

Chapter 18

MARIE (HEBERT) ALBERTI

Berkeley, California

June 16th, 1996

VM = Vivian Moses; MA = Marie Alberti; SM = Sheila Moses

VM: This is a discussion with Marie Alberti in the Round House in Berkeley on June 17th, 1996. Marie, let's start with you telling us how you came to join the group.

MA: I always liked chemistry and as I took classes at UCLA in college then I began to like biochemistry more. I took a physiology class; the fellow was just so enamoured with Calvin. He said "This is the most magnificent scientist of our time and it's such a privilege to read what he has done" and he kind of detailed what he had done. This would be in about 1957.

VM: Who was that who said that?

MA: I don't remember. He taught Physiology 101 which I took as an outside my major class.

VM: At UCLA?

MA: At UCLA.

VM: Might be able to go and look it up, then.

MA: Well, you'll probably find it in 1957. I kind of had in the back of my head that if I ever went to UC Berkeley that would be a person. I met (*indecipherable*), a fellow student who was going to do a PhD here at Cal. So I came up to look for work and, of course, applied at several places, mainly to the Calvin group, that was my most interesting thing. It turned out when I was here that I interviewed with Dick Lemmon, who had an opening with Ed Bennett. There wasn't really an opening in the Calvin group and I didn't realise that we were going to be physically separated or even what I was going to do. Ed Bennett never interviewed me because it was done through Dick Lemmon. They talked about brain chemistry and I thought that's biochemistry of a sort so I felt that would be interesting to start with; at least I'd be in the group of

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Calvin. So, that's what happened. I came up then in the spring of '59 and I came up and started work July 1st, 1959 in the Donner Lab. At that time ORL was already gone, it must have been just a few months gone, because they were just talking of the knocking down of that area. And there was a door that was saved and people were having fond memories of this thing...

VM: Already!

MA: Yes...which was so new to me. The other group was down in the Life Sciences Building. I never got to see Calvin very much because he spent most of his time down in LSB or in the Chemistry Department, because we were a smaller group on the third floor of Donner Lab.

VM: So you never actually knew ORL itself apart from the photograph up there on the wall?

MA: No. I was happy to get those...I had those made, the big shot, for the (*Calvin*) reunion (*in 1989*) and was very happy to see what the thing actually looked like because I had never seen it.

VM: The people down in Life Sciences were the ones who had been in ORL.

MA: I guess that Ed Bennett had probably worked there; I think everybody was there, weren't they?

VM: No, no. There were people who were in Donner who stayed in Donner. It was only in 1963 when this building was built that they all moved into it. It was the ORL group that had to move down to Life Sciences. You didn't get to know the people down there very well, or not very fast?

MA: It turned out that Hiromi (*Morimoto*) and Ann Orme, which (*sic!*) were connected also with Ed Bennett, were down there because there was a room down there for them. When we had to do work together, then we would go down there for them. The rats were down there so whenever we killed the rats for the brain chemistry project we were down there. I could know that there was this other group down there no, but I didn't really get to know the people. I knew Ning Pon just briefly at that time, the graduate student that was there for 12 years or something...

VM: The record.

MA: I also knew his future wife (*Lynn DuBois*) because she was the illustrator (*for the group*).

VM: You really didn't get to know all these people until everybody moved together into this building.

MA: That's true. And then a lot of the shakers and movers were gone; a different group then.

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VM: What about the social occasions that the group always had.

MA: They were wonderful. I think that was one of Calvin's big ideas, people should get together socially so they would know each other and be able to exchange ideas. That didn't work so much exchanging ideas on the brain chemistry although I think maybe on the Ed Bennett level he interacted with the people. I did get to know the people through the parties. Martha (*Kirk*) and Ann (*Hughes*) continued having parties, probably twenty years worth of parties.

VM: You were a young married at the time?

MA: Yes, a young married.

VM: You were free and could do what you liked.

MA: That's true then towards the end of the sixties decade I had children and then I was only working part-time and that took me away from the group.

