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Could I start by asking then when and where you were born?

Well, I was born in Hampshire in a small country town called Alton, and I was born in September in 1948.

And something of the life of your father?

My father worked in the stockbroking office in London, so he had an hour’s train journey up to London and an hour’s train journey back every day. He was somebody who was very numerate, and I suppose I might have got my ability to handle numbers from him, but also these hours on the train he used to spend reading detective stories and used to throw these at me, the old green and white Penguins. He used to throw them at me when he got home from work. So I think my love of detective stories, which has gone on unabated, comes from him.

Did you get any sense from him of his early life?

He was one of a large number of children, so I think it was quite tough. He had to leave school and become an office boy when he was about fifteen and – but he was still keen at advancing and learning, and he took a Pitman course in typing and shorthand. And that no doubt helped him with his job as well.

[01:27]

And did you have any experience of his parents, your paternal grandparents?

Hmm, no, on the whole my mother kept me away from my father’s family. She thought they were a little weird. One of them was – had been a vegetarian, and this was considered slightly odd. One was a piano tuner and was clearly slightly – a little short of ability. And another one in fact did end up in an insane asylum, so my mother thought, no, this family is not good. But my grandfather, I do know, worked on the railways and became a trade union leader in the railway union.
And what do you remember as a younger child of times spent with your father?

Well, he obviously was – left home early in the morning because he was at the end of his train line in Alton, going up to Waterloo, so I didn’t see a lot of him when I was very small, apart from at weekends, but enjoyed weekends. We’d go out, go walking, go to the seaside. In summer, we had a car, so we were able to get out and about and look around us, so he was very supportive there. That’s in – yeah, he would sit and encourage me and talk. He would go and listen to music. My mother didn’t – wasn’t keen on music, so I didn’t know anything about music and I didn’t know anything about music apart from it’s what my father turned on the radio on a Sunday afternoon. I didn’t know anything about music until I left home and went to university but my father clearly had a musical side that was a bit frustrated, I would say.

He was – we were living together with my maternal grandmother and she was a very domineering woman, so there were some slightly awkward situations in the house which was – she was very smart. She became a self trained architect and, together with her husband, built large numbers of houses in the 19 – I guess 1930s and early ‘40s until he died. But she was the person who drew up the plans and did the quantity surveying, and he employed the men and oversaw the work. So she was somebody who would have been able to gone to university if people had done at that time, and that’s why she was very keen that her two daughters went to university. So my mother went to university and my aunt also went to university, which was quite unusual. My mother was the first woman to go from her school to university, where she studied geography.

And apart from seeing your dad listening to music on Sunday afternoons and him passing you detective stories, do you have any memories of interaction with him at
home? We’ll cover sort of weekend travel and holidays and that sort of thing but this is a very specific memory I’m asking for, so you may not remember it.

Yeah. He was, er, the person who sorted out my pocket money, and the pocket money was something which was very prescribed really. It was not a fixed rate, I’m afraid it depended on where I came in class, and that gave me a quiet incentive, which he knew it would ‘cause – and so I remember things like him telling me, well, if you pass your Eleven Plus you’ll get a new bicycle. Well, that was an incentive. And then, when I was at grammar school, it was, well, the pocket money rate you get for next term will be based on where you came in class this term, so it was a very complicated sort of – well, he’d do it in on spreadsheets today but in those days he just sat there and did it long hand. And, yeah, it was – it became a game between us that I would attempt to do very well, he’d be pleased, and so, yes, that was good.

Erm, yeah, I think I had a very close relationship with my father, closer than with my mother, and – but I think also, one of the things that he encouraged in me was to enjoy life, to enjoy life from the point of view of having good food which, you know, it was post-war times when I was brought up, so you didn’t go out and eat, you didn’t go out and drink. But my father would go out – when he was in London working, he would take people out, and occasionally I’d meet up with him and then we’d go out and have a nice meal. And there was this occasion I remember when we went to Lyon’s corner house in London, it must have been the one near Charing Cross, and he said, ah, no, you can’t choose, I’m going to choose for you, you’re going to have this and it’s called lobster thermidor. And I have this great memory of lobster thermidor all my life from that. I guess it was expensive relatively speaking, then as it is now, but he obviously thought it was part of my education because at home it was basically, you know, roast joint and vegetables out of the garden, you know, every day. We didn’t go out and eat, I didn’t realise people went out to restaurants until that occasion. And he also would also make sure I knew how to drink as well, that I was not going to go out and do something stupid when I left home. So we would have a glass of sherry, a glass of wine, and that was very good, so.

[07:57]
Thank you. And what memories do you have similarly, as a young child, of time spent with your mother at home?

Again, my – because my mother – after she’d finished her geography degree she then trained as a teacher, and that meant that she was teaching in a school just outside of Alton. And the – she decided not to teach geography to older girls, she decided she would teach infants, and she went to this very small school. And I remember going up to the school, it wasn’t the one I went to, but I went to that, helping her with the jumble sale at the church school, helping laying jumble sale stuff out, meeting all the people in the village. And I was an only child, so it was just – it was a part of trying to get me to meet other people. Around the home, I guess my mother was rather quiet and because my grandmother, her mother, was rather domineering, and so my grandmother did the cooking. I never learnt to cook. Again, most people will say that they learnt to cook from their mother, I didn’t learn to cook and I certainly didn’t learn to cook from my mother. And my mother didn’t sew because her mother sewed, so I never learnt to sew, I never learnt to knit, all of those domestic things that most girls learnt from their mothers, I’m afraid I didn’t. But I guess what I got most from my mother was from her geographical background, so it was like an awareness of the landscape. Particularly when we went on family holidays when I was in my teens, then it was an awareness of what was growing in the fields, why the hills looked like they did, why the cities looked like they did. And so I think an awareness of one’s geographical surroundings. And also the love of flowers, my mother did botany as a subsidiary subject and she’d always liked flowers, wild flowers. So again, she would go out with – go out from home, looking for wild flowers. In those days you collected wild flowers and pressed them and put them in the album. And, you know, the rarer the plant, you know, the higher score brownie points you got for it. So it’s not very politically correct these days to do that but it meant that I also developed a love for flowers, so – and that definitely came from my mother. And so nowadays, if I’m walking down I can recognise most flowers and the name just comes out of my head, and it’s coming from my childhood because I would learn them very well.
How – how exactly did she pass on the knowledge of flowers and the spotting of flowers and the collecting of flowers, was it –?

I guess it was just walking, going out walking. I mean there was – we used to go out for a walk every weekend, and so to keep me occupied it was, well let’s see how many flowers we can find, and do you know what they’re all called, and what is this one? So there was a dialogue going on about that, so I was actually being actively involved in that. I guess, again, I think being an only child helps in that because it’s a one to one that you’re getting. I was also probably rather quiet at that stage in my life and so perhaps my mother was trying to draw me out a bit, to get me to talk a bit more and – but, yeah, it was always, you know, beauty and nature was being talked about. But there was no – there was nothing artistic about it. My mother had the same inability to get anywhere in her art class as I did. I singularly failed to come more than three points from bottom in the class in art, so I couldn’t draw, I couldn’t represent – you know, I’d appreciate colour but to – you know, to reproduce it on a piece of paper is completely beyond me, and still is, and I just don’t have that ability at all. And I guess that must be something genetic as well.

[12:43]

What did your dad say on walks if your mother was pointing out flowers and –?

I think he was just enjoying looking at the landscape, he – you know, he liked to be outside because he spent all day in an office or on the train working, so he would like to get outside and look and enjoy the exercise. They were both keen on sport, so there was a – again, there was a quiet, unspoken viewpoint that sport was something you did. You could be competitive, competitive was okay but you didn’t – I wasn’t pushed into doing anything. And my parents played tennis, so again it was a form of – tennis was a form of exercise that’s competitive whereas walking was something one did to get exercise but also to get a look around. But, yeah, I would think – I would say it was walking as a form of exercise.

[13:53]
Thank you. And how precisely did your mother pass on the, I don’t know, what might we call the geographical way of looking at flowers?

She would sort of get out a book, always before we went away on holiday for example, and say, right, what crops do you think grow in this area, what do you think the rainfall is? And, you know, so I’d go away and look it up. I mean nowadays you’d go and look it up on Wikipedia or somewhere but in those days it was using basically her undergraduate text books as a source of information for me, and would give them to me to look at, and then would say, well, what’s that, and get – stop the car and get out and say, what do you think you’re looking at. So there’d be some degree of questioning there. So that was – yeah, it was quiet, it wasn’t a sort of pushy involvement. I had a I’d guess a sort of – I have a sort of quiet memory of childhood, I don’t have any great memories of, you know, particularly getting into trouble or shouting matches or anything like that. I sort of think I sort of rather quietly drifted through childhood but was curious about the world about me and I think it has led to me being curiosity driven ever since. So I think it’s trying to awaken curiosity in me, is I think what they were trying to do, while instilling in me a sense that information can be obtained by reading in those days.

Were you asked to write anything down about these places?

Well, my mother would always write a diary when we were travelling. The only problem was she didn’t actually spell the word diary correctly, it was always written dairy, so we always had this standing joke in the car, my mother got her dairy out again. But I wasn’t usually expected to write up the holiday unless, for example, I was doing it to write a thank you letter for a birthday present, and then to fill up the space I’d be expected to write where I have been for my summer holidays, ‘cause my birthday being in September was at the end of the summer holidays. But I had a – had scrapbooks, I remember that. I remember that was part of what was encouraged. Also stamp albums and something – again, it’s part of the – part of acquisition of knowledge, you know, where are these countries. And that – I seriously collected stamps I guess, serious in the way kids are, and collected that until I left home, so I had – and I think that was also something that I found very enjoyable. And the acquiring things and categorising them, I think is something that’s in my nature as
well. And they came from interesting places because my grandmother would go away on holidays and go round the world to rather exotic places, and these letters would come back with stamps on, so I was aware of where the countries are. And again, there was always an atlas in the house that was just lying around. There weren’t a lot of books but there was – an atlas was always there, and so I could always look up the countries where the stamps came from. And I guess thinking about books, as I said, not a lot of books about but my mother was also interested in archaeology and so that – that also had an influence on my later career because she would have one or two books on archaeology. And then also we had a radio, and I guess when I got to the age of about ten, I guess, I mean we actually got a television set and there were programmes on the TV that – there were things like animal – well, on the radio, *Animal, Vegetable, Mineral* quiz programmes, and that was where I think I got interested in archaeology because Sir Mortimer Wheeler was one of the panellists and I seem to remember Glyn Daniel as well. And I thought archaeology was interesting and for one of my presents, one that I think had an impact, was my parents bought me a book by Mortimer Wheeler on archaeology from the near and far – well, near east, going from his work in the Harappan civilisation in Pakistan, for example. And so I thought, gosh, that would be fun to do that, and that I guess was a book that stuck in my head for quite a long time. So for a number of years I wanted to be an archaeologist.

**What memories do you have of the contents of the book, either pictorial or the prose?**

Pictorial, definitely. It was a book aimed at children. It was a large format book, A3 I guess, and it had pictures of excavations, it had pictures of pottery. I can’t remember anything about the words. I remember it was – and I just thought that it was a very exciting thing to do, piecing things together from the past. And the other book that I got, that I got a lot later on, was – I guess when I was in the sixth form at school was on Megiddo, which is a tell in Israel, and that had just been excavated, and that excavation again was very exciting and it hit the headlines. And I thought, yes, I still want to be an archaeologist but by then I realised I didn’t have the ability to learn dates to do history at A level, so I was clearly not going to be an archaeologist, so I had to go back into science but the archaeology interest was – has been there all along and it’s still there.
Thank you. Are there any other examples that you have of activities that involved collecting and organising? You talked about this with reference to the stamps. Perhaps the –

And the flower collection as well, I – one of the things I did that is not quite the same but is related is probably playing chess. If you consider it as a solitary act – well, not solitary activity but you can play against yourself, but it’s something that’s competitive, logical and requires you to concentrate. And my father taught me to play chess, and then at school there was a very active chess club and that was something I really enjoyed doing until I realised how much time I was spending on it and then thought, hmm, I’m actually not going to do very well in my life if I spend my time playing chess. I went back to it once for a while when I was a graduate student in college and I found myself playing somebody who was a county champion and held them to a draw but realised it had taken us four hours there. And I thought, no, I’m not – I cannot be spending four hours a day playing chess, so – but strangely enough, I couldn’t, for example, play bridge, I had no – I did not have any idea how to remember the cards and I couldn’t see how that worked. And I think that was a bit frustrating ‘cause my grandmother would play bridge and my father could play bridge but again, probably just as well because that would – again would have wasted time. But if I’d maybe been taught well or taught at all I might have gone in that direction as well.

Can I explore this idea that you saw it as a waste of time? What did you think you ought to have been doing rather than playing chess?

[laughs] Oh, this was probably doing school work, I was probably a bit of an eager beaver at school, so – but I did go off and do other things. I did go off and, you know, join the girl guides and joined the local youth club, so did the group activities. But it was the large numbers of hours that I could see myself spending playing chess, and it was just the sheer – you know, it wasn’t like one hour a week, it could become addictive. But it – you know, I certainly enjoyed playing chess competitively at
school, we played against other schools. We had – two of the masters in the school were keen on chess and would drive kids off to play matches against other schools in the area. And that was very good, I mean some of it probably doesn’t happen very much today but, you know, before all the health and safety rules came in about driving kids around the countryside in clapped out vans we could all go off and do this. And, you know, once every two or three weeks we’d have a match and enjoyed that. Also I wasn’t particularly keen on going outdoors when it was wet. You know, if it was a choice between playing chess and going and playing netball, well, you know, chess won every time, I didn’t like getting wet and running around outside, so I – yeah, I enjoyed chess for probably a number of reasons.

[25:13]

Thank you. I think that your home at Alton in Hampshire was the home that you stayed at until you went away.

Yes, I was born in Alton and lived there until I was eighteen. Didn’t live in the same house, we moved twice. The first time I don’t really remember ‘cause it was the age of eight but I do remember the house that we moved to was nice. It was a large house with a large garden and gave me tremendous freedom to run up and down it and go out onto the street and up into the woods behind, so that was good. But it was slightly up a hill and as my grandmother lived with us, she was now in her early sixties and decided she didn’t like cycling up there, and so going back to that, she was a self trained architect, she designed a house that she wanted to live in and she wanted it built in the centre of town so she could walk to the market on Tuesdays. She could walk to the – to her whist drives and her bridge club, and she didn’t have to get onto her bicycle, and it was easier for my father to get walked to the station from there as well. So we moved into that house about three years later when I was eleven and just starting grammar school, so again it was easy for me to get to school from there. But the house had a smaller garden and didn’t have the character of the Edwardian house that we’d moved into for that short three year period.

Could you take us on a tour of that Edwardian house, standing at the door, going in and describing?
Yes, I probably can. The first thing about the house is actually from standing outside it. And I was fascinated by the fact there was written in Latin *cave canem*, beware of the dog, on a mosaic up beside the door, put up by some previous owner who clearly had a dog. And went into there, my grandmother had a sitting room that she would use to the right as you came in, a sort of dark room, I guess because it was on the north side of the house. Beyond that, on the south side of the house, was the lounge which had big windows, and I guess that’s one reason why I still enjoy big windows is, you’ll notice in the house we’re sitting in now, there are lots of windows now large and I think that I find is very important to me. I think I first realised that when I was a child in that house. It was a very small kitchen, which was my grandmother’s domain. It had an Aga, I thought everybody had Agas, I didn’t realise that only some houses had Agas. But the Aga was where everything happened, it was cooking, it was heating, and so there was a feeling of warmth in that kitchen. And then there was a dining room off of that where we ate most meals as the kitchen wasn’t particularly large. There was a wooden staircase that went up and there were two large bedrooms and two small bedrooms. One of the small bedrooms was mine, it had a little Victorian or Edwardian, it must have been Edwardian I guess, fireplace in the corner which I remember Father Christmas would come down with his sack and leave the oranges behind. Erm, and so it was large enough to have – the house was large enough to have a visiting aunt and uncle come and stay on occasion. As I said before, that would be on my mother’s side, my father’s family did not come and visit, but my mother had a sister and also a brother, and they both came once or twice a year and stayed with us and they would occupy that bedroom. My parents had a large bedroom and my grandma the other small bedroom beside mine, so a four bedroomed house. And the garden was long, south facing. It had a nice flat lawn which I used to put up a training kit for playing tennis. So again, I was being encouraged to do outdoor things. It had a long garden going down between apple trees, so we used to have our own apples and our own plums. And it went through a right angle, it was like an L shaped garden, and the bit behind next door house, and that was orchards and we had even more apples and plums. There was an asparagus bed which – the first time I’d ever had asparagus and gave me a lifelong love of asparagus, being able to go out and cut it. There was a greenhouse, and that was cold frames. And my grandmother, I remember once, sent me down to weed the cold frame. The problem was I picked out
all the plants rather than the weeds ‘cause I didn’t know which was the miniature carrots. But, you know, it was a garden that was large enough to play in and to have kids round from further up and down the street, so it was a very happy time in that house. I really felt there was a lot of space, and I like space.

What did you do in the woods at the –?

Oh, we would take bikes out through the woods and play hide and seek. It was, you know, build dens, just the kind of things that kids did then. There was an old railway line that went across on the boundary of the wood, and it was through chalk. Alton was on chalk and you could excavate into the side of the old railway line, so this was just post-Beeching and so it was very obvious it was a railway line and we could dig into the chalk and make a little cave and sit and play in that. So, yeah, lots of sort of outdoor activities as a child. I was encouraged to go out and play and we had a lot of freedom, there was no concern. And I could race my bike, and I crashed my bike once when I was racing a boy from across the road and we crashed at the bottom of the hill. And I met him again for the first time in forty years last year, and we both remembered crashing at the bottom of the hill and dragging our rather sort of broken bicycles back up to our respective houses with scrapes everywhere. But neither of us broke anything, so it wasn’t serious. But, yeah, I got lots of freedom to go play and you could – you know, you could also go and occasionally do things like sort of go through a fence and go into somebody else’s back garden and explore when you weren’t meant to be there. A sense of slight excitement doing that. I think I was probably rather boring as a child, I don’t think I got into trouble very often, although I did once kick a football straight through the window of a greenhouse at the local tennis club when my parents were playing tennis. And I was kicking the ball about and shot it straight through the greenhouse window [laughs] but, yeah, very minor misdemeanours, I would say.

You mentioned that your grandmother had a kind of dominant character.
Yes.

*I wonder if you could give some examples of that from your memories of living with her and with your parents as well.*

I was aware of the fact that she was in charge. It was a bit – it’s a bit difficult to put a finger on exactly what – until I got older, when I then realised how much sort of influence and pressure she put on my parents. And so when I left home for example I was aware that they wanted to move when they retired and she flatly refused to move out of the house. And she’d very carefully sewn up the house so that she owned half of it and my mother owned half of it, and my father didn’t own any of it. And that meant that if she didn’t want to move, they couldn’t move. And that was a way of controlling the household, as was insisting on doing all the cooking and looking after the vegetable garden and leaving my father to sort of mow the grass and my mother to plant flowers in the flowerbeds. But, you know, there was demarcation, so from that point of view – but my grandmother was very – again, she was – she saw me as the person that she would have liked to have been, the person that she didn’t get the opportunity to be. She would have liked to have gone to university and had an independence that she could see that I was getting. And she was supportive in that, you know, she didn’t – she wasn’t somebody who wanted to cling around the house and she – she would let me lick the cake bowl but she wouldn’t let me actually mix the cake, so it was – there was no particular point I think that I saw that she was in control, it was just that I could just see her as dominating the household. The household ran as she wanted it. We moved because she wanted to move. I think I realised that ‘cause I couldn’t work out why the heck we were leaving this wonderful Edwardian house that for me was sort of heaven, and why we were having to leave it, I just didn’t see it but realised that, you know, she wanted to move and that was just going to be how it was, yeah.

