THEODORE C. COMBS
(1906-1999)

INTERVIEWED BY
CAROL BUGÉ

December 8, 11, and 17, 1987

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Subject area

Administration, Gnome Club, alumni, trustees

Abstract

An interview in three sessions in December 1987 with Theodore C. Combs, Caltech BS 1927 and former secretary of Caltech's Board of Trustees. He recalls his undergraduate years at Caltech, his work as a civil engineer in Upland, Long Beach, and in the timber industry, and his wartime work for the 9th Corps Area in California and in purchases and contracts for the under-secretary of war in Washington, DC.

He retired from the timber industry and returned to Caltech in the mid-1960s, initially working in corporate relations and later as secretary of the Board of Trustees (1968-1973). He comments on the contributions of various trustees and board chairmen over the years and discusses his longtime involvement with the Alumni Association, the Gnome Club, the Caltech Y, the Industrial Relations Center, and the Caltech Associates.

Administrative information

Access

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CALIFORNIA INSTITUTE OF TECHNOLOGY ARCHIVES

ORAL HISTORY PROJECT

INTERVIEW WITH THEODORE C. COMBS

BY CAROL BUGÉ

PASADENA, CALIFORNIA

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ORAL HISTORY PROJECT

Interview with Theodore C. Combs **by Carol Bugé**

Pasadena, California

Session 1	**December 8, 1987**
Session 2	**December 11, 1987**
Session 3	**December 17, 1987**

Begin Tape 1, Side 1

BUGÉ: Would you start with your childhood and early education?

COMBS: I was born in Britt, Iowa. My parents moved to Colorado before I was a year old, and I grew up there on a farm. My father homesteaded on the South Platte River, very near where Michener located the hypothetical town of Centennial. And that was quite an experience. That's where I first saw Halley's Comet, in 1910. My first school was a one-room school, all eight grades. As it turned out, instead of studying when I should have been, I was listening to the big kids recite. So when we moved into town, and we had one class per classroom, I had to advance a grade. I skipped either the fourth or the fifth grade. My parents wouldn't let me stay out a year; they were afraid I wouldn't get back. As a consequence, when I graduated from college, I was twenty, which I considered to be a handicap at that time. I do not recommend it to anybody. I think the average now is twenty-two, twenty-three.

I had intended in high school to go to the University of Colorado and study medicine; I'd always wanted to be a doctor. My parents moved to California and I graduated from Chaffey Union High School in Ontario. As it turned out, I had very good grades. During the summer of 1923, one of my buddies said, "I'm going into Caltech and see if I can be registered." I hadn't even heard of Caltech at that time. He said, "Well, why don't you ride in on the back of my motorcycle." So we did. And we marched in and we found Throop Hall, which wasn't hard to find in those days—they had very few buildings—and were looking around, wondering where to go. A gentleman walked through in a hurry and introduced himself as Professor [Harry C.] Van Buskirk; he was the registrar at that time. We told him our interest and he said, "Well, have you

got your grades with you?" I handed him my card. He took one glance at it and said, "You'll do. See you in September." That was my entrance exam.

I did arrive in September; my buddy unfortunately did not. We lived very frugally in those days. I found a room in the back of the garage of Professor [Clyde] Wolfe on [401 So.] Chester, which is underneath one of our laboratories today. It was all of maybe eight by ten feet, had a little kitchenette and a bed and so on; the bathroom was in the house. My stipend was to do some gardening during the month.

BUGÉ: You didn't think about living in the dorm?

COMBS: Our dorm at that time was a leftover from World War I; it was very limited. Many of the students lived off campus, and a number of them lived in fraternity houses, because we had locals at that time.

About two days after registration, we were given examinations, primarily for the purpose of putting us in sections. The A and B sections were the advanced sections, and the others were miscellaneous. I don't know how, but I managed to land in B section, along with Carl Anderson [then an undergraduate; later, professor of physics and 1936 Nobel laureate—ed.]. I very quickly found out, though, that the other students had had better preparation than I had, despite my grades. The advantage that they had, in the schools they had gone to and the type of teaching they had, put them way ahead. As a result, I worked very hard to keep up.

BUGÉ: Had you had much science background?

COMBS: Science really was my best subject—science and math, and I gravitated in that direction. I think that even accounts for my interest in medicine in the early days. Competition wasn't the same then as it certainly is today. Many of us engaged in activities, perhaps more than we do today, be it music or athletics or student government, YMCA, or whatever. We did get into a lot of activities.

One of our first class activities was to clean off the T on Mount Lowe. I guess at least half of the class went up there and cleaned off the T, got it looking good.

BUGÉ: Do you know when the T was first cleared?

COMBS: I do not. I would surmise it must have been about 1920. I remember Jack Kendall telling me that he put a surveyor's transit on one of the balconies on the aft end of Throop Hall—a fire escape balcony—and positioned it so that he could give signals to the crew staking out the T on Mount Lowe. I don't know the date; I would guess probably 1919, 1920. There was a forest fire at Mount Wilson in Chilao that fall. It was a very serious fire; there are still remnants of it there today. Although the county fire department emptied the jails and took inmates up there, and conscripted all the help they could get, they came to Caltech—and I imagine other universities—and asked for volunteers. Several of us went up there. It was a little tough. We worked seventy-two hours nonstop, didn't dare go to sleep, because there were winds and falling trees and we couldn't find a safe place. Our kitchen was wiped out. Finally we were told, "Well, you college students, you'll be the first to go home." They told us that there was a bus from the top of Mount Wilson back to Pasadena at such-and-such an hour. We looked at our watches and knew the mileage and figured we'd have to average better than five miles an hour to get up to the top of Mount Wilson. And we made it. [Laughter] You know the old adages, walk a hundred, run a hundred, walk a hundred, run a hundred? We did. We drank practically all the water on Mount Wilson before we got back. [Laughter] But being young, we recuperated.

I signed up for chemistry at Caltech. Thanks to an orientation course given by Dr. Macarthur, who was the dean of freshman at that time—John R. Macarthur, who was everybody's favorite—I soon found that engineering was probably the field I should pursue, which I did; I transferred over. Our brand new prof in chemistry lab, down in the basement of Gates laboratory, was Linus Pauling. He had just come, I think, from Oregon [State College]. My pal Henry Gunning and I were involved in planning the first freshman dance. In those days, we had to have what we called a chaperone. So we asked the Paulings—Linus and his wife—to be our chaperones. They did chaperone, and they were very personable and very friendly.

Student activities. I went out for track—first in cross-country, then in sprinting. By my junior year, we had a good track team and we won the conference.

BUGÉ: What other schools were in the conference?

COMBS: Pomona, Occidental, Redlands, UCLA—that was the little campus on North Vermont in Los Angeles—and Whittier. I think that was it. We managed to win the conference, and we also

went to Fresno for the Raisin Day Relay Carnival. I mention that, because we won everything in sight and came home loaded with medals and cups. We were just delighted. [Laughter]

BUGÉ: Who was the coach?

