

Chapter 38

DUNCAN F. SHAW (with Elizabeth Shaw)

London

November 25th, 1996

VM = Vivian Moses; DS = Duncan Shaw; ES = Elizabeth Shaw

VM: This conversation with Duncan and Elizabeth Shaw is taking place in London on November 25th, 1996.

Duncan, can we start by finding out from you what your pre-Calvin career was and how you came to be in Berkeley?

DS: Well, I started off going to Manchester as an undergraduate; that was from 1948-1951. I did my national service in the airforce for the next two years, then went back to Manchester as a research student in '53 and spent the next three years working with Professor Barker on carbohydrate chemistry.

VM: Was this Barker in Birmingham?

DS: No, Geoffrey Barker in Manchester.

VM: OK — because there is an Alan Barker in Birmingham.

DS: When I was in Manchester, Geoffrey Barker wasn't a professor even; he was elevated at a later stage.

VM: So you were a carbohydrate chemist during your research career?

DS: Yes. I was working a specific branch of carbohydrates, really; it was trying to work out the conformation of ribose in particular but carbohydrates in general, the way in which periodate oxidised the rings.

VM: That was your PhD period?

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DS: Yes. So in '56 I finished. During the last year, Calvin visited Manchester and gave one of his talks. I was looking for something to do, like to go the States for a postdoc., and being involved with carbohydrate chemistry and since he had just given us a talk on the carbohydrate cycle, photosynthetic cycle, I was interested in that. What fascinated me was that I thought that he had sorted it out the carbohydrate cycle and, as I was interested in physical-organic chemistry, I thought it would be interesting to look at the photographic — not the...the photochemical aspects of carbohydrates and how the light energy was tracked. I talked to Calvin, having been introduced by my supervisor...

VM: While he was here?

DS: ...while he was in Manchester during the course...on his tour through the lab. he'd stopped and had a word...and I told him what I would like to do. He said "OK, apply for various scholarships." He mentioned the NATO fellowship and the Commonwealth Fund fellowship. I applied for those and I got the Commonwealth Fund fellowship. I wrote to him saying I've got this, this is what I would like to do and would he take me into his lab. The letter came back "yes", so that's how I got there. We got married just before we went.

VM: Literally just before you went?

DS: A few days.

VM: How did you travel?

DS: On the *Mauritania*...

VM: And then across country?

DS: ...and in New York where we were met by the Commonwealth Fund Fellow people, topped up with money in the excellent way that they do, and then we got a train across country, first from New York to Buffalo, then Buffalo to Chicago and then the California Zephyr from Chicago to Oakland.

VM: This was essentially a non-stop journey or did you stop in these places?

DS: We stopped briefly in Buffalo for a couple of days to look at Niagara Falls and to meet some distant relatives of Elizabeth's who were living in Toronto. We didn't really stop in Chicago, it was just a change of trains. We spent one day in Salt Lake City.

VM: Do you remember your arrival in Oakland? Were you met?

DS: We were met by the senior lab. technician...

VM: Paul Hayes.

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DS: Paul Hayes; he met us off the train and took us to Calvin's house where we were looked after for two or three days until we got ourselves an apartment.

VM: You, of course, had already met Calvin in Manchester.

DS: Very briefly, yes.

VM: How did he strike you as a personality when you first...well, you would have first seen him at the lecture, would you?

DS: I was impressed by the lecture, of course. I didn't form much of an impression during the brief word I had with him. He was friendly enough. He was certainly very friendly when we first got there and looked after us well. Took us up in his car for the weekend in the hills with his children and was most helpful.

VM: And then came the day when you went into the lab. This was presumably not the day you arrived.

DS: No, perhaps the day after; probably the day after.

VM: Can you remember what went on, then, when you first went there?

DS: I went into his office certainly and what happened there was, perhaps, a bit disappointing, looking back on it as far, as I was concerned, disappointing for myself more than anything in that he sort of said "OK, you came here to work on the photochemical aspects but we've got this problem and your background in carbohydrate chemistry and periodate oxidations would be very suitable to solve it. Would you like to do that instead?" I suppose I was interested but it did, in fact, turn out to be a bit of a red herring.