VM: In your early days with the group, you actually did mix socially with a lot of the people, did you?

MA: Yes. Not as much as the people who all went camping with them. I didn't really know a lot of the people.

VM: You didn't go camping?

MA: I never went camping with them. I guess I just wasn't into all this really physical camping, although I got into it later and did backpacking and that.

VM: In the light of all that you have done since then, in particular in setting up the Calvin Reunion arrangements in — when was that? '89?

MA: In '89, January of '89.

VM: What was the occasion?

MA: I think Dick Lemmon and Marilyn know it better. There was some discussion about how much older Calvin was getting and how many years he still had left to be able to appreciate a get-together. I came into it because I was the treasurer of the Biodynamics Connection, which is something that we formed for keeping together the alumni of the people that were in the Calvin lab. I was really the only active remaining member because the Connection, after Calvin left and was no longer director, really didn't have any activities or any meetings or anything. I was stuck with some money, it was several thousand dollars, it was no small amount of money. When I heard about the reunion, I said "let me get in on this and let me spend the money". What better purpose than to have a reunion of the group that the committee

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was designed for; the Biodynamics Connection was designed to keep these people that had worked together (*in touch*).

So I knew some of the names because they would appear in my book as having paid their \$5 or \$2 or something.

VM: It was \$5; it was very little.

MA: And that was a one-time \$5; we had several hundred members, maybe 300 or so. We still have all the records of that if anybody's interested because I was the treasurer and I had the records. In fact, every once in a while I still have to file an income tax thing to say that the club no longer meets, defunct, no money, no income, no expenses.

VM: Talking of records and the saving of artefacts, I remember when I came here a couple of years ago looking for things, you were actually the person who had saved stuff.

MA: Well, when Al Bassham retired, his whole group then disintegrated and all the stuff that he had here was left. People that moved into his area would open drawers and find things. I was the one that was kind of the watcher of radioactivity in the building and some of these things were radioactive.

VM: Oh I see: it was in that capacity that you got into it.

MA: I was in that capacity that I got into it. This was in 350B, the bench that was occupied by Al Bassham people for a very long time. On the bottom was as large stack in several drawers, was a bunch of chromatograms. And some of the radioactive chromatograms, of course, being carbon-14 they are still radioactive for zillions of years. I had to dispose of those. But the films of those were in there also. So I got together with Al, and maybe some other people but mostly Al, to determine which are the important pictures that were left from that era. I wrote on all the films what they all were, just so that there would be some memory of this. I thought that the films that made the photosynthesis pathway might someday be of interest to someone. We saved them and kept them kind of in chronological order that made some sense. When we had this reunion, we pulled them out put them on the wall so that people could see the history.

VM: You've still got them?

MA: Oh yes; I've still got them.

VM: Have you got large numbers of them?

MA: Maybe twenty, thirty maybe. I think they are in three boxes.

VM: These are the critical ones that you pulled out.

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MA: Determined by Al because I figured that any of work I saw it going on...but I never did any of it.

VM: A lot of the less interesting ones, presumably, were just discarded.

MA: Yes. Things that were like duplicates, things that didn't work, the old stuff.

VM: When I came two years ago looking for these things, you also knew where the other bits and pieces were, some of the old Geiger counters and the lollipops in that cabinet...

MA: We did find some of that stuff. Every once in a while I find something odd and I put it in that case up on the second floor (*an old wooden bookcase with glass doors opposite the elevator on the second floor*). I think that odd stuff should be saved.

VM: That's all that is left of the good old days, is it, what's in that case?

MA: Yes, I think so.

VM: There's no hidden stock anywhere else.

MA: No, I don't think so.

VM: Not much, is it?

MA: No. A lot of the things like the radioactive machines and growing areas, were all contaminated so we had to get rid of a lot of the larger things, they were contaminated with carbon-14.

VM: It wasn't worth the expense of decontamination.

MA: Nobody wanted to use them in the future.

VM: OK — so to come back to your own role in the place; there you were in 1959 working in Donner...

