in the sky, to think you can keep people from doing that if you have a non-circulating library. That's a recipe for disaster, as they found out here in some places. I remember the astro library was losing stuff left and right, because they had a non-circulating policy for JPL [Jet Propulsion Laboratory] people, who came down and were using it a lot, but the librarian at that time really had it in for them. She wouldn't let them check anything out, so obviously they started taking things.

WRUBLEWSKI: But didn't JPL have a library?

ROTH: Yes, JPL had its own library and if the JPL staff would go back to the JPL library and submit a loan request, Caltech library staff would send it to JPL within a week. But that's obviously not as good as coming down to Caltech and using or borrowing the material right away.

WRUBLEWSKI: Just to backtrack a little bit: Can you talk about how the conversation got started, when you decided, "OK, maybe the PhD is not for me"? Whom did you start talking to in the library community? Were there any particular polar events?

ROTH: No, just down at San Marino Public Library, and my realization that things hadn't been going as well as I thought they would. And just being economically conscious about what my future was going to be. I realized it wasn't going to be very pleasant, number one. Number two was that virtually all the jobs in chemistry were on the East Coast, so almost everybody graduating here went someplace back in the Midwest or the East. That wasn't particularly appealing, either. It was just an accident that I wound up in the library profession. Because my wife was working [at the San Marino library] and I knew the people down there and could see that it could be very helpful to have somebody with some scientific background in the chemistry library, able to describe how these books could be used. At that time, if somebody had a question, OK, just go to the card catalog and see what you can find. That works only so far. Obviously, if you're going to use *Landolt-Börnstein* or *Beilstein*, or any of those things, you need a bit more knowledge than that.

WRUBLEWSKI: So was it mainly text searching of a lot of those resources back then? [How about] chemical formulas? If you wanted to find information about specific chemical compounds?

ROTH: If you wanted to find information, *Chem Abstracts* had subject indexes, but to do a search was really an incredible amount of effort, in that you'd be in the cumulative indexes, which started out with 1907-1916 and continued at ten-year intervals through the '47-'56 index that wasn't finished until 1964. These were cumulations of annual indexes. They'd gotten themselves in a bind doing it manually with cards. Seems like it was the late fifties when *Chemical Abstracts* got a grant from the NSF [National Science Foundation] to get started with some of the computer techniques for dealing with this, and it wasn't until '67 when they started using registry numbers and got that whole registry-number file started. So that obviously helped. I mean, even in the seventies, if you wanted, you could basically get a tape that had a string that had *Chem Abstracts* on it, and you'd go through and search that string. They didn't have the hard disks yet, so if you wanted to do a search like that, it'd be \$250. To do a search of *Chem Abstracts* was about all that was available at that time, other than the print products, which included *Chemical Titles*—a KWOC [Keyword Out of Context] title word and author index to current articles—as well as *Current Contents*.

WRUBLEWSKI: So that was primarily what you used.

ROTH: Basically, the print. We used the print *Chemical Abstracts* indexes way into the eighties.

WRUBLEWSKI: Did you spend any time volunteering at the public library before you decided to leave Caltech? How did your discussion with your advisor, Carl Niemann, go, when you said you were going to leave to be a librarian?

ROTH: I didn't actually have to have that discussion, because unfortunately he had passed away during my last term as a grad student. He'd gone to a National Academy of

Sciences meeting and had a heart attack. I'm not sure who I told at the time. Jack Roberts stepped in and helped me get the thesis finished up.

WRUBLEWSKI: Did you write a thesis as part of your master's requirement?

ROTH: Yes.

WRUBLEWSKI: So how long were you in the Caltech grad program?

ROTH: Two full years.

WRUBLEWSKI: And what was your thesis on?

ROTH: It was on charge-transfer complexes.¹ It was basically a history, starting with the Benesi-Hildebrand papers² back in the forties that talked about iodine and benzene and the fact that the mixture was a certain color, and why it's colored—that sort of thing, and then some of the experiments I did in terms of separations and stuff.

WRUBLEWSKI: So Jack helped you?

ROTH: Basically just to get that finished up. He was a real stickler for proper journal abbreviations and things. [Laughter] I made the mistake of giving him basically a draft. I just wanted him to look at it for content—"Is this enough? Do you want some more?" or whatever—and I just used JACS [*Journal of the American Chemical Society*] for the abbreviations, and he marked it up in red like crazy. [Laughter] So I learned my lesson there, about making assumptions.

WRUBLEWSKI: And you finished that up over the spring and summer of—?

¹ Roth, Dana Lincoln (1965) "Charge-transfer association in enzyme inhibition." Master's thesis, California Institute of Technology.

² Benesi, H. A., & J. H. Hildebrand, *J. Am. Chem. Soc.*, 70, 2832 (1948); *ibid.* 71, 2703 (1949).

ROTH: '64. I started at UCLA library school in summer '64 and graduated in June '65.

WRUBLEWSKI: What was the library-school curriculum like? Did you work on a project? Did you have an advisor? What was the master's program like then?

ROTH: Basically just course work, cataloging, reference, and—I've forgotten now. I can sort of remember the reference course, and the cataloging course with Seymour Lubetzky, the classic cataloger who was really responsible for the AACR [Anglo-American Cataloguing Rules] series. And [UCLA librarian] Larry [Lawrence Clark] Powell was still there for the last year I was there. It was basically just coursework, and there was an exam at the end. So, you see, we didn't know anything about libraries. Basically we had to write short essays about different things.

WRUBLEWSKI: They didn't talk about any specifics—subject reference or organization or instruction?

ROTH: No, they didn't. The idea of a librarian as instructor was completely foreign to them. Basically, we [librarians] were there so that if somebody came along with a question, we could help them out. That was the whole emphasis—to try to get librarians to take enough interest in the questions to follow through and do it right. I remember Powell mentioning at one time—he taught a general class, talking about different things—that there once was a librarian at UCLA, working in the reference department in the main library, whom people were still asking for five years later because he did such a great job. And I thought to myself, "That's who the hell I want to be!" I think that was Powell's intent—to try to get people caught up in the idea that you really want to take a question and follow through. Don't ever say no; whatever it is, find something. That's been my mantra ever since. And the only way you can do that is [to do] as I did when I first came here, get in and start using all those reference books, like *Landolt-Börnstein*, *Beilstein*, and whatever else would fall into the class of books that would have maybe one card in the catalog. There's this analytical-chemistry series—I've forgotten the series title now—but there are about thirty volumes in there on all kinds of stuff, with big monographic chapters in every volume, hundred-page chapters on acids and bases or

whatever, and one card in the catalog: “*Analytical Chemistry, Volumes 1 to 30,*” or whatever it is.

WRUBLEWSKI: So the card catalogs weren’t—? I do vaguely remember them. The description was—

ROTH: Just minimal. And the worst thing here at Caltech was that they ordered catalog cards from the Library of Congress. A lot of the books, obviously, were cataloged individually, if it was an individual title about something. If there was a series, like *Techniques in Organic Chemistry*, with all these different techniques, gas chromatography, or, you know, whatever other techniques you can think of, each would have a separate volume, but the Library of Congress would also have a single series title card, and here at Caltech the catalog was so—I can’t think of a good word for it. But, just to get it done and get it out of there, sometimes you’d just put in a card for the series, and nobody would have a clue that we had all these other individual volumes.

WRUBLEWSKI: While you were in library school, you mentioned—just to expound on that a little bit—that Powell said, “Find something, find an answer.” So what types of things were being emphasized in library school? Did you have any exercises? Would they say, “Here’s a topic. How would you navigate the card catalog?” I mean, were there any other tools or resources *besides* the card catalog?

ROTH: Not that I remember, no. Of course, the thing was that they were obviously training librarians for all sorts of schools, public libraries, and everything else, but there are basically four things you need: an encyclopedia set, a card catalog, a gazetteer, and an atlas. Ninety percent of the questions in a public library could be answered with one of those four tools. And there again, basically knowing what you could find in the encyclopedia was usually enough to get a feel for all the information that’s in an encyclopedia. At least for public libraries, it seemed an obvious thing they would have to do. And so I felt the same way about the books in our library: “What have we got? I ought to know what’s in these things.” And that way you could provide a lot better service.

WRUBLEWSKI: You'd mentioned that while you were at Caltech it was in particular Jack Richards who was annoyed with the state of the library. So how did the conversation go while you were in library school—that he wanted to have you come back to work in the library? How did that come about?

Roth: I don't remember now, exactly, whether I was contacted by the library advisor at the time, who was Walter Schroeder, or by the librarian. I've forgotten.

WRUBLEWSKI: Was there a librarian at Caltech?

ROTH: At that time it was Harald Ostvold, who had been the chief reference librarian at the New York Public Library. He came out here in a sense to retire and also to help bring [the various Caltech] libraries together into the Millikan building. That was his charge, to get that Millikan thing done right.

WRUBLEWSKI: Now, he came out when?

ROTH: He must have come out maybe like '63.

WRUBLEWSKI: So he came out after you'd started as a student?

ROTH: I think so but I don't remember him at all, until after I was in library school. But that was his charge, to get the Millikan Library thing done. They'd gotten a nice grant from Seeley G. Mudd of \$5 million or \$6 million worth of stock. They'd gotten the stock in about 1960 and didn't use it until 1965, by which time it had almost doubled in value, so they had all this extra money around and they felt they had to cater to whatever Seeley Mudd wanted, so he brought his own architect, and we got this absurd design for a library. His attitude basically was, If you can use it for a library, fine, but if you can't, to hell with you, we're going to build it anyway. We want this memorial to Robert [A.] Millikan [Caltech's first head] and by God we're going to have it. [Laughter] So they obviously made the best of it.

WRUBLEWSKI: Can you talk a bit more about the details of the Millikan Library? Was there a plan? Who were the key players? What was the impetus for that?

ROTH: I've kind of forgotten what the impetus for the original idea behind the library was. They just had the idea that all the [division] libraries probably were getting full and we needed to find more space for library books and this would be a way to do it. And there was a nice central location, in the middle of the campus. It was just eucalyptus trees at the time, and we could put it right there and then bring in—obviously they were all pretty close by—biology, chemistry, math, physics, and humanities. There wasn't really room for geology, but geology didn't want to come anyway, so they were left alone. I think the same thing with the astro. So then obviously they wanted reading rooms and they wanted to have a few journals in the reading rooms, so we had duplicate subscriptions of half a dozen titles, like *BBA* [*Biochimica et Biophysica Acta*], in the biology library. We also had twenty-seven duplicate subscriptions to various organic chemistry journals in Gates Annex, after we moved everything out to Millikan, because Jack Roberts insisted on having twenty-four-hour access to the [chemistry] library, which he wasn't going to get in Millikan.

WRUBLEWSKI: What were the hours in Millikan going to be?

ROTH: I'm guessing it would have been 7:00 a.m. to 1:00 a.m., which were pretty reasonable hours in those days. But at the same time we got a gift from a guy named [Edwin R.] Buchman, who had been a professor here a long time ago, and his house was full of *Beilstein*, *JACS*, and *J. Chem Soc.*, and all these journals, which he donated to the [chemistry] library at the time the library moved to Millikan. So all the stuff that's in Gates now is basically Buchman's old home library. So then we went ahead and subscribed to all the journals he had [subscribed to] and kept those going on. It's amazing how inexpensive stuff was in those days. This lasted up until about 1974, I think.

WRUBLEWSKI: So when you first came back to Caltech, it was primarily to work on this move, get the chemistry stuff together? What was your charge, coming in as the chemistry librarian?

ROTH: Mainly to clean the place up a little bit. They couldn't figure out what I was going to do all day, given that they'd been getting along with this elderly woman who just came over once a day for a few hours and cleaned up the book circulation and put a few journals out and stuff.

WRUBLEWSKI: Was she a Caltech employee, affiliated with the [chemistry] library?

ROTH: No. In those days, they usually found a secretary with declining skills—you know, older secretaries, on their last stop before retirement—to work in the libraries.

WRUBLEWSKI: So they brought you in but weren't sure what you'd do all day.

ROTH: That's right, but they trusted me. [Laughter] Actually, I spent a lot of time just learning the collection, and about this same time they had punch-card IBM machines over in the computer center, so I'd start making up lists of different things, sort of like a subject index to a lot of reference book sets, so I could find stuff. If you wanted to find a volume on gallium or something, obviously we'd have some larger volume on all the inorganic elements, and someplace in there I'd be able to find the gallium volume, either in *Gmelin's [Handbook of Chemistry]* or—we had a French set and some other stuff. So I spent a lot of time doing that.

WRUBLEWSKI: Basically you were making your own card catalog?

ROTH: In a sense, yes. Making an expanded analytic catalog of the stuff we had on site. So that was a lot of fun. I learned a lot, obviously.

WRUBLEWSKI: OK, I think we're going to stop here, but we'll pick up right there and maybe talk a little bit more about the state of the computing and how you went about making that catalog.

DANA L. ROTH

SESSION 2

January 27, 2014

WRUBLEWSKI: I'd like to pick up in about 1965, when you started working at Caltech as the chemistry librarian. Describe the state of the chemistry library and the Caltech library in general. We left off as you were working on some custom cataloging, and right after that came the introduction of photocopiers.

ROTH: When I first started here, the [chemistry] library was still part of the chemistry division. I was a divisional employee, as were all the other branch librarians at that time. The divisional photocopier was used quite a bit. Then we had the problem of looking at the bindery situation and trying to be sure that the bindery was binding the volumes in a way that would make them photocopyable without breaking the spines, because that was a constant problem at the very beginning. The bindery staff had a tendency in those days to take the journals and instead of pulling the staples out of the journal issues—pulling the staples out and then carefully cutting the edge so they can have as much margin as possible—they tended just to throw them into a grinder and grind off the left edge of the journal issue down to the point where the staples would fall out by themselves, just as a labor-saving device. And so that meant that the margins were really tight; you could barely read the [text], let alone photocopy it. They didn't have any kind of an edge photocopier, like they have more recently, so the journals had to be split open, and spines were broken, and there were wooden things they would jam in there that would push [the journal] down and make the page more even, without the wrap-around effect you get sometimes.