VM: What was the problem that he wanted you to work on?

DS: The problem was that Ozzie, Osmund Holm-Hansen had done an experiment, which was alleged to be done in the dark, and he'd found radioactive PGA and this was surprising. The idea was that I would use my carbohydrate chemistry to chop up the PGA and find out where it was radioactive. Having started doing that, I then started to break it down. I had a longer talk with Ozzie to find out just what the background for this experiment was. I have to say I was rather disappointed in that it had been done once; there had been no controls and I wasn't convinced that the thing was really done in the light when I heard how he had done it. For example, he held it up to the light, to the dark light in the darkroom and poured the alcohol in to stop the reaction. How do you know that light couldn't get in at that stage? He just assured me that, oh no, it wasn't bright enough.

I repeated the experiment, taking rather elaborate steps if you remember...I don't know whether you do: I had a bottle on my bench wrapped around with black insulating tape, so that everything could be done in the dark. I injected the alcohol into, hot alcohol, into it in the dark so there was no doubt there was no light in it. The

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amount of radioactivity I got fixed was so small, it was almost negligible. I did actually try to find, you know, analyse it and find the radioactive materials in it but the levels were so low that the chromatogram showed virtually nothing.

VM: How long did you spend doing that?

DS: I suppose it was about three or four months.

VM: So you learned all the techniques in that time.

DS: Yes, I used the chromatography, and the breakdown of the radioactivity and the counting equipment and so on. What I was disappointed more than anything was that instead of doing what I feel I should have done — this is what I came to do, this is what I'm interested in — and, of course, that would have been from a career point of view it would have been getting into photochemistry at an appropriate time. I ended up falling off a red herring, I think! I can understand Calvin wanting this done, so I'm not blaming him at all.

VM: But that was for four months.

DS: That was for about four months.

VM: And then what?

DS: Then there was another problem cropped up which was one, I think, that Otto Kandler brought in where he questioned whether...No; he had done some cyanide poisoning experiments. Instead of stopping the reaction with alcohol, hot alcohol, he stopped it with cyanide and found that he got a different chemical. This might have been one of the key precursors of constituents in the cycle. The idea was that I would work on that, to find out whether that was the case. In fact, it was Bob Rabin that came up with the idea that this material, hamamelonic acid, was the one, the chemical...it was suggested was important. Bob Rabin sort of came up and said that well, this had been made, it has already been found by a chap in Germany who's got a sample; let's send for some. Calvin did that. In the meantime, I did the experiment with...was it Joan Anderson?

VM: Jan Anderson.

DS: Jan Anderson, working with her, where we did the cyanide poisoning experiment but used radioactive C¹⁴-cyanide. We did actually fish out some hamamelonic acid which we identified through using the sample from Germany. In fact, the radioactivity was from the cyanide and not from the CO₂, so effectively knocking Otto Kandler's suggestion on the head. So effectively I spent my time sort of following up two red herrings. It was necessary to follow up but they weren't quite the exciting thing that I thought I was going to get involved with.

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VM: Did you not find in the context of that lab. where everybody, it seems to me looking back on it, got involved in everything that they wanted to get involved with, that you couldn't have done photochemical work as well?

DS: Not really, I don't think, because, as I found afterwards, there wasn't any real photochemical work going on. Calvin actually, surprisingly, didn't have a great interest in that end of it, as far as I could tell. Who was the Japanese?

VM: Power Sogo.

DS: Power Sogo was working with electron spin resonance. I think he was the only one who was working on aspects that might have been related to photochemistry. He was working in a different...he had his equipment somewhere else. Although I knew Power Sogo was around, he was the only one that was working on that aspect. So, logically, if I had struck out and said "Yes, I wanted to work on the photochemical bit", I would have ended up working with Power Sogo, which might actually have been more along the lines that I was interested in, although I don't know that it was ever a major interest of Calvin's.

VM: When you had originally talked to him in Manchester and said you wanted to work in the physical energy area, he'd gone along with that?