COMBS: Fox Stanton. He's the one for whom the track is currently named. The track, up until this year, was named for Charley [Charles W.] Paddock, who trained on our field. There's a plaque there indicating that in earlier days—I would say perhaps 1921—he set six world records, all in one day, on our track. Charley was very popular with the students. He had won medals in the 1920 Olympics and was training with a man named [Loren] Murchison, who was a sprinter, to take a trip around the world, to encourage people in various countries in athletics and competing. I could keep ahead of Charley for perhaps twenty yards; then he took off. That stride and that strength of his, nobody could touch him at all. He was wonderful. And then his habit of the great leap for the tape. I always wondered whether he could leap faster than he could run. [Laughter]

In my sophomore year, I was invited to join the Gnome Club. The fraternities had get-acquainted sessions—rushing. I liked everything I heard about the Gnome Club and was pleased to get an invitation to join. Their house was then on South Madison, at Del Mar. In those days, we mostly walked to campus. There were very few automobiles parked around the fraternity house. We walked across Lake Avenue, which then had the red cars, the Pacific Electric, running up and down. Lake Avenue had no commercial interests, except at the corner of California; they were all residences. The Pharaoh's house was probably where Bullock's is now. The Gnome Club, like the other fraternities, was particularly interested in getting the most out of its members, be it academically or in athletic activities. We were fortunate in having two Heilbron brothers living in the house—Carl and Bob. Bob [Robert F.], as I'm sure you know, won a Rhodes Scholarship and went to Oxford after he left Caltech, but both he and Carl were absolutely tops. They'd wander from room to room during the night, challenging themselves by looking at subjects that they had never studied. We'd be sitting there stumped, trying to figure a problem. They'd help us solve it; they were that adept. So in that way, we were fortunate.

BUGÉ: What attracted you to the Gnome Club?

COMBS: I liked their achievements; I liked their persons. Even now, some of my closest friends are members of the Gnome Club.

BUGÉ: I was looking at your book [*The Gnome Club, Throop and Caltech,* 1986] just before starting the interview. And it was obvious that there's a great deal of affection, and it's an enduring affection.

COMBS: There is, and that seems to have continued among Gnomes. To some extent, it rubs off among the newer members, because the Gnome Club has continued, whereas none of the others have. We adopted the policy of regenerating by taking in new members each year. Although there was a period when the student houses were built, when the fraternities phased out and contributed the remnant of their membership to assigned student houses [1931].

BUGÉ: How were you able to endure during that period? What made the organization endure and come back?

COMBS: The Gnome Club continued having its own meetings. But to that extent, it was the last man's club—until Lee DuBridge [Caltech president, 1946-1968] sanctioned our taking in members from the senior class prior to graduation. That has continued and has kept it alive.

BUGÉ: So until Lee DuBridge came, it simply didn't take in any new members, just carried on with the existing ones?

COMBS: That's right. There was quite a period when there were no new members. There was one episode in which members of the Gnome Club thought, Well, we'll have to test. So they did; they initiated six members, in violation of our agreement. They're all good members, but that resulted in a serious discussion to see what we might do to perpetuate the Gnome Club. Thanks to Dr. DuBridge, he saw it the way I just described it.

BUGÉ: Was there any penalty for having violated the agreement?

COMBS: Not to my knowledge. I was away from the campus at that time. Bob Lehman, student body president, a Gnome, was the chairman of the study group that went worldwide, studying student housing in various places. They came back and gave a report. It was his group that made the finding that yes, at Caltech the fraternities should yield and join the student houses.

BUGÉ: My impression was that this was something that Robert Millikan [chair of Caltech's Executive Council, 1921-1945] wanted quite badly—that he thought it was very important not to have the fraternities.

COMBS: Yes. I think he felt it was important to have students living on campus. The fraternities have one disadvantage—there's always somebody who doesn't get invited. I think that's the shortcoming of fraternities.

BUGÉ: Did the Gnomes resent the ending of fraternities at that time?

COMBS: There was a lot of feeling, yes. But, a decision having been made, they went along with it, until the episode that I mentioned. I considered the Gnome Club as being one of the great episodes of my life, and I wish that students today could have that kind of experience. It had the advantage of being a small group, so we knew each other very well, and they had a commonality that persisted. I would like to know how closely students keep together after they graduate, having had on-campus housing experience. I imagine that information is available, but I just don't know.

I was interested in the student newspaper and worked on the *Big T*—the annual—which I edited in my senior year. It was quite a challenge in those days, because we had very little help, so I found myself taking most of the photographs and writing quite a bit of the narrative. My buddy, Al Miller, a Gnome, was the advertising manager; he's the one who sold the ads for it. Fortunately, I think we were solvent at the end of the year.

Carl Anderson and Hewitt Dix [later, professor of geophysics] were, of course, members of the class of '27. They stuck to the academic end of life and did not enter into a lot of the activities that others of us got into. Bob Heilbron was an exception. He played football, he was on the track team as a weight man, and got into the Board of Control and student government.

BUGÉ: What did the Board of Control do?

COMBS: Traditionally, it was the overseer of the honor system, kept the show on the road with the honor system. I understand it's still working and working well.

BUGÉ: Did you review cases?

COMBS: Once in a while we would learn of a minor infraction. We'd immediately investigate it and see if anything could be done. Probably the mere investigation straightened things out.

BUGÉ: But you were never involved in a case where a student was requested to leave Caltech or anything similar?

COMBS: No, not in my experience.

As to professors, I mentioned that I lived with Professor Wolfe, a math professor. I recall, on a hot day he was writing a series which went to infinity on the blackboard. The open window was next to the blackboard. So he wrote clear to the end of the blackboard, then threw the chalk out the window. [Laughter] He was a good lecturer, very popular.

One of my physics profs was Lucien Gilmore, and I mention him particularly because he had gone to Throop in its earliest days. I think he was the oldest living example of the founding of the institute. And I'm sure that he was pleased in later years to have one of his students win the Nobel Prize—Carl Anderson.

BUGÉ: Did he tell you stories about the way it was founded, or how it was?

COMBS: We didn't learn much from him about the old days. I did afterwards, but not in class. He'd come to class, be very proper, and spend the whole time teaching physics.

Macarthur was very personable; he counseled with individuals and was very helpful. He taught a class called Orientation, in which we were shown the practical aspects of different activities. He also coached us in some of the social graces. I remember him giving a lecture as to how we should prepare ourselves for Mrs. Millikan's Freshman Tea: that we should arrive on time, we should be mindful of the time, we should leave on time, we should say a few niceties as

we came in, how to hold a teacup, et cetera, et cetera. We did arrive on time. Mrs. Millikan greeted us. We chatted briefly, enough so that she got a fix on our names.

BUGÉ: I understand she was marvelous with the students' names.

COMBS: She was. What a memory she had! As we left, in a completely different order than the one in which we arrived, she called each one by name. And I think there were a hundred and sixty of us then. It didn't seem to be an effort to her. I don't know if anybody could do that today.

BUGÉ: What else would take place at the teas?

COMBS: We engaged in small talk, primarily with each other, although there were a few hostesses there.

BUGÉ: Was Dr. Millikan present at the teas?

COMBS: I don't recall. I don't think so; I think this was her affair. Some of the ladies of the faculty were also there to pour and to serve as hostesses.

We had compulsory ROTC. The first two years were compulsory; the last two years were optional. I continued, partly because at the end of the sophomore year we got to go to summer camp and were paid for this, and we were interested in making a few dollars. So we went to what was then Camp Lewis in Washington. Henry Gunning and I bought a big old Studebaker touring car from Professor [Royal W.] Sorensen, and we got it for $50. We recruited three passengers; so five of us drove to Camp Lewis. We had quite a summer. We developed track teams and challenged the army contingent at Camp Lewis and managed to beat them. We did an awful lot of shooting that summer. For some reason, I was a good shot, so I managed to make the 9th Corps Area Rifle Team as an alternate. And they went to Camp Perry, in Ohio, during the summer. I came home and found out that they had been trying to locate me. They needed me, but I never got back to Camp Perry, thank goodness. We didn't have adequate protection for ears in those days, and I remember after a day of shooting my ears would ache. As a consequence, I have suffered with loss of hearing ever since.