As for each library, it was pretty much quiet, patron-driven in a sense. The librarians were sitting there waiting for people to ask questions or raise issues; there wasn't a whole lot of outreach, although I did start—back at the very beginning—sending out a list of recently published books and soliciting people's recommendations for whether or not we ought to buy them. The budgets at that time were really good, in the sense that the U.S. dollar was very strong. And in those days—particularly in the sixties, up until the early seventies—a dollar would buy four German marks. It was four marks

to the dollar, whereas now, as you probably know, to buy four euros would probably cost you five or six dollars, so it's really been a tremendous swing. That's why we were able to afford all the duplicate journals we bought—not only for what we called the organic chemistry library in Gates, but when the [Arthur Amos] Noyes Laboratory [of Chemical Physics] opened [1967], they had a library in there, too; so then, again, we had a whole other set of duplicate journals and gifts from professors to fill in the back runs of stuff like *Physical Review* and *J. Chem. Physics*. Any physically related stuff was duplicated over there—maybe half a dozen or ten journals.

WRUBLEWSKI: This was in the Noyes building?

ROTH: In the Noyes building, up on the second floor, in the middle someplace; it has long since been converted to labs. It had a nice two-story—that's right, there was a two-level stacks arrangement on one side and then a reading [area] taking up the equivalent on the other; maybe it's one big lab over there now.

I must have had time to burn, because there wasn't that much in terms of just keeping things bound, keeping the book circulation straightened out, and sending out the overdues and stuff. It tended to be, almost at least halfway, a clerical position. They hadn't quite figured out yet that they really ought to be hiring a little higher-level clerical staff to do a lot of this stuff and leave the librarians to supervise two or three or four libraries. That turned out later to be the case, but initially it was pretty much a clerical operation.

WRUBLEWSKI: What kinds of questions, and what kinds of interactions, beyond what you've already mentioned?

ROTH: Basically, there wasn't anything else. I don't know that there was any expectation, other than the fact that in my case you would have somebody there who had been through the experience of being a grad student and knew what grad students, and presumably professors, would need in the way of library services, and how the library ought to be maintained, and who, obviously, was trying to look out for their best interests. It wasn't really ever stated that way, but that was presumably the assumption—

that it would be nice to have somebody who knew something about science, number one, and number two, who would have been through the experience and know a little bit more about how things ought to be organized and what kind of books ought to be purchased without having to run and ask somebody, as was the case before I came. They really bought very few books, and I'm not sure whether [that was] because there weren't that many books being published. I think maybe the previous divisional administration had assumed that it was important for the individual divisional groups [to buy] whatever they needed.

WRUBLEWSKI: So there wasn't a centralized collection for the division?

ROTH: It was centralized in one sense—you had the collection of books and the collection of journals—but it wasn't actively developed in the sense that we think of a library collection development now. It was almost random. People asked for something and you'd go and get it—that kind of thing, not any active attempt to have a comprehensive collection for the research being conducted at that time.

WRUBLEWSKI: How did you get notifications of new publications in the field?

ROTH: Basically by looking at the journals that had book reviews, like *J. Chem. Ed.* and *Nature* and *Science* and that kind of thing. Or you'd get things from publishers on a regular basis; there was a lot of mailing-list stuff. If you paid attention and got on the right mailing list, you were pretty well aware of what was coming out. And you'd have publisher's catalogs coming semi-annually or quarterly, announcing their new books. It wasn't that hard to keep up with the important ones that were coming out and be sure they were in the library.

WRUBLEWSKI: You mentioned in the last session about working with the computer center to try to get a better, or more descriptive, card catalog.

ROTH: That's right, because the catalogers were presumably overworked to the point where they weren't able to help do any special projects like this, so I just took it upon

myself to go ahead. At that time, they were still using punch cards here, and so I just went over and it was easy to get access to the cards and the sorting machines and things they had at that time. I just went ahead and began looking at some of the books—and not only books in series but also books that had significant chapters on various topics, and creating my own little personal catalog of things and printing that up on a regular basis and updating it. This led to the development of *Serials and Journals in the C.I.T. Libraries*, which hadn't existed before. When I first came to Caltech, all there was in terms of a campus-wide index of journals was just a little card catalog over in the general library, which was in Bridge [Norman Bridge Laboratory of Physics] at that time. When they brought the libraries together in Millikan, they realized they needed to have something a little more user-friendly than that, so somebody actually sat down with that card catalog and a typewriter and typed up a several-hundred-page catalog of the journals we subscribed to. As the research increased and more journals were coming out, that was obviously going to fall behind pretty quickly, so one of the other things I did right away was to set up a supplement to that printed catalog, which was called the serials list, and maintained that on a punch-card machine, and printed it out on a regular basis. So we had a cumulative supplement to the card catalog and—I'm getting ahead of myself a little bit—then we realized that that wasn't going to work for very long, so we took the serials list and my supplement and put them together into one file, which was a magnetic-tape file. That took eight boxes of punch cards—big boxes about two feet long—eight boxes of those punch cards to set up this magnetic tape. And luckily I had somebody over in the computing center named Edith Huang, who did all the computing for me, and she was a wonderful, agreeable, lovely person who was able to do all this and set it all up. Once we got this magnetic tape created, that was just about the time when they had this computer-output microfilm technique; you could take a magnetic tape and run it through a computer and print it out on microfilm, and you were able to blow that back up and print master copies—photocopies in a sense—and then from that, we printed off hundreds of copies of this list and distributed it all over campus. Every lab then would have a serials list they could look through, and if they wanted to find some journal, they would know which library had it.

WRUBLEWSKI: How often was that?

ROTH: About every year we would do one of those things, beginning in 1970, and we kept doing that until the mid-eighties.

WRUBLEWSKI: You mentioned earlier that the libraries at some point consolidated into Millikan Library, which became the central—

ROTH: Central library for the sciences, that's right; that would have been 1967. When we moved over to Millikan, I also took on responsibility for the engineering library for a while, and later on for math and physics and biology. So over time, I had clerical help to do the day-to-day stuff, and I was able to be responsible for all those four libraries in terms of book selection. In addition to geology and astro, the branch engineering libraries stayed outside of Millikan.

The chemistry library was in the division for a couple of years after I came in 1965, and again, part of that time was spent getting all the gifts from Dr. Buchman bound to create the organic chemistry library that's still there today in Gates; all the stuff in that library today is what came from him. Actually, Gates Annex is the formal name for it. And then getting [the Buchman library] ready for the move, so it would be ready to go in when we moved out, and also getting ready for the move to Millikan and figuring out how we were going to lay out the 8th floor and where things were going to go.

WRUBLEWSKI: Now, what was the physical layout of Millikan?

ROTH: The idea originally was that each division was still pretty distrustful of the library system and wanted to maintain divisional control over its own library. [Laughter] Biology had the 9th floor. These were basically all separate libraries, with their own circulation systems. There was a main catalog and there was also a catalog for the biology floor, a catalog for the chemistry floor, a catalog for math, a catalog for physics, a catalog for the humanities, and a catalog for engineering, a general engineering library. That was sort of an awkward situation, because there was this general engineering collection, which had been the original general library, over in Bridge; the engineering

and the math libraries that had once been together in Bridge, in what is now Central Bridge; and a separate physics library in East Bridge.

So, [in Millikan] you had the biology library on the 9th floor, the chemistry library on the 8th floor, math and physics shared the 7th floor, general engineering was on the 6th floor, and then humanities was on 3, 4, and 5.

WRUBLEWSKI: Three floors for the Humanities?

ROTH: Three floors originally. Humanities had a fairly extensive book collection. I think the book collection was on the 3rd and 4th floors and the humanities journals were on the 5th floor.

WRUBLEWSKI: That included social sciences as well?

ROTH: It was humanities and social sciences together. That was a time when they decided to bring the humanities division into the 20th century and get more researchers and not depend so much on visiting professors. They had professors coming in from Occidental and Claremont to teach some of the courses in the old days, and they were getting away from that and getting researchers in at about that time. That meant we had a big expansion in the humanities library, so every year—from '67 when we moved into Millikan until the seventies—there was always this question: “What are we going to do with all this humanities stuff?” We were always looking for a place to store it; as soon as they moved in they grew pretty rapidly, so that was a constant problem.

The other problem in Millikan was that unfortunately somebody from public relations was going around town talking about this new wonderful library building and everybody was invited to come and use it. There was no security. It was all, you know, for the campus, so it was based on the honor system, and they didn't have anything set up for controlling outsiders. So the humanities library wound up losing a lot of books this way. We had kids from PCC and quite a few USC [University of Southern California] students who lived in the area and were using the library, as well as Cal State LA and stuff, so there were a lot of people coming in who weren't part of the campus community and didn't share the honor system the way one would like. That went on for a number of

years, and then the library administration finally began to institute some controls. They wouldn't let outsiders in after five o'clock, and they began to check [people] on the way out, so it was a constant battle until they finally cracked down and went to a pass system. They did a number of things to try to ameliorate this loss problem.

WRUBLEWSKI: So it was primarily theft? There was never an issue with security or anything of that nature?

ROTH: Nothing really serious. I think even today a number of the women here are not comfortable being on the upper floors at night, when nobody's up there and it's dark and spooky and always a few weird people wandering around. But nothing really serious ever happened, thank God.

WRUBLEWSKI: You mentioned before that each floor was separate. Was the control of those floors, like the people who shelved the books and the people who controlled the circulation—were they employees of the library or of each division?

ROTH: No, they were employees of the library by this time, so when we went over to Millikan Library I became a library employee.

WRUBLEWSKI: How many people, total, were in the library about this time—let's say right after Millikan opened?

ROTH: It must have been seventy at least, in terms of library employees. There were quite a number of people. We had a clerical person on each one of those floors in addition to the divisional librarians, and as we phased out some of the librarians, there was still at least one person on every floor, and then another half dozen in humanities, and several catalogers and acquisitions people and shelvees, so we're way down from what we used to be.

WRUBLEWSKI: You mentioned that you had responsibility for the majority of these collections. So in terms of collection development, were there any other people who were brought on around that time to work on that as well, or were you primarily the person?

ROTH: No, I was the only one doing that work. As I look over my notes here, a lot of this was worrying about humanities and what they were going to do about the space problem and that kind of thing, and the misuse of the humanities collection by outsiders.

WRUBLEWSKI: At the time in the sciences, these collections in Millikan had the journals and the books together?

ROTH: That's right, each library would have those on the same floor. They were still separate libraries. It was just like moving a branch library into Millikan, and they would get a floor.

WRUBLEWSKI: In regard to the journals—just to go back to the technology aspect for the moment—did bringing in the photocopier change how people interacted with the literature? Were there any noticeable differences? I know you mentioned this a little bit last time.

ROTH: I think there was, in the sense that now, since it was so easy to get photocopies, people were looking at a lot more journals than they would have before. Before, a lot of the grad students would come to the library, but most of the professors would have their own copies of the half-dozen journals they would look at, and they obviously wanted the graduate students to go somewhere else so they wouldn't mess up *their* copies. [Laughter] The photocopier made it a lot easier to get copies. It became so easy to get copies that often the journal somebody was looking for was off being photocopied or wandering around some place. We relaxed the rule about checking out journals, so people could take them back to their divisional copier for a few hours, because then they wouldn't get charged [for the copying]. I think we were charging nine or ten cents a page at that time to photocopy, and if they had their own account they could get it a little cheaper back in the division. So that was sort of a constant problem. What we did—I

think that was the one singular thing I did that really stood out over the years—was to devise a photocopy request form, realizing, I guess, that people didn't necessarily want to read something right that minute but just wanted to take care of getting the thing. If they got it within a couple of days, 99 percent of them were more than happy. So we set this thing up where you just filled out this little form and threw it in a box, somebody would come by every morning and pick the requests up and sort them out by floor, and pick the journals off the shelves, take them downstairs, get them photocopied, put the photocopy in a bag and throw it in the mail and get it back to the person basically within twenty-four hours. And that system really worked fine for a long, long time. I think the biggest day we ever had was after one long July 4th weekend. We came back and there were over 700 photocopy requests waiting for us Monday morning. Thank God we had a staff member who had memorized what floor these journals were on, so he could look at the title and put two and two together and figure out that that one's a chemistry journal, that one's a biology journal, that one's a physics journal.

WRUBLEWSKI: Seven hundred requests?

ROTH: Seven hundred requests. We had that done by the next day; everybody pitched in and helped out.

WRUBLEWSKI: So basically there were a lot of people working that weekend. [Laughter]

ROTH: Actually it wasn't the weekend; we were away until Monday morning.

WRUBLEWSKI: OK. It sounds like there were a lot of professors in, or at least over the weekend.

ROTH: That's right, a lot. Holidays really don't mean that much here; it's just another day; they keep working.

WRUBLEWSKI: That's kind of the origin of the DocuServe service, essentially.

ROTH: Yes, it really is. The original photocopy service worked great for a long time. We were constantly hearing from people who had left to go someplace else and weren't able to get that kind of service: "How could we do this?" "What can we do?" They were really, in a sense, thanking us while bemoaning their current situation.

WRUBLEWSKI: We talked a little bit about collection development. Was there anything in terms of research or the broader Caltech community that was going on of interest in that time frame? Say, late sixties, early seventies, mid-seventies. Anything of note?

ROTH: Not that I can remember. It was just a constant attempt to stay abreast, as we do now—stay abreast of the research going on in the various divisions and being aware that this book would apply to that research and was published by a responsible publisher. That was usually criterion enough to go ahead and make a purchase, as long as the money lasted. It wasn't until the seventies that the dollar started going down and the prices of the foreign—particularly the European—journals started going up. That made it much, much more difficult for us. It took the institute administration a little while to figure this out—that we weren't up here just throwing money away but there was actually this very serious problem, a foreign-exchange-rate problem, that was causing this.

WRUBLEWSKI: Was most of the library budget from the institute, or was it from the divisions? What was the structure at that point?

ROTH: They went back and forth a couple of times. Library budgets were first taken out of the divisions and put in the central library budget and reallocated, and later budgeting was put back in the divisions for a couple of years, and the divisions were given whatever money there was and told, "If you want more books"—or journals, or whatever—"you're going to have to come up with the other part of it." So there was sort of a fight there, particularly in the late seventies, as to how this was going to play out. It finally worked itself out when they realized we weren't wasting money, that it was really a foreign-exchange problem we didn't have any control over, obviously.

WRUBLEWSKI: Right. I did want to touch on—and I think this is chronologically correct—I know you were involved with a Caltech team traveling to India to help set up an engineering school. How did that collaboration come about?