[36:25]

*What was the level and nature of religious engagement at home?*
Ah, well, it was the usual one of the token Church of England. The let’s make sure that Ann gets some religious education, so we’ll send her to the nearest C of E Sunday school. So that happened up I guess until the age of eleven, ’cause that was near the nice house, so three years of that Sunday school. And then when we moved into the centre of town and I went to the grammar school, my father would occasionally go to church to get away from his mother-in-law while she cooked lunch. And so we would go to the church, which was only like effectively two doors away, which was the other Church of England church in the town. It was … nothing one – I’d read the bible in school in divinity classes. Bibles were not in – we didn’t have – well, we had a bible in the house but nobody ever looked at it, so there was no active involvement in – in religion at home. It just wasn’t discussed, I only became aware that other people did things differently when I went to grammar school and there was – one of the girls in my class was Roman Catholic and that was something quite exotic for me at that time. And then on one occasion on visiting my father in London I realised that one of his Masonic friends was Jewish, and that was again something that was – I thought this is something new and different. But for me, I – it was really to just accompany my father on occasional Sundays, maybe once a month, Christmas Day, Easter, but it didn’t – it was just something one did. It wasn’t – there was no social aspect to it, we didn’t know the other people. And I think for my father it was probably just a quiet time when he could just opt out of, you know, being at home with an excuse to be out of the house. I then decided that I probably wanted to do something like join a youth club but I in fact joined a Methodist youth club ’cause that was the liveliest one. So I then sort of swapped to going to the Methodist church ’cause I thought I ought to if I was going to the youth club, and that was considered okay, nobody was – my parents didn’t seem at all worried about that. But it was – for me that was the social – it was the social aspect, you know, to get to a group of people who weren’t just the ones I went – in my class at school. So I wouldn’t describe myself as a religious person, though nowadays I’ve actually just been taking a course on development of parish church in England but just from a curiosity viewpoint because of going on walks through the countryside, you know, you see the churches and I realised I knew absolutely nothing about how – you know, why churches were different and how they were different and so I’ve – you know, I come back to it but not from a religious angle, it’s from an interest angle. And the same with choral music, I’m fascinated by listening to fifteenth century, sixteenth century, choral music but, you know, it’s just
as music, it’s not for religious reasons. So religion didn’t really play a large role in my childhood, in my life.

[40:43]

And what about their political views?

Erm, I guess that they were probably Conservative, Liberal, even though my father’s father had been – in the trade union movement presumably he would have been a Labour supporter. I think that my father – from his financial background, he had looked at a more capitalist way of life as being – well, not way of life but a capitalist way of running the country as being something that was going to be more effective as a means of supporting the population. It certainly wasn’t that they didn’t care about people, because they did, they were involved – well, my father would be involved with all sorts of people. My father was much more … I would say socially mobile, he could interact with a wide range of people and did, both in – through his job in London and also probably as belonged to a couple of Masonic lodges. Whereas my mother was not socially mobile, she was somebody who was very fixed in her position in society. You know, she was a teacher and her father had been a builder, but – and I remember when going to these church jumble sales that my mother would interact very well with the other teacher in the school, they were really, really close friends, in fact the only friend, really close friend, my mother ever had. But as soon as it came to, you know, the farm labourers’ wives, you know, she would see them in a different position. She was teaching their children, so she was superior to them. But, you know, if the local landowner or the local doctor came in she would then go, oh – she’d just sort of fall apart ‘cause she couldn’t talk to them because they were in a different social class and she didn’t know what to say. And we – I remember sort of thinking about, thinking oh, that’s a bit weird. My father was just completely different and they’d – you know, I used to think, well, how did your parents meet, you know, how did two people who are quite different characters meet? And I found out they’d actually met on a train. My mother had been – during the war she’d been helping, teaching up in – geography up in Lancaster and my father had been stationed in the Shetlands, and they happened to find themselves in the same train and my father had a sore throat and a cough and my mother had given him a cough sweet that
she had. And he apparently, while she wasn’t looking, pulled her luggage label off her suitcase and then wrote to her, so it was a very sort of romantic meeting in a wartime situation. So I was quite amazed that they’d – you know, that they wrote and then got together and some five years later they got married, so it was – but it’s quite interesting seeing how people interact and wondering how they could ever meet.

When did you discover this story of how they’d met?

Probably quite late on. There are a lot of things that you don’t – you’re not told about as children. They’re not kept from you as secrets but they’re not considered of importance to talk about. So I suspect it was probably when I was just about leaving home, going to university, and I would go then with my father to the pub for a drink to – no, I couldn’t have quite gone, perhaps I wasn’t – maybe I was a little underage when he took me into a pub for the first time for a drink. And, er, we would then be talking about the family and, you know, various things would come out, and that was one of the ones. And my mother died at the end of last year and I found amongst her papers the very first letter that my father wrote to her. They were obviously incurable romantics and my mother kept every single letter that he’d ever written when – the first one he wrote and then when he was in Egypt. He was then stationed – moved off and stationed in Egypt and again he wrote to her and she kept all of these, all the things. So I think she was an incurable romantic and was probably – you know, it was probably good that she met my father who was, you know, a pretty sort of straightforward kind of man.

[46:35]

Did he tell you about his war service?

Hmm, no, he was in the Royal Ordnance Corps, and so was not actually seeing – he didn’t see active service. And I think most of the memories probably came looking at the family photo album, you know, a small picture of my father on a horse, which was pretty amusing, why are you on a horse? Oh, it was the only means of transport in the Shetlands. Or a picture of the Sphinx, oh, I was, you know – I was organising movements of food and ammunition and so on, in Egypt. And – but for him, because
he didn’t see active service in the way of actually doing any fighting, I think he just considered it wasn’t – you know, it was more like just a job and so he didn’t consider it particularly interesting to talk about. But obviously, you know, he’d been fascinated by going in Egypt and being able to see the pyramids and the Sphinx. So again, that – briefly talked about that but he wasn’t somebody who sat there and reminisced a lot. And after he retired he didn’t return and think about that either. I don’t think there was any bad experience, I just think it was just like it was a job.

[48:15]

And I think you’ve covered this a little bit in what you’ve already said, but could you give me a sense of your parents’ sense of what was right and wrong in terms of how they attempted to shape you or control your conduct? Things that they promoted and things that they discouraged.

Yes, they – I mean in the background there was always this unspoken what is right and what is wrong, it was never laid down. I guess when I, you know, tended to stray slightly beyond the boundaries of what was acceptable then I, you know, would have certainly been smacked as a kid. I don’t remember getting any particular reaction to that, I’d just think, oh, that’s probably not a good thing to do, won’t do that again. Erm, usually it was probably not controlling my tongue enough, just occasionally answering back. But on the whole I, you know, was with a – was out playing with groups of kids who, you know, had to be back a certain time, so we all got back at a certain time and we didn’t go out and get into any kind of trouble because we were – you know, we’d be just chasing around, using up our energy with bikes, going walking, playing tennis. So there wasn’t much time, if you like, for getting into trouble. But, no, there was no – I don’t remember being told you must not do this or you must do this. I suppose they were just leading by example, and so one was, you know, doing what they did in a completely unconscious way. And I think kids probably do that, I think you absorb, subconsciously absorb, who your parents are and what their moral values are and you don’t think about it. I don’t remember actively thinking I should not do this because I will get into trouble. Or maybe the opportunities to get into trouble weren’t there in a small market town. It was – you know, it was a town that was very unexceptional, you know, it had some small
businesses, a couple of breweries. And the couple of breweries reminds me that one smell that’ll always get me going is the smell of spent hops. If you’ve been brought up in a brewing town there is something very special about the smell of all the hops when they’ve been then taken to be used as fertilisers in the countryside, and it still triggers memories of my home time. Just, you know, walking in a brewing town now like Bury St Edmunds, for example, and you go, oh, childhood, brewing [laughs]. But, no, I think of all of the influences were at the subconscious, so rather boring, that one.

[51:40]

And your first school; what was your first school?

First school was called Mayfield, it now only exists as a sort of playgroup school. It was a small private school, educating kids from the age of four up to eleven, with the idea of – you know, the chances of getting through the Eleven Plus were fairly high in that school. It was very middle class, it – there was a – a small fee was being paid but as there was only one of me, then my parents could afford that and decided that perhaps I was rather able to be influenced and so I shouldn’t kick about with the local kids in the rough – what was considered the rough town school. So I went to this small school, which was great. I mean the classes were no bigger than ten children I think, and the teachers were all women because it was immediately post-war. So there were not enough men to go round after the war, and so a lot of them were single or had lost their partners. And they – because the classes were small, they really cared about the kids. And so we – yeah, I think we had – I think I had an idyllic school. Anyway, I can remember that school. The only bad thing I can remember is the fact that because I can’t sing in tune, that when the whole school went off every year to take part in a singing competition, there were two of us, one boy and me, who were always left behind. We weren’t even allowed to mouth [laughs] because we had absolutely no sense of timing or pitch or anything, so – but otherwise it was a school where classes would – if the weather was nice it was outside, in the garden, under the apple tree. We were able to do French when we were aged nine. We had a really exciting history teacher who I remember had us doing Beowulf, which seems a bit surprising, but somewhere been the age of four and ten. We had a good playing area,
there were the trees and the garden and a log. There was a sort of big pile of logs ‘cause everything was heated with log fires and we would play in the log pile, which I’m sure wouldn’t be allowed now, we’d stack things up. We would play with Dinky toys. It was a mixed school, it was a boys and girls, so we would come with our little Dinky trucks and play in the wood pile.

[54:56]

So we were – yeah, it was very pleasant and in fact I still – I’m still in touch with three or four of the children I went to school with, and in fact I’ll be staying with one of them in – on Sunday night. What’s interesting is that one of them organised a reunion, both for the children from that school and then from the same class who went on into the grammar school locally, and the reunion had about twenty people turn up. And what was amazing was that I walked into that room where it was being held and there was one person who I thought, I don’t like you. And there was no – I don’t know who it was but, you know, it – I was just sort of summing up the room as I walked in and who was talking, trying to work out who was who after all these years. And I found out the name of the person and I thought, yeah, I didn’t like you then either, you know. It was somebody from Mayfield, from that primary school. And what one realises, that these kids that you were, you don’t change. You put on weight, you get wide, you get grey hair, but you are a fully formed character in your primary school. And it – I found that rather scary, that the body language is all the same, the speech patterns are still the same, and the general vibes that come over are still the same. The person is confident or not confident, and I found that absolutely fascinating. And one of the boys from that school who couldn’t actually be at the reunion, and spends half his time in Switzerland now he’s retired, I went to visit. I hadn’t seen him for forty years and he said, oh, I’ve got no – you know, I’ll know who you are. And I thought, yeah, and I recognised you instantly. And it’s not like meeting – you know, you’re not meeting a stranger, you’re meeting somebody who knows your background, it’s as you have a common history, a common hinterland, and so you know how each other ticks even after forty years. And so I think it’s quite interesting that – to have been able to come back into touch with people from school days and to see where they’ve – you know, gone on and done different things in their
lives, and some are more exciting than others and – but as people, you know, on a one to one, they are exactly as they were forty years ago, or fifty years ago in that case.

*Did you remember why you hadn’t liked this person?*

Yes, she was bossy [laughs]. And just the way she was holding this conversation in this room and, you know, almost holding court in the room, I thought, yes. And she did that then.

*Could you –? I’m interested in your perception of these people as not having changed significantly from primary school age to adulthood at this reunion; can you give me some examples of the continuities that you saw or the similarities that you saw?*

Yes, the ones who were rather shy and retiring are still shy and retiring. They may have gone on – led fulfilled lives, and one I can think of, for example, went off to be a vet. This was from the grammar school, and she is still a vet coming up for retirement and, you know, she is a very caring person, slightly nervous amongst people, therefore perhaps a little bit better amongst – dealing with animals. So, yes, there is – then there’s the dreamy one, the one who dreamed about going to university and went to university but dropped out as she got pregnant. And then, you know, a bit – she’s had a very happy marriage, brought up some nice kids, so she’s fulfilled herself in that way but is now working as a part time chambermaid in a hotel in Devon. And you think, oh, you know, here is the dreamer but, you know, she’s fallen away from her dreams but she’s fulfilled in her family life. Another one who was rather quiet, who I actually played with from the age of four, probably the first girl that I played with, lost contact with for thirty years – thirty, forty years, but she is a really nice and interesting person. She is the only one who’s actually changed physically. She used to be very chubby cheeked as a kid and is now really very, very slim. But, you know, again, you feel this instant empathy with that person because you played with them as a child and liked them as a child. And the same with the boys, the – one who again went through both the schools I went through, he is just the same, he’s – I met him again for the first time a couple of years ago and he’s been an architect up in Newcastle. And he has just the same sense of humour. I think the sense of humour is one of things that come through. If they had a sense of humour then, they certainly
still have one now. And again, you feel totally at home with these people, it’s – I find that very rewarding, getting back, and in fact the reason I got back in touch with one of them was through the fact that she had moved back into town and hadn’t been away. But she moved back into Alton and wanted to buy the house my mother was in just before she went into a retirement home. And the other one I met up with again is because she had moved – been away and moved back, and was now running a car service for elderly people to go to health centres and things like that who don’t want to take taxis. And she met up with my mother who wanted to be driven to the health centre and the hospital for check ups and things. And it’s kind of interesting how this is the caring person, and it goes round full circle. So in fact now I’ve moved into this village, that’s one thing that also I’m doing as a volunteer driver. And it’s usually only, you know, once every two or three weeks but you feel you’re putting something back in the community and you can interact with people and – but, yeah, it only – I only thought of doing that because this friend had done it for my mother and through that had got back in touch with me. It’s again one of these sort of threads of life that I find happen, I find important in life. So, yeah, it – but going back to the children, is they don’t change character, it’s become more accentuated. Those you liked then, you like – you still like when you meet them, and the occasional one that you didn’t like, yeah, you still don’t like [laughs].

[1:02:59]

**What memories do you have of science teaching, if any, at primary school?**

At primary school. Erm … I don’t actually have any memories. I remember the history classes and I remember English classes. There would have been some science and I can have a memory of the teacher who it must have been but actually now you think – now I think about it, I don’t have any particular memory of that. So it – yeah, I probably didn’t really get to think about science until I went to the grammar school.

**And geography or nature study?**

Hmm … again, no particular memories of a – of the formal education. So, as I said earlier, I remember French because that was something that was completely novel. I
remember music and dance, and I was hopeless at dance as well, I couldn’t get the
timing right, so – and I have a sort of negative memory of that. And I have a memory
of the classrooms and the teachers themselves, and I could name the teachers, or quite
– most of them in school. But I don’t have memory of formal lessons. I remember
we were gearing up for this thing called the Eleven Plus but I don’t know what it –
whether we had it, what sort of formal lessons. I mean there was – this memory of
Beowulf comes back but it’s hardly part of any curriculum I think that would be going
through a school nowadays. I doubt very much they were actually teaching to any
kind of curriculum, so I suspect there was a lack of formal structure in primary school,
and it didn’t come in as being formally structured until one went to the grammar
school where you were then gearing for O levels and that would have then had quite
rigorous class structures and class aims, or mission statements and goals they
probably say nowadays.

Yes.

But, no, I don’t – I don’t have any memories of science from my primary school but
very strong memories of it from my secondary school.

[1:05:45]

*And you’ve mentioned Beowulf twice. What do you remember of that?*

Oh, [laughs]. I remember the poetry. I mean of the language and the – you know, the
saga element to it. It was a sort of romantic setting to something that was back in our
past history and this was the only relic we had of our – of the history of our country at
that time. So I guess that must have been what was sticking in my mind. But I can
remember the classroom where this was discussed and I can remember the teacher but
I think I don’t actually remember anything I actually learnt from that period.

[1:06:32]
At this age were there particular toys that you played with? You’ve mentioned things done outside and that being outside was key, cycling and tennis and exploring and making dens, but were there indoor toys that you played with?

Well, I wasn’t into dolls [laughs]. I must have had one or two but I didn’t play with them apparently. I had a teddy bear which I had from childhood, and I still actually have. It’s actually upstairs, it’s the only thing I have from my childhood. I … had a tortoise that was on the end of a little air – squeezy air bulb, that would make it walk along if you squeezed the bulb and the air pressure would make this thing walk along. I vaguely remember that, and that must have been when I was aged about four or five. I also had a – not a toy but I had a Bambi by my bed, a little Bambi figure that was covered in radioactive paint and so glowed in the dark, definitely something that you couldn’t find in the shop these days but which absolutely fascinated me as a kid ‘cause it would glow all night long. Erm … I had a little wooden train set. I wanted an electric one, unfortunately my father was not interested in electric train sets, so I never got a train set. I did keep asking Father Christmas but never got one. So I suppose I was a bit of a tomboy, so I suppose I wanted a train set. And the other thing I wanted was an air rifle, again, for like target practice and again I wasn’t allowed that. I played with cap guns, you know, sort of the Lone – you know, the first television set we got and the Lone Ranger and Tonto were on and I was allowed to watch that, so playing Cowboys and Indians with cap guns was probably what I remember most. I can’t remember any other toys in particular. I mean things like jigsaw puzzles, one obviously had, so one was – did a lot of jigsaw puzzles when I was a small kid. But, no, the only sort of toy I took through my whole life was the teddy bear.

[1:09:40]

And aside from the picture book on archaeology, what else were you reading at this age out in a sort of out –? Other than books you were told to read for school I suppose.

I suppose the – I was encouraged to – definitely encouraged to go to the library. I remember joining the town library. In those days Boots the chemists had a library in
the back and I would have a library card for those and I would get books out. Yes, I was an avid reader. And as a small child I remember I had a collection of Ladybird books, which were books that – the Ladybird book on dogs and cats or butterflies or buildings or something like that, so those kinds of educational books. But for other books I would read – I did read Enid Blyton though my mother would say, ‘You must find something better than that dear.’ The books that I suppose I really enjoyed were books by Rosemary Sutcliff, who was the – one of them was on the radio as well, Eagle of the Ninth. And again, Roman history, it was about the ninth legion which were based in northern Britain. And that book captured my imagination, so that would have been as soon as I could manage to read that. I also – I had a collection of collections that – you know, classics for children, so the abridged versions of people like – historical novels by Scott, things like Ivanhoe … and Dickens, but again they were all the abridged versions, so I’d actually read them. I would also read things like … Biggles and WE Johns. And there was a book that really – the one that I saved my money up to actually go out and buy was – my friend said you can’t get books by John – you know, you can’t go off and buy that, I said, yes, I can. There was one on – that was very different. It was all about Scotland and an eagle, and that one I remember, I had that for years and years. And also a book which I in fact still have upstairs was a book from my aunt and uncle who went to South Africa, and it was a book about animal stories, anthropomorphised animals. And it was like fables but instead of Aesop’s fables these were fables written about animals from southern Africa. And I used to love those, you know, The Zebra and the Tortoise and things like that. So, you know, I think I had – you know, I had the imagination, so I could actually imagine what it was like. I enjoyed reading and imagining things.

What about the accounts of the Roman legion in the north of England interested you at that age?

I think it was just a mixture of it – I think it was a mixture of excitement of the story and, again, just going back into a part of time that was, you know, beyond written history. It was, you know – Rosemary Sutcliff was writing these from the archaeological point of view, using archaeology that was going on at the time, to inform her books. I just found them very well informed but yet exciting. And I guess subconsciously the sort of archaeological theme is sort of, you know, running through
and I think if you’d asked me what I wanted to be up to the age of eleven I’d have probably said I want to be an archaeologist. And I think it was partly coming from these books, both Mortimer Wheeler book and from the things like Beowulf and Sutcliff and other historical novels, or like prehistorical novels. Then I think – I thought I wanted to be actively involved in that ‘cause I just found it, you know, exciting, finding out about people, how they lived in the past and I really – you know, I really found that very, very good. And with increasing sort of radio and television involvement in archaeology in the late ‘50s I thought, yeah, this is something that is of interest to me.