DS: Well, I don't know; it's a bit difficult to say. The conversation I had with him at that stage was a very brief one. We certainly didn't discuss technically what the options were and what the possibilities were. I think the problem was just mentioned...looked interesting...I would like to...

VM: Did you get any publications out of the work you did there?

DS: The work with Jan Anderson was published.

VM: You had a bench, presumably, in ORL, did you, in the big room? I don't remember where you were.

DS: I was within a few feet of the hole in the floor where the original cyclotron sat.

VM: Do you remember who your neighbours were in the room?

DS: I think that Ning Pon was behind me. Immediately behind my bench was a big rack for attaching apparatus to, and I think he was on the other side of that rack was my recollection. Across the bench in front of me was Karl...

VM: Lonberg.

DS: ...Lonberg. I think that was the layout in my bit of the lab. I think they were the only ones that actually worked with benches in that part of the lab. although there were other things going on, there was a big UV machine, recording UV machine, in the

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same room which a variety of people used. There was a big table in the middle around which people gathered for coffee.

VM: You were in that room with the big table in the middle?

DS: Yes.

VM: My own memory is that there were more benches in it than just three but I've got a vague memory. Later we can look at some pictures which may resolve that particular point. How did the style of working in that lab. strike you compared with where you'd come from in Manchester? Different? Same?

DS: I think there were many similarities. People were milling around talking and you could discuss almost anything with anybody so you could find out what was going on, what other people were doing. Many of them were using common techniques and so there was a lot of exchange of information on the techniques and, in particular, I was interested in Helmut Simon's experience of measuring radioactivity. The standard method in Calvin's lab. was do a chromatogram and then put a counter on top of the spot and count it which was a quick and effective way, but a fairly crude way of measuring. Whereas Helmut Simon had a very sophisticated way where he converted the chemical into CO₂ and counted it in a very much more accurate way. I went over with him once and watched him and learned a little bit about his counting techniques. So that was a good exchange of techniques and so on.

VM: Had there been that sort of thing in Manchester?

DS: Oh yes, I think so.

VM: So this whole style of doing things was not unfamiliar to you?

DS: No, it was quite similar. People talk about their chemistry and what they were doing over coffee and swap ideas.

VM: What about the lavishness of the support in Calvin's lab.? Was that a novelty?

DS: Not...I think he had quite sophisticated counting equipment which seemed to become available as soon as it was wanted but since I hadn't been doing any radioactive work in Manchester, and I don't think anybody else was at the time, we wouldn't be using that sort of equipment anyway. But Manchester was quite well equipped. I think there certainly was more money available there (*in Berkeley*) than we had had at Manchester and there was some quite sophisticated counting equipment became available. But then at Manchester I never felt the work I was doing was held up for lack of money, but perhaps the sort of thing I was doing didn't require large amounts of money anyway so I wouldn't have come across the problem.

VM: What sort of relationship did you think you had with Calvin as, after all, the leader of the group? What was *your* relationship? How did you seem him functioning in the group as a whole?

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DS: I think on personal relations I found him...he was easy going and friendly, no problems at all.

VM: Accessible?

DS: Yes. He took an interest and he would like to know how you were getting on, particularly the Jan Anderson experiments because, in a sense, his ideas were being challenged by the suggestion that the cyanide poisoning experiments had shown up this new compound so he was rather interested and, I think, happy when we found out that the hamamelonic acid came from the radioactive cyanide and not from the photosynthetic cycle. So he was interested in that. We devised a little modified bit of apparatus to enable us to stop the experiment very quickly in a way which the original set-up hadn't made possible. He was interested in that.

VM: How did you see his role in running the lab. or in being the inspirer of the work? Do you think he was or do you think...overwhelmingly?

DS: It's a little bit difficult to say there because I was coming to the lab. after the key work had been done. I imagine that he was a key inspirer of the original experiments and the work that was done. As I say, by the time we got there, working on the photosynthetic cycle, the bulk of the work had been done, we were tying up loose ends. I think there was probably not so much a need for inspiration at that stage because that happened. The work done was defending the idea which was done successfully in the case of the cyanide experiment.

VM: Did you get a strong feeling of "end of the project" while you were there?