BUGÉ: Did that hit you early on, when you began to notice the loss of hearing?

COMBS: No, this was sixty years ago and I really wasn't aware of it until perhaps the last twenty years. Perhaps it occurred then, I don't know. I could hear well enough that I didn't consider it a handicap and gave it no thought.

I graduated from college at age twenty and was unable to receive a commission. I got busy immediately out of college and thought nothing more about it. I couldn't see any advantage in having a commission, although it did provide opportunity for summer camp that paid once in a while. But Colonel [Lewis M.] Adams, who handled the ROTC unit here, apparently must have gotten word from a higher-up, because he hunted me up and pleaded with me, "Please take that commission." I think it had something to do with his record, that nobody should ever refuse a commission in the United States Army after having four years of ROTC. So I did accept it, and was very grateful later that I did.

BUGÉ: Why?

COMBS: Because I kept it active. And then I went to duty, optionally, in late 1940. At that time we had a defense effort—particularly in California, because of the Japanese problem. The National Guard was to be called to duty. By law, they could not be called unless there were facilities for them. So we had a huge construction program here on the Pacific Coast. The commanding general of 9th Corps Area didn't know construction, and he wanted somebody who did, so I became his aide. That's why I went to duty, presumably for one year. Six-and-a-half years later, why, I was out.

BUGÉ: But you spent the whole time in California?

COMBS: No. A group that I had known here in Los Angeles had gone, as a group, to the office of the under-secretary of war in purchases and contracts. They put in a call for me. I remember General [Ernest D.] Peek saying, "I received a telegram. Combs, do you want to get out of my command?" I said, "No sir, I'm going to stay right here." He said, "We'll fix them." So he wrote out a telegram and showed it to me. It said, "Combs on indispensable duty; not available

for at least ninety days." Well, on the ninety-first day, my orders came in from the under-secretary of war.

We were extremely busy negotiating big contracts and, as we used to say, trying to see how fast we could spend money. It also involved erasing some of the shortcomings and scandals that had occurred in the defense effort. I recall being detailed to attend the Truman Committee hearings on wartime defense-effort malfeasances. One result was in the construction equipment area. And I recall the under-secretary of war saying, "Oh, there's big trouble with construction equipment. And one of you is going to have to straighten it out." We had a staff meeting. And he looked at me and said, "Combs, now you own all of the construction equipment in the United States and it's in a hell of a mess. I'll give you ninety days to straighten it out." So we did. I think my first assignment was to go to one of the major contracts. I went to a DuPont chemical plant, because the under-secretary of war was to give a nationwide radio talk on how a major contract was affected through the entire United States. So I went out and prepared documentation. On the train on the way back to Washington, I wrote the talk, as I would have given it, at the top half of the page, and on the bottom half I gave the documentation. I had quite a stack of references. Apparently he was short of time, because he read my talk on nationwide radio. [Laughter] Well, those were very exciting days. December 7th, 1941, was a Sunday. I was duty officer that day, and we learned of Pearl Harbor.

Just to digress, my friend Jack Allen had just arrived in Washington and was living with me until he found quarters. He was out walking in the morning, went by the old State, War, and Navy Building, and saw a nicely dressed Japanese gentleman come out, get in a limousine, and drive away. It was [Saburo] Kurusu, who had been ambassador to the U.S. at that moment. Jack took his picture. A few minutes later, out came Cordell Hull—with tears coming down, Jack said, and he got in his limousine and drove away, probably to the White House. Pearl Harbor had already happened at the time of that incident. Insofar as I know, Jack got the only pictures ever taken of that historic episode.

The day after Pearl Harbor, a decision was made that our secret overseas contracts had to be militarized. This involved the army engineers. So our group, with the under-secretary, was detailed to open a camp and do emergency rapid-fire training of units to take over these contracts. The training camp that we opened was still busy three years later, because the demand for engineers just kept on and on and on.

I managed to get my own unit, finally, and took them to the European theater. After V-E Day, I was on the first troop ship to redeploy to the Pacific. We went into Manila, and I was in the Philippines until after V-J Day. Then I was given a new assignment and went to Japan, and finally got home on Thanksgiving of 1945. So it was a fast-moving show during those days.

BUGÉ: Were you involved in any way with the Caltech rocket project?

COMBS: No, I was not. During that period, I had no contact with Caltech. I was really in construction. We were at Camp Claiborne, which was our engineer camp. We were constantly screening for those who had aptitudes suitable for the Manhattan Project, and we sent a number to the Manhattan Project.

Back to Caltech: Several of us have been very active in the Alumni Association. Al [Albert W.] Atwood founded *Engineering and Science* [1937, then known as the *Caltech Alumni Review*—ed.]; a year later, as I recall it, I succeeded him as editor and continued that until I became president of the Alumni Association. I didn't have time to do both; and then I was called to duty and had to resign as president of the Alumni Association. So I only had part of a year as president. Again, those were fast-moving days.

I might mention some of the other individuals on campus. My friend Henry Gunning and I were particularly interested in aeronautics, so we went to Professor [Harry] Bateman and asked if we could have a special class for freshmen or sophomores.

BUGÉ: At that time, they weren't teaching aeronautics to freshmen and sophomores?

COMBS: He was teaching aeronautics, but there was no class that we could take. So he initiated an after-hours class, where we learned a little bit about rudimentary aerodynamics.

We had an accounting instructor, A. A. Merrill, who was an aviation buff. I think he was the one that built the famous early wind tunnel. He also had designed and built his own plane. It was a funny-looking biplane called the Dill Pickle. It flew over Throop Hall once. [Laughter] So it was very easy in accounting class to get him talking about aeronautics. [Laughter] A student, Bobby [Robert T.] Knapp, who became a professor later, was interested in that wind tunnel. One day, as a prank, he reversed the wires going to the motor operating the propeller, which had a thrust bearing only in one direction. That propeller took off; I don't know why it

didn't kill somebody going across campus. [Laughter] He was terminated from Caltech and went to MIT. Later [1951] he came back as a professor—very well respected.

There were always a few pranks, like taking sodium iodide in a plastic condition—semi-liquid, like a putty—and stuffing keyholes in professors' offices. When it dried, it was very sensitive, and the minute a key went into it, it would explode. Not seriously. [Laughter] So, I guess there were quite a few locks blown off.

BUGÉ: Who would do a thing like that?

COMBS: I don't remember. [Laughter] I really don't know. But that was the type of thing that happened.

Dr. Millikan had recruited Arthur Fleming, a very wealthy man, to heavily endow Caltech. And Fleming, as it turned out, gave all of his estate to Caltech. He had made part of his fortune in the Sugar Pine Lumber Company in central California, and he saved about five acres of beautiful redwoods south of Yosemite and gave them to Caltech. One of the trees was named for Millikan and one for [George Ellery] Hale; for some reason, they never got around to naming any others, including [Arthur Amos] Noyes. Caltech owns that property today; I have seen it. I think it has quite a potential to develop it into a recognition, named trees, as a very unique grove. And the Forest Service will cooperate with us.

BUGÉ: Do the trees bear plaques?

COMBS: Yes. It has not had any forestation, so it's a shambles now. A few years ago, the Forest Service wanted custody of the property so that they could clean it up, because they thought it was even hazardous to keep it that way. They said, "You can name all the trees you want to; you can call it anything you want to." As it turns out, nothing has happened.

THEODORE C. COMBS

SESSION 2

December 11, 1987

Begin Tape 1, Side 2

COMBS: We left off the other day talking about Arthur Fleming. He contributed all of his estate to Caltech. When the Depression came, he didn't have enough to live on, and Caltech supported him, which is very unusual among major donors.

