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**L. WINCHESTER JONES**  
(1900 – 1987)

**INTERVIEWED BY**  
**MARY TERRALL**

**March 24 and April 6, 1978**

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## **Subject area**

Humanities, administration

## **Abstract**

An interview in two sessions, March and April 1978, with L. Winchester Jones, dean of admissions, emeritus, in the Division of Humanities and Social Sciences. He recalls growing up in ranch country, Santa Ynez Mountains, and Montecito. Education at St. Paul's and Princeton; marriage, early career in New York; move to Pasadena. Decision to go into teaching; interview with Clinton Judy; hired as an instructor in the English department, 1925. Describes the humanities division in the 1920s and influence of William Bennett Munro. Recollections of literary discussions at Judy's home. Comments on Robert Andrews Millikan and Caltech's Executive Council; Caltech in World War II; Navy V-12 program; advent of Lee Dubridge as president.

He discusses his work on Freshman Admissions Committee; his gradual move into administration; his work as director of scholarships; his recruiting of students.

Describes the growth of humanities division and its change in emphasis from a service to a scholarly division. He concludes with several amusing anecdotes, chiefly concerning astronomer Fritz Zwicky and Albert Einstein.

## **Administrative information**

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**CALIFORNIA INSTITUTE OF TECHNOLOGY ARCHIVES**

**ORAL HISTORY PROJECT**

**INTERVIEW WITH L. WINCHESTER JONES**

**BY MARY TERRALL**

**MONTECITO, CALIFORNIA**

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**CALIFORNIA INSTITUTE OF TECHNOLOGY ARCHIVES**  
**ORAL HISTORY PROJECT**

**Interview with L. Winchester Jones**  
**Montecito, California**

**by Mary Terrall**

**Session 1                      March 24, 1978**

**Session 2                      April 6, 1978**

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TERRALL: I have some biographical information from the Publications Office, so I know that you were born in Baltimore.

JONES: Well, I was born on the Eastern shore in Maryland, actually.

TERRALL: Did you grow up there?

JONES: No, I left there when I was three or four years old, I guess, and we were abroad for a year or so. I don't remember much about it, obviously. And then we came back. My mother died when I was three. My father married again when I was about five, and came back to California, where he had ranched before he married the first time. He had ranched right back of the mountains here, in the Santa Ynez. When he came back, we lived here in Montecito, and also he had a ranch over the mountains, where I spent a lot of time—had a lot of fun back there.

TERRALL: That must have been lovely in those days.

JONES: Oh, it was. It was just beautiful. There were about four or five big ranches in the Santa Ynez in those days. Now they're all cut up into smaller ranches, 100 and 200 acres, but in those days nobody knew where they went, back toward the desert. They had

to be big. You got about three acres to support a cow, or four acres—grazing in the summertime isn't very much.

TERRALL: Was it all open, or was it fenced?

JONES: It was pretty much open, pretty much. It was fenced along the roads to keep the cattle from wandering onto the roads, although they sometimes did. But most of it was open. You had your roundup and your cattle were branded, and you knew whose cattle were whose, and so on. It was a very interesting period. I lived there a good deal of the time and also over here in Montecito, of course—until I went east to school when I was fifteen.

TERRALL: What decided you to go east to school?

JONES: My father died in an accident, and nobody seemed to be very much interested in me or what I did. And I had a very good friend who lived right above us—in those days the places here were fairly large, seventeen to twenty acres for residences here—and we played all over there. He was a couple of years older than I was. And he had gone to St. Paul's, in Concord, New Hampshire, and thought highly of it, and I got enthusiastic about it, so he suggested that I write a letter to St. Paul's. I didn't have a very good school record. I hadn't had much time for school.

TERRALL: But you had gone to public schools here?

JONES: No, I spent one year, or part of a year, at a public school over in the valley. But the other years I went to a school called the Hicks School, now long since defunct, and Cate School, which is still going strong, and from there I went to St. Paul's when I was fifteen. I didn't have a very good record, I don't think, but they had no boys from California in those days. It was a long way to go then, you know. It took you five days and five nights to get there on a train, so it would mean you wouldn't come back Christmas or Easter, of course. So people out here pretty much stayed out here. I guess

they [St. Paul's] wanted to spread their geographical distribution—anyway, they took me, and I had a wonderful time there for three years. And then went to Princeton—went into the Army first, and then went to Princeton from the Army. World War I.

TERRALL: What decided you to go to Princeton?

JONES: Mostly my friends at St. Paul's who were going. We got scattered a bit in 1918, we went into various branches of the service as soon as we got out of school. But I knew a lot of them would end up there, so I went there.

TERRALL: I see, so you knew a lot of people who were going there, too.

JONES: I knew quite a few, yes, and that was mainly why I went there. I had some relatives, cousins, who went there. So all of us ended up there. Some seventy or eighty of us from St. Paul's in that class. Of course, some of us had been in the Army for a while and were a year behind, essentially, so it sort of coupled up. But there were quite a few of us in that freshman class from St. Paul's, which made it very nice. And then I graduated from Princeton [1922] and got married five days after I graduated—it took five days to get out here. My wife lived in Pasadena.

TERRALL: Had you met you wife back east?

JONES: No, I met her here in Santa Barbara. In those days, it was considered cruelty to females to leave your wife or children in Pasadena over the summer. Later on—years later—people stayed there and didn't think anything of it. But in the early days you had to send them to the beach. It was too hot in Pasadena—they couldn't possibly survive. So she used to come up here with her family every summer, and I was here on vacation from school and college, also in the summer. I was still living at my father's place when I was here on vacation. And we met here when I was in, I guess, about the third or fourth form. I never can remember the equivalent to grades. The sixth form is the twelfth grade.

TERRALL: So this would be just after you went back East then?

JONES: That's right. In fact, we were engaged when I went back East to join the Army.

TERRALL: So your father's place was still here?

JONES: Yes. We kept that until 1928—rented it most of the time.

TERRALL: This was the ranch, or the place in Montecito?

JONES: Oh, the ranch we sold right away. We kept the place here and rented it most of the time except for the summer. So, as I say, I was engaged to my wife four years, all four years that I was in college. And I got married five days after I graduated, and went back East to work in a brokerage house.

TERRALL: How did you get that job?

JONES: Well, I knew the head of it. He had a son who was my age, and the son got into a little trouble in school, and the headmaster asked me if I could straighten the kid out—he was several forms below me—and I did, temporarily anyway. He ended up in Leavenworth, as a matter of fact—the penitentiary. Wealthy family, you know, and all this. [Laughter] That was some years later. I don't think that was my influence—I'm not sure. But anyway, the father was very grateful for the whole thing, and said that he wanted me to come work for the firm. Well, in those days, if you wore button-down collars and a Brooks Brothers suit, you sold bonds. That was just fate, everybody decided this is what they ought to do.

TERRALL: Now, had you taken a degree in English at Princeton?

JONES: No, I didn't, and this is something that doesn't really weigh on my conscience, because it was an honest mistake. I was persuaded I had graduated in English literature. I took an awful lot of it. My diploma says I graduated in economics. I didn't find that out until years after I had worked for Caltech as an English teacher, and the diploma appeared from some drawer or other, and I looked at it out of curiosity, and found I graduated in economics. I think it's an error. I hope so.

TERRALL: You took a lot of economics courses?

JONES: I took some economics courses, but I'm sure I had more English courses than economics. However, it didn't seem to make an awful lot of difference.

TERRALL: So once you got into the brokerage firm—

JONES: I found that it was not for me—definitely not for me. And so then we came back to California—my wife was pretty homesick for it anyway—and I worked in a bank here for two years.

TERRALL: In Los Angeles?

JONES: No, in Pasadena. And we built a house there and settled down there. I didn't care much for banking. It was all right, but it didn't seem to me to be very fascinating. I'd always wanted to teach—I'd done a lot of tutoring in college—so I applied for a job at Caltech in the English department [1925]. And I went out to interview with Clinton Judy [chairman of the Humanities Division, 1923-1949], and we got along all right, and he said, "Well, there isn't anything now, this year, because we're full-up on the staff, but I'll keep you in mind." That didn't sound very encouraging. About a month later, he called up and said a member of the staff, not long before college opened, was ill, and couldn't come the first term and would I want to take the first term? And I said, "That's all right, I'll do that." So I came first term. The man never came back, actually. He was

ill for longer than that, and then he came up here and started the Crane Country Day School, up here in Montecito. So I stayed on as a member of the English department.

TERRALL: When you went to apply to Caltech, were you familiar with Caltech and did you know people there?

JONES: Not very, not very. It happened to be in Pasadena, and I wanted to live in Pasadena, and I didn't want to teach in public institutions; I wanted smaller classes and the kind of thing that Caltech had to offer. But also, it struck me as a very interesting kind of teaching to do, to see what you could do with youngsters who did not want to study English. They didn't come there to study English. In those days, they saw no use in it at all. The thing changed somewhere along the line, I can't remember just when. But it struck me that this would be kind of a challenge. And it turned out to be exactly that. The fascinating part about teaching at Caltech back in those days—I'm talking now about the mid-twenties—you had for the most part, as I say, a group of youngsters who had conscientiously avoided any humanities as much as they could in high school, and who couldn't care less. It was a waste of time as far as they were concerned. And you had to do something to show them that it wasn't a waste of time, that a different type of intellectual activity could be interesting. Well, it wasn't so difficult as it might seem, because you did what came naturally; that is, you gave an assignment, and the assignment would usually involve writing something: "What was your idea of this thing that you read?" And you would get back fairly well-written themes. Even in those days, kids were pretty smart who came here, and they knew how to write, more or less. If they didn't, it didn't take them long to catch on. That they did realize they ought to do, to at least be able to write; they had to write reports and things like that. But they would hand these things in after a short time without too many errors in them, and you would give the paper a C, because it didn't have a single idea in it that was interesting. They had parroted everything they had read and remembered what they had read as though it was a mathematics text. And they gave it right back to you. And I would give them a C for this. And they would come in, indignant or weeping or whatever it might be, because

they had never seen a C on their record—they wouldn't be at Caltech if they had. "Well, I don't understand, sir, what is wrong? You didn't put any marks on it."

"Well," I said, "no, there is nothing mechanically wrong with the thing."

"Well, why didn't I get a better grade?"

"Well, frankly, because it bored the dickens out of me."

"Well, are we supposed to interest you?"

I said, "You certainly are, if you want a decent grade."

"What am I supposed to say?"

I said, "You aren't *supposed* to say anything. I want you to tell me what you want to say. What did you think of that thing you read?"

"Well, I didn't like it very much. Seemed kind of dull."

I said, "Fine, all I want to know is why? Why didn't you like it?"