ROTH: Just out of the blue. It started in 1962, when it was, I think, part of John Kennedy's outreach. John Kenneth Galbraith was our ambassador to India. He was the one who started that. The Indians had cleverly figured out that they could play everybody off against each other. I don't mean that in a negative way—just that they got the Germans to build them a school down in Madras and the Russians to build one over in Bombay and they had the British build one in New Delhi and UNESCO built one in Calcutta. By the time the U.S. got involved, there weren't a whole lot of interesting geographical choices left, so we got one up in Kanpur, which was a British military depot when the British were occupying India. They had all the cultural accoutrements you would expect of a military depot. Anyway, they took over what had been sort of a junior college or something and tried to make that work. The mistake they made was that they brought the professorial staff in first and after about five years realized, "Wait a minute, we need an infrastructure here, people who know how to fix things."

WRUBLEWSKI: So Caltech's involvement was—?

ROTH: It was actually Caltech and JPL who both sent people there, beginning in the early sixties. I wasn't approached on this. I don't think I was really aware of it until I was asked by the library director, who said, "Hey, we're looking for somebody to be a library advisor over there and what do you say?"

WRUBLEWSKI: So who was the library director at the time?

ROTH: Harald Ostvold. He was the guy from the New York Public Library who had come out [in 1963] to get us into Millikan, and he was still library director. I said, "Hey, that sounds like fun," so I looked into it a little bit and had one short interview with some committee involved with sending people over there. I talked to them a little bit and they

seemed to feel I'd be OK. So I signed up for it. Caltech paid my salary while I was there; I stayed on basically as a Caltech employee while I was there, for eighteen months.

WRUBLEWSKI: What types of things were you involved in doing?

ROTH: Well, there again, it was sort of an awkward situation. They'd set it up—I think Purdue was the university that had originally worked with the library people in Kanpur—back in the sixties and really treated them in a demeaning way: They would basically catalog all the books at Purdue and then ship them over there, already cataloged, all ready to be put on the shelf. The local staff were actually doing some of their own cataloging and stuff by the time I got there, so it wasn't so bad. But it still kind of ran itself; there wasn't a whole lot of advising to be done, because they'd been doing this for eight years before I got there.

WRUBLEWSKI: You got there about 1971?

ROTH: Yes. The program ended in '72, so I was there from the calendar year '71 and through May '72.

WRUBLEWSKI: When you say the program ended, you mean—?

ROTH: The ten-year USAID-funded program. It was funded for ten years by USAID. But it was the greatest experience of my life. It makes you appreciate what you have and that no matter what situation you're in, there are a lot of really nice people. People are basically nice. That's the way it worked out for us over there. When I was there, I had been thinking about that *Landolt-Börnstein* physical-property set of volumes for a long time, and how difficult it was to use because it was in German and nobody knew enough German to be able to use it effectively. I'd read some place that the National Bureau of Standards was doing some translation project, so I wrote to them and said, "How are you doing it?" or something, and they said, "Well, we did a little of it, but then we let it go. But we'll send you all the stuff we have." They had gone through and had translated some of the contents pages for *Landolt-Börnstein*. So then, OK, why don't we make an

index of that? So I made a property index for *Landolt-Börnstein* and also made an element index for *Gmelin*, so if you wanted to find all the compounds of potassium or something, you'd look in there and find it that way. I also wrote up a thing on *Beilstein*—how to use *Beilstein*, how the system numbers work—so if you find it in one volume, you can just bounce through the rest of the volumes very quickly. So that was my legacy at Kanpur—leaving this behind.

WRUBLEWSKI: This was for the community at large, not just Kanpur?

ROTH: Actually it was just for Kanpur; it wasn't so much for the community at large. Somehow we didn't have the same sort of feeling of sharing everything as we do today. It was there, and when I got home I got into a bunch of other stuff and didn't follow through and expand the thing enough so you could make it into a book.

WRUBLEWSKI: Now, your whole family relocated with you to Kanpur?

ROTH: Yes, my wife and my three-year-old daughter went with me, and my younger daughter was born over there. I know it sounds crazy—it turned out there was an American-trained Indian woman pediatrician there who fortunately had graduated from Ohio State. The hospital was one where you had to clean out your own hospital room, and cows were walking by outside, and people were outside cooking food for their relatives who were patients, and that kind of thing. But you know, you're young and you figure, "Hell, it'll work!" The only problem was that Kanpur was one of the few places in the world where smallpox was still a serious problem, so we had to get my newborn daughter vaccinated before we left and the guy was a little too overeager in terms of the vaccination thing, so she got a pretty big hole in her arm, which I guess is the way the vaccination works—it has to heal from the inside out. It turned out fine. She was about seven months old when we came home. It was really nice in those days, because the government would give you enough money to fly from here to New Delhi and you could use it any way you wanted—I guess they gave you so many miles. So on the way home we went to Bangkok for a few days, we went to Hong Kong for a few days, we went to Kyoto for ten days, we went to Hawaii for five days, and then came on home. Again,

because the dollar was still so valuable at that time—it had dropped from 360 yen to the dollar to 300 just before we left India. But still, at 300 to the dollar, you could stay at the highest-class hotel in Kyoto for thirty bucks a night or something. [Laughter] It was really a magical time in that sense; you could travel like a rajah because of the dollar thing.

WRUBLEWSKI: So now you came back to Caltech?

ROTH: Came back. They had hired a young man to take my place while I was gone. He stayed on for a little while as a biology librarian; then he left and I took the biology library back again.

WRUBLEWSKI: At that point, had you started to become involved with any professional organizations? I know that the American Chemical Society information division had been established for some time at that time.

ROTH: For some reason, I didn't do that, and I didn't do the Special Libraries Association, because I knew a librarian here who had worked at Avery Dennison, in Pasadena, and she said it was dominated by a lot of people who were really unfriendly, not very nice. So I didn't pick up on that too much, but I was a little bit active in ASIS [American Society for Information Science] and more active on a local level. It was more into the eighties before I really got active in the Special Libraries Association.

WRUBLEWSKI: On the local level, do you recall any interactions or projects? What was the idea behind those groups at the time?

ROTH: Really it was just to get together, have dinner, and hear somebody talk. We'd talk about different things—how microforms would solve everybody's problems [laughter]—different things like that. I can't remember anything I got out of it other than the chance to meet some other local librarians.

WRUBLEWSKI: To network.

ROTH: To network a little bit, yes. In a way it was nice, because it disabused me of any idea of going to work for an aerospace company or something, which would pay, obviously, quite a bit more than Caltech was paying. But when I go to one luncheon meeting and they're rolling out the liquor cart at 11:30 in the morning [laughter], the instability of employment in those industries was something I didn't want to get involved with. It was a nice early warning.

WRUBLEWSKI: So even back then, there was—?

ROTH: There was a lot of turnover in the aerospace industry in terms of the libraries, for some reason.

WRUBLEWSKI: Just in terms of personnel?

ROTH: Personnel, as far as I could tell, yes. People moving around a lot. They had what they called the Pacific Aerospace Library during the war, when the companies got together and had one joint library. They actually kept going after the war; I think that didn't close down until the mid-sixties or so.

WRUBLEWSKI: And that was located—?

ROTH: It was down by the beach someplace—Manhattan Beach, or someplace like that—down wherever those aerospace companies were. Off the 405 Freeway someplace.

WRUBLEWSKI: To jump ahead a little, there was still the idea of a corporate library at that point?

ROTH: That's right. I was recruited by a couple of them. They talked to me and I went down there to talk to them at one time. North American, was it? I can't think of the name of it now—one of the big aerospace firms out there. I got to thinking about it, and I just couldn't see giving up the security of Caltech for the additional dollars and the insecurity of working at those companies.

WRUBLEWSKI: The turnover was more personnel, as opposed to them restructuring or removing libraries?

ROTH: That's right. That didn't come until much later.

WRUBLEWSKI: OK. To go back to the professional organizations. It did seem more of a social thing as opposed to these cross-institutional projects that seem to be dominating a lot of the scene today or at least over the last—

ROTH: It was mainly social at that time, in terms of society activities.

WRUBLEWSKI: Were you active in ACS in the research division at any point—in your subject division, as opposed to the information division?

ROTH: No. I attended a few national ACS meetings, but it was more a case of being there when *Chemical Abstracts* was going to do something new, or when SciFinder was coming out, things like that—finding out more about what changes were in the offing for chemistry-related publishers at the exhibits.

WRUBLEWSKI: *Chem Abstracts* was pretty much the definitive tool at that point?

ROTH: That's right, yes. We had all those print volumes that we carefully maintained and used on a pretty regular basis. That's all there was.

WRUBLEWSKI: Later on, you spent some time in Scotland. When was that, roughly?

ROTH: That was in 1975.

WRUBLEWSKI: So you'd been back from India for a little while.

ROTH: That's right. Johanna Tallman was the library director here at Caltech by then. We got along, but there was a sort of tension there, because she tended to be a very traditional librarian, in the sense that if you had a question, you'd just go to the card

catalog and dig around a little bit and see what you could find. The question came up at one time that the reference they were providing—where they had what they called the main reference point—was on the second floor, where the card catalog was. This was in Millikan. And the librarian at that time said that the most difficult question he had to answer was, “What is the weight of the Earth?” Something about as trivial as that. Actually I was sort of appalled that he was asked it. It was somebody from the public relations department who was writing for *Caltech News* or something—whatever that thing is that they used to hand out to the students as a promotional piece. Interviewing one of the librarians: “What’s it like to work in the library?” sort of thing. And he was using that as his hardest question. [Laughter] It was embarrassing beyond belief. So I said, “We need to be a little bit careful about this. Maybe we ought to run this by somebody before we let this information out.” And she was sort of taken aback and surprised that I was concerned about it. And then she said, “What kind of questions do *you* answer?” Well, then I was showing her how to use *Landolt-Börnstein* and *Gmelin* and all these other things, you know. And she said, “My God, I didn’t have any idea you’d be answering questions like that!” Anyway, there was that little tension there.

There was a math professor coming here from Scotland for a one-year sabbatical, and he said, “My wife’s a librarian. Is there any chance of trading jobs for her working here?” or something like that. So Tallman asked me, and I said, “Hey, where do I sign up?” [Laughter] Tallman was nice enough to maintain my Caltech salary while I was gone. I had my salary to go on over there, so that worked out great. The woman had her salary from Britain, and she obviously didn’t get the better of the deal. We switched houses and switched jobs, and I had a wonderful year in Scotland.

WRUBLEWSKI: So that was a twelve-month—?

ROTH: The ’75-’76 academic year. Well, I got over there, and the thing was that it was a library about the same size as Caltech’s and they had twice as many people working there.

WRUBLEWSKI: What university was this?

ROTH: It was the University of Stirling. Stirling was the capital of Scotland in the Middle Ages. It's about halfway between Glasgow and Edinburgh, right in the center of the country. It was a beautiful place, it's a beautiful country, and I couldn't have asked for a nicer situation there. It worked out fine. I got there and there weren't that many people asking questions, so I figured, "What am I going to do? Well, I don't know anything about British government publications." So I went down there and dug around and finally made up a guide to British government publications, basically for my edification, so I learned all about British government publications.

WRUBLEWSKI: On what subjects?

ROTH: Basically everything. There were really very, very few reference questions. I don't know, it was weird—nobody seemed to ask very many questions. I'm not sure why they had all those reference people around.

WRUBLEWSKI: Did they have subject specialties?

ROTH: Sort of, yes. Most of the chemistry books were upstairs, and there was an old retired chemist who was up there to be the chemistry librarian. As I found out later, they weren't very impressed with him, so they didn't tend to ask him very many questions. But there again, the computer thing was just beginning to start, when Dialog first came out. It was almost the first year that Dialog came out.

WRUBLEWSKI: This was in '76?

ROTH: It would have been about '76. Because I know that Jean Anderson, the aeronautics librarian here at Caltech then, was the first one to get that started. She had gotten some money from somebody who came in and microfiched all her NASA reports; I guess she had the best collection of NASA reports in the country. So he came in and microfilmed all that stuff. And then there was some money involved, so she used that money to buy the TR-60 [terminal] we used to use.

WRUBLEWSKI: A TR-60, or a VAX [Virtual Address eXtension]? VAX might have been a little later.

ROTH: The TR-60 terminal, with the phone handset that went into the little modem thing; you plugged the phone into these little rubber suction-cup things and used that at 300 baud.

WRUBLEWSKI: So then what was the company that came in?

ROTH: It was Dialog that provided the access to the databases; it's the same Dialog that we have today.

WRUBLEWSKI: So they were the ones that did the microfilming?

ROTH: The microfilming was at a place called UpData, and they're long gone. I don't know if we even have a copy of that microfilm. It seems weird; presumably we still have all the reports. I kept trying to track that down recently, and it doesn't seem to be around. But anyway, the UpData thing provided a little bit of seed money to get this computer searching thing off the ground.

WRUBLEWSKI: And that was really the first one.

ROTH: That's right, yes, it was the first one. I think Dialog had been around for a few years before that, but in terms of getting these databases up and getting them all on hard disks so we could actually search them.

WRUBLEWSKI: Can you talk a little bit about how that was structured? There was a central hard disk that had this information on it, and then people would call in to access that?

ROTH: That was basically it. Dialog had a facility in Northern California someplace and they had a big warehouse full of hard disks that had the information from a number of

different databases, so we could search Medline or Web of Science, or things like that. I've sort of forgotten. We didn't use much more than Web of Science at that time. You could search *Chem Abstracts* too, but it was very expensive, so it was pretty rare that anybody would spend the money to do it.

WRUBLEWSKI: We're talking late seventies?

ROTH: That's right, we're getting into the late seventies now.

WRUBLEWSKI: What was Dialog's process in terms of incorporating these other sources? Do you remember any specifics about that?

ROTH: I don't. They just sent out news announcements that they had this database or that database. They had quite a number of databases available, just as they do today, like Chemical Abstracts Service's STN. We haven't used Dialog for a long time. Dialog had a number of the patent databases, so you searched Derwent and some of those things, at \$300 an hour.

WRUBLEWSKI: It was the only platform that accessed these databases?

ROTH: That's right; that was the only access at that time. I think the National Library of Medicine had their own thing, but I think they also let these guys have a copy, since it was a government publication. So Dialog had their version of Medline, but I think theirs was a little more costly than going directly to the National Library of Medicine.

So Jean got this started. When I came back, I got involved in it, and then I took the Medline training. At that time, you had to go thirteen days for the basics and then five days for the advanced, so I talked them into letting me just kind of fuddle my way through the basic thing and just took the five-day advanced class. That just seems unbelievable, doesn't it? [Laughter] For something that wasn't that hard to figure out if you spent a little time on it.