What was on the TV and radio at this time then?

There was – there were just – I remember these occasional programmes like Animal, Vegetable, Mineral which had some archaeological content. And there was – I can’t remember any specific programmes but I’m sure on the television there were some programmes about excavations that were going on. Again, I can’t remember any specific programme but I was aware that there was other information that wasn’t just what I was reading nor what my parents might have said because they – again, they were busy with their jobs and they didn’t have the time to become involved in archaeology or history. So I must have been being influenced by the media at the time.

[1:16:03]

Could we now go to your next school –

Right.

Which was?

Egger’s Grammar School. Yes, I sort of passed Eleven Plus. Fortunately that was an easy decision then for my parents, well, you can now go to the local grammar school and that’s fine. Yes, Eggar’s was a small town grammar school. It had actually been founded in 1642, I could even remember that one. It had a hideous uniform, the main
colour of which was bottle green, which does not suit me and I never buy anything bottle green any more, whereas the Mayfield, the primary school, had been red, white and blue, very patriotic and that was okay. So, yes, the big school, it had two classes that went through to streams, the A and B stream. Because of the size of the classrooms they were usually classes of twenty-eight because you’d get an array of seven by four desks into the room, and that was what limited the school intake. So, yes, it was a small grammar school. It was expected that the kids in the A stream would go to university, that’s what you were there for wasn’t it, you know, it was a matter of what you thought. And the other kids would go to teacher training college or nursing, and it contained a complete social mix of kids. It was a mixed school, so it had boys and girls in more or less equal numbers. But, yeah, there was – so it was – for me I guess it was like more of the same. I didn’t see it as anything – any particular big deal. Some of the kids came with me from the primary school, and others were new from surrounding villages, where many of them came in on buses. So it widened my circle of school friends and it was – yeah, there was a work ethos there. We had a very young, very strict headmaster who didn’t stay the whole time. He moved on to another school, a boys’ school in the area, I think he found girls a bit difficult to deal with. But he was – definitely kept that school, you know, well focused, and discipline wasn’t really too much of a problem and so it was fairly easy. I mean, yes, I got a little bit naughty probably but, you know, no more than anybody else. And I didn’t get caught as often as anybody else either, probably [laughs]. But, yeah, it was – I enjoyed my time there. I stayed there all the way through to O level and then stayed on for two years for A level. And, yeah, I enjoyed my time in the school and it changed my direction of what I found I could and couldn’t do, so –

In what way?

Well, as I said, I’d gone into – gone out of my primary school thinking I was going to be an archaeologist and soon came to realise by gearing up towards doing history for O level I couldn’t actually remember any dates, so there was no way I was going to get through and do history, which was at that point really considered a prerequisite for studying archaeology at university, so that was a bit of an eye opener. But at the same time I discovered physics and that was the easy bit. From then on I just wanted to do physics, so that was – and that was down, again, to the teacher. Perhaps I wasn’t so
keen on history because the history master was not, again – was not somebody who I necessarily saw as a role model. I mean the nice thing was that we had teachers who were a mixture of men and women. And, you know, again I – you see them in different ways and you realise there are different things, you are really pleased you interacted with that person and the influence that they had on you. I really found that a very sort of formative time of my life I guess.

[1:21:12]

*What then do you remember of the history master or mistress?*

The history master, he – before we actually hit the syllabus that we were meant to be doing, he would try and engage us in different types of history. I mean I remember doing Chinese history with him, which I doubt was being taught in many other schools. We did the Russian revolution, so going – building up into the Communist period but that was quite a – you know, again, quite unusual I would have thought. And he also did some Roman history as well but I have a complete gap in sort of the history of Britain between Roman history and the present day because we actually never did any history of Great Britain. Our history O level, which we got into I suppose by, you know, three, four and five, we were doing modern European history, 1780 I guess, somewhere like that, the unification of Italy right through up to the First World War. Very little interaction about what Britain did, it was all about, you know, Germany and Italy and lots of dates in France, and lots of dates, and I’m going, right, okay, I can’t handle all these dates, there’s too many of them. So it was a kind of … yeah, I suppose a rather mixed view of history and – but I missed out on all of English history. You know, we knew nothing about the Tudors or nothing like that, so, yes it – looking back, one’s education is a bit like my knowledge of London in that you – if you’re used to going to London and going on the underground, you pop up in all these places, you see what’s in your immediate surroundings, then you go down the hole again and get off at the next place you’re going to pop up. And so you have these bits but they don’t join together, and I think in some way that was how sort of the history – my history education was. And also English as well, the English that we studied for O level English literature was again focused on certain areas but you didn’t really fill in, in between, so it’s – maybe that’s what I found a bit disconcerting about it. I could
deal with things which progressed but I wasn’t very good with bits that popped up all over the place. I could deal with science because that was being sort of taught logically, and I guess mathematics was as well, as were languages. So studying French and Latin, you started – well, I had a little bit of French already from primary school, but basically, you know, we worked our way through up to O level and it was, you know, you’re progressively learning. Whereas one somehow didn’t seem to be progressively learning from the point of view of the history or the English. Geography was that – I guess that was a bit more structured, and again because my mother’s influence and having – her having been a geography teacher, again I found geography easy to do but I was – unfortunately my geography teacher was – virtually never spoke to me again after I refused to do geography A level ‘cause I sailed through the O level and she thought, ah ha, here’s a good one, and I’m going, no, I’m doing physics, chemistry and maths, sorry. Right, okay, so – but, yeah, that was structured and I could again handle that one very easily.

[1:25:25]

Now from what you said before, science at this school is going to be your first encounter with science as taught?

Yes.

What are your very earliest memories of the teaching of science there?

Well, we had three science teachers, they were all men and they had I guess different ways of teaching. And the one – two of them, I would say, had a really strong influence. And the one who taught physics, Edward Harckham, he was a very … and he was a very dedicated teacher. He cared about people, he cared about individuals, he tried to help everybody, I mean realising, you know, that many kids couldn’t – just find science easy but he would try and he got very many people through physics as their O level, whereas if they hadn’t been given encouragement by him they would have dropped out like they did out of chemistry. The chemistry teacher was not inspiring. He’d gone into teaching because he had been in industry but had for some reason retired from industry and was now making a living with teaching, and clearly
didn’t have a lot of time or not of – also not a lot of knowledge as to how to impart chemistry in a way that it was interesting nor successful. Nobody did well in chemistry in school and that could only have been because of the way he was teaching it. The other person who was influential was the biology master, a man called Martin Hyman. And Martin was young, that was definitely an advantage when you’re a, you know, young teenage kid. He was an – he trained to be an Olympic athlete, he actually won medals in British and Commonwealth games and went to the Tokyo Olympics, so for us he was like God. And he could keep discipline just by walking up the room and fixing somebody with his eyes. And nobody ever played up in his classes, he – but he didn’t have to impose any authority, he just had it naturally. And I think it’s partly because he – you know, he had a life as a long distance runner outside of the school. I mean he would sometimes bring one of his colleagues, again, whose name was well known in the ‘60s, Bruce Tulloh, and they would run for charity in the school, you know, occasionally. And, you know, we looked up to these people who could make it in – in athletics and these again for us were exciting people, contact with another world. And he was a very – you know, he was a very good teacher, again very structured. And so a lot of people who might otherwise have dropped out of science would also take biology, so he was also influential as a person and made – you know, made the biology interesting and you listened to what he said. He, I think, was also quite – and he was a little bit of a rebel I think. I remember morning assemblies in school when there were two teachers who clearly didn’t believe in God or Christianity, and so they would stand there in assembly when everybody was saying prayers or singing the hymn. There were two of them who would sort of sit there and sort of be reading something else and he was one of them, and so he was a bit of a rebel. And I also seem to remember that the English mistress also was not actively participating in school assembly, shall we say [laughs]. And again, that was interesting to see that people could be adult and could be quietly rebellious, or not rebellious but not – you know, not be hypocritical either, like neither of them were hypocrites. That was – you know, you were learning things by example and so that was interesting too. But, yes, science became alive at that point but I also managed to, you know, collect a number of O levels on the way, so I didn’t actually drop out of the other classes even though I didn’t necessarily enjoy them all that much. They were just a means to an end and if you could do it, you could do it, but I did reasonably okay.
Do you have any specific memories of the content of biology teaching?

Hmm … yes, for some reason I have a memory of having to write an essay which I enjoyed writing, which was on the lifecycle of a water molecule. I’m not quite sure why it came into biology class but obviously you go through a number of biological processes, and found that one absolutely fascinating to go off and think of taking a water droplet and where did your hydrogen and oxygen disappear and come together again, so things like that I remember. I don’t think we actually did any animal dissection but we certainly dissected plants, flowers, stems. And I remember I enjoyed that practical aspect of doing that. So I could cope with both the written and the hands on approach fairly equally. And also we – we also had active flower collection competitions at that point. So having been interested and got these – collected flowers as a kid with my mother, it was now – part of the summer holiday competition was who could get the biggest collection of wild flowers pressed in and recognised and written up about in an album. And this was one of the things that Martin Hyman had all of us doing, so that was an – it was competitive and it was something that all the kids took part in, and we saw it as part of a competition, so that was – but again, it was a way of learning about variety, you either get – you know, you had your own flower book, which in fact I still have, which you used to identify the flowers. And, again, it was one of these subconscious ongoing learning experiences that one had as a kid.

Do you remember how your organised your pressed flowers in your album?

Oh … no, I remember the act of pressing them. I suspect that they probably just went in sequentially in the order that I found them, and therefore they would go with the season. The album didn’t come loose leaf in those days, so you couldn’t actually shift them around. Once you’d got your flowers sort of glued into the page it was glued to that page forever.

[End of Track 1]
Could you give me some memories of the teaching and learning in physics at Eggar’s Grammar School?

I think it was the teaching of physics that inspired me to go and do the things that I have gone on and done. And the physics master was very supportive of all the kids but when somebody came along and really enjoyed it, he’d go out of his way to help and be there to answer questions. And so I found him very approachable, he taught extremely clearly, and I thought was a really nice person again. So I enjoyed taking the classes from him up to O level and then continued up to A level. And the buildings that we were in were not particularly modern, they were ones that my mother had been taught in, in the past, so it was bit full of wooden benches. But he set up experiments for the class to do and these always went extremely well. And, yeah, I found him a real inspiration and then realised I could actually do physics. I found this a subject that I didn’t really have to think too hard about, I could just go in, do it, you know, come near the top of the class every time and so – and enjoyed it, so that really set me on that route to staying on and doing it at A level.

Are there – given that this would have been the first time that you encountered physics as a subject, are there particular ideas of images or models or even equations that were particularly striking or interesting as a way of understanding what it was about this subject, apart from finding it easy to do, that appealed to you?

I think I like the hands on nature, so I think it was the experiments we did in the classes or the experiments that he demonstrated to us. I remember one when he – we were talking about conduction in different materials, conducting differently. He had a bucket in which he had – well, a container in which he had cold water and then he put in warm water, and he had put – he’d frozen some object, which I can’t remember what it was, but on the strips of metal that came out of this bucket. And as it warmed up, you know, obviously the ones that had the more conducting metal strip that came out, it lost its object first. And so here was something that was being explained and visualised in a very clear way, so I could see physics as being something that you can actually see. It wasn’t like mathematics where you couldn’t see anything, apart from
the equations, and it wasn’t like chemistry where the reactions were all taking place in a test tube and you didn’t know actually what was going on. Here was something that was very much more there, and also thing – the relationship to the real world. I remember having a long discussion about thermocouples and fish plates on railway lines to allow for thermal expansion, so that he brought in practical elements as well. It wasn’t all just focused on getting through the exam and there were experiments that he did that got you interested and then examples out beyond the classroom. So I think that was probably where he was able to engage people in that way. He didn’t have a particularly outstanding sense of humour or presence, unlike the biology master, but it was a quite confidence that sort of came over to you and that you – enthused you to work as well. And you thought, well, if he finds this interesting and can do this, well, maybe I can go on and do it. So, yes, I think he was definitely the person who most influenced me when I was in school.

[04:31]

*Could you describe two things, a) the room in which you did the physics? You’ve mentioned already that this wasn’t high tech or modern.*

No, not at all.

*And then b) the other students taking physics at your level, in other words, in your stream?*

The room itself, the physics and chemistry labs were basically one long building divided in half. And the physics won out because it’s on the sunny side, it’s on the south side of this building, and there were windows all round it, so it’s a very light and airy building laid out with the usual standard wooden benches at which we all sat with the bits of mercury down the various holes in the desk which had been there for generations and we all played around with. Erm, but basically he was able to get the attention of the other students, even though they knew they weren’t going to go on and study physics and may not get particularly good O levels at least they felt they could get an O level in it. So he never had any problems with discipline in the class
and kept people’s attention. So I think, you know, in the stream that I was in most people got through their O level physics as far as I remember.

[06:08]

*And who else was particularly good at it?*

There were – a couple of the boys were good at it and also went off to university to study physics. And there was another girl who was good, and she went off to do forensic science, so she was more into the chemistry side of things but the physics played an important part. There were also – the vet that I mentioned, she did physics and did well in it as well. So it was pretty equal – again, equally boys and girls doing well in science because of the teaching. There was no – you know, he didn’t favour the boys because they were boys, he just took students who were interested and keen to learn. And I think again that was one of his very great strengths as a teacher.

[07:07]

*And could you describe other experiments that stand out in your memory, ones that either you –? And we can go across O level and A level now, experiments that you did yourself or those that you remember being shown.*

Yes, the – I think my main memories then come when I was doing A level because he would encourage me to go and do experiments. There was a little lab off the – it looked like a bike shed really but it was a little sort of long, thin lab which had experiments that – it was used as a preparation room by the technician who laid out the experiments for him but in fact he would get experiments set up there, that I could then go and do just because I was interested. And one of these I remember was measuring the charge – measuring the charge of an electron. And I had to sort of atomise some water droplets, and I think it was Millikan’s experiment which I – I’m now forgetting the exact procedure but I remember just thinking how wonderful it was to be able to do this experiment that somebody had done for the first time maybe some fifty years before. And I just thought this was fantastic, to hands on, and he just let me get on with it. He would set it up, say what it did, and then go away. And he
would do this with – you know, maybe one experiment a month he would do this and let me go on it and I just really found that really – you know, really good that somebody could spend the time to do that with me. And that also meant that I had something extra to write about when it came to doing S level as well. In my school we didn’t have a third year sixth, and nobody stayed on to try for Oxbridge exams, it just wasn’t done from the school, it wasn’t big enough to support a third year. So the most that we could do to show our ability was actually to do a special level in whatever subject you wanted to, as well as the A levels, so I did that in physics. And, you know, again I put it down to all this extra sort of tuition that I got from that. So I think that really really set me going, to think that, yes, I really do want to study physics further, you know, explore things hands on, do experiments. I wasn’t interested in theoretical things, I was really far more interested in doing hands on experiments and, if you like, instant gratification because you can – you know, you’re taking your own data, you’re doing your own experiment and plotting up your own graph. And it’s there, you’re doing it, and I found that extremely challenging and interesting that I could actually just do that. You know, it was open to anybody to do it if somebody helped them with setting up the equipment.

[10:26]

*Given what you’ve said about the enjoyment of the practical and of the doing, how did you then find the pure and applied maths A levels?*

Erm, I enjoyed – well, going back to the maths. The maths teacher was not as good, he was coming up to retirement, at least the first one was, and so he was a bit old fashioned with his method of teaching. He just assumed you could do it and just set you things to do. So, you know, you could – he sort of attempted to teach us calculus, which we could. I worked out that, yes, I could do calculus but when it came to the applied mathematics, it was more like mechanics, that was much more like physics, so I really saw that as part of physics and got on with that far better. I think we had a younger maths teacher sort of start but I didn’t really benefit from his teaching, which I think was probably more modern and would have set me up slightly better to go off to university with. But it wasn’t enough to put me off and by now, at A level, it became a smaller class because people just found it too difficult. They found the
teaching was not good and they dropped maths as soon as they could, that and chemistry, and so people who were studying sciences would do, you know, physics and biology, and probably put it together with geography. But, again, the school was small and so we weren’t really able to do more than three A levels, nobody did four, though I think we probably could have coped with it fairly easily. And I don’t remember being a lot of pressure in – in the school, like time wise. And I remember we had enough time to do things like woodwork, for example. Having had to do domestic science for five years, I was thrilled to bits to be able go get away from cooking jam tarts which never looked right and to go and do some woodwork, you know, use a lathe, use a saw, make a cupboard. And, you know, if we were under a lot of pressure at school then we wouldn’t have been able to spend the time doing that, so. It was sort of structured at A level but it wasn’t that hard work to do it, it was just very well structured and that enabled us to get on and do other things as well.

[13:21]

You say that you’d decided that you would like to go on to do physics at university at the stage that you were doing A level physics.

Yes.

Had you at this time thoughts about what you might want to do as a career, as a job?

I think I wanted to stay in physics. Erm, I’d been on a family holiday up to the north of Scotland and we had taken – my parents had taken their car with a little van on the back, and we’d driven right up around Scotland. And one of the places we went to was Dounreay, which at that time had just opened up producing electricity maybe about five years ago earlier, but basically was a research nuclear reactor, which I think is now still being actively decommissioned. But I had thought, you know, it was a terribly sort of romantic site to see a nuclear reactor sat on a coastline on the north of Scotland. I had a picture of it in my mind, it was a very sunny day, so it probably stood out and I’d never seen a nuclear reactor before. And we – my parents knew I was interested in physics at that point, said, well, they do trips around, we’ll go round. And I remember that absolutely fascinated me, I guess I was probably sixteen or so,
about fifteen or sixteen, at that age. And then thought, oh, this looks like exciting stuff, I think I’d quite like to work in a place like this. I think I was probably expecting I’d end up working in a physics research lab somewhere. Somebody told me about the National Physics Laboratory in Teddington, and so somewhere some sort of job where I was being actually told what to do. I sort of, you know, imagined probably I’d be a technician working in one of these research institutes, that I’d enjoy the, you know, hands on interaction. So I think that was the kind of job I was looking at, and indeed even at the end of my degree in physics I had gone for a job interview in a nuclear research place near Warrington but didn’t get the job. And apparently didn’t get the job because I went in knowing what I thought I wanted to do, and they wanted people that didn’t know what they wanted to do and could tell what to do.

And I think by then I’d moved on from the, I want to be told what to do, to the, no, I actually want to do what I want to do. And so presumably I was going to be a rather awkward person to have on the staff [laughs]. And so, yeah, but going back to when I was about sixteen, seventeen, you know, I thought I’d be working far more as part of a team in a government research lab of some sort. I didn’t want to teach. My mother had been a teacher, didn’t see myself as teaching. In fact, I think I remember saying to my parents I definitely did not want to be a teacher whereas my mother of course wanted me to be a teacher and never could quite understand what it was that I did. This thing called research, it didn’t really make a lot of sense to her, so she couldn’t quite understand what it was I was doing. That was how life panned out.

And this sense then that you didn’t want to be a teacher. I wonder whether you could identify the source of that negative ambition, if you like, or the not wanting.

I suppose that having seen my mother teaching for all those years, and I felt that her life was very introverted, it was centred – it was centred around the school and the kids, which is laudable in itself, but I didn’t really see it as me. I wanted to explore the world, interact with more people than she did, and so I suppose I saw it as a very restricting situation. I mean it may have been her, I may have been doing the teaching a misjustice because I – you know, having had good teachers in the grammar school, then I, you know, I might have thought of them as role models and would have liked to have been like them and gone on. But I just felt I just wanted to challenge myself and go further, and see how far I could go. And I guess that’s what I’ve done all my
life is to see life as a challenge. I haven’t planned it. I don’t think I like planning my career, I just saw it as, you know, whatever happened, happened. And I didn’t want it being stopped by going into teaching, which was somehow how I saw it. I saw it as sort of – sort of a bit stultifying but that was probably in reaction to my mother, and maybe the reaction to my mother, in that she was wanting me to be a teacher and I was probably a little bit bolshie by then and thinking I don’t really want to do what she thinks I want to do, so I’m not going to do it.