BUGÉ: Were you aware of stories at the time about his eccentricities, or his failing health?

COMBS: No. He had a liveried chauffeur. He had a very unusual car—l think it was called a Hispano-Suiza—and he used to come into the alley behind Throop Hall, park it, and run up to the first floor to have a conference with Robert Millikan, which he did rather frequently. Our only indication of any eccentricities were just by observation. As we used to say, Caltech was founded by Millikan but funded by Fleming. [Laughter]

In those years, engineering really dominated science on campus, and we had some splendid engineering professors. I might mention two or three. Franklin Thomas, who was head of civil engineering, was a very, very fine instructor. His courses were completely practical. I mean, we engaged in bridge design; we engaged in the practical end of engineering. Theoretical engineering really hadn't come about yet. Romeo Martel was the originator of earthquake-resistive design of structures. He had his own homemade little shaking table to show how different types of structures respond under shaking. He was a consultant on the design and construction of the Los Angeles City Hall, which at that time was the tallest building in Los Angeles. I forget which floor, but one of the floors was very heavily reinforced, because here was a null point on the vertical pendulum—L.A. City Hall. Apparently he was right; it has succeeded.

Royal Sorensen headed electrical engineering. He had been very active working with the [Southern California] Edison Company on developing transmission lines and insulators and all of the equipment to go with high-voltage transmission from Hoover Dam. He then instigated the million-volt lab. I think we still have the structure, but the million volts are gone.

BUGÉ: That must have been quite spectacular, just judging by the still photographs I've seen.

COMBS: It was spectacular. From time to time, he would give demonstrations, and he'd shoot a spark maybe four feet long with a tremendous roar. One of his students, Hallam Mendenhall, was working on the research program and managed to get the million volts. It burned the soles of his feet, and he was hospitalized for some time.

BUGÉ: I've heard he's never walked properly since then.

COMBS: That's right. They had to rebuild the soles of his feet, because they were burnt to a crisp. He was very grateful that he survived, but he'll never forget that incident. So far as I know, he's still living.

BUGÉ: Were other people witness to it?

COMBS: He was pretty much alone, but there were those who heard the spark and who rushed in and shut it off and rescued him. It was very sobering on campus, that this accident would have happened.

Sorensen himself was very much interested in athletics. He was interested in student affairs; he was extremely popular with the students. His daughter Peggy married one of our students, Fred Groat, who was an excellent athlete and received letters in all of the major sports.

BUGÉ: I've heard about Sorensen that he was dry—that he was one of the last, or never did agree that the Athenaeum should sell liquor, even wine.

COMBS: I don't remember that. I remember being on the Y [YMCA] Board when he was, and somebody had proposed that we raise the salary of the director. He spoke up and said, "I don't believe in it, because that salary level is more than some of our professors are getting." And he thought we should equate. I think the Y has been mindful of that type of formula ever since.

Robert Daugherty was teaching hydraulics and had done very practical work in hydraulic turbines. He also got into politics and was mayor of Pasadena [1929-1931]. If my memory is

correct, he was mayor at the time we built the Pasadena City Hall and the Civic Auditorium, which was a very major step forward.

BUGÉ: Were people on campus involved because he was involved?

COMBS: Not to my knowledge. He may have called on some of his close associates to help out in certain directions, but I was not aware of it. From time to time, Caltech people have gotten deeply involved in Pasadena political situations and community leadership.

BUGÉ: Well, George Ellery Hale kind of set the precedent.

COMBS: Indeed he did; yes. In probably 1926, John Peter Buwalda came to Caltech and initiated the Division of Geology. And a number of my classmates immediately switched over into geology and followed it very successfully.

BUGÉ: Did you take courses from him?

COMBS: I took one course in introductory geology. I recall his mentioning that among local Southern California resources, there was a bountiful supply of salt in the Salton Sea, and somebody should go down there and put in a reclamation and salt works. One of my classmates, Clarence Haserot, did that, and continued for many years until there was a devastating storm that washed out his dikes, and I think he decided at that time not to continue. He [Buwalda] also mentioned that there was a mountain of iron ore, Iron Mountain, out in Riverside County. Years later, I took an interest in seeing what could be done to acquire that mountain. There were a bunch of defunct mining claims with the existing titles. I was just about through with my research to make a move, and I went over one day and found out that the entire mountain was then owned by the Southern Pacific Railroad Company, which introduced Henry Kaiser, who produced iron, and this was the beginning of Fontana. But Buwalda was right, there was a tremendous iron ore deposit there. It has since been abandoned. I think Fontana has been closed down, at least so far as the refining of iron ore, the production of iron from that source.

BUGÉ: Do you think they exhausted it?

COMBS: Oh, no. There's still plenty there. I think the air-pollution control and the cost of cleaning up Fontana was beyond economic feasibility, so they abandoned rather than to try to pursue it. But it's still there; someday it may come back.

I don't know that we mentioned Earnest Watson. 201 [East] Bridge was his bailiwick, and we were always fascinated with his lectures. He taught physics by demonstration in that particular class. I recall a number of his very practical demonstrations in which he was really teaching principles in physics, and from those, I think, stem the Watson Lectures.

BUGÉ: Were you ever tempted to switch into physics because of his lectures?

COMBS: No, I don't think so. Perhaps because physics, as a study, was not as popular then as it is today. I was just looking at the record of the commencement of my class, which I happened to keep in my *Big T*. There were seven who graduated in physics, three in chemistry, four in physics and engineering; the largest group was in electrical engineering, and that was the practical type rather than the electronic engineering we're dealing with today. As I say, electrical is probably still as popular, but in a different direction.

BUGÉ: Did you have any personal contact with Watson, outside of class? Were you aware of his role vis-à-vis Millikan?

COMBS: No. He was certainly a right-hand helper for Robert Millikan. Word was that he had done yeoman service during World War I on submarine detection, I think it was. He was an immaculate individual, with a little bowtie, and always very proper. I think he was a bachelor.

BUGÉ: He did marry, but quite late in life.

COMBS: Oh, did he? I didn't know that. He was greatly respected by the students. He was a very proper individual. Although I'm sure he had a good sense of humor, you could tell from the way he conducted his lectures that he would not want to engage in a belly-laugh, that type of thing.

BUGÉ: And how about Robert Millikan himself?

COMBS: Millikan himself was greatly respected. He was extremely personable, and, although such a busy person, I think he knew all the students on campus by name. We'd see him frequently in the corridors of Throop Hall. Actually, at that time, much of Caltech's business was done in the corridors of Throop Hall. We didn't use much paperwork; there wasn't much telephoning. But the people would see each other, and if they had something on their mind, they'd discuss it and resolve their problem informally and probably without lots of delay. We had assemblies in Culbertson Hall, and Millikan would speak frequently. I recall those in the direction of inspiring us to put forth our best effort.

BUGÉ: Did you find him an inspiring speaker?

COMBS: Yes. And I recall him saying that it was his hope and expectation to equip each student so that he would be ready for any eventuality that occurred after he had graduated. Well, that's a rather broad statement. But I think he meant it and undoubtedly was on the right track. He, too, wore the bowtie. I don't think he spoke from notes; he just spoke ad lib—and he would rock back and forth, forward and backward. Yes, he was greatly respected.