WRUBLEWSKI: Now, how would you access Medline?

ROTH: Same way; just dial up. It was just the dial-up modem, initially.

WRUBLEWSKI: And besides Dialog, were there any other companies that had that type of direct access?

ROTH: There was one called—it was more expensive—I think it was Questel. They had a different search engine, but it used that same terminal and dialup modem.

WRUBLEWSKI: After Dialog got started, after the National Library of Medicine had dial-up access to Medline, who were the primary users of this, and how was this advertised as a resource around that time?

ROTH: I think we just sent out flyers and said we had access to these databases if you had \$25—or whatever it was going to cost to do it. We got a few, but obviously not that many at that time, because it seemed kind of expensive to do this when you could go and spend an hour or so in the library digging through the print indexes and find the same thing. So it took a little while, and getting the cost down to a more reasonable level, to get this off the ground.

WRUBLEWSKI: This was something that the patron would have to come to the library and have the librarian—

ROTH: We had little sheets. You'd fill out your request form and say what you wanted to do, and then we'd go and do it. They had a deal—I think it was with Dialog but it may have been after we started using *Chemical Abstracts*—if you did it after five o'clock, it was quite a bit cheaper. So basically we'd collect these things during the day and then I'd stay after five. I changed my work schedule, so I worked until six so I could get these things done after hours.

WRUBLEWSKI: When did *Chem Abstracts* become part of Dialog?

ROTH: That could have been fairly early on.

WRUBLEWSKI: They were among the first then?

ROTH: Yes. *Science Citation Index* and *Chemical Abstracts*, and probably *Physics Abstracts* was in there. They were all in there by the end of the seventies, certainly.

WRUBLEWSKI: So there were still people who would prefer to search for themselves. What was the objection? Was it cost, was it the new interface—what was the sense you got from patrons about it?

ROTH: I was doing about 500 a year—doing about two or three a day on a regular basis for a number of years. I think it could have been cost, because if you wanted to do a text search, basically it wasn't that expensive to do—maybe \$10 to \$15 to do a text search, depending on how many references you printed out. There was always a cost concern. And then if you wanted to do a structured search in *Chem Abstracts*, I think that was \$25 even after hours, just to search for a structure. So that tended to discourage some of them.

WRUBLEWSKI: Why did it cost \$25 to do a structure search? Did you guys get any indication from the company where that was coming from?

ROTH: No, I didn't, and I'm not sure why they picked that specific figure. I think it was because they figured they could get it. I think they were really looking at the pharmaceutical companies and what they could get from them, and they were giving the libraries a fairly substantial discount. This \$25 was actually a substantial discount on what they were charging the pharmaceutical companies. There has always been this underlying tension, I think, between librarians in the pharmaceutical companies and librarians in the academic libraries, who were given like a 90-percent academic discount at that time. It may be that *Chemical Abstracts* figured that you couldn't make the academic price any less or you'd really tick off the pharmaceutical people.

WRUBLEWSKI: These charges to run each search, this was something that would come from the individual researcher or from the division?

ROTH: That's right; it was all charged back to grant funds. We weren't doing any free ones. The library wasn't subsidizing any of this; it was all charge-backs.

WRUBLEWSKI: Just comparing that to the state of things today, that seems—

ROTH: I know. That's obviously when they went and set it up so that people can do the research for themselves and the library just pays the subscription. That was a big breakthrough in terms of getting people to do it, really get use out of it.

WRUBLEWSKI: Well, I think part of that, again, would come to the broader access to personal work stations. I would assume that work stations then were pretty limited in terms of availability. Were there any available for the public to use? Not the public, but the community.

ROTH: No, not in the library there weren't. That came much, much later. I can remember sharing. There was a PC we had up on the 6th floor that we shared to do some of this stuff.

WRUBLEWSKI: Shared among all the units in the library?

ROTH: Yes.

WRUBLEWSKI: Do you remember when the library started getting patron computers in, ones that people could walk up to and use?

ROTH: I think that wasn't until almost [1997, when] we moved into the Sherm [the Sherman Fairchild Library of Engineering and Applied Science]. I don't remember ones in Millikan particularly. There could have been maybe one or two in the whole building.

WRUBLEWSKI: So in terms of doing a structure search—and I'm thinking of the way things are organized today—they would just submit their request and say, "I would like

to know everything about this particular structure,” but they wouldn’t need to know the ins and outs of how to tell that to the database?

ROTH: No, that was my job—to know how to describe it to the database.

WRUBLEWSKI: And I think you touched on this a little bit before, when you were talking about your interactions with the library director, in the sense that chemical information is at this point continuing to be significantly different compared to other types of information, in terms of searching.

ROTH: That’s right. I think most of the other librarians could do a text search, and that obviously is much easier to do than a structure research—structures, plus physical properties kind of things.

WRUBLEWSKI: And that was something primarily like *Chem Abstracts*, those kinds of databases that had been around for all of—

ROTH: That’s right.

WRUBLEWSKI: Is there anything you’d like to add? I’m sure there will have to be a little supplement when I go over my notes. There were a lot of little odds and ends of things we did. Mention them, please.

ROTH: For example, the humanities library was, fairly early on, switched over to the Library of Congress [classification]. They did that back in the late sixties. We didn’t do that until much later in the sciences.

WRUBLEWSKI: Any particular reason why?

ROTH: Just resistance. I didn’t want to do it. We didn’t have that many books, and it seemed like an awful lot of work, and maybe the money just wasn’t there either.

WRUBLEWSKI: Actually, that's a good question. When you say, "We didn't have that many books," would you take a rough guess? In 1975, roughly, what would be the size of the collection?

ROTH: Maybe about 8,000.

WRUBLEWSKI: Monographs?

ROTH: Monographs.

WRUBLEWSKI: Total?

ROTH: Just in chemistry.

WRUBLEWSKI: How about the library as a whole.

ROTH: I couldn't guess, because the humanities thing was growing so rapidly. It was changing all the time. But the main thing in the early seventies, as I've said before, was that the dollar devaluation made it very tough on us year after year, in terms of the budgets, and then they would sacrifice everything to keep the journal subscriptions going, so in some years they would use that glue stuff for binding issues together instead of sending them out to get bound, and they cut way back on the book purchases.

WRUBLEWSKI: So a lot of that was inflation-driven?

ROTH: That's right, inflation and the dollar devaluation. We didn't go to centralized circulation until '75, as each floor had its own circulation system. Then they went to central circulation downstairs, on the first floor. And we were still getting very large numbers of outsiders coming in. I guess they did a survey back in '75 and there were about 180 outsiders a week coming into the library. Millikan still had two exits—entrances and exits on the north and south side—for quite a while, and it wasn't until '75 that they finally began closing that north exit at five o'clock. And they used those edge-

notched cards. Do you remember those? If you cut the due date, you cut a little thing out of it so you could stick a rod through there, pick it up, and all the ones with the right edge notched out would fall out and then you'd know those were the overdue books. We also had an interesting thing with USC and UCLA; we had a van that went around the campuses, mainly for interlibrary loans, but people could actually ride in them. We had a number of people here who were taking courses at UCLA, or whatever, who would get the van in the morning and catch it on the way back.

WRUBLEWSKI: When did that start? Was it something you used as a graduate student?

ROTH: No, that didn't start until the mid-seventies. It ran for a number of years. It worked fine, everybody loved it.

WRUBLEWSKI: So the scope of interlibrary loan at that point was local. Or could you still get books from other libraries across the state?

ROTH: It was more a time-factor thing. If you tried to get it from someplace else, they had to put it in the mail, and then you'd send it library book rate, which could take weeks, so it was really more to speed things up a bit and be able to get them more quickly.

WRUBLEWSKI: In your interlibrary loan among local campuses, how did you all know what books the other libraries had?

ROTH: There was something on Dialog where you could look up in the Library of Congress. I think we just assumed UCLA had everything [laughter], which at one time was probably true; they were buying everything for a long time.

WRUBLEWSKI: You'd just pick up the phone and call over there?

ROTH: You'd just call over there. They had worked out something with the librarian down at USC. For a long time I'd just call her up and she'd make a photocopy and put it in the mail for me, and I'd do it for her as well. It didn't happen very often, but it was

sure nice when somebody was in a big panic for something. Finally, in 1978, we figured out that we needed to coordinate the library with curriculum changes and watch out for that. That was probably true for some of the other libraries, as I'm sure I'd been staying on top of that—for chemistry at least. I've got a note here that MIT had five times as many volumes and three-and-a-half times as many journal subscriptions as Caltech did in 1978. And that was when we began this conference analytics project. There was always a big deal about trying to find conference proceedings back in the sixties and seventies. They put them out as books, and the publishers realized they couldn't sell those books as easily as they could sell them if they stuck them into a journal issue. So if you subscribed to the journal, you were forced to take these conference papers. So that's when we started; somebody in the acquisitions department would watch as they were checking the journals in every day. As they did, they would watch for something on there mentioning a conference, and they'd pass that off to someone else, who would make a little card for the catalog saying that an international conference on whatever was published in this journal issue. We did that for a number of years.

WRUBLEWSKI: So the conference proceedings, compared to today, were more extensive, less extensive?

ROTH: I think more extensive. Now it seems—maybe it was true then too—that the conference papers were solely a preliminary kind of thing, just thrown out there, and then they'd go back and write up a more formal paper for publication in a journal.

WRUBLEWSKI: Because I know that that can vary from conference to conference, the extent.

ROTH: It depended on whatever subject it was, too. The physicists were much bigger on conference attendance and proceedings than the chemists and biologists were. That was really a big deal with physicists; it seemed they found every resort in the world and figured out how to have a conference there. [Laughter] They'd keep moving these conferences around so they had all these exotic places they could go to and share their thoughts with each other. That I think is probably the main thing.

WRUBLEWSKI: We'll stop there and pick up the—

ROTH: The 1980s.

WRUBLEWSKI: To have a jumping-off point for next time. Around then was when personal computing started to take off and computer technology started to become more readily available. How did this affect the development of local online catalogs? When did that start to pick up? Was it mid-eighties, late eighties?

ROTH: Well, sort of the mid-eighties we started working on it. There was a whole story there about our attempt to get an online catalog and how that didn't work out; and then we had to go with Innovative [Interfaces]. That's a whole other story.

WRUBLEWSKI: OK, so we'll pick up with that next time.

DANA L. ROTH**SESSION 3****January 31, 2014**

WRUBLEWSKI: We're going to pick up time-wise with the late seventies, early eighties.

ROTH: The most significant thing happening at that time was that I was getting frustrated with the library situation in general. There was an ad in the *C&E News* for an online searcher back at Upjohn Pharmaceutical. So I went back there for an interview and spent some time with them, and actually had a job offer from them. It took me about a week to decide not to do it, primarily because I talked to Harry Gray [chemistry division chair, 1978-1984], and he was encouraging me to stay, and I talked to him about the problems and stuff, so I think he talked with the institute administration and they came to the decision that the librarian at the time, Mrs. Tallman, would retire at sixty-five, although she really wanted to stay on indefinitely because she enjoyed the stature. So, with that thought in mind, I decided to stay, as I realized things could be better.

WRUBLEWSKI: Were there any specific challenges the library was facing at that time?

ROTH: I was kind of upset about the staffing situation, because they kept cutting back on my staff upstairs, so we had fewer and fewer people to watch the different floors I was responsible for. And then they took my shelvers away. I had had a really nice deal worked out with PCC—I had PCC students come down and do the shelving for us, and they were really good. They took that away. And there were some other things that got going at that time that were beyond annoying. The fact that Upjohn was willing to pay probably half again as much as I was making here was something, too. But then the thought of moving to Michigan and suffering the winters and the mosquitoes in the summer and things like that. And the day before I got there for the interview, a tornado went through there—surprising for southern Michigan.

So we moved on from there with the promise that Johanna Tallman was going to leave, and we went ahead and just kept doing stuff. I did have a fairly interesting project,

which I had actually written up—I think it's in CODA [Collection of Open Digital Archives]. I went through and looked at every article published by researchers in chemistry and biology—this would have been about the '79-'80 academic year. I took every paper—I actually had staff at that time to do it. And we went through and made a listing of the citations of those papers, to see which journals they were coming out of, and the age range of the journals, and this kind of thing—to find out whether most people recognized that there was a relatively small number of journals these guys publish in and also cite. And the fact that only 10 percent of the articles cited were more than ten years old, that sort of helped direct the library in certain directions later on, in terms of what needed to be kept and what could be moved up to the Annex and remote storage and stuff. So that was nice.

WRUBLEWSKI: Is the Annex still in the same location, or did that change?

ROTH: No, the Library Annex didn't come until they built the Beckman Institute in the late eighties. We had places around campus where you could stash stuff and take it back to the old reading rooms. Most of them were still there and still had shelving that could be used for that kind of thing. We did find storage space where the Fairchild Library is now. Used to be the steam plant, which had moved down south of the campus by the Braun gym some years ago, so we had this old steam plant there, and the Fairchild Library took the footprint of that steam plant for its foundation. So they moved a lot of the humanities books over there. It was a dark, dungeon-type of place for a lot of the humanities books.

WRUBLEWSKI: The steam plant? Was that for research or to power—?

ROTH: It was just a power plant, down there south of the post office in the Spalding building [Keith Spalding Building of Business Services].

Moving on: That '79-'80 academic year is when they changed from Dewey to LCC [Library of Congress Classification] for the engineering and physics books.

WRUBLEWSKI: What prompted that?

ROTH: I think it was more an effort so that you didn't have somebody here responsible for assigning call numbers; they'd just take the call numbers that LCC did. They thought it was a cost-saving thing, and it was just easier for the catalogers to handle it that way. Otherwise somebody had to come down and look at the new books and sit there and actually do them, which I had been doing for quite a few years. And Tom Apostol, a math professor, came over and did most of the math books for a long time, too.

WRUBLEWSKI: Locally assigning Dewey numbers?

ROTH: Yes. That does seem kind of quaint.

WRUBLEWSKI: So different institutions theoretically could have the same book cataloged in different ways?.

ROTH: That's right. I sort of argued against changing numbering to the LLC. For example, Jack Roberts was one of our NMR persons, so any book on NMR got the same Dewey number, whereas if you take it from LCC, there are about ten different numbers, depending on whether it's biophysics or materials or solid state or whatever it is.

Returning now to the introduction to computers and online searching, by 1980 we were dealing with about 200 online-search requests; basically Jean Anderson and I were doing that. I can't remember how we did it or what machines we were using or anything. It's really weird. I can remember we had to start off with Macs; we used Macs for a number of years.