DS: Yes, I think I did. I got the impression that he'd done the work, it had been accepted, it looked to be soundly supported, it stood up to the various attacks that were made on it, and there was not a great deal more to do along that line, I felt, which really was the feeling I had originally when I had heard Calvin's lecture. He'd more or less done it, I am sure I was wrong — there were loose ends to tie up, but the impression I got was he had more or less done it and that's why I felt it would be nice to go on to look at the photochemical aspects.

VM: Did it strike you when you were there that there was no great sense of where we go next in the group as a whole?

DS: I didn't detect that as a feel from the group as a whole. I think I felt that, that there wasn't a lot more that I would want to get involved with in that aspect of the work. Which is really why, when it came to having the option of continuing for a second year, I decided not to do that. I felt that I wasn't doing anything very exciting in continuing with that although the exciting work had been done before. It must have been really quite exciting, I think, during the early stages when they first found the PGA on the chromatograms and were chasing up the reaction pathways and developing the ideas. That must have been the exciting bit.

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VM: From a social point of view, what do you remember about life in that group? Were you very much involved with other people in the group or did you make your social life outside it?

DS: A mixture. We had good social contacts with Ozzie and Harriet (*Holm-Hansen*), we went off on weekends on two or three occasions with the group and had a good time. Helmut Simon, I think, was the other person we made quite good friends with. But, of course, there were other people that I knew from Manchester. Ian Bell, for example, who I'd been a PhD student with at Manchester, was working with Rapoport. We went camping with them and on expeditions with them as well. So we had a mixed social life, partly with ex-Manchester people. There was a Manchester person working at Stanford, we met; there were two other people working down in Los Angeles so at New Year we all got together. Another one in Vancouver. So there were lots of Manchester people on the West Coast.

VM: When you say "Manchester": Manchester chemistry?

DS: Manchester chemists, yes. So we had contacts with them but also with the people from the group.

VM: What was the social life in the lab. like compared to what you had been used to in Manchester? Was that also a vigorous social atmosphere there?

DS: I think there were...it was similar, I think. There were some differences, of course. In Manchester, most of the work postgraduates, most were not married and followed the sort of pursuits that those people do. By the time we got to Berkeley, I got married, most of the people we were working with were likewise married, so you had a different sort of social life with that different situation.

VM: But the postdocs. for the most part, maybe entirely, had no children at that stage?

DS: That's probably right.

VM: Some of the permanent people by then would have had, I suppose. So, we were free domestically in that sense...

DS: Yes.

VM: ...enabled us to run around a lot. Sitting next to me is Elizabeth. What was it like for you coming to Berkeley and being, as it were, on the periphery of the lab. but not actually spending all your days there?

ES: Well, I thought it was terrific when I first got there because I had no concept of what it would be like at all. I was just amazed, partly at the weather, I think, because we used to...You were talking about the social side and my recollection is that almost every weekend we used to go somewhere exciting. We went skiing in the winter and could come back to this lovely warm west coast afterwards.

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DS: We had some good beach parties. Who was the red-headed Swiss man?

VM: Utz (*Ulrich*) Blass

DS: Utz Blass; we had...I remember a beach party with Ozzie and he was there, a picnic on the beach with bottles of California wine, up north, somewhere near Drake's Bay, I think.

VM: Stinson Beach. I think I have a picture.

ES: I remember saying, "Oh, we'll go swimming" and being quite sure that, coming from Lincolnshire where the water is pretty cold, I would have no difficulty in swimming off San Francisco. But, of course, I was rudely awakened. I don't think I ever got in.

DS: You were put off, I think by people who told you that the current is too cold...

ES: ... and it was dangerous; I don't know whether it really was. So I never swam in the sea.

VM: Did you work while you were there?

ES: Yes. I worked. I had a bit of a difficulty in getting a job in the first instance but in the end I got one and I worked full-time.

VM: What was it like for you domestically, the American shopping scene and all those sorts of things must have been different from what you'd been used to?

ES: Mrs. Calvin took me shopping and I was going to buy about two eggs and things like this because I was newly married and had no idea about how to buy the right amount of things. She was ever so sweet and said "you know, really, I do think you'll get through six eggs". She sort of initiated me...was it the Co-op?