At one time, he needed a million dollars and didn't know where to get it, because he'd already contacted the wealthy people he knew. He felt that if he could get a hundred men to give $1,000 a year for ten years, he'd have his million dollars, which he succeeded in doing. And he had no trouble in getting those hundred men. This was the beginning of the [Caltech] Associates. Their original meeting was in what is now the art gallery of the Henry Huntington home. As I recall it, the fiftieth anniversary of the Associates was a banquet held in that room. Some of us were privileged to sit and look at "Blue Boy" on one side and "Pinkie" on the other, a gala occasion. They even opened the carriage entrance from the north, which resulted in a great traffic jam, because it was built for horse and carriage and not for a hundred or two hundred automobiles. There's a little turn around on the north side there, and everybody got balled up, trying to use it. [Laughter] But it was a beautiful evening.

After the Associates were organized came the business of keeping the show on the road. Millikan would always detail special assignments to the secretary of the Board of Trustees, George Green. And apparently he said, "George, you take care of the Associates." As a consequence, the secretary of the board was responsible for the Associates program, even at the

time I became the secretary of the board. It came to me as somewhat of a surprise. I didn't expect that, and I found it quite a challenge. We succeeded, but it became apparent to me that we were doing it the hard way. What with my role as secretary, and the reorganization that we can talk about later, I felt that the Associates weren't receiving their due. I wrote a note to Harold Brown, who'd come in as [Caltech] president [1969-1977], and said that in my opinion, it's my recommendation that the Associates should revert to the Development division and warranted a full-time staff member. Well, Harold was a very decisive person, and about ten minutes later I got my note back with his approval on it. The Associates have prospered ever since, and that's one move that I think was absolutely right.

During the Science for Mankind campaign, endowed professorships didn't catch hold. Whether we hadn't emphasized them enough, or whether they weren't popular enough, we weren't sure. So I conceived the idea that we might get the Associates to establish a DuBridge Professorship. I talked with Lee and said, "Would you stand still for a DuBridge Professorship while you're alive?" And he said without hesitation, "If there's money in it for Caltech, absolutely." Then I went to Bob Gilmore, who was vice president [for business affairs]—he was the number-three man—and said, "To get this professorship established, if the Associates were to give $50,000 a year as the interest on the million-dollar endowment, until they get that million dollars, would you go along with it?" And he said yes. So I went to John McMillan, who was president of the Associates, and said, "John, I think the Associates are ready to have another program. We have the potential for a DuBridge Professorship." After I described it to him he said, "Ted, I'll get you the $50,000 a year, but I'll never get you a million dollars." Well, we got the $50,000 a year, and, although it wasn't easy, we did get the million dollars for the DuBridge Professorship.

One of the interesting by-products of that move, though, is that endowed professorships then became popular, and it resulted in several more. So, again, that was a good move. The Associates have had such special programs over the years.

BUGÉ: Could you tell me a little bit about what you did between the time you graduated and the time you came back?

COMBS: When I graduated [1927], there was no demand for engineers. As a matter of fact, I think the economy was rather stagnant. I had edited the annual and had worked with publishing firms in Los Angeles. The head of one of them said, "I'm about to start a new business. Will you join me in it?" So the two of us incorporated University Publishers, specializing in yearbooks and so on. It did not succeed, in that the rest of the publishing fraternity saw to it that it didn't, because we were competitive. As a consequence, and fortunately for me, because I didn't belong in that business anyway, I took a little interim study at Pomona College to fill in some courses I had not had. I was there less than a semester when I got a call from the city of Upland to become building inspector and assistant city engineer. I had worked with the cities of Upland and Ontario during my summers and was well acquainted with them. I very readily said yes, because this was the type of thing I was looking for. They had an emergency need; because of the construction of a new junior high school, they needed an inspector. So I went to work the next day and took my exams at Pomona College at night. I stayed with Upland until the Long Beach earthquake [1933].

It was a very interesting little city at that time, and an opportunity to do some innovative things and really alerted the little city in several directions, such as a new planning commission, and that type of thing. I enjoyed it thoroughly. At the time of the Long Beach earthquake, I had one building to condemn, and then I went to Long Beach and helped Charlie Wailes, a building inspector, inspect buildings and condemn them.

The Long Beach earthquake in '33 resulted in many, many changes. It was the beginning of structural engineering. It was the beginning of modern building codes. It was a challenge to the building-materials industry to develop standards and technical data that could be used in earthquake-resistive design. As a consequence, I was lured to the lumber industry, and we did much research. Thanks to Professor [Frederick J.] Converse, who was in the soils business at the time, we conducted shaking tests on full-size buildings in Los Angeles, with participation of the Board of Education. We did a lot of technical research through the U. S. Forest Products Laboratory in Madison, Wisconsin. We did promotional work, hoping to represent our industry correctly. As a consequence, we rehabilitated more than half the Long Beach city schools—in wood.

BUGÉ: Completely in wood, so that they became wooden structures?

COMBS: Well, perhaps I stated it incorrectly. They had been primarily wood structures originally. And we came up with the technology and the means of reinforcing them so that they were earthquake-resistive. It required some new construction, for instance, in roof trusses; it had been simply bolted together previously. We, in place, would take them apart and install modern timber connectors, which increased the efficiency of a joint tremendously. That's the type of thing that we engaged in.

I stayed with the lumber industry until 1940. I presumably had the Southern California territory, but when the defense effort came on, I had the southern band of the United States and everything south, including Panama. And my problem was to keep the show on the road between the mills and the purchasers, to make it feasible. Most people at that time had been so sold—and we did it—on structural grades of Douglas fir that they tended to go entirely in that direction, which the mills couldn't do, because they had output of the rest of the log. So we had to correct their thinking, and they went along with it, all of them.

The mills had complained, even before this time, that we were overselling the structural grades and we had better take care of the rest of the logs. So I made some studies and found out that, let's say in mill-run Douglas fir, that the lower grades were low primarily because of large knots and knotholes and had a lot of clear wood in between them. So I developed a pre-cut framing for house construction, and we bundled all of the framing members to go into a window or a door, or whatever.

BUGÉ: This is kind of the precursor to prefab housing.

COMBS: It was. It sold quite well, and the mills were happy again. We developed a little company that had the first prefabrication in timber. And it survived, with many companies across the country. So these were exciting days, and I enjoyed it. I stayed with the lumber industry until I was called to military duty in 1940. When I came out, early '46, I was then confronted with starting all over.

BUGÉ: You didn't want to go back to lumber?

COMBS: The lumber industry had changed, and the opportunities for me just no longer existed—that was my opinion. I felt that I should get some commercial experience, because I'd never had

it, what with city work and lumber industry work and all. So I went with one of the fabricators [Timber Structures, Inc.], and I thought, Well, I'll start in as their lowest salesman and learn. It worked very well. Two years later, I was vice president of sales in their headquarters. I started originally in San Francisco, with a fabricating plant in Oakland, and then went to their headquarters in Portland, Oregon.

A year or so after I was in Portland, I remarried. Carmen and I decided that someday we were going to live in Southern California. As I thought more about it, I thought the longer I stay in the Northwest the deeper I'll get involved. So if we're going to do this, perhaps the best thing I can do is to resign, and do it now. So I came to Southern California and started all over again. [Laughter]

This involved several trial and errors. I headed Arch Rib Truss, which was fabricating in steel and timber. I had a short stint with Holmes & Narver, who were engineering contractors for what was known as Ramo-Wooldridge at that time, who had the master contract on intercontinental ballistic sites. The group I was with had its primary research in picking a West Coast site, and we chose Vandenberg Air Force Base, which startled the community of Lompoc completely, but I think they're happy about it now. I had realized then that, to date, I hadn't really developed any retirement fund.

BUGÉ: How old would you have been about at this point?