WRUBLEWSKI: You mean as in Macintosh, Apple?

ROTH: It seemed like it was bigger, though. I remember we had one of those original Macintoshes at home, but this thing was bigger, as I remember it. And a little later on, we also had a PC that we all shared; it was on the 6th floor. You had to have a little key to open the thing up and use it. By this time, around '82, Tallman had left and Rod Casper, our head reference librarian at that time, took over for a while, until [Glenn L.] Brudvig got here. And that next year, we had 400 search requests.

WRUBLEWSKI: Now, this is per week?

ROTH: Per year. Brudvig came in '83 and search requests kept going up each year—500, 800, 900—that kind of thing. So it was a pretty routine thing for me to stay after work every day, basically from five to six, and do these things, because it was quite a bit cheaper to do it after five o'clock.

WRUBLEWSKI: That's like fifteen, twenty a week, roughly? How long would each one take?

ROTH: Five to ten minutes probably; fifteen minutes maybe—depending, obviously. Most of them were *Chemical Abstracts* but a lot were Web of Science or Engineering Index, those kind of things, which we had access to.

WRUBLEWSKI: This was all still through the Dialog platform?

ROTH: That's right. I think these were all through the Dialog platform at that time. A direct link to *Chem Abstracts* came much, much later.

Returning now to administration of the science and engineering libraries: There were a total of ten libraries—geology, astro, biology, chem, math/phys, engineering, EE, computer science, environmental engineering, and aero—and the unstaffed reading rooms [in Bridge, Sloan, Thomas, Gates Annex, and Kerckhoff] that needed to be maintained. Jim O'Donnell pretty much took care of geology after we hired him [1986]. I really didn't do any supervision; I was just sort of an administrative supervisor, so I would just see if there were any beefs in the [geology] division, and if there weren't I'd just write up a nice evaluation for him. The same with Daniel Taylor in biology. So it was really me trying in a way to get the engineering librarians on board as Caltech Library system employees, because before Brudvig came they were still largely funded by the divisions. They were divisional employees and there were divisional budgets for their libraries. And when he came, all that came back under the library.

WRUBLEWSKI: And this was about what time?

ROTH: About '85, '84-'85. So that was fun. Rayma Harrison worked in environmental engineering. She was great to work with, and Jean Anderson was good, too. And we had a very interesting woman in the electrical engineering library who presented some unique challenges that were never resolved, and finally I got pretty frustrated trying to get her to focus on library matters and not spend all day on the phone with her friends. I finally went to the divisional executive officer, and he said, "Look, she's sort of like a den mother for these hundreds of masters' EE students that we have, so please just let her ride." And so we went along with it. There really wasn't a lot of direction or administrative thing on that; they pretty much ran their operations themselves, as all the rest of the divisional subject librarians did. They were basically on their own, responsible to their division first, and I was really only there if there was some problem they were causing to the department/division—which none of them ever did, with the exception of the EE librarian. She was the only one that some people in the department had any problems with. I'd get complaints from people out there that they really wanted to quietly study in the EE library, which they had a hard time doing. But, beyond that, the other libraries pretty much ran smoothly.

WRUBLEWSKI: We're talking about the engineering libraries?

ROTH: Basically, yes. The other science libraries were OK, but the engineering libraries—computer science, EE, aeronautical, and environmental engineering—were the ones I was encouraging to see themselves as members of the Caltech Library system.

WRUBLEWSKI: So at that time they were still administratively separate?

ROTH: No, they had just been brought into the Caltech Library system. They had been administratively separate before that, but then they were brought in for the first time. So we were responsible for funding, and basically [they were] getting used to the idea that they would have to deal with *me* to get a budget and whatever other problems they had. They had to come through me and not through the engineering division. But that worked fine. I got along fine with them, so it was actually a very pleasant situation, until Brudvig left and Anne Buck came. And then it was the responsibilities for that [and for] online

searching; we were getting more and more into searching *Chem Abstracts*. So I said, “One or the other. If you want me to do the online searching, then I need to give up my administrative duties.” And then we were talking about possibly doing some outreach in terms of searching.

WRUBLEWSKI: Teaching?

ROTH: Both searching and teaching general search techniques, as well as assisting people in searching specific databases. That’s when Kim [Kimberly] Douglas took over and handled the science and engineering libraries.

WRUBLEWSKI: This was mid-eighties?

ROTH: No, mid-nineties. She took over that responsibility, and I focused mainly on searching and staying aware of opportunities.

WRUBLEWSKI: So just to step back again, if we’re talking mid-eighties, around the time when the engineering librarians were brought in, I guess we could talk a little bit about what the subject expertise of librarians around that time was, in general.

ROTH: Really not much. I think Jim [O’Donnell] had—I’ve forgotten what his major was, but it certainly wasn’t geology. Just the fact that he’d worked in the geology library at UCLA and at Trinity University for a number of years, and so just picked it up as he went along. It turned out that that worked out fine for the geologists. In terms of the geology library now, with sufficient interest and motivation that’s not hard for somebody to do. But for biology—Daniel actually had a degree in biology, but it was the natural-history kind of biology, which made connections with the people in the division, who were primarily into molecular biology, a little difficult.

WRUBLEWSKI: Also at that time, there was so much changing.

ROTH: That's right. It had been a big change. I remember at one time we did try to go out—because *Chemical Abstracts*, as you know, has a lot of information on genes and gene sequences—we went and talked a group of researchers in biology. One of the faculty members, who isn't here anymore, wanted to help Daniel get involved, and I went along with him to talk about the fact that we could be doing this searching and it was relatively inexpensive, blah blah blah, but that didn't generate anything. They had their own way of searching—obviously through PubMed, the National Library of Medicine's database, which also provides links for searching gene, protein, and nucleic acid databases.

WRUBLEWSKI: To digress for a second: In terms of NLM, PubMed, when did that start getting wide adoption on campus?

ROTH: It must have been back in the seventies. I'm sure those biologists got onto it pretty quickly. And if they didn't learn it here, they obviously brought it in from someplace else. That was a time of growth in the division, so there were a lot of new people coming, and they were basically on their own. Not that we left them on their own, but they just took it upon themselves to go ahead and learn how to do all this stuff and didn't see that as something the library was going to be particularly helpful with. The library just wasn't involved in that kind of searching. As I remember, the few searches we used to get over there were basically ones that were more a natural-history kind of thing. If somebody was interested in a particular organism, we could go through and search *Biological Abstracts*. I remember doing some *Biological Abstracts* searches for people that were really more organism-based, which obviously wouldn't be easy to do in PubMed, since that's more human health and disease.

WRUBLEWSKI: So just to stay with the bio people for a minute, if they came [to Caltech] and brought this with them, they must have had resources—i.e., computers—to do that with at the time.

ROTH: They must have. We were probably ignorant of all their equipment, and they probably had more resources than we did, so I'm sure they got onto it. We didn't really

know anything about their online search needs unless they asked. Daniel didn't get involved with it, and I wasn't perceptive enough to realize that I really ought to be out wandering around trying to figure out what was going on over there, but I figured that this was his responsibility, so I left it to him.

WRUBLEWSKI: You mentioned that for a while the librarians, particularly in engineering, were divisional employees. How did their being divisional employees, as opposed to library employees, affect their relationship with their division? Do you think they found it easier or harder to see what was going on?

ROTH: I don't think it made any difference, because they were still physically in the departments. It was just a change of administrative structure, but without any physical change in their environment; basically, nobody in the respective engineering departments noticed, other than the department head, because they pretty much continued doing what they'd always been doing.

WRUBLEWSKI: So where were the collections at this time?

ROTH: Same place. They were in Guggenheim [Aeronautical Laboratory], where that nice lecture hall is now, on the northwest corner, or over in the Keck building [W. M. Keck Engineering Laboratories], where the environmental engineering was. And the computer science people were up there in Jorgensen [Earle M. Jorgensen Laboratory of Information Science]. So none of them were in Millikan. There was this central engineering library that was in Millikan, but that was more a bit of civil, mechanical focus, in contrast with aeronautical or environmental or EE or computer science. More general stuff, and stuff these other people either couldn't afford or didn't want to buy and expected us to get for them.

WRUBLEWSKI: You mentioned talking about the increase in popularity of the online searching and possibly reaching out to teach people to do that searching on their own.

ROTH: That didn't really come until the nineties, maybe ten years ahead of when we've been talking.

WRUBLEWSKI: So we're now in the mid to late eighties. What's the status of personal computing access on campus? Do the labs have it, does the library have it?

ROTH: The labs had some of it. I can't remember whether we had any computers that people could come in and use. That doesn't ring a bell.

WRUBLEWSKI: You mentioned that there was only that one computer, which you shared.

ROTH: Yes.

WRUBLEWSKI: Moving on now toward the late eighties, early nineties. We'd mentioned before that the professional associations were primarily more social. So what's happening in terms of the librarianship landscape at this point? Anything significant?

ROTH: In the early nineties I was more worried about the cost of journals; that was a continuing problem. Publishers obviously would do their best to keep raising prices, and all we could do was just cancel titles, so that kept on. In the late seventies and early eighties, the dollar was really weak, up until Reagan got in, and then they had that very draconian policy with the Fed chairman, so they raised the value of the dollar way back up. The problem with that was that the European publishers could raise their deutsche mark and Dutch guilder prices irrespective of value or production costs, because it wouldn't necessarily increase the US\$ cost. Most in the library community didn't seem to be paying attention to this, not realizing that they should end the fiscal year with more than a small surplus. So when the value of the dollar went back down again, they really got hit.

WRUBLEWSKI: When was this?

ROTH: In the mid- to late eighties it went down really dramatically; everybody was shaking their heads: “Why is this happening?” blah blah blah. It didn’t take too much thought to realize that this was really a serious problem. At about that same time, I was getting a little frustrated with the situation here again, because our automation thing, which I’ll talk about in a minute, had gone south and we were at a loose end as to what to do about it. In a sense, we had a failed automation program. So I saw the opportunity to go to Stanford. I went up there and interviewed for the chemistry librarian job. It was the first time I’d been through one of those all-day interviews where you start at breakfast and they keep you going the whole time, all the way through dinner. The first thing next day, I went and talked to the head librarian, the head of the whole Stanford library system, and he asked, “What’s the most important problem you see facing librarians today?” I said, “I think it’s that people don’t realize what’s happening when the dollar depreciates dramatically as it’s been doing.” He looked at me kind of in a weird way, and you could see he thought that was not a problem. It was funny, because the next year it comes out that Stanford had overrun their budget by three quarters of a million dollars. So I like to think I’d given him a little warning, but obviously he didn’t take it.

[Laughter]

Anyway, when [Glenn] Brudvig came, he’d been working with the National Library of Medicine at the University of Minnesota, where he’d been the head of the bio-medical library, and they were working on some library automation thing, so he had two or three or four people working there.

WRUBLEWSKI: By automation, do you mean an online catalog?

ROTH: Trying to develop an online catalog. He had this NLM money there and had been working on it for a number of years, and I think he thought they were at the point where a breakthrough was coming. So when he comes to Caltech, he brings these guys with him and they start working on it here. And it’s not a trivial job to do this; they kept dragging and dragging, and pretty soon they realized they simply were not going to be able to pull this whole thing together. They got an acquisitions module and I think they had kind of a

little serials module going, but that was it. They didn't have the catalog ready, they hadn't integrated it in any way, either, so they finally had to drop this whole thing.

WRUBLEWSKI: This is about what time frame now?

ROTH: '88-'89.

WRUBLEWSKI: So they're basically building an ILS, an integrated library system?

ROTH: That was the idea. So finally they had to kiss that million dollars goodbye and move onto something else, and that's when we got Innovative Interfaces, and they came in, and that's when they hired Min-Min Chang. I've forgotten where she came from, but she was the head cataloger at that time. She's the one who shepherded this Innovative Interfaces system into Caltech and got it up and running, and, as it turned out, everything worked out OK.

WRUBLEWSKI: I don't know if you had discussions with Innovative Interfaces before they came in. What was their background and approach to this automation? And why do you think that worked versus why this NLM project didn't?

ROTH: I think they had done it at the University of California. That was the one that got it started, and somehow they got it going, and so we bought it as a finished product. So we really didn't have to do anything except convert the records and dump them all in there. We had been using OCLC [Online Computer Library Center] for a number of years before that happened, so the records were in OCLC, although they were just generating cards for our current catalog. So we had a substantial number of books that were already in there. So then we had to go back, and there was some process whereby you could send OCLC your shelf list and they cranked out the OCLC records for you. It actually went pretty quickly, and fairly seamlessly, too. At the same time, library staff converted the rest of the science books to Library of Congress classification. And as you probably heard, I didn't take the job at Stanford, primarily because they take a whole year up there to fill a job. The chemistry librarian job had been open for a year, and the poor

biology librarian was having to run the chemistry library at the same time as biology. He was telling me, “This is killing me [laughter]. I’m going to start looking for another job.” And I thought, “God, if I take this chemistry job, then I’m going to be stuck with biology, and I’ll be back in the same position he’s in.” So it just didn’t seem like that was going to work out. Although Grace [Baysinger] obviously made it work for her, which is great; she’s done a terrific job up there. I’m glad I didn’t do it, because I think she’s done a much better job than I would have done.

An interesting thing that happened in 1995 was that the provost, Steve [Steven E.] Koonin, talked to the faculty and said, “Look, you guys figure out what is absolutely essential in terms of journals here. And when you whittle our collection down to those absolutely essential titles, I’ll pick up the tab on their increases.” So we had a big cost-per-use thing and worked out all the details and figured out what was going to stay and what was going to go, basically on cost-per-use.

WRUBLEWSKI: What prompted him to do this?

ROTH: I think he was hearing from the previous provost that every year the library director was coming in to see him, whining and complaining about the journals and how it was killing the library budget, and he had to have these supplementary appropriations. So I assume Koonin probably told the faculty, “Look, why don’t you save yourselves some grief and work with the library to pare down the journal subscriptions to absolutely essential titles.” So we in the library got to work and we actually cut a lot of titles. Not too many of the faculty argued for them to be kept, fortunately, so it was pretty smooth. Once we had the data, we could show a complaining faculty member that, “Hey, wait a minute. This is only being used two or three times a year. Why are we subscribing to it, when we can just get it from UCLA or someplace?” Some deals had been worked out with UCLA so we would give them money ahead of time—say, \$20,000, as a down payment against what we would use up in terms of interlibrary loan charges, so then we would get preferential treatment. That had always been a problem in the past when we went off campus, as our request would be tossed in with everybody else’s and it might take a week or so, or two weeks, to get a photocopy from someplace else.