DS: the Berkeley Co-op, yes. Yes, I'm sure it was; she took you to the Berkeley Co-op, the first of the supermarkets...

ES: I had no experience with supermarkets at all

DS: ...where you trundled your trolley full of goodies out to the car park. Something like that we didn't have in Britain at that time.

VM: I remember also that you acquired rather a splendid car. What I remember particularly about that car is that it had a fluid flywheel. You changed gear but you had no clutch. Am I right?

DS: That's right, yes. It was a semiautomatic; it had the fluid flywheel and it had a gear lever. You only needed to change...you had a range from first to second, which you would change between by lifting your foot off the accelerator and it changed up automatically. You then had to change manually from second to third and then the

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same automatic process worked from third to fourth when you lifted your foot off the accelerator. But in normal driving, once you were in third and fourth and you stopped at traffic lights, you didn't bother to change down because the fluid flywheel and the big engine gave it enough flexibility so you drove around without having to use the gear lever most of the time.

ES: Ah, but the biggest asset of that car, from Duncan's point of view, was that it had a "whooper"...

VM: It had a what?

ES: A "whooper"...

DS: Almost like a whistle.

ES: ...so if he saw some really gorgeous female he could...

DS: Now, now. I didn't go in for that sort of thing. The only thing I used to use it for was if I arrived back from the lab., or wherever I had been in the car — not that I was ever allowed to use the car once she'd learned to drive — I could make this whistle work and she would know I had arrived. It actually was illegal to use it in California.

ES: It had belonged to a student, hadn't it?

DS: Yes. Well, it was the son of the lady we bought it from had fixed this whistle. And you had a little string down here you pulled and it whistled. It was meant for the sort of activity that Elizabeth mentioned. Naturally, I didn't use it for that purpose!

VM: Where did you live?

DS: We lived in Hilgard Avenue which was five minutes walk from the campus. Absolutely perfect, couldn't have been better situated from the point of view of walking to work. Before Elizabeth starting working, I walked back for lunch.

VM: Where did you work when you started?

ES: Richmond.

VM: So you had to drive.

ES: I had to drive. That's why I had the car every day. But he didn't need it anyway.

DS: I did have to teach Elizabeth to drive.

ES: Yes, he did; he did teach me.

VM: So you could drive beforehand?

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DS: I had the English licence, yes.

VM: You were in the RAF Volunteer Reserve at the time, weren't you?

DS: I was in the...actually, I had been in the RAF for my national service but I switched into the Naval, Fleet Air Arm Reserve. I had been in that for the three years as a postgraduate student.

VM: There's something I remember — but it's probably pretty distorted now because the memory is forty years old — had you had an aerodynamic accident of some sort?

DS: That's one way of putting it, yes.

VM: I remember we teased you and said you would have to pay for it at the rate of sixpence a week from your salary. What happened?

DS: I had been involved in a mid-air collision in a Vampire...

VM: Oh, really/

DS: ...and jumped out.

VM: Successfully!

DS: Successfully, yes.

VM: Do you only do that once. What does it do to your confidence about flying when that happens?

DS: Well, I suppose it makes you a little bit more wary but I was half-way through a jet conversion course and went on and finished the course. That was early on in the airforce and I went on to do a flying instructor's course.

VM: It didn't turn you off flying.

DS: No. And then I continued through jets again in the reserves and was doing so right up to a couple of weeks before going to California.

VM: When you came back to England after that, did you take it up again?

DS: Whilst I was in California I was trying to get attached to one of the American naval reserve squadrons which would have been possible although the regulations wouldn't have allowed me to fly an aeroplane myself;. I could have gone up with other people. But, in fact, part way through these negotiations, the UK government abolished the auxiliary airforce and the naval reserve squadrons. So I got a message from the people in...I think it was the Naval Attaché in Washington, saying "sorry, forget it all" There's no more reserve flying for you when you get back so there's no point continuing as an attachment to an American squadron".

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VM: They terminated your association with the reserve just like that?