COMBS: In my forties; I came south when I was forty-three. So I searched around again and found a little company in Burbank, Zero Manufacturing, which was bursting at the seams. They had more business than they knew how to handle and were desperate for help. And I liked the people that I talked with, particularly Jack Gilbert, the head of it. I invested a little money and never worked harder in my life than we did at that time. We opened an engineering department, opened a sales department, built some buildings, developed an eastern plant, and it succeeded. I stayed with them for several years, then reached a point of saturation and decided to do some property development of my own. At that time, Dick [Richard P.] Schuster called me. He was heading the Industrial Associates program [at Caltech], and he said, "Ted, we need help, just the kind you can give us. Why don't you come help Development?" We discussed it, and I finally said, "Dick, I'll be glad to come with you and give you half of my time." And that's how I

started in fifty percent. I never was full-time at Caltech. I started half-time originally and got up to eighty percent of my time, presumably four days out of five. It worked out very well.

My first assignment was in corporate relations, basically going to the heads of corporations and thanking them for being good to Caltech. Nobody had ever done that, and they were quite impressed. For example, I went to see Fireman's Fund in San Francisco, had a date with their president. He said, "Well, come on into the conference room." And we did. The conference room was full of officials, and they wanted to sit down and talk. So we talked Caltech; we talked earthquakes; we talked earthquake engineering—and profited by it.

I went to the executive vice president of Cyprus Mines. He said, "Well, we hire a number of Caltech graduates, and they don't know from *up* in our business." He said, "It takes at least two years for us to convert them. Why don't you give them better training?" I found out it was primarily in the field of economics and management, so I went to Horace Gilbert and said, "Why don't you invite Mr. Allen to come out and meet with your economics classes?" We had two very successful sessions like that. So the students benefitted; and Mr. [Paul W.] Allen had a chance to make his point.

During my period in corporate development, I got acquainted with some of the activities between campus divisions and industry. And I found out there was one group that was supporting earthquake studies in geology and another group that was supporting earthquake-resistive studies in engineering. It seemed so obvious that they had a commonality and would benefit by getting together, so we founded the Earthquake Research Affiliates, and it has succeeded. I understand that its funding provided most of our Southern California seismometer network. I've lost track of it. The members used to get an annual field trip or an annual meeting, a quid pro quo, which they enjoyed thoroughly.

Before long, the Science for Mankind program was developing, and I was asked to head the alumni effort, which I was glad to do, having no experience in fund-raising. [Laughter] So we assembled a staff. There was no place for our enlarged team to work, so we installed two trailers over in Tournament Park. They were temporary structures, and we inhabited them during the entire Science for Mankind campaign. I had two assistants; one was Joe Henry, who came from Pomona College and, when he left Caltech, went to Art Center College of Design; he now heads their Swiss campus. I had the privilege of visiting with Joe here in the last few months. Our secretary was Rose Meldrum, who now works with Jack [John D.] Roberts [Institute

Professor of Chemistry, emeritus] as secretary on campus, and she was excellent. We had a budget of something like a million dollars, and I think we succeeded times two. But at that time, we had no experience in knowing what the alumni potential was. Two things came out of my observation. First, the Alumni Association had always been strictly volunteer, except for some help and continuity through Don [Donald S.] Clark [professor of physical metallurgy; Alumni Assoc. secretary 1946-1969], who gave us a focal point, met with the board. It appeared to me that the alumni had reached the point where they could establish an office and hire a full-time director. I went to Clarence Kiech, who was the one who founded the Alumni Seminar, and proposed this. We developed the Alumni Study Group, which studied for several meetings and came out with this finding. We did establish an office, and Jim [James B.] Black was our first director. It's gone from there, and it's prospered.

Also, we needed something that would communicate with all alumni, whereas *Engineering and Science* was mailed only to members of the Alumni Association. So we started *Caltech News,* and it has continued. It goes not only to all alumni but to a wider audience as well and seems to have justified itself.

In Development, Charles Newton was the director of Development. He was very easy to work with. Ann Bacon was very prominent as a researcher. And those, again, were fast-moving days.

BUGÉ: Until the time the Alumni Association became more formalized, were alumni not particularly involved in supporting the college or in coming back to campus?

COMBS: They were keenly interested in coming back to campus. I know when Clarence Kiech started the Alumni Seminar, it was popular from the very first, and faculty were glad to participate in it. So that's a demonstration of the amount of interest from alumni. I doubt that we had ever done our homework correctly to get financial support from alumni until we made a team effort out of it.

BUGÉ: It seems so obvious, with hindsight.

COMBS: Yes. But they were formative years, and we had to start some place. We were just fortunate that it came along at that time.

At the end of the [Science for Mankind] campaign, it was about the time that James Ewart, then secretary of the Board of Trustees, was reaching retirement age. So Lee DuBridge asked me if I'd be willing to be secretary of the board. I pointed out that I had interest, that I was up to the point of still four days out of five, and he thought that was manageable. He also stipulated that I should agree to stay on until he retired and until his successor came aboard and I could help, to quote Lee, "break him in." Well, as it turned out, Dr. DuBridge left early [1969] to become science advisor to President Nixon. And Robert Bacher became acting president, Bacher having been provost, and held the fort until Harold Brown arrived.

It was about that time that it was felt that there should be some reorganization on campus.

THEODORE C. COMBS

SESSION 3

December 17, 1987

Begin Tape 2, Side 1

BUGÉ: We were going to pick up with reorganization.

COMBS: At the risk of a little repetition, I became secretary of the Board of Trustees on the first of January, 1968, and stayed on until the middle of September, '73. So it was going on six years. Harold Brown arrived in the middle of February in '69, and the interim acting president was Robert Bacher, who had been provost.

Harold Brown very quickly knew a lot about Caltech and about JPL [Jet Propulsion Laboratory]. He had the temperament to be a bit reluctant to develop close friendly relationships. As secretary of the board, I was managing the Associates program and arranged for an Associates affair at the Athenaeum. The reception was in the patio—a good time of year to do it. A reception line was arranged for people to come through and meet the new president. Harold Brown vetoed it and really stood all alone, over toward one corner. I went to groups of people and said, "Go introduce yourselves to the new president." That's the way it was done. And as it turned out, why, he developed acquaintances. But on the Board of Trustees, he soon knew them all and attended many of the committee meetings, which were hard-working sessions. He shone brilliantly with the Business and Finance Committee; he has a particular flair and, I think, has some connections in the world of finance today. Very perceptive; his comments, his judgments were certainly in Caltech's best interest and helped us greatly.

BUGÉ: Can you cite some examples of what you recall as being important things that he did for Caltech?

COMBS: Well, there was one in particular. There developed a sentiment in Washington that JPL should revert to NASA—that they should manage their own show—and should cancel the Caltech contract. People here didn't see it that way. Thanks to Arnold Beckman [then chairman of Caltech's Board of Trustees] and Harold Brown—and he had brought Robert McNamara onto

the Caltech board—there were many trips and many conferences. As a consequence, JPL remained with Caltech, and so far as I'm aware now, the subject will never come up again. That was a very crucial time. The Caltech management fee was not huge, but it was sufficient that Caltech had grown to count on it. To offset the possible cancellation of the contract, a separate fund was established, so that if there was a sudden cancellation, there wouldn't be any emergency in our budget process.

As I recall, even before Harold Brown arrived, there was a consideration of reorganization on campus. An outside firm [Cresap McCormick & Paget] was retained to make a study, to confer with many, many people and come up with a recommendation. Their field man was David Morrisroe, who became so well acquainted that he joined the Caltech staff [as director of financial services—ed.]. As part of the process of reorganization, there was the matter of completely rewriting Caltech's bylaws.