After they caught on to this, you couldn't hold them, because it was the first thing they had studied at Caltech in which they were entitled to their own opinion. They had good, original, creative minds, but they weren't entitled to their own opinion of Boyle's Law or the second law of thermodynamics. They had to learn the stuff at that stage. Later on, they were entitled to more independent thinking, but not that early. All of a sudden, here was something they could get their teeth into and throw it back at you. Well, after that, I don't think we ever finished a morning's assignment, actually—we got to arguing, fighting about this and that. Of course, you always took the opposite side from what they took. And this turned out to be a lot of fun. Strenuous as anything, because they were smart young minds, you know, and to take the opposite side where often there wasn't much to sustain it. . . . I could talk faster than they could, that was my advantage.

TERRALL: These were freshmen you were teaching?

JONES: I taught freshmen and juniors for the first three or four years, and then I had one senior class. As I remember, in those years there was no English in the second year. That's where history came in. Sophomores didn't take English, I'm sure—just freshmen,

juniors, and seniors. So that's why it appealed to me, and why I wanted to go there and why I stayed there.

TERRALL: You came in 1925, is that right?

JONES: Yes.

TERRALL: [William Bennett] Munro had just come also, hadn't he?

JONES: Right.

TERRALL: So he came as chairman, I believe, didn't he?

JONES: No, he never was chairman of the division.

TERRALL: He was just on the Executive Council?

JONES: He was a professor of history. Also on the Executive Council, but as far as his position on the faculty was concerned, he was simply a professor of history. Now, he had the biggest office when we got a humanities building [Dabney Hall, 1928]. Munro was not there the first year I was.

TERRALL: I thought that he came in '25 also, but it could be that he was here part-time that year, I'm not sure.

JONES: He must have been part-time, I'm sure, because I don't know where he would have been located. [W. B. Munro was part-time from 1925 and became a full-time member of the faculty in March 1928—ed.] Dabney Hall wasn't built until 1928, and Munro then had the biggest office in Dabney, with an outer office for his secretary. Clinton Judy just had an office like all the rest of us, up on the top floor. Of course, poor Clinton was kind of in the shadow there.

TERRALL: How did Munro happen to get himself the biggest office?

JONES: Well, in the first place he was a big shot. It was quite a feather in Caltech's cap to get him from Harvard, where he was the head of the Division of History, Government, and Economics. And he was on the Executive Council, and that was what he needed. Of course he also was a scholar, had done a good deal of writing; he needed a secretary, and he needed that space. None of us at that time on the humanities faculty were scholars. We were teachers. We knew a reasonable amount about our subject, but I don't recall that any of us ever published anything, in that early faculty. [Roger] Stanton and [Harvey] Eagleson and [George] MacMinn—no, we all had a jolly good time and enjoyed our teaching, but we didn't take writing very seriously. I don't think Clinton Judy ever published anything, but he was a true scholar of the Oxford type. He actually was, of course, a Rhodes Scholar and went to Oxford. Publication didn't mean anything to him, but knowing everything did. He had a magnificent library; I don't know how many hundred books he had. And he knew everything in every one of them. But none of us thought much about publication. We were, in those days—this goes for history and languages as well—a service division. That's what we were. We were not a scholarly division, or one in which any degree was going to be granted. As you know, that didn't come until a few years ago. So we were a service division, and teaching was what counted. And pretty much, those who were chosen to teach there were more interested in teaching. Later on, we did get some good scholars. Rodman Paul [Harkness Professor of History, emeritus; d. 1987]—I don't know whether he came before [J. E.] Wallace Sterling [professor of history and Harkness Professor, 1937-1948] or not. [Dr. Paul arrived at Caltech in 1947—ed.] Sterling was another person who was a scholar and who was publishing as Paul was. But that was new in the division.

TERRALL: So you're saying that in the early days, when you were first there, Munro was really atypical among the humanities faculty. Did that set him apart?

JONES: Yes. None of us was ever intimate with Munro. We were a tight little division, and we had an awfully good time together, but Munro was not one of us at all. He would ask us to his house for dinner sometimes, we'd have him to dinner, and that was about the extent of it. We were not on intimate terms the way we were with each other and with other members of the faculty.

TERRALL: I was going to ask you about personal friendships with people in the science and engineering divisions.

JONES: Oh, plenty of them. There was no distinction between humanities—as far as that was concerned. Everybody got along pretty well together, and some of your best friends might be members of mathematics or physics or chemistry people. Like [chemistry professor] Ernest Swift, for example. We knew each other very well, and many of the others now no longer there. There was no barrier at all, as far as social intercourse was concerned, between the humanities and the other divisions.

TERRALL: What did the people whom you knew in the other divisions think of the humanities? In other words, did they think it was important?

JONES: They thought it was important. This attitude had been drilled into Caltech from the very beginning, by George Ellery Hale and [Arthur Amos] Noyes. Both Hale and Noyes were convinced that engineers and scientists had to know something besides engineering and science. They needed literature and needed history and needed language. So the faculty was definitely sympathetic toward it. There was never any—as far as I know—antagonism. The only antagonism I ever noticed, and it was very noticeable, was when Munro wanted to enlarge the humanities to become a scholarly division. He had some money that he could get for this purpose and claimed he couldn't get it for any other purpose. And there was a rather bitter faculty meeting on this at one time. E. T. Bell, who was quite a character—Eric [Temple] Bell [professor of mathematics, 1926-1951]. There was another Bell, [chemistry professor] Jimmy [James E.] Bell—they were known as Wild Bell and Tame Bell, and Eric Bell was Wild Bell.

He got up and denounced the whole scheme, and Munro, and everything else, in that faculty meeting—Munro was there—and said they were diverting funds that were necessary for science and that they didn't have enough as it was, which was true in those days. And there was quite a to-do over that.

TERRALL: Did he [Munro] want to build a graduate program?

JONES: He wanted to eventually give degrees, yes.

TERRALL: And expand, obviously, in terms of faculty.

JONES: Right. Right. And it was turned down flat. It wasn't until considerably later that—

TERRALL: So this idea didn't have support among other humanities people, either?

JONES: Well, most of us couldn't care less whether they did that or not. We were enjoying what we were doing, and we knew we were doing a lot of good. We knew those kids were different kids, from things we tried to give them to think of. I don't mean all of them, 100 percent, but we had a pretty high percent of success with those fellows, and we knew in later years, when they came back and talked to us, how much it had meant to them. Well, this was fine with us. We weren't interested in having a big division that was going to turn out degrees. In fact, we wondered a little bit whether people who were really scholars were going to have the patience to work with those youngsters. They took a lot of time. They were interested, but you had to bring them in and go over their papers and their ideas and their attitudes with them, and discuss; it was almost a tutorial arrangement in those days in the humanities. You called one or two of them in and said, "Well, you're not really envisaging what happens, or you're not thinking behind this sort of thing. Let's go over that and see if you don't—what do you get out of that paragraph? What does it really mean to you?" Or, "How do you think the man said this in a dialogue? What was his tone, what was his expression?" And finally, they'd learn to

read. But this took a lot of time, a lot of energy, and I'm not sure today, with publication, that they get that much time and energy devoted to them. I'm not sure; I'm prejudiced.

All right. That's why I went there and why I enjoyed it and why I stayed on teaching until—you wanted to ask me why I went into administration. The answer is very simple—money. You got to the point, you see—and I had no doctor's degree—where the attitude in the division was changing. After Clinton Judy retired [1949], and he died shortly after, then it began to build up as a more scholarly division. I could see that I wasn't going to get any promotion or salary increases to amount to anything. But I knew I could do some pretty good administration, and I went into it for that reason. I taught for quite a while afterward, as a part-time teacher.

TERRALL: I believe you were on the [Freshman] Admissions Committee back in the twenties, right?

JONES: I was on the Admissions Committee almost from the time I was there; I think it must have been in '26 or '27—just a member of the committee. And I was fascinated by it. We couldn't go to the extent that we did later. We did our best. We gave our own examinations for a number of years—I don't remember how long—before we went to the College Boards. We went to them for the very obvious reason that it got to be more and more difficult to find people to proctor our examinations back in New York and Boston and wherever. We were getting, by that time, more people from away. In the early years, they were mostly Californians.

TERRALL: Were you involved in recruiting in the twenties? Was the Admissions Committee actively recruiting students, or was it just waiting for people to apply?

JONES: No. It pretty well just waited for them to come in. Jimmy Bell, who was chairman of it at that time, did go out and do some local recruiting in the local high schools. He gave some lectures on chemistry and so on and so forth and did a little of that—not very much. We didn't have a great many applicants. My memory for figures is very poor, but I think our freshman class then was around 120 or something of the sort,

and we might have 300 applications or something like that. Our applications were pretty good though, so even though it was picked from that few, they were pretty smart fellows. There was never a time when you could get through Caltech easily, unless you were pretty good in mathematics and physics and so on. But there was very little recruiting. Then Phil [Philip S.] Fogg [assistant professor, business economics, 1930-1946] took over [1935]. Phil combined the job of registrar and director of admissions, which before had been split: [mathematics professor Harry] Van Buskirk as registrar and Jimmy Bell as chairman of admissions. But after that, Phil did both, and then I took his place [1937, as dean of admissions; 1942, as registrar—ed.].

TERRALL: And you did both also?

JONES: And I did both for a while, and then it got to be too big. We'd be getting applications from all over the country, and they were numerous, and I just couldn't handle both of them and do a good job. So I gave up being the registrar [1952], which was far less interesting than admissions. Phil and I got together on the interview matter. We were both enthusiastic for the interview, and we thought, "Well, we can't go on making silly distinctions between a few points on a College Board test or our own test." They didn't mean a thing.

TERRALL: So you didn't have interviews?

JONES: Not at the beginning, no. What's the difference between a score of 780 and a score of 800 on a College Board? It doesn't mean a thing. We just said that there was no sense in it. And in the sciences and mathematics we were getting all in the 700s. So we decided that we'd try for the interview, which meant we had to try to get some money. And we did—we got it. [Robert A.] Millikan [chairman of Caltech's Executive Council, 1921-1945] was persuaded of the value of it. And it was then that we started sending out the members of the committee on these interview trips. I was always amazed and enormously pleased over the fact that very busy science and engineering faculty members—publishing, teaching, doing research, and all this—were willing to take a

week or two weeks off and travel around the country, which is not easy, and go poking around finding these miserable little high schools, or big ones, and talking to them.