WRUBLEWSKI: And it was all print, all mail?

ROTH: Print/mail, yes. I think somewhere along the line they figured out some way to do it a little bit more electronically, but that must have been a lot later. But anyway, so we got this payment to UCLA ahead of time and then we got this preferential treatment and got them back very quickly, and then we worked out the book things, too, so we could send them UPS; so it worked out.

WRUBLEWSKI: The pricing escalation had been more or less going on all through the eighties, up through the early nineties?

ROTH: Well, it has gone on ever since. There were a few years in the late nineties when something happened in terms of the dollar/deutsche-mark exchange rate that made it better for us, and the publishers figured that out pretty quickly and said, "We'd better go to dollar pricing." So they set some dollar pricing, and they don't have to worry about the fluctuations. But the publishers always seemed to be one step ahead of us. In the mid-nineties, when we had this TOC/DOC³ thing, which was Table of Contents, Document Delivery, that was when we subscribed to the ISI [Institute for Scientific Information, now the ISI Web of Knowledge] tapes, and so the tapes came here and got loaded at Caltech. I'm trying to think when it stopped; I think it was the late nineties when it stopped. Anyway, we were subscribing to these tapes, and fortunately somebody out there bought a bunch of backfiles, so we had a fairly decent backfile and the idea was we would not put the whole ISI database up, we would just limit it to the journals we subscribed to. Because you'd do a search and you'd be sure you could get a copy of the article, and if you wanted to walk over and do it yourself, fine, and if you didn't we had it all set up so you could automatically order a photocopy at the same time.

WRUBLEWSKI: Which goes back to the service you had been providing earlier.

³ Douglas, Kimberly, and Dana L. Roth, (1997) "TOC/DOC: 'It Has Changed the Way I Do Science,'" *Science & Technology Libraries*, 16 (3/4). pp. 131-145. ISSN 0194-262X.
<http://resolver.caltech.edu/CaltechAUTHORS:20140415-155453065>

ROTH: That's right, so we automated the service we had been providing right along. People just manually filled out these forms and this way we automated the thing a little bit. That obviously then cut back on some of the online searching, but it didn't do anything for the chemists, who needed chemical structure searching, so I was still staying busy doing chemistry searches.

WRUBLEWSKI: So the tapes would come, and then how would people—?

ROTH: I've forgotten who was responsible. I'm not sure it was anybody in the library who was doing this, but somebody was doing this. The tapes would come every week or month or whatever it was, and they'd get loaded. So anybody could log on, on campus, and do it. There are a couple of articles in CODA that talk about this, which are probably good to look up, just to make sure I got the right dates.

WRUBLEWSKI: So people were starting to be able to do some of these searches themselves?

ROTH: That's right. It *really* was well received. People talked about what a godsend this was: "If I hear some guy's name, I can just jump on there, throw it in, and see what he's written recently. Or hear about some subject and stick in a key word and *bingo*, here's a whole bunch of articles on it."

WRUBLEWSKI: So the tapes from ISI: This is primarily table of contents; it's a database of articles?

ROTH: It'd be a database of just author, title, and journal reference records, basically. They didn't have abstracts until March 1992, and even then they were only doing it for about 60 percent of the journals, that presumably would allow direct entry of author abstracts. I know that *Physical Review* for a long time didn't have abstracts in their ISI records.

WRUBLEWSKI: So there was just one machine that had this information?

ROTH: Yes, only one old IBM computer had all this stuff in it. Just kept the thing going, and it actually worked pretty good. I remember we didn't have too many complaints. A lot of people were really happy to have it available.

WRUBLEWSKI: So we're talking late eighties, early nineties; we're now starting to sniff around the Internet, high-speed Internet coming on campus. Do you know about when that started?

ROTH: I wish I did. I cannot remember when that started. It seems like we've been doing it forever. [Laughter]

WRUBLEWSKI: Because most campuses, by the late eighties, early nineties, certainly by the mid-nineties—had become wired. Residential Internet was, I guess, early to mid-nineties. I would think that would increase personal access to these types of search tools.

ROTH: I'm sorry; I'm a complete blank on that.

WRUBLEWSKI: That's fine. Could you speak to when—say, for ISI, which would be sending these tapes that would have to get loaded—at what point did they move to having some sort of central access?

ROTH: That was the late nineties, I think. We waited, because we were happy with the system we had, but I think it was the late nineties when we finally gave that up and moved on to just going directly to ISI for the data, so they could search. We had an institute-wide subscription, so people could search directly from them.

WRUBLEWSKI: So they could go to any computer?

ROTH: That's right, any computer. People could log on and do it, just as they had been able to do with the tape files.

WRUBLEWSKI: I'm thinking back to when I started college. It was pre-Google, and pre-the born-digital cutoff⁴ for a lot of the journals, which is generally considered to be around 1996. Was there anything significant in dealing with the journals or the publishers around that time? I remember there being oddities about trying to access things even back when I was an undergrad at MIT—about whether things were in print or online. How was that line being straddled?

ROTH: Probably clumsily. [Laughter] Again, for some reason, I don't remember that. It must not have been that big a deal, because it didn't really sink in.

WRUBLEWSKI: One thing just occurred to me. You mention that when you started getting the table of contents from ISI, there was a decision made at that point to only get the ones to which the library subscribed.

ROTH: No, actually we got the whole tape; we just stripped off the records for the ones we subscribed to. I'm pretty sure we kept that up until we went to ISI directly. We might have given it up sometime earlier, but I don't remember. With the online journals and stuff, we were a little slow to pick up on that stuff. There was possibly some concern with the pricing. I know with the ACS journals we dragged that out for a while, until the students and faculty were beating on the door so hard that we had to do something, and we finally got going on it.

WRUBLEWSKI: So the impetus to get the online access came from—?

ROTH: From the divisions, yes.

⁴ All online journal articles are now either “born digital” (offering both HTML and PDF versions) or “pre-born digital,” having been scanned/OCR'd and only posted as PDFs. The cut-off for most publishers is ~1995-1997. “Post-born digital” is typically available with a current subscription; pre-born digital requires a separate one-time purchase of an archive file. For example, below: the backfile required a separate one-time purchase, while the “Available from 1995” is included in each year's annual subscription.

Tetrahedron [0040-4020]

Full text available via Elsevier SD Backfile Organic Chemistry, Available from 1957 until 1994

Full text available via Elsevier SD Elsevier/Available from 1995

WRUBLEWSKI: How did they find out about it?

ROTH: Well, probably because many of the faculty, grad students, and postdocs were ACS members, they were constantly bombarded about all this wonderful new stuff that was happening. [Laughter] So we had the online journals, but we still hadn't gotten a site-wide subscription to *Chemical Abstracts*. That came much later, mainly because they weren't offering it at a reasonable rate initially. So we had access to *Beilstein Crossfire* and the ISI tapes, the ISI Web of Science. I remember at the ACS meeting around that time, when a *Chemical Abstracts* forum was held, I got up and said, "You guys are really shooting yourselves in the foot, because our people are using *Beilstein* and Web of Science and seem to be doing very well with it, and the use of *Chemical Abstracts* is dropping off dramatically."

WRUBLEWSKI: Now, this is about late nineties?

ROTH: Yes, '96, '97, I'm guessing. The number of people coming to me for online searches was dropping off, that's why I mentioned it to them. I remember Bob [Robert J.] Massie [head of *Chemical Abstracts*] sitting there and looking at me quizzically, and I think maybe that finally woke them up to the fact that they'd better get something going, like SciFinder, and get it at a reasonable price, and do away with some of the little games they were playing—like it cost more to do structure searching, and you'd have so many seats. There was a whole bunch of stuff they were doing that was making it difficult to figure out how you were going to pay for it. Anyway, it all worked out in the end, thank God. But people [here] obviously picked up that online searching pretty quickly, and we didn't do that much. I remember doing training for *Beilstein Crossfire*, because that wasn't a particularly easy thing to use. Luckily, Andrea Twiss-Brooks at [the University of] Chicago had written up a really nice description of how to do it, so I got her permission to basically rewrite it in my own style and use that as the handout. I did introductory classes on that, and people took off. It's not rocket science, once you do it for a while and understand what is and is not in the database; then it works pretty good.

WRUBLEWSKI: With a lot of these tools becoming universal, it sounds like there was more communication and collaboration in figuring out this landscape. You talked to Andrea about using her materials. Was there a lot of that happening around then?

ROTH: Not a lot, but enough. People took advantage of the early adopters, looked at what they were doing. That must have been when CHMINF-L listserv got started, so basically people were finding out that way. I've forgotten when that got started, probably the early nineties; that was when this whole Internet thing really got started.

WRUBLEWSKI: Like the mailing lists and bulletin boards—things like that?

ROTH: Yes.

WRUBLEWSKI: All of you knew each other from going to meetings, so that's how that collaboration happened?

ROTH: Yes.

WRUBLEWSKI: Was anything notable going on with ACS or SLA [Special Libraries Association], or any of these? Did you ever stay at any of the library conferences, like ALA [American Library Association]?

ROTH: No, it was pretty much all SLA at that time. The one in Minneapolis, 1999, that's where I gave one of those short forty-five-minute sessions with another guy, Bartow Culp, on chemical information, and we had about 150 people show up in a room that held about fifty. [Laughter] You could see there were a lot of people interested in chemical information, since many of them were not chemists or hadn't had many chemistry courses, so it was a way of getting started. Bartow and I expanded on that—what do you call the courses they give before the SLA meeting?

WRUBLEWSKI: You mean the short courses for professional development?

ROTH: Yes, so we did that for several years, and then Judy Currano [chemistry librarian at the University of Pennsylvania] got involved and Bartow and I began withdrawing but continued to help for several more years. Judy has really done a terrific job—far better than I ever did, so I was happy when she came along. She has a talent for that kind of thing—among other things, obviously, but particularly that. She's really, really good at it.

WRUBLEWSKI: Having taken that class, I completely agree. I thought of this after you mentioned that so many people came to the talk about chemical information in 1999. Traditionally, here at Caltech or in general, from what you've seen in the field of librarianship, has there always been a subject specialization in terms of hiring, in terms of either collection management or instruction? I remember my experiences, particularly as a graduate student, not really knowing that there was a librarian for this or a librarian for that. Has that kind of specialization always existed?

ROTH: No. I think that came on later, when Caltech was finally able to hire people who had those subject backgrounds. When I started here, that was rare in academic libraries, and I think over time more people with science degrees were interested in librarianship. So by the nineties Caltech was able to advertise for people who had a science background, or at least some science courses; whereas, I think traditionally most librarians were English majors or majors in the humanities or the social sciences.

WRUBLEWSKI: Just to speak to the field of librarianship: Do you have any observations in particular about how the library reflected campus diversity—or did it, at the time? Let's say from the eighties onward, or even earlier, was there any noticeable—? I mean, as a primarily technical school, Caltech's been heavily gender-skewed toward men. And in my own experience it's always been the opposite, particularly in the science library; there tend to be more female science librarians than male. Have you noticed anything about that—a shift in that over the years? Has anything struck you about that?

ROTH: No, nothing's really struck me about that. Moving on now to collection development, the library has always focused on purchasing materials for current research

interests. Particularly in the humanities, there's a fairly diverse group of people there, because it changed all the time. People would come here for a few years and realize that since they were the only person on campus interested in that kind of thing, they wanted to go someplace where there were maybe two or three other people interested in it. So we had a regular turnover in the humanities. If you look at the book collection and the journal collection—not so much now, because they've gotten rid of a lot of stuff—but back when, there were a lot of weird journals we'd get for two or three years and then stop. This was a stop/start kind of thing, for whoever happened to be here. But we had some fairly major things. We had Ned Munger, who was an African specialist, so we had this big Africana library, which was housed over in Baxter [Donald E. Baxter Hall of the Humanities and Social Sciences]. And that's where Judy Nollar, who was our humanities and social sciences librarian for a long time, started—with Munger in the Africana library. But just depending on what the topic is, within physics or chemistry or biology, whatever they're studying right now, that's all we're getting, which explains why we got rid of many of the plant biology journals. There was a Campbell Plant Research Laboratory on the north side of San Pasqual originally—before they built Beckman Auditorium. And once the two plant guys retired at the same time, *bingo*, that was the end of plant science for a number of years and they built the behavioral biology building [the Mabel and Arnold Beckman Laboratories of Behavioral Biology, 1974] there on the left side of the Beckman Auditorium mall.

WRUBLEWSKI: So Caltech library's focus, in contrast to being a historical or preservation library, is very much—

ROTH: There was no attempt at being historical or preservationist; in terms of buying things, it was always for the current research interests. The only gender thing I can think of is, obviously it was all male here until '70, when they finally let the—sorry, they had some female grad students, but no undergrads until '70, when they finally broke that barrier, and it's risen over the years. It's probably as high now as it's ever been. The thing I found in the library, though, was that the women were much more willing to come and ask for help, by a factor of 2 or 3—although the guys who came were the best

students, the ones who would win the chemistry division award every year. They were the ones who were in the library almost every day. In the old days, you'd come in to scan the journals, that kind of stuff, and they'd be in coming in every single day. And then the postdocs, too, they were in a lot. But in terms of questions, the women were there much more—which made it nice. They asked a lot of good questions, so it was great.

Where are we now? We're up to the nineties; that's when Anne Buck came [1995]. I don't remember too much; things kept going the way they had been going, pretty much; I just gave classes on chemical information resources and expanded the class offerings on database searching.

WRUBLEWSKI: Was there a demand for more classes at that time?

ROTH: Not so much a demand, but I thought it was more a case of we just needed to do it, in particular after Anne passed away [2003]. Kim [Kimberly Douglas] replaced her, and together we felt that the library should be doing more. Even though I wasn't in charge of the subject librarians, it was just something that should be done, so I started a patent class with Louisa [Verma], who came the same time that George [George Porter, an engineering librarian] did and was Kristin's [Kristin Buxton] predecessor.

WRUBLEWSKI: So were you talking to other librarians, particularly the chemistry librarians, at other schools and finding out whether they were getting a demand for instruction? I know that traditionally in library school—I've talked to a number of people about this—you don't get a lot of training for how to do outreach, or how to teach, or how to think about educational design. Have you seen that there's been an increase in this type of role for librarians? Has there been a demand for that here at Caltech?