DS: When I came back, the squadron had been disbanded. I stayed on the naval reserve list for some time...

VM: But not flying?

DS: ...there was no flying.

VM: You said earlier on that one of the reasons you didn't want to stay on in Berkeley for a second year was that you felt your research wasn't going in the direction you wanted it to go. What, then, did you do?

DS: I came back to this country and took up a job that had been offered by ICI at Billingham.

VM: That job had been offered before you went to Berkeley? It was waiting for you?

DS: Yes.

VM: What sort of work did you do there?

DS: It was general work on hydrocarbon chemistry, a variety of things concerned really with making use of the materials that come out of cracking hydrocarbons, ethylene, propylene, the sort of chemical reactions that those undergo and can be converted into more useful things that sell for money.

VM: Were you thinking of making your whole career then in an industrial context?

DS: At that time, yes, I thought it would be worth a try. But after a couple of years I decided that the chemistry wasn't going very far.

VM: Your chemistry or their chemistry, or chemistry in general?

DS: I didn't find it very interesting, the chemistry I was doing, I suppose.

VM: So what happened next?

DS: I went to the University of Liverpool into the organic chemistry department under Professor Kenner...

VM: As a lecturer.

DS: ...initially as a senior research assistant, I think I was called — it was a permanent post as opposed to a postdoc. I had a number of different responsibilities. Instead of going to do research and teaching, which is the normal mix, I went there to do research and running the lab. so it was an administrative-cum-research job. I had

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research students and gave some lectures at the honours level. But I had responsibility for seeing that the lab. ran properly. That was quite a heavy load at the time because they were just getting completely new organic chemistry labs. built from scratch. I was heavily involved with the equipping, furnishing, setting up and running the of the labs. for the first three...four years. After the fifth year, things had settled down, and I was getting on with doing more research.

VM: If I put some dates into this: you were at ICI roughly from '57 to about '60?

DS: '59.

VM: In that case, to about '61 or so?

DS: No: I went to ICI in October '57 and stayed there for two years. I left in October '59.

VM: That's when you went to Liverpool?

DS: Yes.

VM: OK. You've taken us through to about five years into your Liverpool stay, by which time everything had been organised and you were in the clear, as you were saying.

DS: Yes — more or less.

VM: So that's '64, '65-ish. You continued doing that sort of work?

DS: Then I was offered the post of Sub-Dean of the Science Faculty which involved a promotion to the senior lecturer level. So, I moved into that post. Again, it was running the Science Faculty; that was more administrative and rather less academic.

VM: Was it taking you away from research and teaching?

DS: Yes; the agreement was that I could continue to do research in chemistry which I did to a certain extent and wrote a couple of papers whilst I was there. But then I got involved with applying computers to the administration student records, and so on. After about four years of that, the idea...well, it was actually suggested that I should apply for the post of Academic Sub-Dean, Academic Secretary, in the university — a level under the Registrar. When I broached the subject with the Dean to see what did he think of this idea, he said "well, did you not know that you might be made full-time dean sometime?" Which I said that I didn't. The Science Faculty started then under his initiative — he was a professor of chemistry so we had a lot in common anyway. He got the university, the Faculty of Science to agree to having a post of full-time dean. The university didn't like that idea. They had just had a full-time dean of medicine go to sleep in the job.

VM: Hadn't deans been elected before then?

DS: They were not elected; they emerged...for three years.

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VM: But they were proposing that you would be a permanent one?

DS: That was the idea, yes. They didn't like the idea of the Science Faculty doing this experiment. So, they compromised and made me a post of Pro-Dean. Essentially I did the same work as I would have been doing, had I been permanent dean, but there was a part-time dean to peer over my shoulder.

VM: And you did that for a long time, didn't you?

DS: For a long time, yes.

VM: Until formally you retired?

DS: Yes, although I got involved with other things. I started the Centre for Marine and Coastal Studies. I had been made Director of that and had been doing that on a part-time basis. When I retired as pro-dean, I kept on the part-time activity of being the Director of the Centre for Marine and Coastal Studies, which is where my interest in nature conservation and marine conservation came from.