Now, the interview has often been misunderstood, or misinterpreted. People think of the interview as being with the student, and they say, “What can you find out from a shy, scared little kid?” You don’t find out much from him. Even after a long time, you can’t tell much about him. Where you get the information is from his teachers. If you can sit down with his math teacher, or his physics teacher, or his chemistry teacher, and say, “What did this fellow do that he didn’t have to do to get a good grade? Sure, he got all his homework in, so did a lot of other people. So he didn’t make any trouble in class, neither did a lot of other people. Did he ever ask you embarrassing questions that you had a hard time answering? Did he ever come in with the urge to go further with something? In other words, how about his curiosity—has he really got it?” That’s where we got our information. Sometimes we got bad information—not infrequently, the teachers didn’t know enough to know whether he was that good. But by and large, the interview paid off. It wouldn’t still be there, obviously, if it hadn’t.

TERRALL: What about scholarships? Was there a separate committee for scholarships in those days?

JONES: Yes. As far as I remember, there has always been a separate committee for scholarships, and for a time, as I recall, I was chairman of both. And then I was given the title of director of scholarships. Isn’t this strange? I ought to remember. No, the last few years I was there, they had a chairman of the scholarship committee. The last two or three years I was there, the faculty was beginning to feel that they wanted more direction of the administrative positions. You see, for years, Earnest Watson, who was dean of the faculty, and [Frederic] Hinrichs, who was dean of upperclassmen—and later Paul Eaton, dean of upperclassmen—Foster Strong, dean of freshmen, and I, and the chairman of the faculty, used to meet and appoint all the committees. Now, of course, they have an election system, all very elaborate and very democratic. It wasn’t democratic in those days at all. We appointed the committees and the committee chairmen. Well, the faculty began to feel that this wasn’t very democratic, and they wanted to get in on this. And

there began to creep in, in the last two or three years I was there, some kind of feeling between the administration and the faculty, as exists in a good many colleges and universities. But for most of the years I was there, there wasn't any such feeling, because we were all faculty members. Every one of us was teaching. Now you've got a number of them who don't teach at all, and who didn't grow up there, and there's a different attitude, very different. I think it's too bad that this has occurred. But for years there, there was no feeling at all of, "Well, that's the administration." I'm talking now about the academic administration; I'm not including necessarily the financial, or the directorship under Millikan.

TERRALL: Back in the twenties and thirties, were there many students on scholarships?

JONES: Not very many. We didn't have very much money. The biggest scholarship we had was tuition. So these poor fellows had to scramble up board and lodging some way or other. I don't remember now when we first struck out and determined that we were going to get more scholarship money out of the budget.

TERRALL: Was it just that nobody had thought of it, or was there feeling against scholarships?

JONES: No, no feeling against scholarships. Remember that a good deal of that time we are talking about was the Depression.

TERRALL: Yes, that's true, so there wasn't much money around.

JONES: And you know what happened to the Fleming money; it just vanished.<sup>1</sup> And all of a sudden, there we were—\$5 million short. Salaries were cut, everything. Well, the Depression lasted, you know, until the forties. For a long time, things were pretty tight. There just wasn't any money for scholarships. But as soon as things began to loosen up a

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<sup>1</sup> Arthur H. Fleming, longtime president of Caltech's Board of Trustees, was a noted philanthropist who donated acreage and more than \$5,000,000 to Caltech in its early years.

little bit, and as soon as a little prosperity returned to the country where we could approach individuals, then we began getting scholarships for more than full tuition, and many more scholarships.

TERRALL: How were scholarships awarded? Was it on the basis of scholarship or need?

JONES: At first it was on the basis of scholarship, and that was true for a number of years. And then we got more and more into the basis of need. People began to say, "Wait a minute, these kids are all good. We're losing too many fine boys whom we need because they didn't stand two-and-a-half points higher here or there but can't come without money." So we decided, "Heck, we'll go to the need basis." We had been on that for some time when the College Scholarship Service was started and you had to be on a need basis. Now that's breaking down again, I'm sorry to say. More and more of these so-called "honors scholarships"—they're starting to buy students again, the way they used to.

There used to be tough competition buying students, you know—taking them away from another college. MIT and Caltech have always gotten along pretty well, and we've had a big overlap list. I used to go back every year between the time we made up our mind on scholarships and the time we had to notify the boys. I'd dash back and spend three days back there, and go over with MIT and Cornell and Carnegie Tech, and so on, who had duplicate applications, what we were offering. "All right, now, why are you offering more than that?" And they might know something we didn't know about the boy, you see. We'd finally get down to the same figure—the same comparable figure, depending on how much tuition difference there was, and travel, the travel allowance from the East or from the West. We'd get down to the same comparable figures so the applicants could take their choice. That was a very good idea.

TERRALL: So it wasn't like MIT was luring him away.

JONES: No. That was one thing we wanted to cut out. We said it wasn't fair to the student. Let him have his own choice. If he wants to come here, all right, he comes here

for the same amount of money he can go there. And that pertained for a long time. I don't know what has happened to it since I retired, but I hear it's kind of beginning to drift back into the dog-eat-dog business of buying students. I think it is very unfortunate.

TERRALL: Did you continue to do this, going back and talking to them right up until you—?

JONES: Right up until the day I retired. We interviewed, we all got back, we met, we made our decisions, and we never finished more than about a week or ten days ahead of the candidates' reply date. I had to rush back east and sit down with these characters and come back again. I guess Peter Miller [assistant director of admissions] did it after I did, for some time—I think, I'm not sure.

TERRALL: Before we get on to World War II, I wanted to ask you a few more things about the social atmosphere in the early days, before the war. I've heard that, for example, there were regular discussion meetings of some sort at Clinton Judy's house. Did you go to those?

JONES: Oh, yes. Once a week, Clinton would have us down to his house, and I suppose there would be as many as a dozen faculty members.

TERRALL: From different fields, different divisions?

JONES: Oh, yes, anybody who wanted to come. And what was generally done was that somebody was asked if he would prepare a paper, a short paper. And he'd give it, and the others had read, or tried to read, the same thing that he was talking on, or in that area, and then we just sat and argued and had a fine time discussing.

TERRALL: What were the topics like?

JONES: Well, for instance, I did one on Eugene O'Neill, and somebody else might do one on Victorian poetry—on a field, you see. As I recall, I did one on the appearance of myth in Byron and Shelley, something of that sort; I've forgotten just what it was now. I did one on Conrad. And we had a very enjoyable evening doing that. We were all amazed at [Charles] Richter, of the Richter Scale, you know, the seismologist. That man had read about everything ever written in English literature, I think. I never saw such a mind; he retained everything he'd ever read. He gave some eloquent papers on sometimes rather abstruse poets that very few of us could recollect at all. And other times on things that were well known. No, he was amazing. His knowledge of literature was extraordinary.

TERRALL: And the other scientists gave papers on literature topics also?

JONES: Oh, yes. It was all on literature, there wasn't any science in it. No, they were glad to get away from science for a change and do a little something else. Those were very enjoyable evenings.

TERRALL: How long did that go on for?

JONES: It went on until Clinton began to fail, just about the time he retired [1949]. Years just don't mean anything to me anymore. I can't remember just when that was.

TERRALL: But it was all the first years that you were there?

JONES: No, it didn't start until, as I recall, the late thirties—somewhere around there, he began those sessions. It might have been somewhat earlier than that, maybe the mid-thirties, but it wasn't going on in the beginning. There was a much smaller group of us, including Clinton—I guess Clinton and I were the only ones from Caltech—about seven or eight of us, who met every week, every Monday night, at each others' houses and had general discussions of everything, and that went on right up to the time that too many of them died, shortly before I retired. It was way back in 1925 or '26 or '27 that I was a member of that.

TERRALL: You said that you were the only people from Caltech. Where were the other people from?

JONES: There were two lawyers, two doctors, a book publisher—a Rand McNally officer—and the head of the California division, or whatever you call it, of Price Waterhouse. So there were a variety of occupations.

TERRALL: Pasadena people?

JONES: Yes, we all lived in Pasadena.

TERRALL: What about any contacts you may have had with the trustees? Was there much contact back in those days?

JONES: There was very little in the early days. I knew one or two of them from outside connections; otherwise, I didn't see anything of them at all. Almost none of that, until Jim [James R.] Page became Chairman of the Board, and he sought a much closer relationship. As long as [Allan C.] Balch was chairman, the trustees and the faculty just didn't have much to do with each other. We were represented—Earnest Watson, as far as I know, and of course Millikan, sat in. But the rest of us just didn't bother much with the trustees, and they didn't bother us, and it was no loss to us or to them, I think. The much closer relationship now, where they have division representatives to the trustees and so on, is entirely new. In fact, it's since my retirement.

TERRALL: But socially you didn't see them either? They didn't move in the same circles?

JONES: No, not at all, unless you happened to know them in a different way. You might know them socially for other reasons. The only time we ever mingled socially was at the Associates' dinners, where the members of the faculty who didn't look too awkward in

black tie were asked to come and be nice and hope they could entice some money out of the Associates who were invited for the evening.

TERRALL: Well, I guess some faculty members did more fund-raising if they knew people.

JONES: No, as far as I know, not the faculty. The Executive Council, perhaps—although the Executive Council as such, I believe, met about four times in Millikan's entire career. I don't think the Executive Council ever had anything to say about anything. Millikan ran the show, you know. He was a one-man show. And then I think that Munro had a good deal of influence on him. You see, Millikan was a great believer in democracy, provided it didn't interfere in getting what he wanted done. And this is why he never would take the title of president, because he said, "All right, now, this is setting us up here, and it's democratic. We'll have an Executive Council, and we will decide things in that. No one man's going to dominate." Well, as I say, I don't think the Executive Council met. Max Mason, who was on it [1936-1945], told me he'd been on it for four years and he had never been to a meeting, so for sure it hadn't met in that length of time.

One thing I do have to say for Millikan. Sure, he was a dictator, in spite of all his talk about democracy. But we needed one then; we had to have one. Times were tough, and he was the greatest money-raiser that ever came down the pike. But he gave you a job and he let you alone. He never interfered. He'd promptly gather it indirectly if you were not doing a good job, or if it was in academic administration, he knew darn well the faculty would take care of you if you weren't doing a good job. You'd come into lunch at the faculty club, and they'd say, "What the heck were you doing when you admitted this class, for heaven's sake?" So there wasn't any way you could backslide very much. And nobody wanted to. He knew he had dedicated people there, people who wanted to do their jobs and who were good at it. He didn't need to interfere. Although there were occasions, particularly in admissions, when a good deal of pressure was brought on him. I'll never forget when we turned down the son of one of the members of the United States cabinet. And he [the cabinet member] got hold of Amadeo Giannini, who was head of the Bank of America, and Giannini said, "Well, I know all those trustees. Your boy is as

good as in. And Giannini said to Millikan, "Let that boy in." Millikan said, "You go to Jones. I have nothing to do with it."

TERRALL: Millikan wouldn't step in?