BUGÉ: What was the background that necessitated reorganization?

COMBS: My memory might be a bit vague as to the specifics. We didn't have a vice president for student affairs, for instance, and we felt it was needed—that type of thing. It was really an administrative readjustment. The bylaws were very antiquated, and I recall working on the bylaws with a specialist at O'Melveny & Myers for the better part of a year. We'd confer a little bit at a time and gradually make progress. We had a Bylaws Committee, headed by Herb [Herbert L.] Hahn, of Hahn & Hahn in Pasadena, who was just great to work with. The tentative recommendations of the consultant were discussed in conference, and then when the final version came out as their recommendation it was ready for adopting. Finally, the bylaws were adopted.

In addition to being secretary of the Board of Trustees, I was also a secretary of the corporation. One of my responsibilities was to countersign all of the JPL contracts, which were in multiples—sometimes six copies, eight copies, and so on. A virtual tonnage of paper came down from JPL, trotted up to my office—we were then in Millikan Library, because Throop Hall had been torn down—and it didn't seem right, because it was purely a perfunctory proposition, almost a rubber-stamp proposition. So in the new bylaws, I saw to it that we provided for

assistant secretaries and assistant treasurers. The head of our legal staff at JPL became an assistant secretary, to do the work right there; that saved a lot of trouble.

There had been the established practice that when a trustee's term expired, when in fact he was retired, he was thanked for services and, in effect, told goodbye. George Beadle, who had been [president of] the University of Chicago [1961-1968], came on the Caltech board and contributed the idea that the University of Chicago had adopted, in which the retiree achieved the title of Life Trustee. We quickly adopted this plan. A Life Trustee is welcome to attend all meetings; he can engage in discussion. He has everything but a vote, and that's because of the legal complications—the size of the board is fixed, and so on. It works beautifully.

BUGÉ: Is there a retirement age for Associates?

COMBS: I found a letter in the file that said if an Associate paid up his dues, $10,000, we in effect said, "Thank you. You have fulfilled your obligation to Caltech." Well, they didn't see it that way, and I very quickly changed that. Now an Associate is always an Associate. And that's the way it should be.

BUGÉ: Did Life Trustees tend to continue coming to meetings after their regular term was over?

COMBS: Well, I think we've lost a number of people. People like Albert Ruddock became chairman emeritus, when he had been chairman of the board. As I recall, we've lost some of our longtime trustees. Now, whether there was a retirement age—there probably was and probably still is. But becoming a Life Trustee has no handicap anymore.

Arnold Beckman, as chairman of the board, was very perceptive on both the issues and the individuals concerned. He was known then as a scientist more than as a businessman, but Beckman Instruments had prospered, and it turned out that Arnold was brilliant in the field of business as an administrator. Caltech got the benefit of his aptitude.

To give an example of his quickness on the uptake, I had been visiting friends in Fallbrook and had a date with Arnold early one morning here in Throop Hall. I was hurrying back, and as I passed Frank Capra's ranch, I noticed a "For Sale" sign and thought it might be just great if Frank Capra would want to give to Caltech his home place. I discussed this with Arnold and said, "Doesn't Caltech need a retreat? Couldn't we make contact?" And Arnold

said, “Suppose I write him a letter?” Well, Arnold drafted the letter and showed it to me, and I said, “Well, let’s send it.” My secretary typed it, and very quickly we received a very favorable response from Frank Capra; he gave us the home place.

On acquiring it, we tore out some of the home garden and planted it with profit-making citrus. So that, in effect, it would not be a liability to Caltech; it would pay for itself, which we did succeed in doing. We still have it, and it’s still used. That was just one example of Arnold Beckman’s quickness to make a move, and it worked very nicely.

On the board’s finance committee were several who really contributed greatly—Bill [William M.] Keck Jr., and Jim [J. G.] Boswell II, who now is the world’s largest cotton grower. He got so busy with cotton in Australia that he did have to resign from the Caltech board because he couldn’t attend enough meetings.

BUGÉ: What was Keck’s involvement at that time? Was he very involved?

COMBS: Yes, he was. Again, in the field of finance, he made great contributions on the finance committee and saw to it that contributions were made on campus. Keck laboratory [W. M. Keck Engineering Laboratories].

The Caltech endowment in the late sixties was probably half of what it is today. It has grown, partly through add-ons, but partly through good management of the funds. The last I saw of figures, it was some $275 million.

BUGÉ: Are trustees required to contribute financially? Is that part of their obligation to Caltech as trustees?

COMBS: It’s implied. One reason why they come, and I think they understand this, is to support not only with expertise but with funding—either their own or through influence with others. Yes, they’re very funding-conscious.

I enjoyed working with the Nominating Committee. Norman Chandler was chairman and knew many, many people, and came up with some brilliant answers.

BUGÉ: Can you give me an example where his brilliance was particularly evident?

COMBS: I remember a discussion on Lew Wasserman, who is in the entertainment field. And Norman said, "Yes, he's a very fine Jewish gentleman. He's very successful in his field. He'd be an excellent trustee. Suppose I call him and see if he's willing to serve?" Things like that. And Wasserman is a good trustee.

BUGÉ: Did you know Otis Chandler as well, or was he a different era?

COMBS: I knew Otis, but not as a trustee. He came on later and then, I think, resigned because of conflict. I have no personal memory of this. But Norman was excellent to work with.

I enjoyed working with the Buildings and Grounds Committee; Henry Dreyfuss was chairman. It bothered Henry that the Caltech campus didn't look like it was well integrated. Our architecture was various miscellaneous styles. And to Henry, it looked like just a bunch of buildings, all dropped in proximity to each other. He wanted to go to work on that, and he did it with landscaping—it wasn't within his province to be able to change any architecture. And the Caltech campus today, in most people's opinion, is quite outstanding.

Albert Ruddock, among the trustees, was outstanding—such a greatly admired gentleman. He had served on the board but still attended meetings later. And you could tell, just as long as he was physically able to toddle, for instance, in the robing-up for commencement procession. Incidentally, in one of those processions in June, Albert was looking out instead of in front of him, and he stumbled over a little step, and went down. People picked him up and he was quite shaken. As a consequence, that was the beginning of ramps on the Caltech campus. We have them every which way now.

Si [J. S.] Fluor was very active and interesting. Tom [Thomas V.] Jones. Seeley Mudd. The Mudds of Cyprus Mines were great benefactors of Caltech as well as of others. I had occasion to read Seeley Mudd's will, in which he left his home place to USC [University of Southern California] with the provision that their president live in it. And if he did not want to, the property would revert to Caltech. So I have a chance to kid some of my friends once in a while. But that property is inhabited by the president of USC. It's a beautiful estate in San Marino, about a mile from here.

BUGÉ: It was Seeley Mudd who gave the money for the Millikan Library, is that correct?

COMBS: I think so. But there was a foundation, too. But I think Seeley Mudd was the instigator of the—

BUGÉ: Were you involved with the negotiations for that?

COMBS: No, I was not. I do recall that Caltech received Cyprus Mines stock and decided to hold it for a while. The stock, at the time it was given, was ample to build a library. When the stock was cashed in, there was enough money over to build one more building, which I think was the new geology building named for the Mudds [Seeley G. Mudd Building of Geophysics and Planetary Sciences].