[18:58]

_Thank you. You said that you have a clear picture of seeing the reactor on that day. I wonder whether you could describe what you see in your mind when you think of it._

What I see is a large round building, spherical dome, sitting perched on a cliff above the sea. So it would have been a sunny day that I saw it on, which is probably why it impacted on me. And then – so it was the visual memory from outside and then going round inside and seeing through one of the lead windows something of the reactor core. I remember seeing Cherenkov radiation, which is this really bright white light coming out when particles are interacting in the water. And I just thought that was just such an amazing sight, like nothing I’d ever seen before. And I also liked seeing all these scientists in white coats running about, and of course that’s what they were doing. They were all in white coats in those days and were, you know, actively involved in a function. And I just thought, well, that’s a nice group activity, I quite – you know, I quite enjoy doing that. So those are the three – those are the only three things I can remember but I do remember thinking, yeah, this is something that I would like to end up doing.

_What do you remember of your parents’ responses to it?_

I think my mother still wanted me to be a teacher. My father was very happy, my father was somebody who wanted me to do – encouraged me to do what I wanted to do and never influenced me to go one direction or another, and would just be very supportive. So I think he would have been very – you know, would be quite happy if
I’d gone that route. He was quite happy with every route I took, so, er, yeah, that was very good.

*What was his level of interest in science and in physics in particular?*

I think he would have liked to have studied science. I said he left school relatively early to be an office boy and he was good with numbers but I think he would have actually – I think he would have liked to have been able to go to university but his family didn’t have a background of doing that. And there were occasional books on popular science which came out, I guess it was – they were paperback ones, and I remember just one or two that he must have – I didn’t buy them, so he must have bought them and brought them into the house, my mother wouldn’t have done. So I think he was interested in modern science and would read about it as an educated layman, so. And I think he just saw here – you know, here is the future, there’s all sorts of opportunities, go out and do what you can do. So that – that I think would have – you know, I think had he been born twenty years, thirty years, later then I think he would have gone to university and probably studies science just because I think he had an analytical mind that he had just turned into working figures and looking at investing in the stock market. But I think he equally well could have applied it to science, the logical thought that’s required there.

[23:02]

*And could you give me your most striking memories of other family holidays?*

Well, we – initially when I was very young we did the usual seaside British holiday, erm, holiday camps, and things like – things I hated doing like dressing up in fancy dress competitions. There are embarrassing pictures of me dressed as a Tate & Lyle sugar cube, Red Indian, all sorts of strange things. Didn’t like this kind of display, didn’t like acting, didn’t like that kind of thing, so we fortunately got away from those kind of holidays, moved off into doing a little bit of walking holidays in the UK and used the centres that were run as walking holiday centres. And my parents enjoyed that, I enjoyed it, though I did get into trouble once when I walked to the top of the mountain ahead of everybody else. My parents thought I’d fallen over the edge when
all I’d done was attach myself to the wrong group of adults, as you do when you’re aged about eight. But didn’t put me off walking, I did get a dressing down afterwards. Then we started to be more adventurous on holidays. I have this distinct memory of getting into my first aeroplane when I was about ten. There was a picture of me with a teddy bear I know exists somewhere in an album. We went to Alderney on the Channel Islands and again I remember the beaches, picking up shells. I remember the various castles which were then refortified by the Germans during the war when they occupied it. And rather more amazingly, I remember the time when I went up to the room and found that the ceiling had fallen in through a suitcase, so, you know, a very large sort of visual memory of that but – so that was the first aeroplane and the first out of Britain holiday.

[25:25]

And then we started exploring abroad. My father had a friend who’d got a camper van that he kept in Cherbourg, and so what we would do for about three weeks is to take the ferry over to Cherbourg and we would then drive. We’d explore parts of France, we’d get as far as Spain and Portugal, we even got down as far as Naples. Usually going in – seeking, you know, sunshine and warmth but interesting in different cultures. And again, that was where my mother would get me to read up in advance about the countryside we were going through, the crops that were being grown, what the climate was like there, and so – and also some of the archaeology. I remember some of the Roman remains in southern France had been absolutely fascinating, and then finding there was a Greek settlement up in the hills behind the Camargue area. And just going, well, there’s all these things here and so it – these holidays were eye opening at all sorts of levels, sort of educational levels, but then there was also the sort of other things that came along. I mean unfortunately eating out was not things my parents did, and so I remember the awful thing of travelling suitcases full of sausages, and tinned sausages and dried potato, and so I never really did taste French food properly, which was all a bit rotten but did learn about some French wine as my father took me off on one occasion. From a campsite we went out and went to the Cote Du Rhone and he and I, while my mother was looking at some archaeological work, he and I disappeared into a wine tasting place. So I learnt about wine and that I found intriguing and part of adulthood. And also discovering Sangria
for the first time on a camping holiday, likewise in Spain, and finding there was this amazing drink that was refreshing and not too alcoholic and so, yeah, there are memories at all sorts of levels. They were – we went to cities, so there – I have memories of Cordoba, looking around the, what was the mosque and became the cathedral and, you know, strong images of that. So this is an age where you’re now in your … I was now in my early teens and so the images are much stronger of buildings and even places I’ve never been – you know, I’ve not been back to, I just – you know, I can just see all these various places. And I think that was really good to get out of one’s country, see life in other countries. Even if you didn’t actually get round to eating the food there, you could at least see that life was different, in some ways better and in some ways not as good. So, gave a good background of – to one’s education as well I think.

[29:05]

And you mentioned that your mother wrote a diary or account of these holidays?

Yes, well, my mother would always write up what she did every day. She didn’t expect me to, which was just as well because I think I’d have got bored very quickly, but she – yeah, she – so she’d always be able to look it up afterwards. Whereas going on the holiday my father did all the planning, so he’d decide how far he was going to drive, which campsite we were going to stay in. And so he did the forward planning and she did the day by day write up of where we’d been, because by then we had a camera that took colour slides and so we had to know what we’d seen and where we’d been to be able to make sense of the colour slides when we got back to the UK. So my mother’s diary came into use at that point. But, no, I – fortunately I wasn’t expected to write it up though I might have been asked to write up a bit when I was sort of writing letters to people to say thank you for birthday presents in September at the end. Then I might be asked to write something but otherwise there wasn’t any great pressure. I would be expected to, you know, be able to talk about the slides when we got home, so –

When were these slides shown then?
They were shown when family came. It was, you know, aunts and uncles came round and so we’d get the projector out and show them where we’d been and it was – I was usually the one who was expected to talk about it, and I think that was probably part of the subconscious learning experience that my parents were helping me with.

[31:05]

*And do you have any sense of whether your mother was writing this account subconsciously of someone who’d studied geography or merely as … a record in relation to the slides?*

I think she did it – I think she just did it because she was used to taking notes as a geographer and notes for her environment. So, she would keep a diary – a weather diary when she was back in the again. So going abroad, and it was just a case of expanding that diary but they were quite full. They would describe, you know, the landscape and the camp – but also practical things with – whether the campsite, they’ve got decent toilet facilities for example or not, so it was a practical element to it as well. And she – yeah, she wrote and I think she read them to herself afterwards. I think she – you know, she was using it to reinforce the memories as well when she got back.

[32:11]

*What do you remember of the interaction between your mother and your father on the holiday?*

Hmm … on the whole it was pretty good. I mean it only fell down once, and that was when we took grandma with us on the camping holiday. She and both slept in the top half of the Volkswagen camper van. Three generations in a camper van, travelling round in Spain, is not a good idea. And I remember my father saying, well, if she passes away on the holiday I’m just going to wrap her up in a blank – in a carpet and put her on the roof, and we’ll keep on going with the holiday. And I thought, hmm, right, okay [laughs]. But, yeah, on the whole it was – their relationship was, I would
say, conventional. I don’t remember it being a particularly – certainly never touchy feely childhood, and I don’t think they had a touchy feely relationship, but I think it was a conventional relationship where they got on well and didn’t quarrel. So I wasn’t aware of any arguments as a kid, I was just vaguely aware of tensions concerning, you know, my grandmother on the periphery. If my grandmother wasn’t there, then usually there weren’t any arguments. There was usually sort of – one of them had done slightly more research on whether we were going to look at the – you know, where the Roman remains were that we were going to look at or where the mountain range was we were going to investigate. And I think that was done fairly sort of equally and equably I must say.

[33:56]

*And finally for this session, could you tell me about what might have been called, what might not at the time, but might be called now extra curricular activities at the grammar school? You’ve mentioned the playing of chess but I was wondering about other clubs or visits or sports.*

Right. Sports I wasn’t particularly good at, apart from tennis which my parents played and – so I practised and I enjoyed practising with this sort of contraption, they had a ball on the end of a piece of rubber that you hit backwards and forwards to yourself. And I enjoyed doing that, and I could do that quite competitively against myself. I really disliked winter sports, I disliked netball with the hard surface if you fell over, and I didn’t enjoy that. I … didn’t enjoy playing hockey and I couldn’t run fast, so I was standing around getting cold and I didn’t enjoy that at all. So I wasn’t any good at any athletics either, apart from throwing a rounder’s ball that I could throw further than anybody else, so that was okay but nothing else. I couldn’t – I learnt to swim very, very late in life, so I wasn’t into swimming and I still don’t swim, so I didn’t go on school canoeing expeditions because you had to swim to do that, and I couldn’t do that. But the – I think there were a couple of school holidays, like this was another very good thing that the school did was to organise trips. One of them was a skiing holiday, a small group of us in the sixth form went skiing with two of the teachers. I have sort of two memories of that in particular, one is the fact that, it must have been on day one, I saw our maths teacher, the young one who’d never been on
skis before, going backwards down a hill slope looking between his legs as he went down before falling over, and that was great. And the other one was less funny, that was me falling over, and we hadn’t been taught how to stop and somebody in another group got in front, fell over in front of me and I went into them and tore ligaments in my knee. And I’m afraid I then spent the rest of my holiday, instead of on skis I actually spent it in the bar trying to teach the bar pianist the words of Beatles songs. But that was okay but it didn’t do my confidence on skiing, and I didn’t get around getting on skis again for about another – good another ten years or so, so – but that was very good that they would do that. They’d take you out, organise a holiday. And the other school holiday was actually one of the boat cruises that’s run – was run at that time by local councils, Hampshire County Council and I think some of the other county councils ran these school cruises. The Dunera I think was the name of the boat, they were boats that had once been small cruise boats, then had got commandeered in the war, then had got converted into these small cruise boats again but now a bit out of date so they were suitable for sticking loads of kids onto. And had this wonderful one of – which involved taking a train overland to Venice and getting on the boat in Venice, going down the Adriatic - that wasn’t so great, violently sick all the way down but, you know, we had time in Venice. We then went to Athens, we went – well, we landed in Piraeus, went and saw the Parthenon. We went to Rhodes and we went to Istanbul, and these are places that, you know, would cost a lot of money to go to now, you’d take a cruise, but in those days there’s all these kids all sort of, you know – there must have been a couple of hundred, maybe three hundred kids, on the boat. And it was just a wonderful opportunity to see countries and different cultures and that was great. I mean there were slight sort of difficulties like some of us got stuck in the bazaar in Istanbul and almost missed the boat back. But these are the memories that stick with you, the slightly stressful moments but, you know, those of us that did that remembered it when we had a school reunion a couple of years ago there were all these sort of stories about do you remember when, and quite a few of them were relating to this time on this school cruise. So I think those school cruises were an excellent way of people – you know, young people being able to go off and learn about other countries and learning how not to get lost and how to stand on your own two feet a bit. So I think they were very good for, you know, helping to establish character.
And what amounted to social life outside of school as a young teenager?

Erm, I think I was a little shy, I sort of wasn’t – I’m afraid I wasn’t really into boys, they were slightly – well, they were – boys were just boys you were at school with, and one or two of the girls had romantic associations with them but I must have been a late developer so I didn’t. I joined the Methodist church youth club just because it got me out and playing tennis and doing other sorts of activities, not that I can remember what they were, but the tennis was the main one. And otherwise it was going to girl guides and involved in activities to do with that. Going to the theatre, I – there was – one of the girls in the school was keen on acting and she would organise trips up to London and we’d go to the Old Vic on a regular basis, and my parents would let us go on the train as a group. So there’d be about six or seven of us who’d, you know, go together and go to the Old Vic and that was wonderful, just seeing real live, top quality theatre. And, you know, it’s taken me a long time again to go back into going to see Shakespearean plays, which I’ve done this year but, you know, I realise that quite a lot of my interest was from those, you know, informal school groups. So that – but those were the main sort of activities outside of school.
Track 3

**Could you talk me through the sorts of decisions that you were making at the end of your A levels, both in terms of what and where to study?**

I think by the time I came to the end of A levels I realised I wanted to go to university and study physics because I’d had such an inspiration from my teacher, so I was applying for places in physics. And in those days you applied for six universities and I couldn’t apply to either Oxford or Cambridge because our school didn’t support a third year in the sixth, it was a very, very small school. I then thought I would apply for what independently was thought to be the best university for physics, and that was Bristol. And as another choice I put down Sussex, ‘cause that was a new university which I thought would be interesting, and I chose the one that was strongest for science, which at that time was Sussex. So I applied to them, Bristol came back with an offer straight away, but Sussex had a policy of always interviewing their potential students and they invite you down and you had a one to one conversation with the tutor as well as a sort of tour around the labs and general facilities. And I was so impressed by the interest shown during the interview and the nature of the interview that I thought, yes, Sussex would be a place I’d like to be. I don’t even want to go and look at Bristol. If they don’t want to see me then, you know, I don’t think I want to go there. So I think Sussex played it very cool in that they got people to go, be interviewed, therefore would like it, and therefore would take up a position there to study. So that’s exactly what happened. Come the results I could go to either Bristol or Sussex, and I rejected Bristol and I went to Sussex.

**Could you tell me how at that age, at the end of A levels, you had been given this information that Bristol was – you know, had the best reputation for physics, where that information came from?**

Yes, I mean we had a careers master. In fact the careers master was the physics teacher, so he’d actually probably done a better bit of research into where it was good to study physics than any other subject. And it was assumed that most of the kids in the A stream would go to university, so there was lot of information about university
places. So it was talking with him and he suggested that Bristol was the best, and that if I was wanting a new university then I should perhaps look at Sussex.

_And are you able to say what it was about either the sight of Sussex, sort of the visual appearance of the interior and exterior, or about the interview itself that enticed you, that impressed you?_

I think it was a bit of both actually. I liked the campus, which was just outside Brighton. It was relatively close to the parental home, so if I needed things bringing down I could, you know, phone up my parents and get them brought over. So it wasn’t like applying to somewhere in Scotland, it was convenient. But it wasn’t available on a direct train route so it was that far enough away that I felt independent enough at that point. So here is this nice campus, new campus, that had been set up only three years earlier to take its first intake. Its setting of Brighton being next to the sea, it meant that one could then go into the town, into a large – for me, a large town, which I would enjoy. And I had the sea that I could walk beside and enjoy that. So I think the setting all round was very good. The interview, I just remember as being challenging but not threatening and thinking this would actually be a stimulating place to be if I could actually get tutorials. And Sussex had small group tutorials on a regular basis with no more than four students to one faculty member, and I thought well that’s an unthreatening environment that I will probably learn from and appreciate. The other thing was that all the staff there were very young at the time because they had just set up the university and all the new universities were then competing for people, bright young things, and so they were going for the people who were just finishing their PhDs or post-doctoral research and really sort of dynamic. And I think again there’s this young staff, you know, I found appealing as well.

[05:34]

_Thank you. And then could you describe the physics that was taught there? If you’d like to divide it up into first, second and third year or however you want to structure it but to give us a sense of the physics degree._
Well, I guess physics degrees are pretty much – well, were and probably still are, very much the same everywhere. They will have some elements of nuclear physics and solid state physics. Solid state physics is the course that I enjoyed, and that will go all the way through being taught progressively in all three years. And then your conventional things like optics which again I remember enjoying. What I didn’t enjoy were the theoretical physics courses, such as quantum mechanics and relativity. In fact, relativity is the one course that I went to, really didn’t understand a word, when it came to the exam, which was a counted exam, I went in, wrote my name, wrote down one equation, and said my knowledge has been relativistically contracted according to this equation and then I walked out. And I was the first person to walk out of the exam, you know, three minutes after it had started. And I obviously failed but in fact I got something like two per cent, and somebody else got worse, presumably they’d spelt their name wrongly [laughs]. So, yeah, that was a bit of a disaster as it was in the final assessment but, yeah, just reckoned it wasn’t worth struggling with something I really couldn’t get to grips with some – had some mental block about it. But I particularly enjoyed the solid state physics and I also enjoyed the practicals, so being a physics course there were practicals.

[07:31]

At Sussex as well, you – they preferred not to do just straight physics, they would teach physics, maths and chemistry, with maths and chemistry as subsidiaries in the first year and then you moved on in second and third year and studied physics only. But it gave you the option of moving from the physics course into say chemistry or maths if you wanted to go that way. And that I think was unusual at that time though it’s common now that you have options at the end of your first year. But I – yeah, I found the physics – sorry, I found the chemistry more interesting, much more interesting than at school but not enough that I wanted to move out of physics. But I – I did this physics, maths and chemistry, and then majored in the last two years in physics.

[08:24]
For people with not much prior understanding of the different kinds of physics, are you able to say why solid state physics appealed whereas quantum mechanics and relativity didn’t? Is there something different in the content or the approach?

I think it’s probably more immediate and more practical in that you’re dealing with materials and behaviour in materials, either at room temperature or lower temperatures whereas quantum mechanics seem much more sort of like mathematical and rather esoteric. And so it wasn’t as applied, it wasn’t as hands on, and I think I discovered that I was a sort of more of a hands on person, and I think that was the point where I preferred that. I enjoyed the – I did an electronics course and I enjoyed that as well. And again, that’s hands on. I remember looking at how electrical currents and circuits enabled you to do all sorts of things. Yes, I think that – it was the hands on. I mean another thing that we did at that time, which I remember which is sort of hands on but I didn’t get on with, and that was the computing course. We had a crash course in FORTRAN and – which is a programming language that was used then, and crash was about what my programs did every time. You would write your program, you would put it onto punched cards, you’d go along to a big computer centre, you’d had the cards in, they’d run it, you’d come back a day later and they’d say it crashed, and you’d go away and try and rewrite it. That I did – you know, that I found rather irritating and put me off computers for quite a long time.

[10:31]

And are there particular kinds of experimental work that you did that are – were striking enough for you to now remember the details of them? Particular, I don’t know, perhaps demonstrations or experiments that you did yourself which were different from the sorts of things that you’d done at A level but were experiments, experimental work, practical work, as part of this degree.

I suppose rather – I don’t remember much about the individual lab practicals which were done in large rooms where they were – the equipment was laid out. You were given a written set of instructions and then given the aim of how to get there. I don’t remember much about those, I remember more about the dissertation that one had to do to – in the second year where it was a case of building a piece of equipment and
trying to get it to work and trying to aim it to measuring something in particular. So that was – I chose there to investigate the construction and testing of a small laboratory magnetometer, and I guess that wasn’t very successful. I guess that I found interesting because I was doing it myself but, again, with a good member of staff as a supervisor sort of stopping me making too much of a mess of it. But that – working in that lab, I remember; I remember the large lab spaces, the small research areas built at the – you know, coming off them, so I remember the setting of the lab.

Could you describe that in a bit more detail because it was going to be one of my questions, these very new physics laboratories associated with this university?