JONES: He just said to Giannini, "Go to a man by the name of Jones, he's Director of Admissions. It's his job. I don't know anything about it. I won't do anything." And Giannini said, "Well, he has already turned down my vice president—I had him go talk to him." And Millikan said, "Well, that's too bad, there's nothing I can do about it." Giannini raised hell about it. And I think we lost some money. But Millikan wasn't going to interfere. He knew it was wrong to let that boy in when he didn't deserve it. He knew the committee knew what it was doing. No, we never had any trouble that way.

### **Begin Tape 1, Side 2**

TERRALL: Do you think things would have been different if Millikan had been president instead of having the Executive Council?

JONES: No. There wouldn't have been any difference at all. I don't mean the members of the council and Millikan didn't talk to each other, but there wasn't any formal meeting where they voted on this or that. Sure, Millikan would ask Mason what he thought about this, and he'd ask Munro, and so on, and Munro would go to Millikan and see about this or that, but it wasn't a formal meeting once a month, where somebody made a motion and kept minutes. It just didn't happen.

TERRALL: I think we're up to World War II. Were there very many of the humanities faculty members who were involved in war work in one way or another?

JONES: Not as many as there were in science. We stayed on the job and did pretty much what we had been doing. I don't recall that any of us really was engaged directly in war work. Oh, yes, we were on various boards and things that were trying to do something

for the war, independently of our connection with Caltech. But Bill [William W.] Huse [professor of English] as far, as I know, was the only one who really got into it. He got into it as a kind of recorder and historian for the rocket project.

TERRALL: On campus?

JONES: Right. He was the only humanities man, I think, as far as I remember now, who really got into that.

TERRALL: Were there people, though, who left and took leaves?

JONES: No, I don't remember anyone doing that. I may be wrong.

TERRALL: Well, I know that Horace Gilbert did, in economics.

JONES: Oh, that's right, so he did; he went off doing something or other [Horace Gilbert took a 1940-42 leave of absence to teach in Harvard Business School's industrial mobilization program—ed.]

TERRALL: In terms of the teaching, were most of the same courses offered even though the enrollment was down?

JONES: The [Navy] V-12 [program] left our humanities, and practically everything else, pretty much to us. They said, "We want these boys educated the way you educate your students, and that's fine, go ahead."

TERRALL: So what was the situation—a certain percentage of the student body was in the Navy, actually?

JONES: Practically all. Practically all the students at that time were in the Navy.

TERRALL: Were they assigned to Caltech by the Navy?

JONES: Yes, yes. Of course, they had to volunteer, they weren't drafted.

TERRALL: But they didn't have to get admitted by Caltech.

JONES: No, they didn't. The Navy sent us a certain number of students. They transferred them from other colleges that didn't have a science or engineering place, and oh, boy, what a headache that was. The first day of the V-12—well, I didn't go to bed at all, and there were two or three of the rest of us who never got to bed that night or the next day. These boys all poured in from various places with their transcripts in their little hot hands, and we tried to make head or tail out of them, and where in the world could we fit them in. Were they partly sophomores or partly freshmen, or all freshmen? Or had they had any advanced algebra? No. What the hell are you going to do about that? Oh, it was a mess. To make it worse, we had no commanding officer. Here these people all arrived, and there was a scared little lieutenant who hadn't been in the Navy more than just his breaking-in period, whatever those Reserve fellows went through—six weeks' or eight weeks' training. He was scared to death. And no commanding officer. We kept telephoning back, and they said, "You have a commanding officer, Admiral Holmes." Well, Admiral Holmes was Navy liaison in the torpedo and other research part—nothing to do with V-12 at all. And he said, "No, I haven't anything to do with it." We finally got a man by the name of [E. W.] Mantel, who came out here three days late, but he settled things in a hurry.

TERRALL: Did you try to fit the students into the regular Caltech curriculum?

JONES: We tried to, yes. The Navy had a very few courses. There was some strictly Navy stuff taught by the commanding officer. For the most part we tried to fit them in to just what we had been teaching—that's what the Navy wanted.

TERRALL: How did that work out? Were they able to do the work?

JONES: It wasn't as bad as you might have thought, in the end. Some of them got set back a year or two, but it wasn't all that bad, and the faculty wasn't quite as tough as they had been. It was wartime, after all. The thing to do was to get them out and get them doing something useful. So things were a little more lenient as far as standards of performance were concerned, but it was amazing how little trouble. . . . Our failure rate was higher, yes, but not all that much higher, as you might suppose.

TERRALL: What was the feeling among the civilian undergraduates toward the Navy students?

JONES: To the best of my recollection, there weren't more than about seventy-five or eighty of them [civilian undergraduates]. And they felt out of it, of course. For the most part, they were 4-F.

TERRALL: Wouldn't freshmen have been too young to have been in the service?

JONES: The freshmen, right. But the upperclassmen had to be pretty much 4F. No, if they were able-bodied they volunteered and got into the V-12 unit. After all, their way was paid. Everybody wanted to be in the V-12. Whether they wanted to or not, it was about the only thing to do. Better than sitting around and being drafted. So we had very few civilians, and it was kind of tough on them; they didn't get into the activities very much. Of course, the V-12 wanted all the athletic activities it could get—teams and everything. Boy, we had the finest football team Caltech ever had, for three years. We had two-thirds of the Stanford football team down there in the V-12 unit, and the rest of it was made up of Cal [UC Berkeley] and University of Washington football players. We won every game there for two years; nobody came anywhere near. Sixty-six to nothing over Occidental one year. [Laughter] Oh, those were great days as far as athletics were concerned.

TERRALL: That must have been quite a change for Caltech.

JONES: It was.

TERRALL: Were you involved in administering the V-12 thing?

JONES: Yes. I was the administrator for the V-12 program.

TERRALL: Was that because you were already registrar?

JONES: They thought the registrar was the logical place to go, so I was the administrator, and I also made some of the contracts that we had to make, not only with the V-12—that is, the feeding and housing contracts for the Air Force unit we had there, the meteorological people. In fact, more or less unknowingly, I rented Tournament Park to all three services for the same amount each. Somebody found out about it later, and said they were going to sue or something, but I believe we were entitled to fifty cents a head or something. I got fifty cents a head from all three services. As a matter of fact, they were all out there together at the same time. That contract-making was kind of fun, because Jim Page was chairman of the trustees at that time, and when I started making contracts—I don't know how I got into it—I said to Page, "Look here, Jim, I don't know anything about business, how to make contracts." He said, "Well, the last contract we had made by the business office we lost our shirts on, and you can't do any worse than that." And I said, "Well, all right, Jim. If I'm going to make a contract, I want a case of Scotch and a case of bourbon, and I'm not going to pay for it." And he said, "It'll be there tomorrow." So [in the meeting] they had a captain and a commander, and there were all sorts of flunkies around, and we sat there in a room and talked, and put things off and looked up information and so on until about four o'clock, and I said, "It's getting kind of late, let's go have a drink back at my house." Well, finally about eight o'clock that night, you made a darn good contract.

TERRALL: Who were you making a contract with?

JONES: The Navy. I just had the Navy feeding and housing and so on and so forth.

TERRALL: So you were providing them with the services, and you were working at how much they were going to have to pay.

JONES: How much they were going to pay, right.

TERRALL: Did this contract have to be reworked each year?

JONES: No. There was some revision, yes, where it didn't work out in this way or that, but it stayed pretty much the same.

TERRALL: You were also in the California State Guard at this time. What did that entail?

JONES: That took the place of the National Guard.

TERRALL: Was it like a reserve?

JONES: The National Guard had gone into active duty and were fighting somewhere, and so they had to have somebody in case there was a riot or whatever it was. And you went out and took riot training—mostly that. Guard duty and riot training. As a matter of fact, on Pearl Harbor night, the company that I was commanding took over Caltech. They were very much worried about the aeronautics lab and one or two of the other buildings, where the beginnings of the rocket research were going on, and they wanted those guarded.

TERRALL: They were worried that they might be targets, you mean?

JONES: Yes. Somebody might blow them up or whatever—some sabotage or damage done. It wasn't an easy place to guard, on account of those steam tunnels. Every building could be entered from underground through the steam tunnels.

TERRALL: So what did you do?

JONES: We had guards down there, and we changed them every hour and a half or two hours. You stand there in that steam tunnel—

TERRALL: It must be wicked.

JONES: Oh, boy, yes, it's like being in a Turkish bath.

TERRALL: With your uniform on.

JONES: Right. I'll never forget: About six o'clock the next morning, I went over to the Greasy Spoon [Chandler Dining Hall] to have a cup of coffee and get some scrambled eggs—I'd been up all night. They kept the Greasy open all night for us. And as I was going over, I heard a guard challenge over in front of the aeronautics building, and the word was passed, and the corporal of the guard came up, and I looked across to see what was going on, and there was a poor little Japanese graduate student—he'd woken up and gone to work. He hadn't even heard about Pearl Harbor, much less the idea that the Japanese had attacked. And this guard had him nailed right against the door. [Laughter] He said to his corporal, "Can I shoot him now, Corporal, can I shoot him now, or do I have to wait?" They were really eager. I got over there in a hurry. I said, "For gosh sake, take that gun away from him, or you *will* pull the trigger before you're through." It was a nervous moment. It was just lucky he didn't pull the trigger too, by mistake. We hadn't had much training with actual firing.

TERRALL: Was this guarding of the aeronautics building just for a short period?

JONES: Just two or three days. By that time, Caltech got regular professional guards. I don't know whether they went to Pinkerton or what. Some agency would supply them with guards.

TERRALL: So as long as the war research was going on, there were people there.

JONES: Right.

TERRALL: So, after the war, when DuBridge was brought in and Millikan retired [1945], were there obvious changes?

JONES: Not a great deal as far as the undergraduate area was concerned. The transition was very easy, on account of Earnest Watson. See, Earnest was really acting president. He didn't have any title, but he really was, for the last year or so, between the two. No, DuBridge fitted in beautifully. He had the kind of mind that saw immediately what went on, and there wasn't any need for any immediate change. And as far as the undergraduate work was concerned, I don't think he had any great plans. It was going very satisfactorily, and we had good students, and we were doing all right. I think he thought that we might step up our recruiting a little bit, which we did—and, like Millikan, he left us alone. I made a report to him once every year, a written report. He wanted more reporting from us directly to the trustees than Millikan ever had. I reported to the trustees somewhat during the V-12, because there were obviously things they needed to know, but not much aside from that. But DuBridge had me talk to the trustees, to know what we were doing, what was going on, particularly with admissions. They were always interested in that, obviously. So we had much more contact with the trustees under DuBridge than we did with Millikan. That was the biggest change.

TERRALL: What about more general atmosphere change on campus?