ROTH: I don't know that it was in demand. I just felt it was very important to do it, so at every opportunity I'd do something—like the patent class, with Hannah Dvorak-Carbone from the OTTCP [Office of Technology Transfer & Corporate Partnerships] office, and a crystallography class, with Larry Henling from the X-ray Crystallography Facility. I was also providing instruction on both *Beilstein* and *Chemical Abstracts* together, and offering classes on physical-property data, Web of Science, and so forth. It was

something we felt was important; we ought to be doing this on a weekly basis, just to justify our existence, in some ways. Whether you'd get that many people showing up or not doesn't make any difference. It's a way of advertising the fact that you have some expertise in this area and that you'll be able to help if people need help. But you're right: I don't think we had any particular encouragement. People weren't talking about it all that much. You hear questions on the listserv sometimes from people asking, "How do we do this? How do we do that?" It's obvious that there never has been that much training. It's something you basically learn how to do yourself and do the best you can.

WRUBLEWSKI: Has there been a noticeable change in class attendance, either up or down?

ROTH: Probably down a little bit. I'm just guessing, because I'm not that close to it anymore, but once SciFinder got here and we trained everybody, they probably took care of it in the departments themselves. In the departments, when people come, there are probably people there doing it all the time. Probably every research group has its expert and a bunch of other people doing it too, so they don't see it as a library thing so much. The last really good turnout I had was when [professor of organic chemistry] Sarah [Reisman] came, she brought a group of eight or ten people with her, and she made a point of having them all come over and went through both Reaxys [*Beilstein/Gmelin*/Patents] and SciFinder, so I had four consecutive sessions to take care of the whole group. But that was the last one where there was a really good solid turnout like that. It's mainly that synthetic organic chemists are really into this kind of stuff more than some of the others. Some of the others are probably just doing Web of Science.

WRUBLEWSKI: There are many databases we don't have any more, like Engineering Index. What would you recommend as a strategy going forward to keep tabs on those information needs? If you were to give any advice about what has worked, what resources are used, what resources are good, what do you rely on to make those types of decisions?

ROTH: If I were starting over again, what I think I'd do is go out there and meet with the research groups at their meetings at least once and tell them the library has all these resources and we'd like to get an idea of where you're getting your information. Or we might be able to help you be more productive in getting your information. I'd try to have a conversation with them, even for fifteen or twenty minutes, so they'd get an idea. If they're all out there just searching Google, which I'm sure a lot of them are, at least it would prompt me to do some comparison searches. If you could talk to them a bit about what they're searching for and then go back and do some comparison searches of Google and SciFinder or Web of Science or whatever it is, and show them what they're missing—so at least they're not ignorant about that.

DANA L. ROTH

SESSION 4

February 6, 2014

WRUBLEWSKI: We're going to talk about the adoption of personal computers into the library.

ROTH: Well, when I first came here in the sixties, we had typewriters, obviously, and fortunately I was able, fairly early, to get a nice IBM typewriter with a carbon ribbon so we could do some really nice book lists and whatever else we needed to do. That continued for a number of years, and about the time computers became available, we started off with Macs, as I remember. It was a transition from using typewriters to using computers to do the same things, initially, and then as online databases became available from the National Library of Medicine or through Dialog, as I mentioned before, we had modems and other ways to connect to these outside databases, and we began to use computers—in addition to the book lists and that kind of stuff—to also do the online searching. And backing up a little bit, in the computer center they had machines that people could use, mainly for the students to use for their computing requirements. So after we transitioned from punch cards to direct access to the computers, that was all over in the computing center, over in Jorgensen, They had a big computer lab for the students, and that lasted until about the time the Sherman Fairchild Library opened [1997], and then we had enough money to buy the computers to replace the facility over in Jorgensen—because the use of that had been dropping off as people began to get their own access, either personally or in the labs where they worked.

WRUBLEWSKI: And that central computing facility [in Jorgensen] was a batch-process thing? People would bring in their programs, and the programs would run, and they would get the results.

ROTH: Yes, initially, and batch processing continued here much later than at other schools. One of the problems with most of the centrally funded facilities here is they tend

to be kind of stepchildren. There's not one division that's responsible, it's sort of a joint thing that's taken out of the overhead. Nobody wants to pay any more overhead than they have to, so [these places] tend to be underfunded, including the library. The library computing center and these central facilities that are open to everybody suffer a little bit in that regard.

WRUBLEWSKI: To address one of the other points of interest, looking at rapid change and how libraries have adapted to that, particularly over the last ten or fifteen years, in terms of technology, in terms of changing budgets, do you have any thoughts about how that has affected libraries, or how can libraries respond to that—or just any general observations on that? It's been a fairly tumultuous time, I think most people would agree.

ROTH: It wasn't quite so bad here, because obviously there's a lot of research money out there, so the funding for the mediated searches that we were doing seemed to be fairly generous. We weren't charging back any service charge for doing searches; we just tried to charge back whatever the direct charges were. But then obviously the library had to pick up the slack, as it were, when the databases became open for users to use directly, by picking up the subscription costs. I think in that sense that the institute's been fairly generous in providing the money necessary to do that, because these things obviously are fairly expensive. SciFinder is at least \$100,000 a year, and I'm sure we're paying that much for Web of Science, and Reaxys is probably half to two-thirds of that, so there's quite a budget there for online databases in addition to the online journal subscriptions. So funding hasn't been a significant problem. It transitioned over very nicely, and people seem to be happy with the way it is now. It's a lot more convenient than having to wait for somebody else to do it for you after five o'clock.

WRUBLEWSKI: Absolutely. So, in terms of the introduction of all of these tools, learning and then going and teaching that, it does seem that there's been more of a communal effort of librarians across institutions, and some of that has been facilitated by organizations like SLA, for example. I know you've had a long history of association with SLA, doing a number of things, including holding a number of positions in SLA.

Do you want to talk about what you did in terms of that, and what you feel was your biggest contribution in the roles you had? It's important in particular for new librarians coming into the field to see what's possible, and particularly librarians coming in from other fields that may have a clear path in terms of development, in terms of leadership.

ROTH: Well, it was an interesting situation here, because we divided up the memberships and there were a couple of people who were here before me who were fairly active both locally and nationally in SLA. So that was put off, and I had to find something else. I did attend some of the ACS meetings in the sixties and the seventies, so I didn't really get involved with the SLA mainly for that reason, and also because I'd heard that the [SLA] chemistry division had been dominated by some older industrial corporate librarians that were very resistant to anybody else coming in and having any active participation. So I just sort of let it go. Then later on, when Gary Wiggins at Indiana University got this CHMINF-L listserv started and began to do some interesting things in SLA—which I'd heard about from somebody else—this piqued my interest. The people at Caltech who had been active in SLA weren't that active anymore, so I was able to transition over and become active in SLA, and I just started attending some of the annual meetings.

WRUBLEWSKI: What sorts of things was Gary doing at the time?

ROTH: Mainly the CHMINF-L listserv. He also had a newsletter that he put out in association with the chemistry division. It was something he was doing with both ACS and SLA at the same time, because he was active in both organizations.

So after getting involved and being secretary and treasurer, and then finally division chair—I think around 2000—I found that that was really very beneficial, in the sense that you get to know other people, you find out what other people are doing, you see how things are done in other libraries. And it gives you ideas and makes your work more productive, and hopefully more useful for your users. I've forgotten the chronology of when some of these databases came online, but people had Web pages or you had some way to find that other people were working with these databases as you were, as they came out. For example, when the *Beilstein Crossfire* got started, I found out that Andrea Twiss-Brooks at the University of Chicago had already done a whole outline on

how to use it, so I talked to her and got permission to go ahead and take her outline and redo it the way I wanted it to look. That's when I started offering classes here and getting chemical-compound searching introduced, so that got off the ground pretty well. We had previously been doing some classes on Web of Science, both the tape version we had here until 1989 and also when we went directly to ISI in Philadelphia. We obviously had to make a transition there and do some instruction and get people started on that.

WRUBLEWSKI: Were there other people in other libraries in the same group working on instructional materials?

ROTH: Well, mainly the *Beilstein Crossfire* thing. I've forgotten now what the Web of Science did; maybe we just did that ourselves—because they had some materials they handed out. I think they came out and gave some training, and we just built off of that and more directly. With the *Beilstein Crossfire* thing, there wasn't too much in the way of people showing you how to do it. There again, you really need to be involved in these organizations, otherwise you just cast yourself off in a boat someplace and you're lost. [Laughter] I've met some librarians like that. They take a small company job someplace and they're out of the mainstream and don't get out enough and find out what other people are doing, or keep up with what's going on in the profession, and within ten years they probably don't have much value anymore. And the key is, you want to keep increasing your value to the institution; continuous education provides you with an opportunity to do that.

WRUBLEWSKI: And one facet of that has been the chemistry class you taught through the SLA chemistry division.

ROTH: That's right, we got that started. Gary had been the program chair in 1999 or whatever it was, and he invited me and another librarian to come and talk about chemical literature resources. So we did, and we had quite a number of people, who overflowed the room, and we could see that it was a pretty good deal, so we made it a continuing education course that was offered before the annual meeting, and that got it off the ground; and it's been greatly expanded now by Judy Currano. There are two or three

different courses they're offering. She's got some other people to come in and help her out with patents and some other things—so that's a legacy I'm very happy about and really happy that she was able to take that over and run with it and take it to a whole level above what we had been doing initially.

WRUBLEWSKI: And I do have to mention that in 2011 the SLA instituted the Wiggins-Roth award. Just curious if they approached you about that and what your take on that was. It's obviously a great honor.

ROTH: Well, it was a complete surprise. I was really dumbfounded, to be compared to Gary, who I really thought had done a lot more in terms of getting [the SLA] chemistry division off the ground, and I just sort of came along and kept it going, hopefully close to the level that he'd left it, so it was quite an honor, and I appreciated that very much. There are obviously a lot of people out there who are deserving of the award, and I just hope they keep it going.

WRUBLEWSKI: I think the description is "For outstanding service."

ROTH: That may be tied to the fact that when the CHMINF-L listserv got started, I fortunately, here at Caltech, didn't have the demands from all the undergraduates and other users that most other chemistry librarians have, so I had a little more time to spend on answering questions. So my submissions were probably more than almost anybody else's for quite some time, because, number one, it was fun to do, and number two, it was educational for me, and thirdly, it was nice to be able to share the fact that we had a lot of resources here at Caltech and they were all within about fifteen feet of my desk, so it was really very easy to answer these questions. Much more so [for me] than [for] almost anybody else I can imagine, probably. So I can justify it on the basis that it was educational and also helped other people.

WRUBLEWSKI: Looking toward the future, what is your take on the idea of library space? There's been a lot of discussion of this with so many more resources becoming electronic. What do we do with the library building? There are moves to bring in things

like 3-D printers, increased study space. What are your thoughts on some of that change that's happening?

ROTH: The thing I go back to is the rationale behind those photocopy request forms we used years ago, in that people don't necessarily want to have something right this minute. They want to make a request knowing it's going to be taken care of within twenty-four hours or so. So I'm not averse to some sort of twenty-four-hour remote storage for a lot of the books. I look in the Fairchild Library, and you see all those books there, and it's obvious they haven't been out for a while. You don't necessarily want to get rid of them—we've got a strong and focused enough collection and there's a lot of good stuff in it that ought to be kept—but you don't need to necessarily have it right there. So I can see some value in making that library a more attractive place for people to come to, because to me, right now, that's one of the important things. You want to make the library a place people come to. I think they're losing a lot by not coming to the library on a regular basis, either to see the new books once a week, which people used to do pretty religiously, or just coming through to see the librarians and it'll remind them of something they've been thinking about, they want to ask questions about—things like that. So having a small coffee shop, or having 3-D printers, or other things—that will attract traffic, which I think is really essential. The idea of having a completely electronic library, which I think most people realize now is pretty silly, is far beyond what I would suggest. You have to have a core collection, obviously, but there's probably a lot of the circulating collection that could be remotely stored.

WRUBLEWSKI: I know there are at least a few examples of libraries, both public and academic, going completely electronic, with mixed results. So in other words you think the library's going to be around for a while. [Laughter]

ROTH: At least for my lifetime, I hope so, yes. I'll let you worry about the next wave, as it were. [Laughter]

WRUBLEWSKI: Since you formally retired last year [April 1, 2013], are there any other thoughts you would like to add at this point? What are you looking forward to most? Or

what are you going to miss the most? Are there any other final thoughts on Caltech as an institution?

ROTH: Obviously it's a great place, a great place to work. What better group of people could you serve than the ones here? They're very appreciative of whatever you do for them. That's been the main benefit; the main pleasure of working here has been the appreciation on the part of the staff and the students and the faculty of what you're able to do for them.

WRUBLEWSKI: And that's probably something that hasn't changed very much, I would guess.

ROTH: Well it's dropped off a little bit, because as you have more and more things available electronically, you go in that direction. That was why I tried to push the idea of increasing the traffic in the library. I think it's also important to keep making contact, even if it's something as benign as sending out new book lists and things like that, just to keep reminding people that, Hey, there's somebody here who knows what they're doing and can help you; when you get in a bind and need some help, there's always somebody here to help you—that kind of thing. You keep going back to that old adage, "It's easier to spend two months in the laboratory than spending two hours in the library." In some ways it might be truer now, because you get on Google and you start looking for stuff and you see a few related things and you kind of wander off. And pretty soon a couple of hours have gone, and where are you? [Laughter] You haven't found what you're looking for, although you've had a good time on the trail. Something's got to give on that. Somehow it seems that the quality of the research over time is going to drop off if there isn't a little more focused approach to literature searching.

WRUBLEWSKI: That's a very interesting point. There have been a couple of articles over the last year talking about ethics, standards—things like that. Do you think there might be a tie-in there?

ROTH: Well, in the sense that maybe you get in a bind and you wind up running out of time and have to skirt the rules to get whatever you have to get done right away done. The ethical thing is hard, because it's so easy to find stuff that really, "Good God, that's a perfect description!" So you can see why there's—hopefully there's not a lot—but it seems like a small percentage of this is going on, on an almost regular basis.

WRUBLEWSKI: Maybe there's so much information out there that people can't determine the correct or appropriate information. A paper came out in *Nature* last week [doi:10.1038/nature.2014.14658] about how scientists are, for the first time, reading fewer papers, which to me seems kind of shocking in the electronic age. [The paper's analysis was later corrected to show no statistically significant difference.]