Right, the lab – because Sussex was a new university it meant that the buildings were new, that they were custom built, they had big windows for experiments which required lots of light. They had interior rooms built for experiments that required to be done in the dark. They were an integral part of the building, so you walked past laboratory spaces to get to offices, to get to lecture theatres or to get to undergraduate laboratories. And so you were aware of the research environment because you were walking round it. And the labs that I got into, for example the one where I was doing this project, was quite small and it was partly dark because there were processes going on that one needed to maintain low light levels. And then the other labs I got into were the research labs related to working in summer as a junior technician, and these were the low temperature labs. They were working down at liquid helium temperatures and carrying out experiments there. And that was in a very spacious lab which had glass windows down one side, it had four major pieces of equipment in it with a couple of people working on a piece of equipment at any one time. And I spent – I certainly spent all of one summer working there and also part of the second summer working, assisting, basically being junior dogsbody. But that was fine because I then learnt about what research went on, how it was done, and people were extremely good, from the graduate student through to the – you know, the lecturer involved it – they all explained to me why they were doing certain things and how I can help do that, and I just found that a very nice supportive environment.

What sort of thing did you tend to do?
Erm, well, I remember sort of being set to wiring up various things. So I sort of roughly learnt to use a soldering iron, which I hadn’t done before. So wiring up small circuits for parts of the equipment and preparing samples. I can’t remember exactly what the samples were now but they were obviously being given – I was being given things done, to do, that did not run the risk of killing the experiment so to speak [laughs]. And so it – but it gave me a real feel for what was going on there.

[15:36]

And what did you notice about the sort of mode of interaction in the laboratory, whether they were, I don’t know, serious, earnest, professional, lively? How did the people behave in relation to each other and to their bits of equipment?

The people were very interactive. I remember a great deal of humour, I don’t remember a great seriousness. I mean science was obviously serious to them but there was a feeling of gentle competition between various faculty members but they were always – they were sociable. And, for example, I remember going to parties at two or three faculty members’ houses where there would be a range of faculty members, there’d be graduate students and post docs and, you know, me because I was by then known as being somebody who worked in the lab in the first summer, so I got involved in going – invited to these parties which were, yeah, quite wild. They were early ‘70s parties. And it was very nice that they included me and, you know, I could see scientists letting their hair down and, you know, they seemed a really nice bunch of people.

What sort of thing went on at early ‘70s parties?

[Laughs] Oh, they’re before your time, huh?

Hmm.

You know, a fair amount of consumption of alcohol, some small consumption of food, probably a little bit of smoking of illegal substances and lots of dancing. And, yeah, that was something again I wasn’t used to from my upbringing, really any of
those things. They were social interactions and I enjoyed that, it was – yeah, it was part of learning about life and learning to grow up I guess.

Were there other undergraduates who, in a similar way, became invited into this?

I don’t remember that. I think it was just because I was – you know, had been in the lab and then also when I’d been working in the lab there was a tea room which was – it was ostensibly for faculty technical staff and PhD students but not for undergraduates. But I was always invited along during term time. After that they’d say, just come on, you know, if you want a coffee, just come in and I was then treated as one of – you know, one of the regular team. And so I think I managed accidentally to find myself in a rather privileged position and enjoyed talking to people about what research they did. So that continued through the term time in the second two years, and so that was a nice place to be. I got to know members of staff, not just in the research group I was in, and not just my tutors, but also the head of nuclear physics and the head of plasma physics, so I was able to talk with them. And many years later when I met some of them, they would still remember me from those occasions.

[19:17]

And why did you decide to build a magnetometer? I suppose we ought to mention the sort of context that this is – all this had been late ’60s when magnetometers were used pretty widely in the earth sciences for discovering various things about the way continents move.

Yes, I – the way that practical options, you know, dissertation options, get set up for undergraduates is that the staff members come up perhaps with one or two ideas of what a student could be expected to do and they write up a sort of three line description of the project and then the students go and look at this list and say, oh, that looks interesting. And the one that appealed to me was the magnetometer because it was then being developed, erm – it had been pointed out it was being developed for measuring the earth’s magnetic field. And I was also at that time starting to become aware that perhaps it had a use in archaeology as well as in geology, and I thought this sounded interesting actually. And I think I was getting the feeling that I was more
interested in the application of physics than in studying pure physics, and so I already had this inter – outside of physics interest. And so I saw this thing to build a magnetometer. Also the faculty member who put it up, Peter Townsend, was a very approachable tutor who I’d come across when he was teaching one of the courses and I thought, yeah, I think I could get on with him, he’d be helpful. He had a great sense of humour and again he’s somebody I’ve seen more recently. And, you know, again I think that helped me decide that this was what I wanted to try and do. So I found it interesting because of its potential application outside of mainstream physics but also because somebody who I liked, I could get on with, would be supervising me doing that.

What was the archaeological application that was envisaged for a magnetometer?

Right, well, the – if you have a buried building such as a brick wall, then you’ve got some fired bricks. When you fire material above a certain temperature then it will both take on the information about the direction of the earth’s magnetic field and about the strength of the magnetic field as it cools down from its heated state. And that information can be measured by bringing close to it something that measures magnetic fields. If you bring a magnetometer, which is a device for measuring the magnetic field, if you bring it – if you’re walking across a field, say, and there’s a background magnetic field that’s been modified by what’s under the surface of the land, then if you go from a soil with unheated materials and you then come to a wall, of say brick or some disturbance, then you can pick that up. And so if you walk backwards and forwards across a grid you can build up a pattern of magnetic anomalies under the ground and then these can focus where you’re going to do your excavation to investigate any feature. I mean if it’s a wall then, you know, it’ll show up as a linear feature and you think, well, linear feature, manmade, therefore it might be relevant for excavation to answer some particular problem. So that was how magnetometers were being developed at that time.

[23:44]

And was this interest in archaeology present in any members of staff in this department of physics, or was this coming from elsewhere?
No, it wasn’t an interest as far as I remember from that member of staff or any other one. The physicists there were definitely physicists, and this was just a small side project related to some other branch of physics research that was going on. Sorry, I can’t remember exactly why he had put that up as one of his projects.

[24:26]

*And could you talk about your interest in archaeology more widely at this time, while at Brighton?*

Yes, I’d always been interested in archaeology and it must have been in my first year at Sussex that I’d heard about an archaeological excavation that went on outside of Brighton, near the Channel port of Newhaven. And up on the hillside above that was a Saxon cemetery and that was being excavated systematically every weekend. It wasn’t being run out of the university, as the university had no archaeology department, it was an individual who was running this. He worked during the week as a stockbroker in London and somehow had got together a group of people who enjoyed archaeology and were willing to go out all weathers and dig at weekends with him. And I heard about it, went out, and from then on I was out one day a weekend for the whole of the three years, come rain, come shine. I mean looking back on it, I mean he was clearly a sort of dilettante but on the other hand he was encouraging all sorts of people to be interested in archaeology. And one of the other guys – well, guy, he was a schoolboy at the time, Martin Bell, went on to study archaeology and is now a professor of archaeology in the UK, so that must have had an impact on him as well. But the other people were a strange group. There was an office worker, there was somebody who’d inherited Manders paint company and he was definitely very odd because I remember seeing him standing at a gate at the end of a dig talking to the cows on the other side but – so it was a really odd bunch of people, and with a few others from the university who came and joined in. So that interest in archaeology was always there, and I enjoyed again getting out, getting away from the student life as well, I – you know, I didn’t want to just be a student for three years. I was able to meet other people and enjoy that aspect of life as well.
For those people who haven’t ever been involved in an archaeological dig, could you describe what you were asked to do on the hillside above Newhaven, what was going on in practice?

Well, what we were doing was basically down on our hands and knees with trowels. And when we managed to find something, then we’d go down and use brushes to brush away the earth so that the artefact could be taken out. The most exciting artefact that was found while I was there, not by me but by somebody else, was a small Anglo Saxon bucket, small bucket, which caused great excitement. But otherwise the pieces were more of pottery and, you know, nothing really exciting but it was just seeing material that had been there for centuries that, you know, hadn’t seen light of day since. It was a burial site, so there were bones, and it was a site that was very close to the current earth’s surface, so it was only like about six inches beneath the current land surface and one could, you know, see the dips in the landscape. In fact, we went – on one occasion we did some dowsing with a couple of rods, walking backwards and forwards, nobody believing it would actually work but actually finding that we did find where the outer perimeter of the burial ground was. Presumably the land surface changed a little bit and one walked in a way that then the two rods that – you know, the divining rods that you were holding, dipped. I couldn’t believe it but I was actually holding them at the time, so I was quite amused by that. So, yeah, I don’t think unfortunately that the dig really got written up properly because David unfortunately – David Thomson, the guy who was directing it, died before he did so. He was a stockbroker and he enjoyed the good life, and I think was rather overweight and ended up having a heart attack, you know, shortly after I left. But it gave me an experience that I enjoyed that interaction and going to meetings that discussed the archaeology, I enjoyed that.

[29:50]

Could you say more about what you perceived to be the nature of his interest in doing this, the stockbroker’s, David Thomson’s?

He – I think he saw himself as the gentleman archaeologist from a couple of centuries earlier. He collected books on archaeology, and particularly ones which were on
stone monuments which were written by, and privately printed by, people from 100 or 200 years earlier. So I think he then saw himself in that mould as, yeah, a gentleman archaeologist. He certainly had no, you know, intentions of giving up his lucrative job in the city to go and be an academic at – and he wasn’t trained in archaeology originally anyway. I never did found out how he ended up, you know, taking this up but it must have been out of deep interest. And I remember going back to his mother’s house, which was in Lewes, and finding – and him showing me the loft where he stored the finds, and hopefully they got from there to proper museum curation by the time he died.

*How was it that you went to visit his mother in Lewes?*

Ah, he just invited me back there, Lewes being not very far away from Newhaven. He would invite one or two people back to have coffee and warm up. If it was in the winter it was damn cold up on that hillside, and I remember on one occasion he turned up with a bottle of really superb apricot brandy to try and keep us all going as the snowflakes were coming down [laughs]. So, he was definitely a character.

*And so the finds then were in the loft?*

They were in the loft, indeed. Well, his mother’s house was quite small and so she wasn’t going to have them downstairs, so he had to catalogue them and put them in the loft. So, yes, and that isn’t the way that one ought to be conducting an excavation because that way material can get lost. And as I said, I hope it didn’t, and I think Martin Bell maybe came back in later years and got the material and properly curated it.

[32:25]

*Thank you. And I wonder whether you’d be able to tell me about wider social and cultural life in Brighton at the time you were studying there, things done.*

Right.
You mentioned this was for you a large town, and so it’s really your experience of exploring it.

Yes. So this was like 1966 to 1969. Yes, what was it like? I found that one could eat in restaurants, I wasn’t – my parents didn’t go out and eat in restaurants. I found so-called food from China, a Chinese restaurant. Yes, it was greatly exciting, and Italian restaurants. So I learnt about eating out and, yeah, there was nothing – there was nothing like the range of restaurants from different places in the world that there is now, so it was all very new and exciting. I learnt about music. In my childhood there wasn’t very much in the way of music or music appreciation. And I bumped into somebody, I can’t remember exactly how, but she said, ‘Oh, why not come to the concerts that happen on a regular basis in the Dome.’ The Dome is a big concert hall in Brighton and you can get very cheap student seats right up in the Gods. And I found that absolutely amazing. I’d just never encountered an orchestra filling a space with lots of people, so I enjoyed that. Also the Theatre Royal in Brighton had a lot of pre-London runs, and again there were cheap tickets for students if you sat right in the very top, and so I’d go to plays. That was also opposite the Brighton chess club and I spent a little bit of time playing chess there for a while. Other things that I enjoyed were based on campus and they were things like – they were poetry readings and I’d really not been interested in poetry much at school but I remember Dame Flora Robson coming and reading a piece of poetry. I’ve no idea what it was that she was reading but delivery of something, a piece of poetry, it just sort of stuck in my mind as being, you know, something which was another world that was out there that I’d never experienced. And that – you know, again I was just enjoying all these different things that I hadn’t encountered as a kid.

[35:28]

Who were your sort of most important or closest friends?

I think my closest friend was a woman who I found myself sharing with in the first year. The university allocated us to guesthouses on the sea front in our first year, and there were a lot of guesthouses because it’s a holiday town, and so they would take a number of them over and put students in there. So there was ample accommodation
and – but it usually ended up with, you know, sharing a two bedded room. And so this was another woman who was doing the same physics course that I was, and she and I stayed very good friends. In fact, we’ve stayed in contact over the years and in fact I had lunch with her a couple of weeks ago down in London. And again, people don’t change, so the friendship then is the same friendship now. You can – you don’t see the person as much because you move away into different places but you stay in touch once a year at least and the friendship is still there. And there were two – you know, two or three other people that we stayed in touch with who were from our course and other people who we met and had a wider group. In fact, one small group with whom I went off to relax at the sauna in – just along the coast between – while revising for exams just to get away, again into a group of non-university people. Half a dozen of them would go along to a sauna and relax, you know, have a coffee, jump in the pool afterwards. And that was actually fun because there’s the classic event of going along to a party that somebody there had organised and we all turned up, and it was the classic one of, well, I’m sorry I didn’t recognise you because you’ve got your clothes on [laughs], whereas you’ve only ever seen these people before completely starkers. So that was – no, that was an interesting thing to do in my final year, just as a way of trying to, you know, relax and get away from the pressure of sitting in the library all the time.

[38:27]

Thank you. Now I’d like to ask you in particular about your third year dissertation project, which was on the application of science in archaeology which involved a visit.

Right, that started off by the fact that Sussex had a policy that all science students had to do an arts course and, conversely, all arts students had to do a science course. So I was faced with having to do a dissertation on an arts project, and take an arts course, and as I said, there was no archaeology being taught at Sussex. However, there was ancient history, Greeks and Romans, and that was the nearest I could get, and not being a sort of natural linguist I didn’t go to, you know, modern languages. And I thought, ah, this might be – at least be interesting because I’d seen various Roman and Greek remains in my travels around Europe with my parents. So I thought, yeah,
okay, let’s take this course. And I enjoyed the course but I was completely lost as to what dissertation topic I could do. So the tutor, whose name I’m afraid I’ve forgotten but I can see her in my mind, and I said, well, what – you know, I really don’t know what to do, have you got any ideas? And she said, ‘Well, there seems to be a starting movement in the application of science to archaeology and as far as I can see,’ she said, ‘there is a laboratory in Oxford where these – some new ideas are coming out of and perhaps you’d like to investigate what science is applicable to archaeology and then, you know, use that as the basis for your dissertation.’ And, you know, she was clearly interested in what was going on but not interested enough to actually go and find out. So she said, you know, ‘There is this lab in Oxford, why don’t you find out what they do? They seem to have published a couple of papers in these scientific journal *Nature* that – you know, within the last year and this is pretty good, so you’d better go and find out what’s going on.’ And so I found the paper in *Nature*, I found the name, Martin Aitken, as being the head of the group, and wrote and said that I was doing this dissertation and I was, you know, wanting to find out some more information, could I come up and look round. And then received an invitation to go up to Oxford and have a look at the lab, and so that’s where I guess the big career step was made. It turned on going to Oxford to see what was going on, and then realising that that was absolutely fascinating.

[End of Track 3]
Track 4

Could you give the name of the laboratory that you visited in relation to this dissertation project and then describe in as much detail as you can remember what you saw on that day, on that visit?

The laboratory in Oxford was called the Research Laboratory for Archaeology and History of Art, so a very long title but one which was obviously chosen to cover the fields of research that were done there. It – the laboratory, I should say, was set up jointly between archaeology and physics, the Clarendon Laboratory of Physics and the department of archaeology, both in Oxford. And it was physically situated about halfway between the two. And it was a very sort of new development, being such an interdisciplinary research lab. The building itself was, I guess, a bit of a shock. I’d been used to, in Sussex, being in these nice spacious custom built laboratories with people in small groups clustered around apparatus, and I turned up at the research lab in 6 Keble Road, otherwise known as 6 Keble Road, and Keble Road runs alongside of Keble College, and the buildings in which number six is found are a row of tall, four storey high, terraced building, clearly built a couple of hundred years or 100 certainly – maybe 100 years earlier, 150 years earlier. Clearly not built, not purpose built. They had accommodation, and at some point it had been like a boarding house, so they were constructed of small rooms. Number 6 Keble Road was in the middle of this one. It actually extended into the buildings either side, into numbers five and number seven, by dint of somebody coming along and knocking a hole in the wall on the different floors. Heaven knows what that did to the structure of the building. But as more and more people came to work there and new applications to science and archaeology came about, they needed more space so they just took over the buildings either side which presumably belonged to the university. So I arrived in the front of it, looked up at it and thought, oh, okay, not quite what I had in mind. There was a bike shed out the front, half of which seemed to be taken up with big five foot high gas cylinders, and there was a small flight of steps up to the present front door. Got inside and realised it was a building in which you walked in and went straight up the staircase ahead and then up flights of stairs going up and up and up to the very top, with rooms coming out, these small rooms coming off at either side, but no more than two to a floor. And there was a laboratory also in the basement, that’s where the
magnetic work was being done. And then up through the rest of that side of the building was where the luminescence work was being done. And into number seven, up a similar flight of stairs and the rooms off of that, was where the techniques using physical chemistry rather than physics were being applied to the study of paintings, you know, pigments, the study of ceramics, maybe the body of the ceramic but maybe also the study of components of the glaze, and these were physio chemical, analytical techniques to determine provenance, to determine ability of past generations to make such super glazes in the case of Chinese or Persian ceramics. And so I came into the building, I met Martin Aitken, and he showed me round and we talked about what research was being done. And he introduced me to the graduate students who were working on different projects and I thought, gosh, this is rather fun. There were people who were doing individual projects on their own equipment in their own room. It wasn’t group activity but there was a group ethos there, so that people talked to each other about what they did, and I thought, hmm, it’s interesting. And then towards the end of the tour and I suppose what in hindsight was probably being carried out as an unofficial interview, not that I realised that, being rather naïve at the time. Martin said, ‘Oh, I’ve got a studentship for next year. If you’re interested why don’t you apply for it? You’ll need to get another second at least but, you know, this is the topic. It’s on luminescence dating but otherwise it’s completely open what – how you carry out the research within that’ and so that – I went away thinking, gosh, that’s rather interesting, maybe I’ll pull my finger out and make sure I get another second and I think I might find this an exciting place to be.

What did he tell you about luminescence dating?

Right, he said that luminescence dating was a method that they had developed there in the lab for helping archaeologists who put chronologies onto ceramic materials. So fired materials, pottery, burnt stones, er, bricks, things that had been fired, and he was explaining that the zeroing mechanism was exposure to heat and then the signal that was built up through the radioactive decay processes occurring in that ceramic and the surrounding material. I should point out that Martin Aitken himself was trained as a physicist and that he did his PhD in nuclear physics but whilst he would have been a
graduate student he’d become friendly with a guy called Teddy Hall who was a physical chemist and who had a real interest in – in ceramics, in beautiful modern ceramics, and the two of them got on very well and they decided to see if somebody would be interested in setting up this joint lab between the physics and archaeology departments. And – so that was the environment and the background of the people who were the – Teddy Hall being the director of the lab and Martin Aitken being the deputy director. There were no other permanent faculty positions there, everybody was on soft money of some sort. But, yeah, that was a really interesting sort of place to think about going on to.