Fred Hartley was very helpful. Fritz Larkin—Frederick Larkin—of Security Pacific Bank had an awfully good business head and related so well with other trustees. And in ’71, Stanton Avery became a trustee. This was Arnold Beckman’s inspiration; he told Norman Chandler, “Well, I’ll be glad to talk to Stan.” Stan said, “I’m greatly honored. I would like to do it, but I’m involved with Pomona College. May I have a year to make a graceful transition?” And he did. I think by that time Avery had expected to move his headquarters to San Marino and then to Pasadena. And being close here was an appropriate move. He was a marvelous chairman of the board. Again, Arnold Beckman was right.

Tom Watson, head of IBM, is now a Life Trustee. He had a wide acquaintance, particularly on the East Coast, and was helpful to the Nominating Committee. And thanks to his business genius, he was extremely helpful on the Caltech board. You’ll recall the other day, when you asked were there any tremendous conflicts in the board. People like Albert Ruddock, Tom Watson, Arnold Beckman, and now Stan Avery, provided the atmosphere to solve conflicts before they grew.

BUGÉ: Did they do that by personal contact or in the group context, by kind of pouring oil on the waters? I’m curious, obviously, about the conflicts and about the stories. Were you ever present when something had to be calmed down? Because, obviously, strong people have strong feelings about things.

COMBS: There were feelings over several subjects. But I don’t recall any heated debates in meetings of the Board of Trustees. The problems were resolved by other means.

Bill [William E.] Zisch was in on the founding of Aerojet-General, very helpful through the development of JPL, and was excellent as a trustee in many ways.

BUGÉ: In the course of these years, weren't there discussions about admitting women?

COMBS: I think the first discussion came up in the Nominating Committee: Should we ever have a woman trustee? And the first judgment was, "No, it's a men's fraternity, and it would be awkward to bring a woman aboard." That feeling has certainly passed now.

There were discussions over the matter of admitting women students, as to whether fewer men could be admitted or whether we could increase the overall freshman class size or student body size. It seemed to have turned out as somewhat of a compromise; the student body is a bit larger now.

BUGÉ: Did the board feel that this was inevitable?

COMBS: I think so. And there was some discussion of merging with another campus, Immaculate Heart College. It was considered quite seriously as a possible branch campus, but it did not develop. My personal opinion is that it was fortunate for Caltech that we remain intact here at one campus.

BUGÉ: The only other question I had about the board was whether the board dealt with the question of recruiting minorities, or was this not a board issue?

COMBS: No, I don't know of any deliberate mood, except at the dean's level, not the trustee level. We were probably aware of it, because of committee work, but it wasn't a trustee policy or decision.

In the process, I became involved with several fairly small corporations in which Caltech had inherited a sizable interest, or even a controlling interest or whole ownership. I went on their boards, I guess primarily because I'd had some business experience by that time. One was Lyon Metal Products, near Chicago, in Aurora, Illinois. It was a firm that had been purchased by Keith Spalding when Spalding Sporting Goods started receiving requests for steel lockers in gymnasiums. Up until that time, all lockers were wood and built by carpenters. So he bought

Lyon Metal Products and developed the locker business. Keith had a knack of having everything he touched virtually turn to gold. I read an article very recently about Rancho Sespe. Keith had married a Chicago girl named Eudora Hull. Mr. Hull moved to California and had loaned $75,000 to Rancho Sespe. As it turned out, he had to foreclose. Here he was with about 4,500 acres of beautiful land, so they operated it, planted it with citrus, and eventually Caltech became the owner. It was sold by Caltech in about ’71, and I forget the price—maybe $7.5 million, something like that, which was pretty much needed at the time. The sale currently was for better than $23 million. It might have been well if Caltech had held on. Hindsight is so good in California real estate.

We had two little oil companies up in the Bakersfield area—one was Mysa [Land & Cattle Company] and one was Lerdo Land. Those have since been dissolved. They were primarily oil production leases by the time we received them. One was ASDP, the property development firm. As soon as its outstanding property payments were completed, why, the corporation was dissolved. Caltech benefitted from this. One still continues as Summit Lake Investment, the Balch estate. The recipients are Pomona College, Caltech, and the Museum Alliance of Los Angeles County. Thanks to [assistant treasurer] Henry Tanner, here at Caltech, he puts the meetings together and he acts as secretary, and we manage to make an annual distribution of some significance. But of all the corporations we’ve had, that’s the only one that remains, to my knowledge.

As time went on, I gave a talk on the first transcontinental flight that landed in Tournament Park. This resulted in my writing the Tournament Park book [*Tournament Park: Pasadena Historic Site, Caltech Treasure*, 1984], on a site that is about as historic as anything you can name in this entire region. That book has been out for about four years now. There are still a few copies being sold. One of the professors at PCC [Pasadena City College] uses it in his history lectures.

BUGÉ: Is that David Leary, by any chance?

COMBS: Yes. I took him a stack of books the other day. An interesting by-product: I got a letter from a man named Chuck Benjamin, who asked whether I had any photographs—in the Caltech Archives, for instance—of the Pacific Electric trolley car that went from Lake Avenue to

Tournament Park. Just two days ago, I received a letter from Chuck Benjamin, and *he* had found it, and he sent me a Xerox and said, "It's in the *Big T*, page 21, 1921." That picture was taken probably from the top of Throop Hall, across California. The football field had bleachers on all four sides. That's the northwest corner of Tournament Park. There was a ticket booth, which I remember, at the corner of Wilson and California, and that picture shows the little trolley that came right down California.

In any event, I thoroughly enjoyed the Tournament Park book, and that was followed by a history of the Gnome Club, which was published last year, '86. I still am involved in a number of activities—the Caltech Y Board; I've been on the board several times since 1925. I helped Ned [Edwin S.] Munger [professor of geography] in developing the Friends of Caltech Libraries—FOCAL; served as president from '82 to '85. I'm still involved with the Industrial Relations Center; secretary of the Executive Forum, which is a program for chief executives, and we have several dinner meetings a year, with an outstanding speaker. The Gnome Club continues—getting stronger—and has established a scholarship fund that is now sizable enough to, I think we're on the verge of supporting two full scholarships. It's coming along.

I've mentioned the Alumni Association and the Associates. Informally, several of us get together and play tennis. It started out when Ernest Swift [professor of analytical chemistry] was then Pasadena singles champion years ago and still played. And in the neighborhood, Dana Smith, who was very benevolent to Caltech, offered the use of his court. And later Preston Hotchkis. So people like Harry Gray and Jack Roberts and Ned Munger and Fred [Fredrick H.] Shair and Jim [James J.] Morgan played, and I enjoyed playing with them.

In summary of what we've talked about now for several sessions, there certainly have been a lot of changes at Caltech. As I can see, all have been for the better, except possibly for one. I don't know that students today have the experience we had living in a fraternity house—close association, wonderful friendships. The group loyalty we had from Caltech causes, be they scholarship or activities, or whatever. And I don't know that the student houses have been able to provide quite that type of experience. I don't know that it was possible to provide it. But I think that was one place where we did lose some ground.

Today, certainly, Caltech is on the right track. President [Thomas E.] Everhart is excellent. Our research has the prospect of some breakthroughs that are certainly going to better mankind. We've developed a highly supportive community. Funding is going to continue to be

a challenge. But the things that I have mentioned certainly set the stage for the next capital campaign, which will be inevitable.

As to my own role, I'm probably reaching about the conclusion of my helpfulness to Caltech, although I want to stay involved as long as I can, and will certainly continue to support the scholarships—one particular reason being that I had the experience of having to work awfully hard to get through college. And I think a scholarship would help provide the time and the atmosphere that permits a student to achieve what he's here for. I would hope that my several contributions to Caltech will be remembered through their own history. And I think it much more important that the accomplishments be remembered rather than the proponent. It's been a fascinating life; it's really been a love affair for me these many years.