MA: Right.

VM: ...and what were you doing?

MA: We had several different things that were going at that time. There was tracing the path of adenine in the body. This is kind of a weird thing, we would take a whole mouse and throw it into a blender (I thought that was pretty cruel but it's very quick but we wanted to have...)

VM: A live mouse?

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MA: Well no, I think we killed it first, but it was almost like a live mouse. We would skin him and look at the skin, and the liver and various organs separately to watch how radioactive adenine moved around the body. Ed Bennett can tell you a lot more about that; that was one thing we were doing.

And then there was a new collaboration that had been going on for a couple of years with Dr. (*David*) Krech and Dr. (*Mark*) Rosenzweig in the Psychology Department. They were growing rats and training them in mazes and they wanted somebody to dissect out their brains. Well, this involved a rat. Now a mouse is a little thing that's not so bad. In fact I think I had Ed Bennett kill those mice before I threw them into the blender. But these rats were kinda cute looking and were bigger things and I didn't think I would be able to kill them. So I had to kinda come to terms with that. My husband said, "well, if you want the job, you are going to have to kill them, because that's part of your job. Just think about it that they would never be there except that they were bred to be in that experiment". So I started thinking of the rats as chemicals rather than as live animals and I got over the point of having to chop off their heads and take out their brains. That was my job for many years. I got to be quite expert at using a little T-square on the brain to cut out the same point (*each time*). We find repeatable, although small, differences in these trained versus isolated animals, maybe on the order of 5%. Although there was some variation between animals, we matched up brothers into two conditions and then found repeatedly that they had thicker cortexes. That was determined by the weight of the piece I took out (*from the brain*).

VM: Apart from Rosenzweig and Krech who were in the Psychology Department, in the Bio-Organic Chemistry Group (the Biodynamics Group as it later became), the people were Ed, you and...

MA: Hiromi Morimoto and Ann Orme. They were doing more of the chemical part of it. I would do the dissecting and freeze the brain sections; they would then homogenise the brain sections and test them for chemicals.

VM: You worked in Donner and they worked in Life Sciences. So you had this to-ing and fro-ing.

MA: We also did some acetylcholine assays; I was doing that with the frog muscle, to watch the tension of the muscle with acetylcholine. I was doing some chemical assays too.

VM: Of course, you went to the Friday morning seminars like everybody else, did you?

MA: I can't remember them before they were in this building. I don't remember them impacting us over at Donner Lab.

VM: I wasn't here just at the time when you arrived, that was the two years that I was not here when I went back to England then returned later. Before ORL moved, they (*the seminars*) had been in the Faculty Club, in, I think it's the Lewis-Latimer Room which is a room with a movable divider and they made just one big room out of it,

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with a table, just like the table in fact...(in the Round House). For posterity, I might say that I am sitting in the very Calvin position at this moment at the end of the table (here in the Round House). You remember: Calvin always sat at this corner of the table and he did that in previous (seminar) rooms also, the same corner of the table as it was. You don't remember having gone into those (seminars) at all?

MA: I just don't.

VM: You would have met the rest of the group there, I should have imagined.

MA: No — because I never really knew what all they were doing in their research so I don't think that I did. Which was probably too bad because I would have known more about what was going on and have been of more help to you.

VM: When it came to moving into this building and the design for this building, as someone who had never known ORL, were you party, did you hear the discussion that went on with respect to this building, this round building?

MA: From what I understand, there was a centre table, which everybody worked around the outside of, and that was part of the discussion for designing (the round building). I don't think the building was round to start with, I think it was half-round. One day, somebody says why not make it all round!

VM: I think that was the architect who felt for some reason thought it would be difficult or too fussy with the building this size to have it in two styles. We just took a look at the big white table, it's very cluttered nowadays, with stuff, and people obviously don't use it in the same sort of way at all.

MA: There was a big round white table). That has been gotten rid; that was on the second floor and I sort of thought that was also involved with (the original group).