JONES: I wouldn't say that the change in administration had anything to do with that at all. Like anything else, things changed as they do anywhere over a period of time. One of the attitudes that changed in that period and made teaching, for me, much less interesting was that these fellows who came out of high school were now convinced that they ought to know something about the humanities, and instead of being there saying,

“All right, the heck with you,” and then finding out what they really wanted, they sat there almost pathetically: “Here I am, educate me.” It was a much more passive attitude.

TERRALL: And it was harder to get them to be actively interested?

JONES: No, not harder, they just did what they were told, like a good horse, you know.

TERRALL: This would be after the war that you noticed this?

JONES: That’s right. Except for the veterans. The veterans were our prize, really, as far as that was concerned. But from the time after the war, after the veterans got through, there wasn’t the same feeling about the humanities. They had been persuaded somehow or other, they didn’t know how, that it was like castor oil, it was good for you: “We don’t know why, but we’d better take it.” [Laughter] We didn’t have to work with them and convince them. For me, they were less interesting students.

TERRALL: How did the admissions work then change after the war? Did you have a lot more applicants?

JONES: Yes, the applications picked up. We had much wider interviews and more of them. During the war, we couldn’t interview at all, you see. We really didn’t have to, with the V-12, but we couldn’t get transportation and there was no way to do it. So that had dropped out entirely, and that was revived. We had gone to the College Boards shortly before the war, as I recall. The only change was, there were more applications and a little more recruiting. We *never* did, in my day, any very heavy recruiting. In a way, the interview trips were recruiting. Actually, the man who interviewed only saw the student who’d applied, or students from that place, but he saw the teachers.

TERRALL: And then the teachers would know about Caltech.

JONES: Right. They'd find out a great deal. You'd sit there and have a cup of coffee in the coffee shop down there, and ask about the boy, and in discussing him they'd say, "Well, how about it? Now, I have a student so-and-so and so-and-so. Would he be all right? What do you do in physics there? What really do you do about this and that?" They found out a lot. So in a way that was recruiting, indirectly. But I was about the only one who did any recruiting aside from that—in the fall, for example. Peter Miller did, to some extent. I did a good deal of it in the fall.

TERRALL: You mean going around to schools and talking to them?

JONES: Yes. I had a little different system from the other colleges. The schools got fed up with it after a while. People were coming in all the time and wanting to see your top ten students, you know, and they got pretty fed up with this. Well, I *never* went at it that way at all. I wrote them a letter and said, "Do you want a vocational guidance talk on science and engineering?"

"Why, sure, we think that would be a good thing for our boys."

So instead of seeing the top ten students, I talked to a whole class. Often I have talked from eight o'clock, the first class in the morning, until two in the afternoon without a break. I talked to every math class and every physics class that had met through the morning and afternoon. I never mentioned Caltech, but I was always introduced, of course, as being from there, and the students would come up afterward and ask me about Caltech. That was fine, but I had never mentioned it. And the schools would know that, and they figured I wasn't recruiting. Well, I certainly was—that was what I was doing it for. But they felt that those talks were valuable—who should go in and who should stay out.

TERRALL: It was probably a lot more helpful to the kids, too.

JONES: I think so.

TERRALL: Was there any discussion back in the fifties about admitting women?

JONES: Yes, yes, there was. Quite a bit. And as you know, the main reason was, particularly in graduate work, that you put all this time on the girl, and she went out, and maybe she worked at it a year or two after graduation, got married, had children, and never did anything more. She made no further contribution to science or engineering. That was the theory, anyway. And to some extent it's true, I guess. It was a small place, and we had a limited number of graduates, so we'd better take those who had a better chance of staying in the field and going on and doing something for the next twenty or thirty years after they graduate. And that was the attitude. Well, finally it became obvious that we should admit them [women] to graduate school. As you know, that came several years in advance of the undergraduates. So there was a faculty meeting, and it was pretty obvious by that time that it was going to be approved.

TERRALL: But were there people who were really vehemently against it?

JONES: Oh, yes, there were several—quite a number, as a matter of fact. But most of [the faculty] were pretty well convinced by then. There wasn't any real opposition at that faculty meeting. It had all been said before. I've forgotten who it was—I think it was [professor of physics William] Ralph Smythe, [though] I wouldn't swear to this, got up and made the motion that we admit women to the graduate school, provided they gave every promise of being unusually productive. And there was a dead silence. And I rose and asked if the gentleman would kindly define his terms. Well, I wish you could have heard the next half hour. Four hundred serious faculty people tried to decide how you define productivity in women. [Laughter] It was just fantastic. I never had a better time.

TERRALL: Did they then decide on that?

JONES: Oh, yes, it passed. They finally got a motion that satisfied everybody.

TERRALL: Was there a stipulation that the female graduate students had to be especially qualified?

JONES: As I recall—my memory may not be exactly right as far as what the actual motion was, but it certainly contained some phrase or other that they had to be people who we thought really would go on and make a life career out of it. Well, of course, the same thing should have been said about the men.

TERRALL: That's right. What about the decision to admit undergraduate women?

JONES: I made it clear—from that time on, I said, “You will admit women to the undergraduate school when I either die or retire, and not before.”

TERRALL: Why was that?

JONES: I had enough trouble. I didn't feel that any of us were capable of picking women students. I had enough trouble anyway. So I decided the heck with it. I wasn't prejudiced about it, I just didn't want any more bother. So they said, “All right, we'll wait for this crazy man to get out.” However, they took a minor revenge, because the last year I was there, they decided they were going to admit women the following fall [1970]. And they made me the chairman of the committee to decide what had to be done in order to admit them. Where we were going to house them, where we were going to feed them, what we were going to do about this and that. So I had to get to work on that, and I said, “All right, that's fine with me, I won't be here next year. You can have it.”

TERRALL: But in general—you made one comment about the quality of the student body in your classes having changed, in the sense that the attitude about English had changed.

JONES: The student body had changed. For the most part, they were no longer opposed to it. They had been convinced that it was a pretty good thing and they ought really to buckle down and get at it. I may have exaggerated when I said it made them less interesting, but in a way it did. Again, they were curious and you had good arguments and a good time, but you didn't have the challenge of having to overcome the objection

in the first place, and of seeing them turn around and change. So I think it was just a matter of being a little less sporting, if you want to put it that way.

TERRALL: Did you get a sense that there was a difference in the overall qualifications of the student body as time went on?

JONES: No, what you got was that there was perhaps a little more sophistication. Some of the early students were pretty rugged guys, rugged individualists and everything else. I would say that, on the whole, the later group was—"conformist" is not the right word, they never were conformists, but they were, I think, a little more housebroken. I don't know just how you'd want to say it. In the first place, many more of them were theoretical people, even the engineers. In the early days, engineering was a pretty practical matter. I don't mean there wasn't research in engineering; there was. But it was not expected so much that the engineers would go on in the same proportion and get graduate degrees, or that they would be the kind of engineer that was basically a fundamental research man. That had not yet spread into engineering to the same extent. I don't mean to say the idea wasn't there, but it hadn't taken hold to the same extent, and the students who went into engineering were not, to nearly the same extent, there because they wanted to be highly theoretical. They were there because they wanted to learn surveying and mechanics, to do something practical and go out and run factories, or whatever they did. Many of them did [fundamental research], of course, and many of them do today, but the courses were not nearly as theoretical as they are now. I don't know whether "theoretical" is the right word or not, but certainly the engineers did not go to the same extent into the physics behind their engineering—or the chemistry, for that matter—as they do today. Or the math.

TERRALL: So, in that sense, the type of student changed.

JONES: In that sense, yes. They were highly motivated, but certainly not all, by any means, of our admittees in the 1920s could have made it at Caltech in the 1950s. I would say maybe half of them would have fallen by the wayside. Maybe more than that. They

were bright in their own way, but they were not people who could have taken the modern math and physics that are being thrown at them now. Those were the two courses that would knock them out, I think.

TERRALL: Also, I think the high school preparation continually got better, so it's hard to judge.

JONES: This is true. It got much better as time went on.

TERRALL: I read something that you wrote in *Engineering and Science* back in 1949 about how Caltech has one of the lowest academic failure rates in the country. And then I happened to be looking at the *Bulletin* from the early seventies, and it had some figures about how 10 percent of the freshman class don't come back as sophomores, and 30 percent don't graduate. What happened in there?

JONES: I don't know. I wasn't there. I don't know what happened.

TERRALL: Now it's obvious that many people just can't do it.

JONES: Can't do it, or don't want to, after they find out what it's really like. I don't think. . . . You see, my figures were the failure rate. Now, the dropout, the man who shifted and decided he wanted to go to Stanford to study economics—of course he doesn't have to go to Stanford to study economics now. There's another thing, you see; we lost him, whereas we wouldn't now. But I wouldn't count him as a failure.

TERRALL: Were there many people who did transfer away from Caltech?

JONES: Well, there weren't many. I've forgotten my figures now on how many actually graduated. Not nearly as many as we wanted to graduate. We would admit 180 in those days—well, it got up to 210 or 215 by the time I left. And, as I recall, our senior graduation used to run about 125 or 130 when we were admitting 180. We figured that

we wasted our time on an awful lot of people. Now, not all those are failures. Some of them just transferred to other areas. And we were concerned about it. [Professor of English] Paul Eaton was especially concerned. He was dean of students [1953-1969] then. And he got up some figures on that, which I can't remember now. I do know that they looked kind of bad when you took the transfers as well as the failures. So then there was a good deal of agitation to enlarge our transfer admission—from the junior colleges, particularly—to fill up these ranks. But that was not so easy. We were beginning to outpace the junior colleges in the demands that would be made on them as juniors. However, most of them that we did take in did very well. What we needed was a recruiting program in the junior colleges, and we just didn't have it. I said I was not fitted to recruit in the junior colleges. By that time, they had gone way beyond any math or physics discussion that I could have with them as to whether it was good or bad for them to come there. I was not a mathematician or physicist. I couldn't hold my own there at all. So it had to be done by faculty members. And they had given enough time on their freshman interviews and one thing and another. The upper-class admissions committee never had the same enthusiasm for that kind of thing. Now, I understand, they have gone at it much more—oh, heavens alive, they've got a recruiting man in there, haven't they now? Yes. A high-school-relations fellow [Lee Browne] who does a lot of recruiting, I think. It seems to me I read that the other day. This is what they should have had a while ago. He doesn't do any teaching; he doesn't do anything but go out and recruit. All right, that's fine. I don't like it in a way, not being a member of the faculty and not teaching—again, you've got the administration versus faculty. But you can't do it anymore today; there isn't time.

TERRALL: Yes. To go back to the fifties, what effect did you notice at Caltech that the Army-McCarthy hearings and the general anti-Communist atmosphere in the country had?