[08:45]

And what did the pieces of equipment that you were seeing in these small rooms off staircases look like to you as someone who at that stage didn’t know what they did? [both laugh]

Well, the first thing that you find out is that the room in which those pieces of equipment are, are darkrooms. The rooms are lit by either dim orange or red lights, usually dim red fluorescent lights, so it’s a bit like walking into a photographic lab and your eyes take a bit of time to get adjusted. So that’s the first thing you definitely notice. And it’s explained that the reason for this is because firstly the signals that come from mineral grains that you wanted to get the luminescence signals from, these signals are light sensitive. And so if you accidentally expose your sample to light, something nasty will happen and you won’t get the right answer effectively. So that’s why it has to be dark. And also because the light detection device that people use is itself light sensitive and you can upset it considerably if you actually let it see any intense light. So the small laboratories tended to be … dark, the equipment was there all the time, and you might have to have your desk in the dark with a table, anglepoise table lamp, as your working environment. So it was – it’s a bit claustrophobic for some people but then it’s a bit cosy, reassuring for others, that you’re in your own little environment. And the equipment will take up most of the space. Your desk was an afterthought really. The equipment had lots of pieces to it, it had a rack of electronics, it had a base onto which to place the sample, and then you’ve got the light detection device on top. There were gas pipes coming in and providing gas to the
sample chamber, and there were water pipes coming in and supplying water to – water
to cool the equipment as well. So it was a very busy kind of environment. Samples
tended to be prepared in other rooms, which were also dark and which were shared
facilities, so – because they involved chemicals and the chemicals, any fumes that
might come from them were going to affect the equipment. And it was in the very
early days of health and safety or rather the lack of health and safety requirements.
But, yes, it was a small, active environment, and I think what I realised I would like is
to be able to carry out my own experiments with my own equipment, design an
experiment, carry it out, and get instant information. That the information was
recorded – in those pre-computer days it was recorded on a flatbed recording device
called an XY recorder because it plotted in the X direction and the Y direction, and
what it plotted was light output as a function of temperatures as you heated the
sample. And so the – when a button was pushed it would trigger the heating and then
it would also trigger the recording device to collect the information and you got a
trace as the pen passed over the page, and that was your data. There was no – there
was nothing numerical about it. You ended up doing it on squared graph paper and to
analyse it you ended up counting the squares on the graph paper, so all a bit primitive
now, in hindsight, but perfectly adequate at the time.

[13:20]

Did you get a sense then or later of who’d built this instruments or who had designed
them in the first place?

Yes, they were all home built. The research lab had its own workshop, and so they
would be – the design would come from Martin Aitken and from John Alldred, who
was a research officer in the lab. And they designed the equipment and then built it,
together with the help of the electronics technician, and so they were all home built.
There was also a machine shop and there was a – a guy, Dave, who would machine all
the housings for the light protectors, the photomultiplier tubes. He would be able to
manufacture them from a solid sheet of aluminium in the basement, so Dave Seeley
was absolutely valuable to all the people in the lab. There was no commercial
equipment available, it was all very much – the research was being done just in that
lab in Oxford and so everything had to be hand built.
Now before we go to this place again but now with you employed there to do your project, if we can just take you back to Sussex and ask about the sort of gender balance among the undergraduates on the physics course.

I think on the physics course it was probably about twenty per cent women and eighty per cent men. Erm … that’s just from an image of the classroom. Yeah, there were women there but it was definitely dominated by male undergraduates.

And was that imbalance a cause for comment in any way?

No, I don’t think so. I think at the time when people were going to university in the ‘60s it was very much seen that science was not really a male preserve ‘cause I certainly felt there was no resentment or nobody pointed out that, you know, you’re women, why are you doing this? There was none of that, though looking back again I realise that all of the faculty at Sussex in the physics department were men, and I can’t think of a single – I don’t think there was a single woman there. But I don’t think any of us actually noticed. I guess partly because in our social lives we were mixing with people who were doing other courses. Again, you didn’t – you weren’t just in your – with your friends who were doing physics through sport or going to the theatre or whatever it was, you met other people in other disciplines and so there was – you know, there was a mixture of men and women around so you didn’t actually notice that when you went back into your physics department that you were one of the few. I certainly wasn’t aware of it.

And what was said about different disciplines at this time, do you remember? I remember, for example, when I was at university people would – there were certain identities that went with different disciplines, so people would make sort of remarks about particular subjects, about the kind of person that did particular subjects. So I
wondered what was talked about, I don't know, the way in which the discipline that you did was connected to identity in any way, or perhaps this wasn’t.

I don’t recall that there was any of that at Sussex. I mean people – there were new experimental courses like American studies and, you know, that was new. But I don’t recall anything like – I mean the comments that were made were much more on the sort of slightly odd social mix. I mean, for example, when I was there the Jay twins were the daughters of Douglas Jay MP. They were clearly the part – the real party types and very much sort of social climbing and that was a whole sort of group of people that I had absolutely nothing to do with. And most of us seemed to get on and say, oh, well, that’s just the Jay twins and their crowd and you just ignore them, whereas those who were doing science, yeah, just – I don’t think we were thought of as being strange or different. But it was interesting, as it is at the other end of the scale, the Jay twins were there, but I remember also it was – university then was a great social leveller. One of my friends was also the daughter of a dustbin man from Birmingham and she was doing biochemistry. And, you know, you only found out what people’s parents did in sort of – you know, after about a year of having a conversation. But otherwise, you know, everybody was equal. If they behaved in the same way then you didn’t take any notice, so it was – I think Sussex had a very good sort of social mix at that time.

[19:36]

*How did the Jay twins sort of mark themselves out in terms of what they were doing or how they appeared?*

Really sort of wild parties, outspoken, always if you like seeking the limelight, it seemed, whereas the rest of us just want to get on with, you know, getting our degree and doing our thing. But you felt they were out there for a wild social time and I suspect there was a sort of cult of that amongst a small group at that time.

[20:14]

*And were you involved in sport of any kind at Sussex?*
Well, I think I was probably avoiding sport at that time. I did – I played tennis socially for a year but was not into – I was not into team sports. I hated standing outside doing things like hockey and netball in school, so I was just not interested in that at all. Erm …

And could you describe relations with your parents over these three years which, as you say, were sort of close but not too close in terms of –?

Yeah, they relaxed. They were quite happy that I was at Sussex, they were quite happy that I seemed to be enjoying life and enjoying the course. And so they were very supportive. And I would go home in – over the Christmas holidays and the Easter holidays but usually used it as a time for revision and sort of, you know, get my head around the studies, so a bit of a serious nerd at that point. But, you know, just wanted to make sure by then that I was going to get the degree that I wanted to get at the end of it, so I thought I’d better pull my finger out and do some work.

Could you then tell the story of how you got from degree to the next stage, which is working as a research assistant studying for a PhD, the various options and choices made there?

Yes, well, I – though I’d been up and visited Oxford and it had been suggested by Martin that I apply for a studentship. I thought I’d better not have all my eggs in one basket and so I thought that I might like to do research, so I also applied to do a PhD in Cambridge where at that time there was a lot of work on continental drift. And one of the ways that people were investigating the timing and frequency of the opening up of the continents by looking at the lava flows underneath by towing magnetometers backwards and forwards across the lava flows that had been spewed out and then cooled and then record the earth’s magnetic field. So I was interested in – I had this interest in the geophysics, in the earth’s magnetic field, and how you can look at it in the past, so I had this interest in the past. It was a lab in Cambridge that was – it was the geophysics institute, so it had the physics side to it. It had physicists in it as well.
as geologists, and I applied for a studentship there that was being supported by Shell. And I went along for a couple of interviews, one in Cambridge and one in London, and unfortunately I failed on the second one and the studentship was awarded to somebody else. But, you know, that’s life, I – you know, I was interested in going along for the interview anyway.

_Could you describe that Cambridge interview?_

Er –

_This was presumably at Madingley Rise._

Yes, it was at Madingley Rise. Teddy Bullard was the professor of geophysics at the time and he was a great character. And it wasn’t really so much an interview as more telling me what was going on in the lab, and I guess seeing what my reaction might be to it. But I remember thinking, yeah, this is, you know, interesting – again, an interesting group of people to work with and another sympathetic and interesting person to be being supervised by. So I thought that would be exciting. And again, another ramshackle collection of laboratories. At that time I don’t think the custom built laboratory was completed, and so again it was in rather ramshackle buildings out of Madingley Rise. So, yeah, that was a possibility.

_What do you remember of Teddy Bullard’s character which …?_

Self assured, er … he clearly knew that he was very good at what he did, but I didn’t find particularly overbearing. I thought I could cope but, you know, it was – you know, it was an interview, it was for a short time, so I didn’t take on board much more than that.

_And did you meet Fred Vine, for example, who was I suppose one of the key people?_

No, I don’t remember meeting the other people who were working there. I came across those people later when I returned to Cambridge, again a bit by accident some, oh, nine years or so later I think and came back into that scene.
Thank you. So, sorry, this was one of the – you didn’t want to have all of your eggs in one basket, this was one of the other options aside from the Oxford studentship that you were exploring at the end of your degree?

Yes. And there was also – I actually applied for real jobs. I thought, well, you know, maybe I should go and be a real job. And having done a holiday in northern Scotland and gone to Dounreay, which I thought was an exciting place, I thought, well, I’ll find out what jobs there are in nuclear physics facilities in the UK. And there was one – I think it was a research lab near Wigan, I’ve now forgotten which one it was, but it was basically for a radiation physicist. And I thought that would be interesting, it was for somebody coming straight from a bachelor’s degree and I turned up for the interview. I don’t remember much about the interview or in fact the building, and presumably I wasn’t taken round very much. But I didn’t get the job. I suspect that was probably a good thing, I think they wanted somebody to do exactly what they said and maybe I showed a little bit of independence that, you know, can I possibly do this or that, and maybe they thought that was probably not a – not the kind of person they wanted to have but – so I was back to only having the option of applying to Oxford, which I did, and then making sure I got a good enough degree to get there and hoping that nobody else who was better than me was going to turn up in Oxford and would be offered the position instead. So I did end up with just that one option. But then, you know, I wanted to concentrate on the exams and not worry about what the future held. I thought I could sort that one out if things went pear shaped and I would regroup and work out what to do next.

[28:10]

And so did you then go straight on to this post?

Yes, I – yes and no. Gap years were not in fashion at that time, they were starting to come about, people were starting to do trips overland to places like India. And I really couldn’t see my parents allowing me to head off with, you know, a couple of other people. And nobody in my school was sort of really – sorry, nobody in my university was actually interested in, er, you know, joining up in a small group to go
off. But there was something called the Commonwealth Expedition to India which was set up by somebody who’d been in the Indian army and he was trying to promote cultural exchange between particularly India and the UK. And he set up these expeditions which involved taking buses from the UK overland to India, and I managed to persuade my parents to let me join the one that went from Sussex University with a group of about 18 people, some from the university and some from Brighton, and I could join them and go overland to India. And one of my undergraduate friends had done it a year before and she’d found it very worthwhile. And that – yeah, and because it was something which was semi-organised then my parents would let me go. We had a training camp before we left at the beginning of summer after we’d done our finals degrees. I took on the job of being one of the navigators. There were people who went off and did a training course in driving buses, mechanics’ courses, how to fix the bus if it went wrong. And then we all got involved in things like the cooking, so there were about seventeen people on a twenty-four seater bus, where the rest of the bus was full of our stuff and food and tents and, yeah, all that kind of stuff that you need. And we headed off to India, we – it gave us the opportunity to have cultural exchanges with people on the way, so we’d set up in say Tehran and put on a sort of show of English culture, or British culture I should say, there were some Scots there as well, interacting with people. But also as there were still quite – there were several buses that were doing this. Some of us sneaked off and I remember taking an overnight bus down to Isfahan and Shiraz and seeing these cities that now it’s more difficult to visit. So I got – I became friendly with a guy who wanted to go and look at different places, so we would travel occasionally together, just going off and visiting places that – we weren’t actually meant to be doing this but we did anyway. And we did it also in India, ‘cause our bus broke down in Delhi, and so the two of us popped on local buses and went up to Nepal, got stuck, managed to eventually get back, picked up our bus in Delhi which was now fixed, and came back again. And then on return to the UK I went up to Oxford, went through the matriculation ceremony, and then turned a rather nasty shade of yellow and had hepatitis and was put in the isolation hospital just outside of Oxford. So I hadn’t actually hardly set foot in the lab at that point, I think I’d been there a week, and I was now sort of not allowed to go out and go anywhere and had to have sort of rests for about a month. But at that point got visited by Martin Aitken, who very kindly arrived with a number of papers and previous PhD theses and conference proceedings,
and said, ‘Here’s some reading, I think you should get on with it,’ [laughs]. So, yes, so a bit of an inauspicious start to doing the PhD.

**What was the display on British culture on offer from the bus at various –?**

Oh, singing of folk music, people playing classical violin, various kinds of sort of Morris dancing, that kind of thing, so –

**Was this show devised by this particular group or was this a kind of standard product for the Commonwealth Expedition that each bus –?**

No, it was devised by the group though what aspects of culture can you display and discuss when you meet groups of people, so – and it was organised so that there were, you know, students or townspeople from some of the major cities that we visited on the way over. But obviously at other times we were just driving through small towns and didn’t have to put on any display there, just turned up and drove on, so.

**What do you remember of the response to this?**

I think slight amusement at things like Morris dancing [laughs]. But, yeah, polite and appreciative is what I remember.

[34:40]

**And at that age what did you like about travel, I mean about going to unfamiliar landscapes and places?**

I was just fascinated by the complete variety of ways of life. And I’d seen Europe with my parents, I’d seen France and Spain and Germany but I’d not seen more exotic places. And going through – down through Yugoslavia, for example, seeing how rural Yugoslavia was. I mean driving along and finding the roads were all pot holed and that what appeared to be a solid object in front of you was in fact a horse drawn truck on which there was a huge haystack and all you could see was the haystack and it wasn’t lit at night. And so rural backwaters, and then going through Greece and
Turkey where again, you know, they weren’t really used to seeing people from overseas coming through. In the case of eastern Turkey, actually actively disliked us going through and we had stones thrown at us by ladies working in the fields in some of the remote areas. So, you know, realisation that people didn’t necessarily like you turning up as – you know, as a tourist which was a bit of a shock. And then being able to go to places in Iran, and that was in the days, the last few years of the reign of the Shah, so it was – again, it was a very western society and yet with a width of culture that you could go and see these beautiful buildings. I think one of the most beautiful buildings – well, areas of the world, is actually the central Maidan, central square, in Isfahan in southern Iran, and I think it really is the most beautiful setting. And then going on into Afghanistan and being impressed by the history, going to the museum, small museum, on the outskirts of Kabul and just being fascinated by the Greek – the Greek remains that were then. And then looking at the people and seeing people with blue eyes who clearly, you know, were coming in – had come in from somewhere else, so cultural mixing. Again, just experiencing all of this and then, you know, going through Pakistan and into India. And just all the different cultures and on the way, and I – and experiencing because you had to go shopping for – into the market to get, you know, tomatoes and bread and vegetables of all sorts, so – and this was in the days of the travel allowance when you didn’t have very much money to spend on all of these things. So it was all a bit of a challenge to make the finances and as a person actually work. So I found that a – just a great experience of life. Also group interactions, I mean looking at the people on the bus that we were travelling in, how people interact. You know, you start off in the UK with having meetings and a natural leader emerges. You know, I’ve never been in a group, taken part in a group activity like that before, finding a leader emerge and then finding that on the trip somebody comes along to challenge that leader’s authority whether it’s – whether we’re going to stop in this village or that village, and whether we need the food now or later, and just trivial things and how they’ve become very important but could affect the whole of the group dynamics. In fact one of the people went off, when he got back, and did a master’s degree, and his dissertation was on the interactions of people in that group. You know, you are with seventeen, eighteen, people that you don’t really know when you set out. You’re not going with your friends, you’re actually going with a group of people who are strangers even though they’re from the
same university or university town, they are strangers. And just watching all the
group dynamics is what I found absolutely fascinating as well.

*What role emerged for you within the group?*

Hmm … the usual one. I’m not a natural leader but somebody who wants to try and
keep the peace, so I guess sort of partly a peace broker I would say, if not, keeping
head below parapet and just not getting involved in dispute. And so I think those are
the two things I learnt about myself on that trip.

[40:15]

*And then, so your research work. Having from your hospital bed read the material,
presumably on the technique that you were going to be working on, what do you
remember of beginning your research at Keble Road?*

Well, the first thing was absolute panic because when I started doing the reading I
realised that so much had been done and I thought, what am I going to do, what can I
add to this? You know, surely people worked on pottery and they worked on the fine
grains that come out of pottery or the courser quartz grains that come out of pottery,
and they’ve really done everything that could possibly be done. And that moment of
doubt, well, what on earth am I going to do. But I needn’t have worried because at
that point Martin said, ‘Well, actually I think something interesting to do would be to
look at other heated materials.’ And again, he was particularly interested in trying to
date lava flows as – so going into a geological realm rather than staying within the
archaeological, and this – his interest in this came about because the lava flows, as I
pointed out in the geophysics field, they would record the direction and strength of the
earth’s magnetic field. And that field strength affects the production of Carbon 14,
which is the basis of Carbon 14 dating. It’s Carbon 14 is produced in the atmosphere
by the impact of particles coming in from outside the earth’s atmosphere, so cosmic
rays hitting atoms in the atmosphere and producing C14. And when the field is strong
then there is – the particles that are coming in, which are charged, they’re forced away
from the earth, and so there’s less of them coming, so there’s less C14 being
produced. And, you know, how that fluctuates through time is of interest because it
messes around with the starting point for Carbon 14 dating. So people were interested in that, at that time, and we needed to be able to date it to work out when those changes occurred, to take an independent technique and to do the dating. And so that’s what Martin suggested was, okay, let’s work on – let you work on lava flows. But before that he started me generally in the lab with pottery, so you got used to handling the materials, preparing the grains to measure, working in the dark lab to prepare them, and then making measurements. And I think actually one of the earliest things I worked on that was nothing to do with my PhD was a piece of heated rock crystal from Sri Lanka. And that was interesting in itself but also it was interesting because the person who wanted it dated was a man called Kenneth Oakley who worked at the British Museum in London. And he had just been the person who, using fluorine content of bones, had been able to prove that the Piltdown skeleton from the previous century was actually a hoax. So he was a fascinating person to meet, he had a house in north Oxford and he was interesting one – starting then to meet some of the interesting people who passed through the research lab to talk with Martin Aitken or Teddy Hall, so it was – they were a really interesting group of people.

What marked him out as an interesting person?

Erm, his interest in world archaeology I think. You know, this was from Sri Lanka but then he’d be working, as I said, on Piltdown and he was interested in archaeological material from round the world. So I had this sort of global aspect coming from him, that’s why I found him interesting.

So it was the nature of his interests rather than the character of him as a person?

Yes, he was a bit of a dry character but it was the nature of his interest that I was curious about.

[45:11]

And could – before we go any further could you –? You’ve given some very clear descriptions of science now, but wonder before we go any further if you could explain
this property of thermoluminescence which is being used at the beginning of your work here as a technique, separate from the radio carbon technique, as a way of establishing the problems with the start point of it, in other words, the amount of it in the first place. But why is it possible? Why is this technique of thermoluminescence possible?