VM: No, no, no. That was the second-floor version of the big white...the big white table was, of course, not a table. It was a set of drawers and cupboards which had a top made for it.

MA: It's what we have on the third floor (of the Round House).

VM: That's right.

MA: I just redid all that. You know, I decided those drawers were full of stuff that nobody ever used and I have gone through all the drawers, taken out all the stuff that nobody wants, some of it's thrown away but most of it's stored away because I don't throw things away.

VM: What sort of relics did you find in that?

MA: Some funny old caps and bottles that fit together in strange ways.

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VM: We might have a look at them: I might recognise some of them. There were lots of these micropipettes, these lambda-pets

MA: They are throwing those away now.

VM: Nobody uses them

MA: Nobody wants them. I wouldn't do it but somebody else did. I said I think they want them thrown away but I won't do it because I remember they were a dollar a piece. There was \$10,000 worth of pipettes there.

VM: They were very valuable things at the time.

MA: Now we just do it all by Eppendorf. We discard the tips. I still have a bunch of those...

VM: Those lambda-pets?

MA: Yes because I won't throw them away.

VM: I should think not. The big white table, the original one, is the one on the third floor now. The one on the second floor was (*a round white table*) just made for this building. It was never...

MA: Dick O'Brien probably made it.

VM: I don't remember — or whether it was purchased; that I couldn't tell you. But it was never the scientific focus the way the other one had been. The other one was built so they could lay out chromatograms. That's why it was the sort of thing that it was. The other one was simply a coffee table, the central focal point for the second floor. Since the second floor was the middle of the three floors, people had coffee on that floor in the days when you could have coffee in the lab. Nowadays probably you can't have coffee in the lab.

MA: No we can't; we have our separate rooms.

VM: I'm not sure that everything is progress but that's what happens.

MA: Yeah. There isn't the discussion that used to go on. We would all gather and everybody would talk. We got to know people.

VM: That was the idea and that's, in a sense, what underlay the design for this building — was to have a focal point like that.

MA: There were often scientific discussions that went on at the coffee or they were discussing the next trip that they were all going to take.

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VM: You, as someone who'd not known the original, you found that this design, this round building, was an effective way of organising a (*indecipherable*).

MA: Oh yes, I liked it a lot. I have lived in many different areas. I have lived on the first floor, second floor and third floor.

VM: You used to occupy a small room, didn't you?

MA: Yes, we had 136, with Hiromi. I have had a couple of benches on the second floor and now I'm on the third floor.

VM: As a user, how do you find the design of this building as a place to work?

MA: I like it a lot. I have heard a lot of complaints, certainly the fireman when he comes here has tremendous complaints about how it's all one big open space with a central stairway that a fire could just move from one lab. to the other. We have been under restrictions that we have to close off the halls and shut down that central winding stairway and we just haven't done it. We claim that we have no money, which is true. So, we just don't do it.

VM: They really want you to close it in?

MA: Oh yes. We were threatened of closure of the building until we got it walled in. We just didn't do it, we said we don't have the money and we will never have the money because we like it this way. It's really great: I can just run down and peek down and see if the Xerox is free, see if somebody is on the second floor.

VM: It's nice to know that thirty-odd years after it was designed that put into practice and, as it were, the management and the style inside the building has no doubt changed a great deal, the design is a useful one and you enjoy using it.

MA: Originally they wanted us all mixed up so I wasn't near anybody that I worked with. I was near Rapoport people or near some of the cancer people — just any other person, they would never put two people together (*who were working in the same area*). As the years went by, groups wanted to be more together because they got so specialised that they couldn't talk; the physicists and biologists parted ways. And so now we are much more clustered, not totally, but much more — there are little wedges, the Hearst people, and there are the (*indecipherable*) people over there.

VM: But you are still close enough so that you know one another well?

MA: Oh sure and being around so long I know everybody.

VM: Is there still a rapid turnover the younger people, transients through the lab.?