JONES: It had a profound set of feelings of practically nausea at the whole thing. It was just a horror to people, you can imagine. No scientist would have any sympathy with a thing like that.

TERRALL: Was it much discussed or was it ignored?

JONES: It was not much discussed, but I wouldn't say it was ignored. People said, "This is just perfectly awful." Unless it happened to come up in connection with something that affected us—I don't recall that we sat down and cried over it at luncheon at the faculty club. But if the subject ever came up, why, everybody hated McCarthy of course. It was considered a very serious matter. And it did come home to us every so often, where we would find that someone was denied access to certain kinds of information on some hearsay business, that an agency that was giving some research money, scared of the McCarthy attitude, was trembling on the verge. "Oh, goodness me, this fellow talked to so-and-so, back a year ago last Christmas." There was some of that. And it created, of course, a tremendous amount of indignation. There wasn't much you could do about it. Government agencies were terrified. I think the worst case we had was that of [Hsue-shen] Tsien [current spelling: Qian Xuesen], the excellent aeronautical and jet propulsion engineer. Tsien was a very smart, very bright man. The whole McCarthy business stirred up against Tsien, who was a Chinese—this was after the Communist takeover, of course. He was no more a Communist than I am—he didn't want to go back to China—and they deported the man. They actually kicked him into the van, by the way, with a foot, like that—pushed him into the van and sent him off. And you can imagine what he felt like when he got back to China. Of course, he went to work for them. We lost one of our leading engineers as a result of that, and it was just perfectly stupid and outrageous. That episode, of course, created a tremendous furor.

TERRALL: People on campus were generally outraged about that?

JONES: Oh, gosh, yes, they certainly were. Everybody, whether they knew Tsien or not. Tsien was not the most agreeable character I ever ran across, but there was certainly no reason to suspect him of being a Communist just because he happened to be Chinese.

TERRALL: I guess not too many people at Caltech really felt threatened by the whole scare, though.

JONES: No, not that I felt or knew. No, I don't think so, directly. They had friends who were. There was a lot of indignation expressed over it. It just wasn't a daily topic of conversation; people weren't worried about it every day. But every so often, something would crop up about some friend of theirs who was in trouble, and there was a lot of indignation about it.

TERRALL: What about the work that you did with the College Entrance Examination Board?

JONES: There were two things. I was on the board of directors for three years, I guess, [and I was] on a number of College Board committees. And three or four of us were instrumental in starting a West Coast association of admissions officers. We met two or three times in San Francisco, two or three or four years in a row. The College Board had then opened a western regional office and wanted to formalize this more. Well, we didn't know whether we wanted to be formalized or not. And I think we finally got bribed into it. Our meetings would be paid for, and we'd get a free meal, and free board and lodging in San Francisco, where we met, instead of having to dig it out of our own budgets, so we finally decided, all right, we would now be the Western Regional Conference of the College Board.

TERRALL: What did that actually mean?

JONES: Well, it meant that there was a regional office here, that our needs—examination dates and types of examinations and so on—could be thrashed out here and then have somewhat more forceful influence back there. It didn't really mean a great deal. More than anything, it meant that we could thrash out our own problems here, which we could do without the College Board and had been doing as our own little association. And really we didn't gain much by it, except as I say, getting free transportation to meetings

and so on; we didn't gain an awful lot. Sure, we had information from the board officers who spoke at our meetings and said, "This is going on in the East," but most of us knew that anyway. I can't say that I think it was a very important endeavor. I think the association itself was, and its importance continued. Just because we were a member of the College Board didn't cut that off. We had a lot of things to thrash out here. Among others, this business of scholarship award, and how much we were going to go along with the College Scholarship Service and the way they awarded it, and so on. Were we going to be more consistent? How about recruiting? And how about a number of other things that interested us. We had a lot of arguments and a lot of good discussion on what we were doing and how we were doing it. So that part was very valuable.

TERRALL: But it wasn't involved in actually changing the tests themselves?

JONES: No. Well, we complained about them, and sometimes we got our complaints rectified. But no, I wouldn't say that it had a great deal to do with the general administration of the College Boards. It was important on the West Coast, and I think it set the pattern for some other regional groups that operated under the College Board. There were four of us who started that. I was president of it for two or three years, and a man from Pomona, and Rick Snyder from Stanford, and so on, took over the presidency. But that was the extent of my work with them, aside from some committees that met in the East that I went back for, and then being a trustee on the board.

TERRALL: What about the changes that took place in the Humanities Division over the years? By the sixties, it was really quite a different place.

JONES: Yes, very different. And the change I think I've already indicated. It changed from a service division to more and more of a—I don't know what you want to call it—a research and scholarly division. As I say, I think Rod Paul, if I remember correctly, was the first one who ever claimed to be a research man among all of us. I think he was probably the first—it may have been somebody else. But more and more under Hallett

Smith [chairman of the Division of Humanities and Social Sciences, 1949-1970], and later we began to get real scholars, and there we got built up. Look at the tremendous numbers we had. When I stopped teaching—well, Clinton had died by that time—but Bill Huse and Harvey Eagleson and George MacMinn and [Horace] Gilbert and [Ray] Untereiner—well, there certainly weren't more than a dozen of us in the Humanities Division. Now, there are—what is it?—fifty or sixty people in there? Something like that. That was your change. It became a major division instead of a service division.

TERRALL: Was that change resisted by the people who were in the division already, or was it just sort of accepted?

JONES: Well, I would have a hard time saying that, because, you see, when it really began to grow pretty fast, around '65 or '66, I was pretty much out of the division. I hadn't taught in the last four or five years I was there. My good friends were still there, but you don't get all the information unless you are sitting there in your office, and somebody in the office next to you comes in, and three or four of you are talking about something that really concerns you. Those were not my chief concerns at the time. So whether there was much opposition, I don't know, and I don't think there was. You see, there weren't many of the old guard there to oppose anything. Judy was dead. By the time this thing got under way, Eagleson and Huse were dead. I was as good as dead. There weren't very many of us of the old guard left to do any opposing. All the people who had been brought in in their place were all scholars and all eager for it. I think it was a fine thing; I think it's all right. I'm not sure that the boys get quite as much individual attention as we used to give them, but I don't know if that's much of a loss.

TERRALL: What about changes in the more social things we were talking about before, where you were saying that everybody knew everybody, and it was very common to have friendships with people in the physics division, for example. I think that changed somewhat.

JONES: I would think it had changed. I had been there so long, and the new people had come in so fast, that I lost track of a lot of them, yes. I knew all of the faculty at one time; I knew them fairly well. By the time I left, I don't suppose I knew half of them. I might know their faces and vaguely who they were, but I didn't really know them. How much does the Athenaeum hold at lunchtime? In the old days, it held all the faculty that wanted to eat lunch. Now it has spread out to the Greasy Spoon, and the dining rooms to the west there are always filled at lunch. We used to have about three faculty tables that we sat around—big round tables, and we sat at one one day and one another, and you were friends with everyone. Then it just got too big. And I think this had happened ten years before I retired. By the mid-fifties, it was getting beyond me, at least, to keep track of them.

TERRALL: So the people you would know would just naturally be the people who were in the same building with you.

JONES: Well, yes, but some of the people you had known a long time were still there, before the days when this happened. And there were new people you came to know pretty well. But more and more, there came to be a table that you usually sat at—and at lunch was where you really had your social contacts, of course—and pretty much the same table. You might sit at one other or so. And there was a physics table and a chemistry table and a geology table, and there wasn't nearly as much mixing. Whether that is still true, I don't know.

TERRALL: But you think it was really a function of the size change?

JONES: Oh, yes, definitely. I don't believe there was any change in attitude of not wanting to know people in other divisions. But I imagine that the humanities people there now have a lot of friends and know a lot of people in the other divisions; they always did. But not the same proportion of the other divisions. They can't; there are just too many of them. I suppose—I don't know. You're talking to a man who has been out

of there for nearly ten years, you know. Since I've been up here, I haven't been close to it in any way, shape, or form, so I really don't know what is going on there now.

TERRALL: So you actually stopped teaching back in the early sixties, right?

JONES: Yes, it must have been about—I don't remember now, '63 or '64. I think the last four years I was there, I didn't teach.

TERRALL: That was a question of time?

JONES: No, it was a question of age, I think, as much as anything. I didn't have the energy anymore. We were doing more interviewing and more recruiting. I was away more. It isn't good to teach if you are going to be away that much. I was away in the fall for three or four weeks, and away in the spring for that length of time. Going back to meetings and so on, College Board meetings. You shouldn't teach if you're going to be away that much.

TERRALL: I seem to be at the end of my notes here.

JONES: Well, it has been pretty exhaustive, I would say.

TERRALL: Have I forgotten to ask you anything?

JONES: I think we've covered pretty nearly everything.

### **Begin Tape 2, Side 1**

[After the first tape was finished, it was decided to continue with some anecdotes. Fritz Zwicky's words were recounted in a Swiss accent, difficult to put down on paper.]

JONES: One of the famous people on the faculty was Fritz Zwicky. You've probably heard of him. His fame must have come down. He was a wild Swiss. And a very controversial figure, a very definite figure. And very amusing. Well, I came into the faculty club one day—this was back in the early fifties, I would guess—and I sat down at the table where I usually sat, a big round table. There were more foreigners, it seemed to me, in those days on the faculty than there were later. It must have been longer ago than I thought. It must have been before the war. It was a rather dull lunch, I thought, and I don't like a dull lunch, so I threw a remark out into the blue to see what would happen. I said, "You know, all foreigners are rotten automobile drivers." And I sat back to see what would happen. Well, three or four mouths opened around the table, and Zwicky got his open first—he usually did. He turned on me and he said, "Jones, that is the kind of idiotic remark you have been making around here now for twenty years. Justify such a stupid statement." I said, "Well, how about [German physicist Josef] Mattauch. He killed himself up here on the Ridge [Castaic-Tejon] Route, coming around those curves picking wildflowers off the side as he drove along."

"Mattauch, Mattauch, he was a congenital idiot before his grandmother was born. Leave him out."

Well, I mentioned somebody else; he was a congenital idiot even further back. And I said, "All right, what about [Paul] Epstein."

"Oh, my God! Eppy! Must you bring Eppy into the argument?"

I said, "Yes."

"Then I am lost. Only one thing is making me believe in Divine Providence, and that is the conjunction of Eppy and the automobile lasting for more than forty seconds. This cannot possibly happen by chance, only by Divine interference. Am I ever telling you about the time Eppy and Mattauch, before he killed himself, before you ask a stupid question, is driving back from Azusa in the old days when the road is winding?"