ROTH: I was talking to someone just the other day about that. He and I agree that it's so much easier to let an e-mail notification of a new journal issue keep sliding down in your inbox instead of dealing with it right now. There doesn't seem to be a good way to let those things stack up and remind you every couple of days or every week or so, "Hey, you've got five issues here waiting for you; better get in there." Whereas in the old days, when the journal issues came, they would sit on your desk and start piling up and you'd say, "Oh, crap!" and [laughter] take a few hours and go through them. And he also bemoaned the fact that the information is almost too focused or too direct now and you're missing the next article or the previous article and "Oh, hey, I hadn't thought about that kind of thing!" So you're missing a lot of serendipity that he felt he'd made good use of in the past. With the research groups, you really have to get those postdocs lined up and flog them until they're providing some leadership in keeping up with the literature—for example, running a journal club, which I'm sure a lot of people do. Sometimes people get away from that and forget how useful it was, and their research suffers.

WRUBLEWSKI: I find that interesting—looking at table-of-contents alerts. But then the flip side is, with electronic access, everybody to a degree expects to have access to the article *now*.

ROTH: To me that's the main driver of this open-access thing. If people routinely retrieve articles that they usually can get right away, then there is the anticipation that you can *always* get it that way. And if you don't, then you get mad or whatever. The other problem, too, is that when it comes to electronic articles, you've got to click and you've got to wait. And then you go to the article and you see the abstract and then you try to go to the full text—whereas if you've got the issue in front of you, you're reading down and see stuff, OK, how long does it take to flip the thing open to the page you're looking for? You can do it right away. You're actively involved, doing it right away, so it doesn't seem like it's that long. But if you've got to click three or four times and wait and wait and wait—maybe it'll take thirty seconds or forty-five seconds—but it seems like you should be able to just go directly. So there's a little frustration factor there too, so you tend not to go off and look at things as much, because you're frustrated by the seemingly long time it takes to get there.

WRUBLEWSKI: And the browsing phenomenon is interesting in terms of our discussion about e-books and how you browse e-books. It's a fundamentally different format.

ROTH: Maybe that's not quite so bad, because if you see a chapter in there that looks really good, you just hit that print button and take it with you and then you can read it anywhere. You've got it sitting there on your desk, keeping you reminded that you need to go back and read it.

WRUBLEWSKI: Right, but how do you find that chapter?

ROTH: Well, that's the real kicker, since there aren't any subscription databases that consistently index book chapters. So, if you can't do keyword alerts, this may be one of the attractions of Google/Google Scholar searching, since they include book chapter information from the publishers. But there again, that's what the librarians could help out with, if they understand—as they *should* if they're working here—the research interests of various research groups. They should be able to watch books as they come in, and if they see a book, or see chapters, that should be of interest to these groups, you have some way to tailor these new book lists to the research group level. Whether the library wants

to pay for that level of activity or not is a whole other matter. It might be good if you got it started and people found it useful; then it would be hard to take it away from them. So that would be the way to do it—just go and do something. That was another reason it was so easy for me to answer some of those questions, because I had that whole chemistry reference collection within fifteen feet of my desk, so I could get up and walk over and pick up a book I remembered and find the thing, *bingo!* I didn't have to go off and sort of dork around trying to find the electronic equivalent of it.

WRUBLEWSKI: It's interesting that something that's supposedly given us more access and more convenience sometimes hasn't made things easier for us.

ROTH: I think you're right. In some ways [the electronic literature is] harder to use. I got into this a number of years ago, when we delayed getting the ACS electronic journals. There was some price differential or something, so the library administration held off a little bit. I tried explaining it to some of the grad students, who weren't too happy about this, and said, "Well, look, if you're going to look for a synthetic procedure or something, if you get a list of references, wouldn't it be easier just to come over here and quickly look on the shelves? You can quickly look there and see whether it's appropriate or not without having to drag the article up and go all the way through to the article and try to read it online and find the thing down there." And they said, "Well, that's great [for you], because you're sitting there right next to the journals." [Laughter] So a lot of it was the fact that they just didn't want to get out of their chairs and come into the library. I know it sounds silly, but I sort of justified it. When they complained, "Why haven't you got this online? We've got to come over here to get it," I'd say, "Hey, I'm doing you a favor: If you didn't have to come over here once a day you'd probably just be locked in your chair getting no exercise." [Laughter]

WRUBLEWSKI: There's pros and cons to open access [Caltech's policy: <http://www.caltech.edu/content/caltech-announces-open-access-policy>], and I'd be curious to hear your thoughts on where that could go, where it might go, where it should go, and in particular what effect it may have on libraries and librarians.

ROTH: Well, my initial feeling was, and I still feel this way, that the whole open-access thing has been driven by people who thought they needed to get access to medical research journals. However, I suspect that most of those people could just as well get by with the abstracts provided in PubMed. So if you want [to read about] whatever disease you're concerned with, you can look it up in PubMed and get a whole slew of references and start digging through the abstracts, and from that you can get a pretty good idea of what's available, or what some of the treatments might be, and stuff. But the need to be able to do that somehow got translated into having access to the full text of the complete article, which I suspect is probably really not necessary enough to make this tremendous transformation of the publishing industry to accommodate them. And [with regard to] people not having access to everything that's published, it seemed to me that most people who need access to chemistry research journals, for example, would be at an institution, or have access to an institution, where they could easily use the institutional subscription to get their articles. I know there's some talk about maybe doing it. The American Physical Society has made the full text of all their articles available in public libraries and signed up with them, so that anybody can walk in off the street in a public library that has signed up with them and look at all the articles in *Physical Review*, for example. So I think there are ways to accommodate people without this complete transformation of the publishing industry. The other problems I see with it, number one, is why should the authors who are doing all the work have to, in essence, pay a supplemental fee to get their articles published? Number two is that most of the articles that do get published come from academic institutions, so you're basically letting all the industrial companies off the hook in terms of having to pay for anything. If it was all open access, then obviously the non-academics wouldn't be paying any subscription fees and they would be getting all the articles for free. So that discrepancy bothers me a little. But it seems like there's a new open-access journal every day now. In particular, in the biological sciences there are a tremendous number of postdocs out there who are going through one, two, three, four postdoc-employment sessions, and they're having a very, very difficult time finding a job. The job they want—in academia, basically, or a job that's making the best use of their skills—is very, very hard [to get] now, as there's such an overproduction of biology majors. So they need a place to publish, and that's why *PLoS* [Public Library of Science]

has taken off like a rocket, because they've got to get published—at least, they think they've got to get published if they're going to be able to get something. You see tens of thousands of articles every year coming out of that journal. There's obviously a small army of folks out there who are really in desperate straits. I think the idea of having an embargo and then making it open access after a certain period of time is not an unreasonable way to deal with the situation. Obviously the government feels there ought to be some way to make open access work, since the government is paying for it, and government-sponsored research ought to be available to people. I always think of it this way: Just because the government paid for a battle tank on an Army base doesn't mean that the public gets to come in and play with the tank for a while. I know that's an extreme way of looking at it, but I think there's a bit of truth to it. Anyway, if the government does force authors/publishers to provide open access, hopefully they will allow publishers to first impose a short embargo to ensure subscription funds for publisher services, and hopefully the chemists can live with that. Obviously some of the older chemical literature is of interest, but I don't think it's anywhere near of as much interest as the older physics literature, which the American Physical Society is basically giving away. Originally, you could buy the backfile for a few hundred dollars. And to see the ACS and some of these other publishers charging \$50,000 to \$75,000 for the backfile of their chemistry journals seems a bit much.

WRUBLEWSKI: You made the point that just because the public paid for it, should the public have access to it? There's been that pressure from [some] in the open-access community of, "We paid for it several times over; how many times do we have to pay to get access?" And there's also been the viewpoint of the libraries and the librarians, in terms of journal budgets, etc. How do you see that playing out?

ROTH: I've always been surprised at librarians promoting open access because it's going to save money somehow. I don't think they appreciate the fact that if journal articles become open access [the institute would] just take that whole journal budget off the table, as it were, and go off and spend it someplace else. You're not going to save any money by doing that. Obviously if they don't have their budgets set up correctly and they have

to go outside the journal budget to make it balance every year, then obviously that's a problem for them, but I don't see that that's going to be a big deal. The other thing I forgot to mention was that when the open-access concept first came up and the people here in the library were talking about it, I went around and talked to a number of the chemistry faculty members and the basic reaction was, "Why the hell should I pay to get my stuff published?" This was four or five years ago, but I can't imagine them changing their mind too much on that.

WRUBLEWSKI: So there's the public and government mandates and then there's libraries and library interests. But again, is this really serving the interests of the people who are actually researching—people who are producing the research?

ROTH: That's right.

WRUBLEWSKI: Now, the flip side to that is there have been instances of professors posting articles on their Web sites and getting takedown notices.⁵ So open access theoretically would solve—

ROTH: It would solve that problem, but the problem could also be solved by posting their final peer-reviewed manuscript and not the publisher's final copy, although I think some of the publishers are now taking away your right to post your final manuscript. But that's something you've got to work out with the publisher; stop publishing with those guys. People have been putting up with these European commercial publishers for far too long. I can think back to the original Gordon and Breach, which was the epitome of the evil publisher; they were the Evil Empire in space. Not only were they charging too much, but then they wouldn't supply the issues they promised in a timely manner, and they were the first to start off dredging up seven- or eight-year-old conference papers and publishing them as journal articles in a journal issue—just horrible things. And that dragged on. People kept subscribing to that. There was one journal they published for

⁵ Digital Millennium Copyright Act takedown notices that threaten legal action if articles also appearing in one or another journal are not removed from the author's Web site. See more at: <http://www.caltech.edu/content/caltech-announces-open-access-policy>

which Yale was the last subscriber. “Well, somebody’s got to subscribe to it.” That was their justification for continuing this absurd subscription—at \$20,000 a year for virtually a bunch of trash—because, “Well, somebody has to be a resource of last resort.” Well, my feeling was to try to put a stake in the heart of that publisher. [Laughter] The same thing with Elsevier; they got completely out of control. What they do is, they go behind the backs of the librarians and work with the institutions directly and get these big deal things going, where we have some sort of special deal that would cover *all* our journals.

WRUBLEWSKI: It’s not just Elsevier.

ROTH: I know; I do like to pick on them. Basically all the publishers now try to do that; obviously it’s in their best interests. For some libraries, particularly some of the science libraries, it might not have been that bad a deal, because everyone would now have access to the all of the publisher’s journals. So I think in the end the library probably saved money for a while. But even at a 7-percent-per-year increase, how many years before it doubles again? In about ten years. Even a relatively small increase every year is unsustainable.

WRUBLEWSKI: It’s kind of like subscribing to cable. So where is the value in that?

ROTH: I think it’s more inertia. For a library that subscribes to a big deal, it’s sort of like the cocaine theory of marketing: You know, give it away for a while until you get them hooked and then you start taking advantage of them. And that’s sort of what Elsevier did. I’ve got some old issues of *Tetrahedron Letters*. When it first came out, back in ’59, it was something like \$20 a year. I saw in my files that *Brain Research* suddenly jumped from \$35 to \$42, which is minuscule compared to what they charge now. So that’s what I mean. They started small and inexpensive and rapid publication. The societies at that time were probably pretty much underfunded. I know the ACS had difficult times there in the fifties and sixties, in terms of probably not charging the membership enough. They used to sell the whole *Chem Abstracts* for \$100 a year, something like that, so they were spending a lot of money on the society activities and they weren’t charging enough for their subscriptions to build up a little reserve fund so they could start some new journals.

Like *Organic Letters*, for example; that should have been started thirty years ago. And that would have headed off some of the commercial things. I'm not sure why, but it seemed that societies had not built up enough money in their reserves to start new journals easily. It was just like pulling teeth for them to start a new journal. [ACS's] *Biochemistry*, for example, didn't start until 1962, whereas the *Journal of Biological Chemistry* started in 1905; there were long, long years of missed opportunity to get started earlier.

WRUBLEWSKI: This is stuff that you don't learn in library school. [Laughter]

ROTH: You've got to get out in the field. The first thing I learned coming out of library school was that Gordon and Breach was really bad. [Laughter] Almost like the first day you find that out, and it goes downhill from there.

WRUBLEWSKI: So for librarians coming into the field and being faced with this, what would be a good approach? And yes, I am asking for advice. [Laughter] How do you see the role of the library and librarians in terms of navigating these changes as they happen, in terms of dealing with publishers, dealing with open access?

ROTH: The way we've done it here is that you don't jump in and get too excited about things too soon. You know, it's like when they talk about basketball and football—let the game come to you, don't try to force yourself on the game. You've got to get into the flow of it and not try to take it over. The main thing is that this isn't an eight-hour-a-day job. You've got to make this your profession, and it takes more than eight hours a day to make it your profession, if you want to really be good at it. And when you're good at it, you're really happy and get some pleasure out of your work. It's probably the poor ones who are just doing this as an eight-hour-day job, and trying to leave it all at the job when they go home, that's what breeds insecurity and makes it a lot harder to do a good job if you're not thinking about it, at least on a subconscious level, all the time. It's funny, because that was part of the reason I didn't want to become an academic chemist when I was in grad school. Because I saw my boss was doing this—basically working fourteen, fifteen hours a day. He was one of these guys who got up early and got going, so he was

here by eight o'clock, worked until five, went home for dinner, and then came back for another two or three hours. I thought, "How can anybody do this?" But obviously a lot of people do. I don't think librarians have to do that to quite that degree, but you still have to— It really is a seven-day-a-week job, even if you're only spending a few hours thinking about it on the weekends.

WRUBLEWSKI: For something like information science, it's kind of hard not to.

ROTH: It really is, yes. Because you're always trying to be aware of what's going on. And that's what's fun about it; to me, that's the fun of it. I couldn't see doing it in chemistry, but I could see doing it in something a little broader, and that's what the library profession gave me—although at the time I didn't realize I was going to do that. But once I got into it, I realized, hey, this is the perfect job if you're really interested in a lot of stuff. Having been a history major, and with all the political background my folks brought, and the science background too, you can be interested in almost everything.

WRUBLEWSKI: And never stop being interested.

ROTH: That's right. You never stop being interested. It's like an addiction. [Laughter] Once you get into it, it's great, really great.

WRUBLEWSKI: I can't think of a better place to pause and say, Thank you so much!

ROTH: My pleasure.