MA: What I see is a tremendous number of undergraduates who come in very short hours, often work nights and weekends, so I don't see them. I'm not here during the (*day??*) nights and weekends; I tend to work in the morning and then leave in the late

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afternoon and they tend to come in at night. But these people are only here for a semester or a year.

VM: Just doing an undergraduate project?

MA: A large number. The postdocs. most often stay for two years. We have a lot of postdocs. now because with funding being as it is we have very little staff. It's mostly graduate students or postdocs. or these undergraduates.

VM: There's lot of throughput of people coming through the lab.?

MA: Sharing space even. It isn't as bad as over at UCSF. We were over there the other day, collaborating with somebody, and people had just one little section, about six feet of lab. bench, that's all they had. They had a little desk somewhere and somebody else was working right behind them.

VM: In this people still occupy the space as originally intended?

MA: Unless they share the space with an undergraduate.

VM: They have this eight- or ten-foot bench plus a writing desk...

MA: ...and then a rack behind them.

VM: Do you find in the building now that people mix socially well?

MA: Yes. That still goes on even though there is rapid turnover and much more pressure, it seems, to have to do a lot of work and less opportunity to socialise because we don't have the parties when people get together except Vangie putting them on in the building.

VM: Sorry — that name Vangie?

MA: Vangie Peterson is our building manager.

VM: I don't recognise the name "Vangie" but you just said "she" so I know it's a woman.

MA: "Evangeline". She has been working for the lab. at least ten years, maybe twelve years. She's the building manager and takes on a lot of responsibility including doing all the social things.

VM: Do you have parties when people leave?

MA: No, within the (*individual*) group they do but there're no more big parties. Maybe a retirement party.

VM: You have a Christmas party?

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MA: We have the Christmas Party. We have a Halloween Party. We had just a spring party the other day, maybe two weeks ago. Whenever Vangie decides to put on a party. There are no more parties at people's homes that the whole lab's. is invited to. I think the Kim group does things where they go off camping; the Hearst group goes off camping for a weekend or something.

VM: What about seminars in here? Does the Friday morning occasion still remain?

MA: I think it happens once a month and people tend to go to the times when their group is there. I don't go on a regular basis anymore.

VM: So the population in the building is nowhere near as coherent as it used to be?

MA: I would say that's true. Not as coherent. I think within (*individual*) groups they do get together; when somebody passes a prelim., then that group gets together. It used to be you would invite everybody. Oh, somebody passed a prelim. and the whole building would be involved. Now it's only the Wemmer group, the Sauer group get together.

VM: The director of the lab. doesn't occupy the same role as Calvin did when he was director.

MA: Oh no.

VM: That clearly is what makes the difference.

MA: His style of directing is different.

VM: So you've seen actually a lot of changes.

MA: We had (*George*) Pimentel as director for a while.

VM: You have been here for 36/37 years; something like that?

MA: Since '59; yes, you're right.

VM: That's a fair time to see things happen. Perhaps it would be invidious to say whether things have got better or not because that's not really a fair question.

MA: It's just the change. When you see what has happened in industry, in the world I think we still have a very special place here. People leave, having gotten their PhD or done a spell of postdoc. here, and we talk to them later: "Oh gosh; I didn't realise what we had when we were there — it was so wonderful". A gal that postdoced with us went back to Spain, went back to the same school she was in, but, of course, now she was in there as a professor and she said that she didn't realise how it was until she came to our lab., how the people helped each other so much and opened their doors and there was sharing.

VM: And that was recent, was it?

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MA: She just went back last November and then she wrote me this in February.

VM: That's exactly the same sort of thing that I found when I first came in the mid-fifties and I think that lots of foreign visitors who came here found that. We never knew whether it was this place or just America.

MA: She was a little bit nostalgic, when she was here, for her university in Spain. But, then she got so used to...she never even had spoken English until the day she arrived here; she knew it as a language, as a study language but never talked to someone who could not revert to Spanish. She had a (*indecipherable*) and picked it up very quickly and made lots of friends throughout the building and did a project that there wasn't anybody really to guide her for. It was a different project than her graduate student work, new field, molecular biology, she was a biochemist and protein chemist. She asked people all around to help her and got so much help. When she went back to her same university she said that everybody closes their doors.