And I said, "No, you didn't tell me that." So Fritz brought his fist down on the table and broke a couple of coffee cups and said, "Shut up, everybody! I am talking." So they shut up. "In the old days, when the road is winding, we is driving back in the dark, in this ancient Buick Eppy has. This Buick comes from the tomb of Tutankhamen. In about the Middle Ages is the top disintegrating, so there is no more top. Comes a big

wind blows across, blows the glasses off Eppy, smashing on the road. Well, you know Eppy. He sees about eighty feet with the glasses on, and not a damn thing with the glasses off. So I am saying, 'Eppy, better let me drive.' Very proud fellow, Eppy. He says, 'No, it is not necessary.' I say, 'Eppy, you can see nothing.' Eppy says, 'That is a vast exaggeration, I can see the tail light on the car ahead. And when this tail light has an apparent luminosity of a star of the fourth magnitude, I am about two hundred and fifty feet behind, too far away. When it has an apparent luminosity of a star of the second magnitude, I am about thirty feet behind, too close. A star of the third magnitude I must be keeping this tail light. Shut up, I'll do the calculations.'

"Jones, do you know how to calculate luminosities? Differential equations, covering two blackboards. Eppy is doing it all in the head. Marvelous mathematician. Put the foot on the brake, on the accelerator, on the brake, he is keeping just about the right distance from behind. All of a sudden, what do you think is happening? The apparent luminosity of that tail light disappears to a factor zero. I am saying, 'Eppy, Eppy, what are you going to do?' Eppy says, 'Sh-h-h.' the car is going around the corner. Eppy is counting, one-two-three-four, and then pulls the steering wheel. And we bump over a little low stone wall into an orange grove. So we all get out and Eppy says, 'Gentlemen,' Eppy bows from the waist—but that is not strictly true, Eppy's got no waist, but he bows, and he says, 'Gentlemen, gentlemen, not since I was in the *Gymnasium* have I made such a silly mathematical miscalculation.' And I am saying, 'Eppy, never mind the miscalculation. How do we get out of the orange grove?' Eppy says, 'Elementary, gentlemen, elementary. Any child knows that the square of the hypotenuse is equal to the sum of the squares of the two sides. The road is turning ninety degrees. When I am pulling the steering wheel, I am about exactly eighteen feet too far. On the square of this hypotenuse, I must now go exactly twenty-nine feet and come out on a thirty-five-degree angle on the highway and there I will be.' And I am saying, 'Eppy, that is all very well, but there are orange trees in the way.' Eppy says, 'Oh, that complicates the situation. How many orange trees?' I am saying, 'Four.' 'How big is an orange tree?' I am saying, 'Well, twelve foot in diameter, six-foot radius.' 'Hmmm, off the hypotenuse I must take one-two-three-four-, six-foot radius off. Elementary, gentlemen, elementary. All calculated. Get in, get in.' So we get in. Eppy starts the

engine, and we go. Around the first orange tree, the second, the third, fourth. Not touching a leaf, all by mathematics, Eppy sees nothing. And we come on the highway precisely at the right angle; marvelous mathematician, Eppy. Only one thing, one, he does not take into consideration in the calculation. At the same time and the same place where we come on the highway is also another car coming, and what a hell of a mess that was.”

So that was what Caltech was like in the old days. It was quite a place. Zwicky came the same year I did. He and I were coming back from the old faculty club, which was up approximately where the Athenaeum tennis courts are, and the rest was all orange groves, east of Throop Hall. And very muddy it was, going through that orange grove on rainy days—we had rain in those days. We were coming back from the old faculty club, back to Throop, and all of a sudden Fritz turned to me and said, “Jones, am I ever telling you why I am liking you?” And I said, “No, I didn’t know that you did.”

“Yes, I must tell you, must. All my life I’m looking for perfection. Everywhere I go, looking for the perfect and not finding it. And then thinking, ‘Ah, in science, there I will find it, because either you are right or you are wrong, and if you are wrong, God Almighty strikes you down, so you must be perfect.’ Oh, my God, you know what I am finding in science? Of all the hypocrites stewing in the juices of envy until the stench they raise reaches the nostrils of God Almighty in the cosmos, the scientist is the first. And then I meet you. At last I am meeting perfection. So I am liking you.”

“Well,” I said, “Fritz, that is very nice. I appreciate the compliment, but just in what way am I so perfect?”

“Jones, you are absolutely the most perfect goddamn idiot I have ever met.”

He meant it, too. He never said anything he didn’t mean. Oh, he was a great character. We had some other characters there, too. But he was the best.

**L. WINCHESTER JONES****SESSION 2****April 6, 1978****Begin Tape 3, Side 1**

[This session is a series of anecdotes. Tape recorder was turned off between stories.]

JONES: Sometime after World War II, I don't remember just how long—what was going on down at White Sands [Proving Ground] at that particular time, I don't know, but it had something to do with attempting to send missiles or something out of the Earth's gravitational field. And Zwicky called me up one day, and told me that he had been asked to go down there to give a paper on a certain idea of his that he had roughly outlined, I guess in a seminar. I think the title of it was "Cascading Pressures," but I can't be certain of that. And he asked me whether I thought it was worthwhile, and I said I didn't know whether it was worthwhile or not. I said it sounded like a fairly important symposium they were having down there. And he said, "Yes, but all these stinking hypocrites will be there, they won't know what I am talking about."

"Well," I said, "you ought to go down and make the effort to make them understand."

So he finally agreed to go. And a few days later I had another call from him. He had returned, and his voice was very sad indeed. He said, "Jones, I am now back and all is lost, all is now lost."

"Well," I said, "Fritz, I have heard you in a pessimistic mood before. Better come up and have a drink and tell me about it."

So that evening he came up and we sat around and had a little wine, and I said, "Now, tell me what happened."

"Well, I'm getting there, in the symposium I am giving this paper. What do you think is happening? All of these people sitting around, these hypocrites and stupid people. In the paper I am giving, I try in very simple language so that those elementary intelligences can understand. There is old man Millikan, young man [Clark] Millikan, [Frank] Malina, I don't remember who all, but I give a pretty good explanation. And

what do you think is happening? They all cheer and say, ‘Marvelous, marvelous. This we must try. Give this man telescopes, rockets, and let us observe what is going on. We must try this instantly.’ All is now lost.”

“Well,” I said, “Zwicky, I always thought you were crazy, and now I know it. For the first time in a long while somebody agrees with you right off the bat, and you tell me all is lost.”

He looked up at me with this impatient expression, and said, “Jones, can you not understand, even with that pea brain you’ve got, can you not understand that when those people agree with me, I must be wrong? And when I am wrong, the brain is gone, I am senile. All is lost.”

I don’t think it is something you ought to publish, but Dr. Millikan was an extraordinary man as everybody knows—that’s an understatement, of course. But as he grew older, toward the end of his career there at Caltech, he did slow down mentally in some respects. And my wife was, at that time, I think, program chairman of the Women’s Club. And the program committee wanted Dr. Millikan to speak at one of their meetings, and my wife asked him and he agreed. Well, they had a dinner first—it was an evening meeting, I presume—they had dinner, and during dinner Helen sat next to him, of course, as chairman of the committee, and Dr. Millikan wasn’t making much sense. He wasn’t finishing sentences. He’d forget what he had started with and reach for the words, and he said once or twice, “What was that I was talking about?” And she got more and more nervous. What was going to happen when he got up on the platform? Because this was obviously a full meeting, with Dr. Millikan speaking. There were a number of guests and everyone else, and she was terribly nervous. What would she do if he simply couldn’t get through the speech? Now, she is not a woman who is fond of speaking herself or likes to be in that position. It would be pretty embarrassing for her. Anyway, she introduced him, and he got up, put his hands on the lectern, and he rose a little bit on his toes, which was a characteristic gesture when he was speaking, and from then on he was absolutely fluent and cogent and coherent, right straight through to the end. The old fire horse got his hands on that lectern—I think I mixed my metaphors somewhere there—anyway, he just went right off. He gave a beautiful speech—but before and afterward, my wife said, he was a little incoherent.

TERRALL: She must have been relieved.

JONES: Oh, yes! But he had a wonderful control of language and a wonderful enthusiasm when he spoke. Get him near a lectern, he could really come through.

When Einstein came to Caltech the first year there were two things he wanted to see. One was the desert—he had never seen a desert—and the other was Hollywood. Obviously, he had never seen Hollywood. Well, the first of these two desires was fulfilled one night when he and Mattauch—I think Zwicky was driving—and somebody else went over Los Feliz Boulevard—it was long before the Hollywood Freeway was there—he went over Los Feliz Boulevard, which was just lined with great bright signboards, enormous things. And Zwicky was driving and he was pointing these out, and saying, “This is ugly. Why are you putting up these big signboards telling *me* what kind of garters I should wear, and corsets for the women. I cannot understand.” And in pointing these out, he began weaving a little bit along the road, one side to the other a bit. And one of these real old, tough cops—nowadays they are coolly polite; in those days, they weren’t so polite—came along on a motorcycle and drew him over to the side of the road and thought he had a carload of drunks. Well, he became convinced later that he had a carload of idiots. In the first place, when he came up to the side and said, “What the hell do you think you are doing?” Zwicky said, “I am pointing out what you should remedy. Look.” [Laughter] The cop hadn’t heard that before. But anyway, he became convinced they weren’t drunk, but just stupid or a lot of idiots. He said, “Go on, but for God’s sake watch the road.” At that moment, Einstein put his head out of the back window—he [the cop] hadn’t seen Einstein before, and he put that little woolly head of his out, and in that sweet voice of his said, “Officer, officer, I do not understand. Why should we watch the road? There is so little interesting there.” And that was the end of the cop. He just stood with his mouth open, and they drove on. [Laughter] I bet he had a story to tell when he got back to headquarters that night.

On the other occasion, they took him [Einstein] out on the desert. And I was driving that time. I cannot remember—Epstein, I know, was along, but I can’t remember who else. There were at least four of us, maybe five. And I was driving, because none of

the rest of them had driven sand roads before. You can't see the desert unless you get off into the canyons. And I knew one place that might be pretty good. It was getting a little late in the year and kind of warm, but we got to the end of the paving and started out on the sand road. And you know what you do there, you let most of the air out of the tires, a good deal of it, so you don't skitter off. You want to stay in the ruts; if you ever get out of the ruts, you're in a bad way. So we drove about six or seven miles, as I remember, up this canyon, a beautiful canyon. A lot of typical desert flora, and views, rocks—beautiful rocks and things. And Einstein was quite impressed with the whole thing. So we had lunch up there, and shortly after lunch some discussion started that was way beyond me. It had to do with the redshift. I still don't know what the redshift is—not much, anyway. And so I finally said, “Boy, we'd better get started back. We want to get back on the paving before dark.” And so back we went. And we got back to the paving, and I said, “All right, boys, get out and pump up the tires. I've been doing all the driving all this time. Get the tires pumped up.” So everybody got out. Well, there had been a tremendous argument going on in the backseat on this same subject, all in German. I hadn't understood a word of it. I had concentrated the whole time in keeping in those ruts, and I wasn't paying attention to anybody. So I looked around and, by golly, Einstein wasn't there. He simply wasn't there. He wasn't in the car, he wasn't outside. I said, “Where in the world is Einstein?”