Well, if you look at radio carbon dating, which was being developed from the late 1940s, early 1950s, that is a method that depends upon this Carbon 14 being found in organic material. So to be able to apply the technique you need to have organic material, some sort of plant material, it might be a piece of charcoal, it might be a – a twig and – or a seed, for example. So these are the things that radio carbon can be applied to but if you’re at an archaeological site with man being there, and man presumably using fire, then if you can date directly when he used fire to heat, to make pottery, to cook, so if you can date that directly then that is sort of more relevance. Often you don’t get preservation of organic material at sites, and so if you don’t have any organic material then you can’t apply radio carbon dating. But you will always find quartz and feldspar grains, two very common minerals. You will always find quartz and feldspars in material which has been heated in pottery and in the stones that perhaps make the fireplace or in the earth which is directly underneath the fireplace and is therefore being heated. So these minerals are able to act as what we call dosimeters, in other words, things that measure dose. So a dosimeter would be feldspars grains, quartz grains, and they measure radioactive dose. This is the energy that is deposited in these mineral grains as a result of radioactive decay. One’s got in the environment, you know, uranium, thorium and potassium which are radioactive elements, they undergo radioactive decay, when they do so they release energy in the form of alpha and beta particles, and gamma radiation. And this energy, when it interacts with matter, results in the delivery of a radiation dose to those minerals. And what happens is that the – when those particles or rays interact with the material they will knock electrons off of atoms in the crystal lattice, and some of these electrons can get trapped at defects in the crystal. Somewhere that is slightly positive in the crystal will attract a negatively charged electron and it can go into a range of traps that are in those minerals. Some of them are stable, thermally stable, in other words the electron will stay there for tens of thousands, millions of years, and it’s those ones that will – if they’re there for that length of time will build up with time and they can be removed.
from those traps, the electrons can be ejected from the traps, by exposure to heat, so very efficiently. So heating is a zeroing mechanism. The electrons then build up in the crystals, in the ceramic, from the radioactive decay that is going on all around them. And then, if you then take that piece of pottery back to the lab and you can measure the trapped electrons, the number of trapped electrons in those thermally stable traps, then that is proportional to the length of the time since that ceramic was heated. And then you just make a separate set of measurements, which works out how much dose per year is going in – coming from the radioactive decay, so you have to make separate measurements in uranium, thorium and potassium for the sample, and you can put that together with the luminescence information. To get the past dose that those grains have received you need to do – not just measure the amount of light coming from those heated grains, in other words the thermoluminescence signal, not just the thermoluminescence or TL signal, but you need to measure what is its sensitivity. And you do that by using a radioactive source in the lab, exposing those grains to a known radiation dose from an artificial source in a very short space of time, and then looking at the thermoluminescence signal that comes from the grains in response to that dose. And so you are able then to calculate how much dose it received in the past, combine that with the dose rate information from the uranium, thorium and potassium measurements, and dividing one by the other you calculate an age. And that’s the age or the time since the – those grains were last heated so that’s a long – simple concept. It has lots of pitfalls and difficulties in it, as one finds out when one actually tries to do the dating, but in essence that is what either the thermoluminescence dating that I was doing then or the optically stimulated luminescence dating which I’ve been doing more recently, both of them rely on that. You measure the dose received in the past from these natural dosimeters, the potassium – well, the feldspars and the quartz.

[52:30]

Thank you. And so your – perhaps shall we start then with parts of the laboratory work ‘cause I notice that you were there a year before you went out to collect samples yourself in Iceland? So what you were doing for this first year, was this the using materials that you’ve mentioned, the pottery and the grains to work out how to use the machines and to use the –?
Yes, and most of that first year was getting to grips with the equipment, the concepts, and doing little small projects like the one on the heated quartz from Sri Lanka. Also the lab was using – just starting to use thermoluminescence as a means for authenticating ceramic works of art. And at the same time as I joined, somebody was employed to do this kind of work because if you can tell how old a piece is then you can – and you can measure a little portion of ceramic material from a work of art, then you can work out whether something was made 2,000 years ago or 20 years ago. And so it’s used for authenticating in that sense the work of art, it’s – you know, is it genuine or is it a fake? And there were pieces of artwork held by collectors around the world who wanted this testing. They didn’t want to send their piece and they just wanted somebody to come and drill a very small sample from their ceramic. And so sometimes I got involved in doing that. I was then – Martin Aitken was always asking for volunteers to go off and do something, and if it involved travelling I was the one. I always made a joke and said that – our motto, it said ‘Have passport, will travel’. And so I was sent to places, for example, to Switzerland, to Lausanne, to the home of a very wealthy art collector, and drilled his Chinese ceramic collection. Yes, the word drill and expensive ceramic, those two words don’t sit easily close together, but – and it’s a very nervous moment ‘cause you’re having to do it not in full daylight, you have to do it in a dark room with a very small anglepoise lamp with a little red filter on it because you don’t want to expose these to light because not only does heating empty those electrons out of the traps but light does as well. And that’s why the laboratories that we worked in are dark but also when you take a sample and you’re drilling it you don’t want the powder spewing out over a piece of paper and being exposed to light. So you’re trying to hold – well, hopefully you’re getting the person who owns it to hold it while you drill in with a very small bit drill into a discrete part of the pot, and hopefully you’ve found the bit that isn’t restored and that’s not the – making sure it is in a genuine part of it.

*Does that hole, however small, not reduce the value of the item that they’re checking the value of?*

You would have thought it would but in fact it started and still continues to be important that there is a certificate that goes with the ceramic piece of art. And
clearly if you have a certificate that this is genuine, and you’ve got a piece of pottery you’re putting it with and it doesn’t have a hole in it, then they can’t possibly have been tested. So it’s now perfectly acceptable that there is a small hole. That can be filled by somebody skilled in restoration so that it’s not actually visible or is only mildly visible enough to say, yes, that’s where the sample was taken from for testing.

And at this time, if you had a piece of ceramic art that you wanted to have tested, where else in the country might you take that?

Nowhere else. This was the centre for testing the authenticity.

[57:19]

Thank you. Could you then tell the story of your fieldwork involved in collecting lava flows?

Yes, well, Martin – one of the things in the first year was Martin Aitken had actually been to France ‘cause he was quite keen on going to France, and had collected some samples from the lava flows in the near volcanic area of the Massif Central, the area around Clermont-Ferrand. But he had collected those and he thought, now Ann, you need to go and collect material of your own, and it needs to be well dated. And Iceland was the place to go because a lot of people had been coring for magnetic studies and they’d been carrying out radio carbon dating on any burnt material which was lying underneath the flow or got trapped in the flow as it flowed over the landscape, got a bit of tree underneath, they dated it, or another technique called potassium argon dating for some of the older materials. And so I was carrying out sort of research in the literature first of all to establish where these flows were, trying to locate them on a map of Iceland, and then try to go out and collect them. Well, this was me on my own, not a geologist, being headed off in the direction of Iceland. And I – first thing was that I had to borrow a vehicle to get about, to be able to go to the places, their public transport was pretty minimal. And I went to the University of Reykjavik, and through a contact from my college in Oxford, a geologist called Stephen Moorbath, he had colleagues in Reykjavik University and through him arranged to borrow a Land Rover. The first problem was it was a diesel engine and
I’d never driven a diesel engine or Land Rover before. The road’s a dirt track and it’s on a – you know, you’re driving on the right. So all of these things on my own was all a bit daunting. The next thing was, was to – how do you sample lava flows? Well, the people who do the magnetic work would come out with drills and drill nice cores, and they would be petrol driven drills. And, you know, there was a complete drilling rig with two or three people, and I didn’t have that. All I had was a sledgehammer, and lava is extremely hard, and so there was a slight – definite naivety on that one. But I had struck lucky by arriving in Reykjavik and finding a bed and breakfast accommodation where there were a couple of young British lads who came for holidays. They didn’t know each other, one was a photographer from London and one was a technician from a fisheries in Pitlochry in Scotland. And they wanted to travel round Iceland but found they couldn’t afford it but they – so I struck a deal with them. I said you guys come with me, I’ve got the Land Rover, we can travel all over Iceland in it. I have to go to certain places and collect samples but I need you to swing the sledgehammer and bash these samples off for me. And so we agreed to do that and that enabled me to collect the samples that I then shipped back through the university, back into Oxford, so I could work on them. But, yes, it was definitely how to stand on your own two feet rather quickly.

And where did you stay during this?

Stayed in numerous places that were – didn’t actually camp because I hadn’t set out for camping but we had sleeping bags. And so we – they had sleeping bags, I had a sleeping bag, and we were staying in some hostels that were youth hostel type places round the country, though on one occasion I got a bit caught. We stayed up near Mývatn in the north. Mývatn means lake of the midges and it’s a small lake which has got lava all round it in amazing contorted shapes. And there was a road round it and – but it was a gravel, broken up lava road. And it was like the day – we had a day off there and so I hired a bike, and they went off and did something. I biked round to where I knew there was going to be a youth hostel set up in a school at the other end. Got round to the other end of the lake in the late afternoon to discover that the school had now restarted, therefore I couldn’t sleep in the school, and was standing there thinking, now what do I do? And went and knocked on a farmhouse door and the people didn’t speak English but realised what my predicament was, put me up for the
night, gave me breakfast in the morning, and refused any payment. They were just wonderfully hospitable people, and so that was quite exciting but I’m afraid I was blowed if I was going to spend the night with – sort of like in September, it was sort of autumn, and it was going to be a bit chilly at night, so I thought no, farmhouse.

Were you able to communicate what you were doing in Iceland to the –?

I think I was able to make them understand that I was actually working on the geology, so I – but I don’t – didn’t get any further than that. But, yeah, interesting experience.

And what did the samples look like, given that they were produced by hitting the lava with a sledgehammer?

Very irregularly shaped, I – because when I got back to the lab I’d been taking bits off the – outside to take away the light exposed parts, it didn’t really matter what shape they were. The samples were fist sized, which is about as much as you could manage to break off, off of something that was massive.

And how did you –? This may seem pedantic but it’s interesting, how did you ensure that when you got back to Oxford you could recognise where a particular sample was taken from?

Oh, the sample – I wrapped the samples in aluminium foil and then put them in a plastic bag. But inside the plastic bag you put the label with the information of where it is where you collected it from, map reference, and your – the sample number that you’re giving it. And then you put that plastic bag in another bag and another label on the outside, so you’ve got a double labelling situation, one of which may get damaged on the outside but the one inside the plastic bag that won’t be damaged.

And what do you remember of the comments of the two friends you made about your work?
I think they thought it was a little unusual, as they’d not – as far as I remember, neither of them had gone to university, they’d gone straight off into their respective jobs. But the one working in the fisheries was clearly interested in research, that they were involved in developing breeding programmes for salmon up there. So scientific research was not an alien thing to him. And the other guy was just interested in the environment and information about the environment, so he was pretty – he was seeing it from a photographer’s point of view.

And when you sort of picture in your mind’s eye then trying to hack these samples, what do you see, what do you remember of their first efforts to –?

Just remember thinking, oh, I wonder if they’re going to be able to get any material off of here at all [laughs]. And you soon worked out where you had to find a bit that was poking out from the mass so that you could actually stand some chance of getting it to break off. And the feeling of again, thinking, oh – I was terribly naïve about this but, you know, I just – that was how Martin Aitken had collected his samples in central France, so I suppose that was how I was meant to collect them, although obviously I would have been better had I sort of planned to do it along with somebody with an appropriate drilling rig and could take the samples in a more controlled way. But, no, it was, you know, a starting PhD student who – you don’t think about these things.

[1:06:55]

And then you’ve mentioned that you had to remove the surface which had been exposed, if you like.

Yes.

Could you take us through the steps of what you then do when you’re back in Oxford? You’ve got – you take it out of the carrier bag, unwrap the foil, you’ve got this thing, what do you do next and then next, and then next to get what you want?
What you do is to use a circular saw like the kind of one you’d have to have in a wood
mill, for example, to cut. And these circular saws were being used to remove the
outside of pieces of pottery at that time, so the technology was already there. And so
basically you are just cutting it much more slowly and having to apply water at the
same time because otherwise the blade will overheat going through something that
hard. So one’s slowly cutting it, cutting off the outside surfaces, with this saw blade.
The next process is that you are trying to extract minerals from it. I was interested in
that point in feldspars, there’s no quartz in these basaltic lavas from Iceland but
there’s plenty of feldspar crystals and that was what I was trying to get. And I was
then trying to crush the lava in a – with ceramics you can apply pressure by putting
the piece of pottery into the jaws of a vice. You make a little metal wedge in the jaws
of the vice and put the bit of ceramic into it, close up the vice by hand so you’re
applying the pressure until it basically breaks up. Well, the ceramics break up
relatively easily between grain sizes – between the grains. This is not true of the lava
flow. It’s much more difficult to break up and then get feldspars out. At one point I
was trying to stop the bits of lava from shooting across the room and wrapped it in
paper, a rather glossy paper, ‘cause I thought that wouldn’t interact with the lava.
And I crushed it and collected it, and managed to get some fine grains to deposit onto
the discs that were used to make the luminescence measurements but on that occasion
I discovered that clearly little bits of fibres of paper had gone through the system and I
hadn’t noticed. And when I – you make the thermoluminescence measurements
you’re heating up from room temperature up to 500 degrees centigrade, and if you do
that to paper it burns. So I was getting these fascinating signals and then I realised
that looking at the discs after I’d heated it that there were these little black shreds on
the surface, and these were clearly the fibres from the paper in which I’d crushed it a
couple of steps earlier, hadn’t noticed ‘cause we were working in the dark and they
were igniting in the sample chamber and giving light. So I became slightly more
careful on how I prepared samples after that.

And so having then isolated the particular crystal or grain of a crystal that you want –

Yeah.

-these go onto sample dishes?
They – you’re wanting to carry out experiments and replicate your measurements. So you’re probably trying to make somewhere between twenty and forty identical sample discs. What one is doing is depositing grains out of a liquid. You make a suspension of grains in a liquid and then pipette them into little glass vials, in the bottom of which is – of each one is a one centimetre diameter aluminium disc. And then the grains deposit out of the liquid, which at that time we were using acetone, grains deposit out, and then we evaporate the acetone off at room temperature in a fume cupboard. And you end up with – in the bottom of each of these little glass vials an aluminium disc on which our grains, one or two milligrams, no more, of grains on each disc. And hopefully each disc is virtually identical to every other disc, so you have about twenty to forty of these with which you can make your experimental measurements. So these discs are taken individually to the equipment, one by one, placed by hand on a small hotplate. The light detection device is then placed over this hotplate and then the sample chamber is evacuated, backfilled with nitrogen as an inert atmosphere, so we have not many chances of anything burning or oxidising. And then you heat up at about five degrees per second from room temperature up to 500 degrees. And recording on that chart recorder the output of light as a function of temperature, and that is the thermoluminescence signal from the grains on that disc.

And the amount of light by temperature that is emitted will reveal the amount of these hidden electrons or the –?

Yes, what happens is when you heat the electrons that are at these defects in the crystal, these electrons will then be released within the crystal. They are then released from where they are trapped and they then – some of them can recombine in the crystal where there is another kind of defect called a luminescence centre. And this luminescence centre, as its name suggests, gives rise to light, to the luminescence, and so the electron – when it’s thermally ejected it’s got energy, it travels. It gets to the luminescence centre, it releases that energy and that energy is then released from that defect as a photon, as a quantum of light. And so you get a quantum of light released for every other – for each electron that arrives at the luminescence centre. And it’s the – all of those photons coming out from those crystals which are what you see as the luminescence signal. And we’re talking about, er, the order of hundreds of
thousands of photons per second being released from material that’s, say, a thousand years old, that sort of order of magnitude. I mean the number depends on a lot of things but it’s a lot of photons that you’re looking at, and that is what your photo multiplier tube is detecting. And its output then goes to the XY recorder.

*So in this case it would give you an estimation of the amount of time that's passed since the lava cooled.*

Yes, that’s right.

*Whereas in the case of the pottery it would be since the fire occurred* –

Yes.

*Or since the community lit a fire or burnt – or fired a pot or –?*

Yes, exactly.

[1:15:20]

*And what then did you discover using this equipment about the lava flows?*

Well, it was the – there were two things on it. The first thing was measure the radioactivity of it because I wanted to know how much dose per year that those grains would get, so that was dealt with. So I knew how much dose per year. But then I started measuring the luminescence signals and comparing the natural signal from the sample with that that I could induce in the same grains by exposure to an artificial radioactive source, in this case a beta source in the laboratory. And the – so using that I would use the luminescence measurements to work out how much dose it seemed that those grains had received. So if I took that dose and divided it by the dose rate from the radioactivity measurements I should get the age.

[1:16:25]
The problem was that the age I got for all my vials of flows that I looked at was far lower than the age that I was working from, that I’d been given from the radio carbon information that was available or from potassium argon information. Like it was as much as – or as low as twenty per cent of the expected age. And so I was faced with a problem; I was not seeming to be able to get an age for these lava flows, the appropriate correct age for the lava flows, and therefore I didn’t have a dating technique that worked on lava flows. It appeared to work on pottery that other people had worked on but working on the lava flows, it didn’t work, it severely underestimated. And if that’s the point where this is – the aim of your PhD is to develop a dating technique for lava flows, you come unstuck. So halfway through my PhD I was going, right, I have a technique that doesn’t work. And what I found was that all – slightly accidentally, like if I irradiated a sample one day and then I left it before measuring it, then the next day the signal appeared to be too low. And I thought, this is a bit strange, so I set up an experiment where I’m deliberately then irradiating my grains and measuring them with different time delays. Usually you just go irradiate and then measure because it’s all – you know, you’ve got your experiment in your head, you’re trying to measure the dose, for example. But I then planned an experiment where it took it out of length of time to see what happened. And then I found to my horror that the thermoluminescence signal was decaying over a period of hours, days, and so no wonder I couldn’t get the right answer for my older materials because some of that signal that should have been there for the geologic time had decayed away through geologic time. And so I had an unstable signal and it was unstable signal that wasn’t just the electron traps that emptied at low temperatures, where you might expect there to be some thermal instability and you could measure the energy response of those electron traps and you could predict what the stability should be. But when you looked at the higher parts of the higher temperature output, the output colloquially referred to as a glow curve, then the higher temperature part of the glow curve, that should be thermally stable and – however, it was losing signal and that was when I sort of coined a phrase, anomalous fading for it. It was anomalous because it didn’t follow the kinetic laws from physics and something was going wrong in this material. So I was describing it as anomalous fading and I was finding it was a characteristic of many feldspars. And it did this to different amounts but the fading was much, much worse in volcanic derived feldspars, which was I was seeing the problem. It is there in non-volcanic feldspars but to a lesser extent, which
is why it wasn’t picked up with people looking at fine grains from pottery. And anyway, I sort of explored this and was encouraged by Martin Aitken to write up a small paper for the science journal *Nature*. Looking back on it I don’t think it would ever get published now but at the time it did, it obviously hit on something, and I – that was how I got my first *Nature* paper. And what’s interesting is that the topic of anomalous fading is still studied now, it – the problem of how it affects the ages that you calculate is still there. People have taken two routes to try and overcome it. They’ve tried to correct for it using laboratory experiments of how the signal decays with time, and they’ve also tried to look at other parts of feldspar, electron traps that may be more stable and to tackle the problem experimentally. But that is still ongoing and both will be criticised if you look in current literature. So it meant the paper got cited an awful lot of times but it is a fundamental problem of trying to date the feldspars, which is interesting as a scientific point of view as to why it’s occurring, but it’s definitely not a good idea when it’s your PhD thesis. So at that point in the PhD thesis I thought I’d better find something which did work, that didn’t suffer from anomalous fading, and the rest of my thesis was on quartz and also on calcium carbonate, and so I was able to retrieve the thesis. And partly why it took me four and a half years to do it, was having to switch course midway through but always there were so many other interesting things to do whilst in the lab in Oxford that took you away from your own research, such as doing the work, for example, a little bit of work related to the authenticity testing and also to going off to interesting places to collect archaeological materials. For example, an expedition to Iran to collect surface samples for a survey of the archaeological history in – it should have been in Afghanistan but the border had just got closed and so we were looking at similar sites in Iran.

[End of Track 4]
Can you continue to describe the, I suppose, extra voluntary work that you were involved in during your PhD at the Research Laboratory for Archaeology and the History of Art?