VM: It's a different style of doing things, I think; it's part of the culture.

MA: She says she is going to try to bring our spirit to her university.

SM: I don't know whether I missed it earlier, but do you have a job title?

MA: Research Associate, Principal Research Associate.

VM: One of the things I have noticed, just in the last few days since I've been here, is that in the building there are a number of elderly people knocking around, wandering in and out. Calvin now lives here; Marilyn is with him; John Otvos; people like Dick Lemmon and Al Bassham and Ed (*Bennett*) come in for coffee. Do the youngsters have any idea who all these people are?

MA: No, I don't think they do. When we had the reunion, we had it just for the Bio-Organic Group, and the people presently in the lab. (at that time — 1989) were not invited. But they saw we were inviting; we told them what was happening and we had posters all around the building and I put up one poster that had dates and we copied some pictures from the LBL files and put up this big older poster. They looked at it and said "My goodness. This was before I was born!" They couldn't believe that all this was going on with such a history.

SM: How does Ning fit into this as far as people are concerned?

MA: He is in the Hearst group now, so I work with him. He was in the Bio-Organic group in LSB and I always just knew who he was because he's such a friendly character and fun to be around. He and Hiromi were good friends and since I worked with Hiromi I would see Ning. I didn't really know him personally at all 'til he came now. He's a retired professor from (*UC*) Riverside and just works here for free. He comes when he wants to and doesn't come when he doesn't and contributes a lot of information from antiquity — this is how we used to do it.

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VM: Ning must be the longest serving scientist, as it were. He came in about '53 or '54 as a graduate student and therefore he has been here longer than you have, not continuously but at least in the building. Calvin is no longer active as a scientist so Ning is the...

MA: Marilyn, too.

VM: She's not a scientist. After Calvin, she's, as it were, the oldest inhabitant. She joined in him in '48.

MA: In '48? That's about the time Ed Bennett came too.

VM: Something like that. Some people have been around for a very long time! That's quite true.

So you say the youngsters were surprised. They know it (*the building*) is called the Melvin Calvin Laboratory? Did they not know what that meant?

MA: Sure because of the Calvin cycle in photosynthesis would have been studied.

VM: They knew about that?

MA: Yes, I'm sure they would know that.

VM: They realised that this building was in some way...

MA: We had the pictures up. We had pictures of the ORL; they don't know what it is but they know there's some history. And then the picture of Calvin getting his Nobel Prize hangs in the reception.

VM: Tel me, as someone interested in relics, do you remember, you were here more or less at the time, do you remember that big working model, that never really worked properly, of photosynthesis, the big thing with the screen and the flashing lights that used to be by the backdoor of this building?

MA: And the panels on this wall here. It never worked very well.

VM: What happened to it?

MA: I think they finally took it down. Vangie might know. I can ask her; she's not in today. She might have been involved in taking it down because finally people decided they couldn't get it working.

VM: No, no, they couldn't. It was before the days of electronics and it was all done on microswitches or whatever and it was a right pain in the neck.

MA: I have seen it work. It was working.

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SM: Was that the thing that dispensed a sugar lump at the end?

VM: It was supposed to dispense a sugar lump...

MA: I didn't see it dispense a sugar lump. I just saw lights go around the cycle.

VM: I don't think anybody saw it dispense a sugar lump. The thing originated with the Brussels World Fair of 1958...

MA: Yes that's what I...

VM: ...and it was designed for that and I was part of the team. I can't remember what I did: I wrote some of the programme notes or the paper that went with it or something like that. It was designed to show the system of carbon dioxide going in, following the carbon...

MA: I have seen it work with the lights so I know that it at least partially worked.