VM: What contact have you had with Calvin's lab. since you left?

DS: None, really. I got a letter, I think, just after he got his Nobel Prize. I had contact...I was written to and asked if I would send a comment on the bottom of a publication, which I did but I haven't had any contact since.

VM: Never been back?

DS: No, we've never been to North America. Oh, we went to Newfoundland for a week. Haven't been to North America since.

VM: Have you kept up with any of the people that you knew there at the time?

DS: Only Ian Bell, who was from Manchester anyway, who we were friendly with while we were out there; we've kept up with them. But I haven't kept up with any of the others; that's right, isn't it?

ES: Not from Berkeley, no.

DS: No. Not from Berkeley, no.

VM: When I saw you in Liverpool in about '81, I think it was, I'd had no contact with you for about twenty years. I knew that you had gone to Billingham and then — I don't remember how I found out that you had gone to Liverpool but somebody must have said or something — and I was going there for a meeting, I got in touch. Looking back on your own Calvin period, what did it do for you?

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DS: I think socially and the opportunity to live in another country, particularly California, was fantastic. It was interesting to see the facilities and the way they worked in Calvin's lab. All that was positive. The chemistry, the actual chemistry I did was not as positive as I would have hoped.

VM: Careerwise, was it an insignificant interlude?

DS: I think it was a disappointment from a purely scientific point of view; looking back on how it possibly could have affected my future career, it was a bit of a disappointment.

VM: You don't think it influenced your later career?

DS: No, I don't think so. Whereas it could have had a positive influence. So, I think it was fairly neutral. Nice to go there; I'm sure I haven't lost anything by having gone and I'm glad I went.

VM: A lot of people have spoken about the uniqueness of the group being associated with a particular architecture of the building, the fact that it had these large, open labs. and people weren't hidden behind walls and doors. Did it ever strike you like that?

DS: Not really, because the situation in Manchester was not unlike that. When I first went to there (*to Manchester*), for my first year and a half, I suppose, as a postgraduate student, I was in a very large laboratory which must have had sixteen people working in it, one of these big almost like a teaching laboratory, benches with two people working side by side and two people opposite, and then another bench, and another bench. So there must have been at least sixteen people, maybe twenty people working there, all postgraduates so that there was a thorough mix-up of people. After that I then moved a little bit down the corridor into a smaller lab. with, I think, there were four people in that one. But again, we got tended to get together for coffee and...I didn't notice any particular difference working with Calvin because I had never worked in a small lab. on my own or with just one other person. From that point of view the Calvin set-up was very similar to what I had experienced in Manchester. And, very similar to what we set up at Liverpool while I was there.

VM: You remember, of course, seminars...the Friday morning seminars.

DS: Yes.

VM: With pleasure, or not?

DS: Yes, I think so.

VM: They were very early in the morning.

DS: They were, yes. I don't think I went to all of them.

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VM: Also, I have one particular memory which involves you. You remember there used to be a beer session on Friday afternoons, very often?

DS: Not particularly.

VM: There was. There was a place called Laval's: you do not remember that?

DS: No.

VM: ...where we would go out for beer? You and I were preparing to go to beer one such Friday afternoon, and we were standing in front of a blackboard, actually above the place where they dried the photograph films, I think: some sort of oven. We were doodling on the blackboard and we produced what we called the *Dephlogisticated Soot Cycle*? Do you not remember that?

DS: No, I can't remember that.

VM: Well, we started out off carbon dioxide polymerase to make all polycarbon dioxide and then all sorts of magic things happened. We were playing around with this and Calvin came through the door. We were suitably embarrassed and grabbed a duster and to start rubbing it out but he said "hold it, hold it. There might be something in it!" We then had to wriggle our way out of it.

DS: No; I've forgotten it.

VM: I am sure it was you because it was the sort of thing the British got up to in places like that..

Are there any other things that we've forgotten to talk about which you would like to bring up? What I'd like to do is show you some pictures and maybe after you've seen them you may have other things to say.

DS: That would be nice to see some pictures.

VM: OK. Shall we close it down now...?

DS: OK.

VM: Thank you.