“Einstein? Oh, we must have left him.”

Well, I was scared to death. I said, “We've killed the greatest scientist; he'll die of thirst up here.” I was afraid he'd wander out of the canyon, you see, trying to find his way. It was pretty hot. And we'd never find him. He'd get up in one of those blind canyons, you'd never find him. So back we went, as fast as I could drive. And there was Einstein, happy as a clam. He was arguing with a barrel cactus. Now, a barrel cactus looks very much like Epstein. It's about the same shape, and has a sort of gray fuzzy things all around it, you know, and Epstein in those days had a gray kind of fuzzy beard, and Einstein was pretty nearsighted. And he was arguing with this barrel cactus. I went up to him and I said, “Look, Einstein, we left you here. You'd better come along.” He said, “Oh, Jones. Are we going? At last, after a long argument, I have convinced Eppy on the redshift. He is convinced. For a half an hour he says nothing. There is no more

argument. We go now.” He had just stayed where we left him and he was arguing with the barrel cactus, about the redshift, I think it was.

Many scientists, as you very well know, have a difficult time explaining to laymen what in the world they’re doing, about ideas that may be interesting to the laymen. And one of the reasons so many of them have difficulty is that they are simply temperamentally incapable of using an illustration, a simile, or a metaphor that isn’t strictly true. They just can’t do it. It goes against the grain too much. And the result is that they can’t, in many cases, speak English. They have to speak mathematics, which the laymen can’t follow. And a very good illustration of this, I think, was one lunch shortly after the bomb was dropped on Hiroshima. It was obvious that some wonderful or horrible or extraordinary thing had occurred. So I came into lunch, and I sat down there, and I said to the table in general—there were two or three physicists there—I said, “All right, boys, now this thing has been dropped, and I presume it is no longer quite such a secret. What in the world went on there? How could that whole place be wiped out like that in no time at all?” Earnest Watson said, “Well, I’ll tell you. It is something like this. You have tremendous forces within the atom and you must multiply this by billions and billions of atoms, of course, to realize the total potential. It is as though in some of the elements, those forces are held together as though they were hooked like this,” and he put his fingers together hooked into each other this way, straining apart like that, “and they’re held together by tremendous forces, and there are of course tremendous forces in the opposite direction, and they balance each other. Now in some elements, those hooks are a little less firmly fastened than in others,” and he slid his fingers toward the fingertips this way, and he said, “Now they just sort of barely hang on, not nearly as solidly as others. And uranium-238 is one of those, and if you do certain things with it, you can knock those hooks loose. That’s the first part of the problem that you must solve, and the next one, of course, is how to make one atom do that to the next atom and the chain reaction, that was one of the most difficult parts of all.” Well, there was one physicist across the table who kept opening his mouth, and trying to break in, and he finally said, “Now wait a minute, wait a minute, Earnest, you know very well there aren’t any hooks in those atoms.” Now, you see, it just went against the grain, he couldn’t stand that illustration.

On the other hand, there were a number of them who were just excellent at finding ways of telling you things which not only were plain and understandable but also picturesque enough so that you would remember them. George Beadle was one of those, chairman [1946-1961] of the Biology Division at that time. Well, I was going out on what were really recruiting expeditions for freshmen, but I had disguised them, and it turned out to work very well, by writing to high schools and saying, "Do you want a lecture on engineering and science as careers, and who should or should not go into these careers?" I found I was accepted pretty well that way, whereas ordinary recruiters were told, "Well, you can't interrupt the classes." I used to talk to math and physics classes all day, start with the eight o'clock class and run through the day. They thought this stuff was fine. It really wasn't very fine, but fortunately the teachers weren't very bright, so they didn't know that. Anyway, I needed illustrations of certain aspects that were interesting. I went to George and said, "All right, what have we got to tell them about biology?" And he said, "I think you might tell them about sulfanilamide and how it works. It's a very interesting subject, because it illustrates how we can create a substance that doesn't exist in nature, that does what we want it to do." He said, "It works this way. Gangrene is caused by a bacteria called *Clostridium* and these *Clostridii* exist everywhere and they get into your system when you have a wound of some kind or another. They don't like the air, so they hide away down in a deep wound, usually. If you just make a superficial cut it doesn't usually involve it. They hide away down in there—they are in the bloodstream by now—and they secrete a large protein molecule. This protein molecule is a very ugly molecule—it has great big teeth and its ears stick out, and it really is very, very fierce indeed. A nasty kind of a fellow. And it looks all around and it sees a molecule of a certain vitamin that we all have in our systems. It's not one that you take in a pill, but you have it there or you wouldn't be alive, and it has a great deal to do with the healing process. And this big protein molecule that has been secreted looks at this beautiful little blue-eyed, blonde vitamin molecule, and it really is very pretty indeed. And the big ugly protein molecule is attracted immediately, and rushes over and grabs this beautiful little girl, and out of this union there is secreted an enzyme. Only when that enzyme is present can the original *Clostridium* breed—only in that environment. So," he says, "nature can be enormously complicated, and these poor souls have an awful time

carrying on the species, because they have to go through all these motions. But once they get in you, they can do this very successfully, and they will, of course, eventually kill off all the vitamin molecules and the flesh doesn't heal, and it mortifies, and you're finished. So now what do we do to overcome this? Well, we take a look at that beautiful little blue-eyed blonde, and we say, 'All right, now, suppose we change her just a little bit. Maybe we'll make one of her eyes black. I don't think the protein molecule will recognize that, or think there is anything different there.' So we find out that this molecule is made up of certain atoms"—and he told me what they were, but I've forgotten long since. I think, though this may be totally incorrect, that it was an atom of oxygen which they removed and for which they substituted an atom of sulfur. So that was what we call sulfanilamide. It had all the properties of the vitamin except for the fact that it had an atom of sulfur in place of some other atom—oxygen, or whatever it was. "Now," he said, "when we do that, and we sprinkle the wound with sulfanilamide, there are an awful lot of molecules of sulfanilamide in there. And so the *Clostridium* gets in there and secretes its big protein molecule, which looks all around and sees this beautiful girl over there and doesn't look carefully at her eyes, doesn't see that they are not the same color. So he grabs ahold of her, and says, 'Ho-ho, here's my gal.' And nothing happens. Nothing happens. The union is sterile. The sulfur has neutralized the whole thing, so no enzyme is secreted, and the *Clostridium* is terribly disappointed, and sits there and has no children or grandchildren or great-grandchildren, and dies at a lonely old age." Now, you know, that is something you'll never forget. If you can tell it to people, it holds their interest and it amuses them and so on. George was a master at that sort of thing. As Earnest Watson was, too. Earnest knew how to explain things to people, as I told you.

There was a professor—I can't remember where he came from, but he retired from wherever it was and came to Caltech. This must have been in the early fifties, I suppose, or late forties. He came to Caltech, and he was, I think, a paleontologist. Delightful man, white hair, white mustache, a little white goatee; he looked very serious, very solemn. He looked more or less like a serious scholar. But you had to be careful; he'd pull your leg very easily and very skillfully. Well, there were Associates' dinners in those days—and I presume there still are Associates' dinners—and so when there were

Associates' dinners, the powers that be would ask a certain number of faculty members to come and be nice to the Associates, and hope that everybody got along happily and it would be profitable. So Helen and I were at one of these dinners, and we were seated at round tables of six or eight people. And I was at this table and this professor was there—he was not married—and the rest were Associates. And sitting next to him was one of the stupidest women I've ever had the ill fate to have to entertain during a dinner party. She was really kind of stupid. And she had been plying him with questions, too, about what he did, and she was obviously not able to take in anything he had to say. And she said to him, "Well, I've often wondered why there are so many varieties of animals. It seems like such an uneconomical thing to create so many varieties. Why does the world need all those creatures?" And he said, "Well, Madam, I can tell you something of that. They are not actually created in the way that perhaps you are thinking of. They become that way; they change because of the way in which they feed. Now, you know, food is one of the necessities of life. You have to eat or you don't get anywhere at all. And if you have to eat under certain conditions, you have to adapt to those conditions. Now," he said, "let us take as an example the giraffe. Now, what does the giraffe look like? Well, let me say first, Madam, that in general, nature tends to keep quadrupeds—that is, four-legged creatures—with their spines on an even keel. Man and some apes, yes, they stand upright, but most quadrupeds' spines stay on an even keel. But you will notice that the giraffe is not built that way, because his front legs are very, very long and his hind legs are not nearly as long, so he's on a slant, and he has a very, very long neck. Now why should he have developed in that particular way? Where does he live? He lives, as you know, on the plains of Africa. Were they always plains? Not at all, Madam, not at all. At one time, those plains were quite mountainous. And the giraffe always got in the habit of feeding downhill. Now when you feed downhill, Madam, if your front legs are very, very long and your hind legs are awfully short, your spine is horizontal. So, that is one accomplishment of nature. And the other was that, of course, he was always reaching downhill for his food and was stretching his neck further and further, so his neck got very, very long in order to encompass the whole slope of the hill. And this is how he got that way."

"Why," she said, "I never thought of that."

He said, “No, Madam, I don’t suppose you ever did. Now, let us take another illustration. Take the kangaroo. Now, the kangaroo is exactly the opposite. His hind legs are very very long, his front legs are very very short, and his neck is very stubby and thick. The kangaroo lives on the plains of Australia. Were they always plains? Not at all, Madam, not at all. At one time they, too, were mountains. And before the mountains had eroded away, the kangaroo always got in the habit of feeding uphill. And so, his hind legs being very, very long and his front legs very, very short, his spine stayed horizontal, and he was always feeding into the hillside like this, so his neck got further and further back and then very thick and stubby. And now finally, Madam, let us take the California buzzard. You are certainly familiar with the California buzzard, a great black bird that flies round and round and round. Now, why does the buzzard always fly round and round? He could just as well fly over here looking for his food and back over this way, zig-zag, and it might even be more efficient. Where does the buzzard live? Mostly out on the desert and plains. Was that always flat land there? No, not at all. At one time they, too, were mountains. Now, the buzzard, when there were mountains, had to fly round in order to see what food was on the other side. If he had stayed on one side, he might have starved to death. But he had to go round and round to make sure he wasn’t missing anything. So around he went, Madam, and do you know what happened? That mountain eroded right out from under him, and there he is still flying round and round and round.”

**End of Interview**