VM: The idea was that the carbon atoms would go in and every so many carbon atoms in a sugar cube would come out of the dispenser at the end. This was to have been either C&H — or Spreckels sugar, I think it was. It was to say on the wrapper in umpteen languages this sugar lump represents the sunlight falling on so many square whatever over such-and-such a period.

MA: How wonderful? Did it dispense sugar?

VM: I've never seen it dispense sugar and I have an idea that it never did. Something — I'm not quite sure — I have an idea that something went wrong with the sugar manufacturers and the contract got blown and they never actually delivered the sugar.

MA: So it never dispensed it because there wasn't any sugar!

VM: Sure; I think that was part of the problem but that was the original idea. It was actually a clever idea and, had it worked properly, it would have been very good. But you're right: it stood there for a long time and eventually it went, it disappeared. You know, that there is an archive, a warehouse down in Emeryville belonging to LBL. I went down there a couple of years ago and there is surprisingly little from the Calvin group down there; in fact, very surprisingly little.

MA: There used to be tons of (*relics*) from gross purchases, where you get 144 for the price of 100 and then you only use about 20; the rest of them are all down there. We had toluene that no one would ever want anymore and we had to get rid of all that stuff.

VM: There were only two pieces of equipment. One of them was that very large automatic counting machine that Al used to use.

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MA: That's something from the relic times.

VM: That's right. That's something that I and Karl Lonberg designed, Al modified and the remains of it are down there.

MA: Do you know what I found that belongs to that? The plastic.

VM: Ohm the mylar.

MA: The mylar.

VM: Do you still have it?

MA: No.

VM: That's something you threw away!

MA: It was just a roll, and it was that wide, and I said that's what used to go into that monster (*the appellation for that automatic radioactivity counter*).

VM: That was a 5-inch roll of mylar, 5/5-1/2 roll. We had special ordered the mylar. (...*indecipherable/confused; too many people talking at once...*) We had two sheets of mylar wrapped up in brown paper.

MA: You would stick these little leaf-shaped things...

VM: You watched them do that?

MA: Yes, it was wonderful. It would just go at a rate, everything was going through. You would stick them in and you could see...It was wonderful.

(This exchange refers to cutting the chromatogram spots from the papers [the "little leaf-shaped things"] and encasing them between two layers of very thin mylar film for transport between two Geiger counters. Details can be found in V. Moses and K.K. Lonberg-Holm: "A semi-automatic device for measuring radioactivity on two-dimensional paper chromatograms", Analytical Biochemistry, 5, 11.)

VM: That's the height of my inventive skill.

MA: I wish we had a video of that. You know, we didn't have video at that time. It would be fun to watch that operation going on.

VM: It's all part of the record, and it might just as well go in now as at any other time. We once had a competition — well, let me back track. In order to use that machine we had actually to cut out the radioactive spots from the paper, separate them, and we once had a competition in the lab. one afternoon as to which was the quickest way to cut spots out. There were three people, and I was one and Martha (*Kirk*) was another, and I don't now remember who the third person was. One of us used a pair of scissors

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and cut it (*the spots*) reasonably carefully — they were marked out on a piece of paper. We made a series of fake things on bits of filter paper so that everybody had the same problem. Somebody else used a scalpel, as it were, to slash it out, and I used an engraving tool; it was a thing which vibrated a point for engraving metal...

MA: You had to plug it in?

VM: You had to plug it in...you sort of bashed it around the thing (*i.e. the spot*) and it just sort of destroyed the paper and you were left with the spot.

MA: But it may have made edges.

VM: I don't remember that. Anyhow, we had this competition; to tell you the truth, I don't remember who won the competition but it was teatime one afternoon no doubt at the big white table.

MA: I had cut out those spots and put a little tang on them and hung them up on a little tray and collected into a little vial...

VM: ...eluting them.

MA: Eluting them.

VM: That was a technique invented by Alex Wilson about five years before you joined the group. We met him a couple of weeks ago in Tucson and he told us about it then.

MA: I remember there was an apparatus, but that's long destroyed, that you would fill with the appropriate elutant and then watch the bottle.

VM: I must actually come round and see what sort of relics there are because I am not collecting relics at this time, but I think we might well be collecting photographs of relics so that we can use them in whatever we write up in addition to pictures of people — pictures of some of the equipment.

MA: You probably won't find to much.

VM: Well, whatever there is. The publishers will never let us use hundreds of pictures anyway.

MA: That's true.

VM: But we may be able to get a few pictures of this and that.

We talked before that you were responsible for doing most of the organisation for the Calvin reunion in 1989...

MA: Not much, just part.

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VM: A significant part.

MA: I think Marilyn did most of the organisation.

VM: You've been giving us goodies, either to keep or to borrow.

MA: One of the things, we had this money I told you about, several thousand dollars, and I wanted to spend it down. We were afraid to overspend it because there was no source — there wouldn't be anything more, so we wound up with about \$700 left over which we then bought (you can see it right there [*i.e. in the seminar room*]) we bought that television that we can play — it's got a VCR in it. We can play tapes for teaching people because now all learning things are coming out in tape form. This is a gift. You can see on the back of that a sign that I put on it: "This is a gift from [the Calvin Reunion — not the Reunion but] the Biodynamics Connection".

We found out who was coming to the reunion and I looked up the years they were there so this is the chart (*which is really a timeline for the people and the period of their stay in the lab.*) People then knew who was in the lab at the time they were. This was afterwards: "Currents" put out a whole page of the "Currents" pictures (*about the reunion*).

VM: Is this a lab. publication?

MA: Yes; "Currents" comes out once a week by the lab. They sent down their photographers just for the afternoon part of the party (*i.e. the seminar presentations*). Several of the people in the group, like Dick Lemmon, were taking photographs on their own. We hired with the Biodynamics Connection money a video-taper. When we had the programme we had it professionally videotaped by the lab. out of our costs.

VM: Those are the tapes that you lent me to be copied?

MA: That's right. Those are the tapes of the afternoon meetings of Calvin with the different aspects of his research. In the evening we hired somebody to audio tape (*the remarks*). Unfortunately, the audio tapes are not too good. We audio-taped the proceedings. We showed a bunch of slides of the group get-togethers and then had peoples' reminiscences. That was totally off-the-cuff and the people were all over the room and they didn't talk into the microphone very well. So the sound was difficult to hear. Very soon after that, I started listening to it and typing it up as best I could. Marilyn sat and she and I would take turns. She would listen to it and add what she thought might have been said.

VM: And those are these transcripts here.

MA: Those are the transcripts and this is just a list of the participants.

VM: That's very useful indeed. I'll get these tapes copied and at least, even if they're not totally clear, I can use the transcripts to help me understand.

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Lastly you have given me something which describes some of your own work, you said from about 1983..

MA: From '83-'90. Well, I still am working for John Hearst but the project I was involved in was sequencing all the photosynthesis genes which happen to fall in a cluster — lucky for us. We have that cluster isolated. It's about 48 kilobases It's pretty long, and this is of the photosynthetic bacteria, *Rhodobacter capsulatus*. We even had T-shirts made at one point, all the people that were working in the group; we called it the "Photosynthesis Cluster". This is the thing I was sequencing. I was working my way along the gene, all the genes. We have about 44 genes identified on that cluster that we sequenced.

VM: So you've come a long way from chopping the rats' heads off to sequencing genes. Well, the last thing I would like to...

MA: I was glad to get into photosynthesis. Remember I told you that I came here with my ideal to work on photosynthesis. When I was handed this project I just said "whoopee, yes I will do this". I had to learn all this molecular biology which I didn't...which had come in since I was a chemist. I did.

VM: I would like to thank you for all the time you have spent with us and all the material you have provided for us to look at and say that I still would like, when we have a few minutes, to look at whatever the artefacts are that remain and maybe take some pictures of those as memories of the good old days and we'll come back and see you within a few days or so and fix a time to do that.

MA: OK.

VM: Thank you very much — and you have time for your meeting and we for ours.

MA: Thank you.