Well, one of the projects that I do remember was an archaeological one. There’d been a request from a professor of archaeology in Germany that he wanted survey work done, dating survey work done, on bricks in particular and also some ceramics from Afghanistan. And he wanted not an excavation but he wanted somebody to come over and take samples that could go back then and group the buildings or the sites according to their chronologies. And this one fell in my lap but I thought, gosh, I’d quite like to go back to Afghanistan. So I met up with the German, Herr Professor Dr Fisher, and – in the UK and then he said, right, you know, get yourself on a flight, so I got out there. And the first thing that happened was we couldn’t go into Afghanistan, there’d been some border problem, so we were left doing a similar survey in Iran. This was an interesting experience. The group consisted of Professor Fisher, Dr Radamacher who was also an archaeologist, and a young couple who – the husband of which was an architect and the wife was a medical doctor. And the idea was to look at the field archaeology and look at the architecture of the buildings, and then look for heated bricks in what were quite a lot of actually mud brick buildings. And this – I had a couple of amusing experiences en route. And the first one was got there and we stayed in a – literally a small hotel where I first encountered cockroaches in my room. I then encountered Dr Radamacher trying to get into my room and I forcefully ejected him. And then a few days later we were in the field. This meant being in tents and sharing tents, and for some reason I would have a tent on my own. However, I found myself sharing a tent with Herr Professor Dr Fisher, all very above board and – but just a little surprising, and the other three were sharing a tent. So I suppose it was okay as I was a visitor but it was the following morning when I decided that having spent the evening and slept in the same tent, that I could hardly go on calling him Herr Professor Dr Fisher. And I said, ‘Do you mind if I call you Klaus?’ And he said, ‘Oh, no’ and he smiled and I thought, oh, that’s okay. So later in the morning I said, ‘Oh, Klaus, can we do this?’ And the look of shock on the other Germans, I hadn’t realised how formal Germans were and this was clearly a no-no for them. So this
little upstart had actually called their beloved professor by his Christian name. So anyway, we got the material back and we did a small survey for them. And then later on the work was being discussed at a meeting that had been set up in London on middle eastern archaeology, and so I was invited to go down to London for the meeting. And Klaus Fisher was there and I was talking to him when suddenly across the room came this very tall and imposing figure who was, as I recognised immediately, Sir Mortimer Wheeler who’d been the person who’d inspired me in archaeology when I was a kid from a book that he wrote and from the radio and TV programmes that he was involved in. And I looked across the room and thought, oh, gosh. And then he was making a beeline towards us and so Fisher obviously knew him, and so turned and greeted him and shook his hand. And Fisher was a very short man and Wheeler was very tall, he was over six foot. And to my amusement and amazement he sort of kept shaking Fisher’s hand but staring straight over the top of his head at me saying, ‘And who are you my dear?’ [laughs]. And here is this man who was a) eminent and b) in his – probably well in his eighties, and was absolutely charming and I thought – didn’t have long enough to explain to him that because of him I’d gone into archaeological science and that was where I was now. But, yeah, it was kind of nice to meet your childhood idol in the flesh, totally accidentally. So, yes, I was really pleased I went on that expedition to Afghanistan. Well, to Iran rather, not Afghanistan.

[05:26]

And where were you living during your four and bit years as a postgraduate?

I started in a college – a flat in a college house, opposite college. And the next year I moved in with two friends from college and we shared a house. And then I met a guy who was not in the university but worked as a physicist in the Culham research station looking at fusion reactors and moved in with him for the rest of the time I was living in Oxford. So he was a physicist and so we actually spoke the same language.

And there was a connection I think with one of the colleges at this –?
Yes, I was – as a student in Oxford you have to be associated with a college and you have go through matriculation through the college. So you are joining the university through your college. And Martin Aitken had – where he was a fellow at Linacre College, which was a graduate college, it had mixed men and women, mixed disciplines and it had people from many, many different countries, and so it was a very lively international atmosphere and one which was only very slightly formal in that there was a formal dinner once a week but otherwise was very relaxed and everybody spoke to everybody else. And so I enjoyed that at a social level, I became social secretary in one year and organised the college ball. And quite a lot of my life was involved in the college, particularly in those first two years, and I became involved in rowing. It was a new sport in this fairly recently established college, and I guess the move from being at Sussex University, a new university, to a modern college, even though it wasn’t in a custom built building, it – you know, it was going to be a much more easy environment to move into than say to be a graduate student in a traditional college. And so I enjoyed my years at Linacre and stayed on as a research fellow for a couple of extra years after I finished my DPhil as well. So, yes, I enjoyed being at Linacre, meeting people. Again, I still have friends from those days and some of them were people with whom I used to row in the college eight. We used to have bumping races on the river twice a year. And because it wasn’t a traditional college that was highly competitive, it was much more of a friendly college and so we were – our rowing was taken in a rather light hearted way. But it was a mixed crew, which was fairly unusual, and we did – we took part as though we were in a single sex male crew. But it was great, we had – the eight was usually made up of an Australian, Japanese, American, two Brits, a New Zealander and a – we had a Dutch coach who rowed quite seriously for Holland and who would shout at us from his bicycle. And we all learnt to swear in Dutch, it was the only words of Dutch we ever learnt but he was always forever swearing at us. But it was an enjoyable experience, that there is actually nothing quite like being in an eight when it’s going through the water smoothly, everybody’s in balance, everybody’s timing’s spot on, and you are just gliding through, cutting through the water. It’s a wonderful sensation but on the other hand I did realise that I probably shouldn’t continue doing it because it was quite time consuming. We did have to go and practice and I thought I was probably not going to get a PhD if I went out on the river too often, so after a couple of summers and one
winter rowing for three competitions I withdrew and retreated back to my little lab and got on with some work.

*It sounds like a very similar anxiety to the story of giving up chess or other –*

[laughs] Yes, I think it’s – I can see how things can become addictive or maybe I can see when I have a slightly addictive personality, but if want to do something I want to do it well and I will put time into it. But I’ve realised that I can’t do it completely casually, I couldn’t just turn up and jump into an eight, race on the day and disappear, so I had to spend time on it and I reckoned I was not going to get a PhD if I didn’t put effort into it. I wasn’t finding it easy to do research, I would bump into dead ends and then you know you can’t write that up, it doesn’t go anywhere in your thesis. And so, yeah, after you’ve encountered a few of them you think, I’m never going to get there. I’ve been here for three years and I still haven’t, you know, got an adequate amount of material. I mean it’s the thing that every PhD student but I seemed to sort of suffer a bit from that, so I thought, no, I’ll spend a bit more time.

[11:55]

*Aside from the anomalous fading problem –*

Yeah.

*What else was keeping the amount of material that you’ve collected down or making you feel that you hadn’t got enough data or results?*

I think the – I felt that the anomalous fading part, though it was interesting as a phenomenon, was not actually allowing me to do the dating successfully that I wanted. And so I then needed to find more different types of projects and materials so, for example, working with burnt flint. That had me, for example, heading off to the south of France to go and look at a cave site there which had one of the very earliest records of human occupation in this cave site, just outside of Nice. And then I came back and spent – must have spent probably about a year trying to work out how best to work with flint, which unlike pottery I couldn’t crush very easily, and when I
did strange things happened to it. So it was developing a new material, working with slices, how do you work with slices of material? Various difficulties ensued. And so I found every I sort of made one step forward, you know, another five avenues on that front would open up, so which one did I go for? And so there was a bit of decision making that I think again I found quite tricky from a research point of view. But, no, I mean each archaeological project was interesting in itself but, you know, trying to bring myself in to say, well, what is your thesis going to come out as. And it turns out with a title which is probably the most all encompassing one of any person in that lab before or since. If I can remember it correctly it was something like *Thermoluminescence Properties of Chronologically Significant Materials*, which is basically you can measure the luminescence signals from any material that might be of interest both archaeologically and geologically. So, you know, nothing focused but then neither was the material that was enclosed within that thesis, so the title was fairly appropriate.

[14:29]

*And could you say something about the proportion of males and females working in different roles at Keble Road? And also I suppose gender relations there as well.*

Yes, it wasn’t – it wasn’t a large lab, so the number of students coming in to do a luminescence PhD was probably only about one a year. But it seemed like every other one that came in was a woman, so there seemed to be always a very good balance in the students that Martin Aitken took on. I don’t know whether this was by accident or whether it was by design, whether he found it easier to have not an all male environment and not an all female environment. And if he did it by design then I think that was – it was good, I think it worked. In – the other people in the laboratory, the electronics and mechanical engineering technicians were men because those people would then be – you know, those jobs were then usually being taken everywhere by men. There was no training for a woman to become an electronics technician. And the other people who were taken on as research assistants or technical assistants tended to be women who had maybe brought up some kids or perhaps had a short career somewhere else and just wanted an interesting job, one that didn’t have any career progression because it was basically assisting in research and
required directed research the whole time rather than independent research. And there were a couple of women who came in, one of whom was working on the authenticity of the ceramics, that was her specialty, and she has gone on and done that and set up privately after that lab decided that they shouldn’t be doing commercial work that would help people loot archaeological sites. So she said, well, okay, but I’m going to go away now and set up my own company, and she’s been doing that, running very successful business, doing the authenticity testing using thermoluminescence and is still running that company now as a totally private enterprise. And the other woman was also a physicist, and she was working on more of the dating applications that came in. Some of the ones, for example, were the projects where I’d collected some of the samples. Sometimes some of the projects went to her. She didn’t usually want to go and collect them herself, she preferred to stay home, and so that was why I would always be able to go. But she – yeah, she was involved in that but, you know, both were physicists and both were women. And other technical assistants came and went, and they were also usually women in between jobs in and around families. And it worked very well, there was good interaction. There were a couple of slight hints of relationships between a couple of the students but they were not long lasting ones. But it was basically a group of people that interacted I would say, while I was there at least, and these people interacted well. And I don’t remember any major arguments or difficulties that surrounded people.

[18:35]

*You mentioned off the recording a perceived difference in the confidence of female and male research students.*

Yes, I think – my memory, looking back, is that when the young men came in they were – they came in as much more independent, much more following their own line of research and having confidence. Whereas I think the women – I don’t think it was just me but I think they were more seeking reassurance that their research was going on the right tracks and would be more interactive with Martin through sort of active supervision. I mean he was somebody who would come along to talk to students and I remember distinctly, like every other Friday, I think it must have been, he would go round the whole group and go to their rooms individually and I could hear him
approaching along the top floor corridor towards my room. But I knew he’d stop in
and see somebody else along the way, and if I really had nothing to – nothing new
that I wanted to discuss, I would always at that point dive out of my room and down
the nearest flight of stairs and wouldn’t be visible but – and I’m sure he knew that I
was doing that. But then, you know, by the time next week came around I’d have got
somewhere and have something to discuss. But he would always come round and
discuss at least once a week, and you could always go and talk to him as well. And I
definitely took advantage of that whereas some people just seemed to resent him
asking questions. Not resent, that’s a bit too strong a word, but would feel that they
were getting on quite okay, thank you, and didn’t need any extra discussion or
support. And that was more with the men rather than the women.

[20:55]

And I wonder whether you can talk about the conferences associated with an event
organised by and through the research laboratory, conferences on the application of
science in various ways to archaeology.

Yes, there was – I think it was a meeting that was every one or two years, I can’t
remember exactly which, but it involved any aspect of science applied to archaeology.
So it would have something on dating, it would have something on magnetic
measurements, it would have various kinds of physical chemistry analysis of paintings
and ceramics. It would have people working on isotopes, to oxygen isotopes, for
example, and any kind of physical science application to archaeology was discussed.
There were techniques designed to look at elements such as neutron activation
analysis, and this brought in people from not just the UK but there were people
coming in from America at the time, people from France. So as a lab this occasion
was great because we were all exposed to all these people and learning about what
they were doing and, you know, seeing if they had dating problems that we might
possibly be able to help with. So it was a very sort of fertile environment in which to
meet people and get new scientific ideas. And I really enjoyed those and met various
people when they were still sort of very young in their careers, people like Colin
Renfrew who was as big name in scientific archaeology, Gale Sieveking who was
involved in the excavation of Grimes Graves and flints that came from there, from the
Palaeolithic sites. And also met Nick Shackleton who turned out to be pivotal in the next part of my career, he was somebody who was working in Cambridge and he came over to this meeting to talk to people about his work on isotopes.

[23:45]

What do you remember of that talk and of early experience of Nick?

Erm, I remember somebody very dynamic, who was really interested in not just the best way to measure the isotopes, the oxygen isotopes in his case, but somebody who was also interested in the wider questions that could be answered using his isotopes. And I guess it’s that kind of impression that stayed with me. He was, for example, interested in applying them to marine deposits and it was in the early stages of the work on deep sea cores that he was involved with. And it was the excitement of being able to look at ice volume records through the isotopes that I found fascinating. But also he was interested in archaeology, and I remember one year he came and talked about the oxygen isotopes in shells from an archaeological site called Klasies River in South Africa. And that’s somewhere that I eventually got to but, you know, he would think sideways about, well, these are marine shells living in a marine environment and the way that they take in the isotopes will reflect the isotopic records of sea water in which they’re living. So it was this wide ranging thought but a highly focused and dedicated scientist.

[25:35]

And what were your impressions of him personally?

I enjoyed his company. I found him an interesting person to talk to. He didn’t really go in for much in the way of small talk but on scientific ideas he would talk. And as I later found out when I went to work with him, he was also terribly knowledgeable about music and musical instruments. And I found that was interesting, how a scientist could almost have gone in either direction. Either become the scientist that he became or could have become an accomplished musician. And I thought, oh, that’s – you know, that to me was again something of an eye opener that people just
didn’t stay in their own little pigeonholes, narrowly going up their life through the years, but they could branch up and do different things, so I found talking with him interesting and illuminating.

[26:49]

*And your relations with Gale Sieveking, personal and work based?*

Yeah, well, Gale was somebody who turned up at these meetings. And again his work as an archaeologist in Palaeolithic archaeology in the UK, I found very interesting, though I must admit my main memory of him relates to a social occasion after one of these conferences when he was taking me for a meal in the restaurant Elizabeth which was opposite my college. And we were talking about some – wanted to talk about some sites, so he said how about dinner, and I said fine. And what I mainly remember is sitting down and hearing him saying, ‘Oh, shall I order the wine?’ I said, ‘Yes, you go ahead and order the wine.’ And he ordered a wine and clearly he was expecting that what he had just bought was a bottle of wine. It turned out to be a half a bottle, and the look on his face – fleetingly, he did a very good recovery job, but fleetingly it was, oh, my God, I’ve just bought a very expensive wine but we’ll have to have another half bottle as well [laughs]. So, yes, that was a – an amusing occasion but, no, he was again entertaining company, you know, with wide ranging interests I remember, so.

*In what way were you involved in the Grimes Graves?*

Well, I actually went – I didn’t do any dating work on the flints from that site. I actually went to the site with him. I remember going down in the days before it became open to – properly open to visitors, crawling down through a very small hole and going out in the galleries with torches and looking at the people who were doing some excavation there. And I just found that as a rather nice example, if you like, of active archaeology and actively realising what it was like for the people who had been getting flints out of those seams in the chalk layer. So I remember it as, you know, one of these isolated events in my life that just sticks with you.
How did you meet your – the boyfriend that you said that you lived with for a time and who was a physicist but not I gather a physicist from your research laboratory?

We – what we did in the lab was quite frequently to, at the end of a day at about 6:30-ish, we’d have off round to the Royal Oak pub which was just one street away from the research lab. And sometimes Martin Aitken would come, sometimes John Alldred who was the guy who designed the electronics equipment that we used, and I would often join one of them, maybe a couple of times a week, and go into the pub. And one day I went in there and neither of them was there but there was a group of people who were quietly having a pint at the end of the day and started talking with them. And one of these was Philip and – but it was a group of people. Some of them were medics from the Radcliffe Infirmary, which at that point was across the road, immediately across the road, from the Royal Oak. And some were just other people from the town, there was a GP and somebody who was a bank manager. And Philip used to stop in there with the crowd. Somehow he’d started going there, and he’d stop in there most evenings on his way home from Culham, and so we got talking and realised that, you know, had interests in common, so – and it was actually one of his friends, a physicist who worked on fluid dynamics with him, who gave me some very good advice later on in life when I was finishing my postdoctoral position in Oxford. And I was saying, ‘I don’t know how to get a job. I’m a physicist, what …?’ you know, ‘but I can’t get a job as a physicist because I’ve been doing this rather sort of esoteric archaeological application work, so what shall I do?’ And he said, ‘Well, what you do is you’ll never find the job, the ideal job. What you have to do is find the job that will pay you money and then work out how it is you can actually do the things you want to do, i.e. your luminescence research, as a sideline until it becomes your main research area.’ And I thought, well, that’s good, I’m looking for the wrong kind of job really and so he – so that was very useful to have made that contact as well. But, yes, it was very good having somebody who was stable, a physicist, knew what academic pressures were like, with whom to live. And then it just – and then socially we had the group of friends. So it was a very good way to spend, er, basically six out of my seven years in Oxford.
Thank you. And the work that you undertook after your PhD, this is in the period 1974 to ‘76, I wonder if you could describe that work, including the stalactite and stalagmite question.

Yes, the research came from having done a little bit of work on heated limestone within my PhD. And then Martin had applied for a research grant to look not at heated materials but to look at unheated materials. The limestone that was unheated was a bit old but he thought maybe to look at calcitic materials such as stalagmites and stalactites, which are often found in caves and are a record of the build up through time of changing climate. They might also not form – make loose formations but they may make flow stone which goes across surfaces. Again, it’s calcite which will seal off archaeological levels. And if you can date that you can again put an age limit on material that’s found beneath it. So the suggestion was can you use then the thermoluminescence signal from calcite to date this. And I’d already – this is material that again it’s difficult to crush but it cuts into slices nicely, so I was at that point making slices of both calcite and flint for dating. And so I learnt quite a bit about calcite, I found that it was actually – it was quite challenging to work out what the dose rate was because the – unlike in the resting natural environment, the isotopes are not in equilibrium. They – the uranium has come in without any daughter products and so you have to have a changing dose rate with time and have to calculate it. And I must admit that – that had me really challenged mentally, making sure the equations actually worked. But – so that involved going to various cave sites and working with archaeologists and geologists in that situation as well. Erm, so that – yeah, that was where I – that’s what I spent those two years doing. But again, at the end of those two years it was – it was what am I doing next and before those two years were up that’s where I came back to the contact I’d made with Nick Shackleton where he’d suggested that perhaps I’d like to look at calcite in a different form, that would be calcite that was making the small foraminifera, the little shells of the little organisms that live in the tops of the oceans and then drop down. And that if I could date the formation of the calcite in cave sites then maybe I could date the formation of the calcite in these little shells.
And then – so how did that that –

[End of Track 5]
Could you then tell the story of this change then from working at the laboratory in Oxford to developing a proposal with Nick Shackleton to do something different?

Yes, the – I guess it was in the last six months of being in Oxford that Nick said, ‘I need a dating technique for my marine cores. I think what you’re doing might be relevant, it might provide me with the chronological information that I need,’ and so I – we sat and jointly wrote a proposal that he submitted to the Natural Environmental Research Council, the NERC. And we wrote this, put it alongside his isotope work. His isotope work was being well – very well funded. People had really realised how important that work was but there was still – it was linked to timescales based on matching the wiggles of the isotopes to the driving mechanisms for climate change, the movements of the earth around the sun. So he was basically matching two sets of wiggles, and whereas if you could actually find a chronology that was independent then that would given an independent timeframe and you’d then be able to say, yes, this is the course and the effect. So that was what the aim was.

[01:49]

So we put in the proposal and there were going to be a couple of months between the employment in Oxford finishing and employment on these research grants in Cambridge starting up. And at that point I took up an offer of going to Canada for a couple of months. One of the people who had visited the lab in Oxford – ‘cause we had a lot of visitors. We had people coming in to spend six months with Martin Aitken, working on luminescence dating. By now there were people coming in for visits, people from India, people from Canada, people from the States. And Martin was very good about pairing them up with research students, so we got the experience of teaching people, we got the experience of interacting with people, and I suppose from his point of view he didn’t actually have to deal with all these visitors on a one by one basis. And the people coming in realised that they were getting interaction with people doing hands on work in the laboratory, so they get the best sort of technical approach. So one of these people who came through was a physicist in Simon Fraser University. And he in fact came and visited but he wasn’t setting up the
lab. A colleague of his called Dave Huntley was actually setting up the lab but Dave didn’t fly, so he sent his colleague, Erle Nelson, to come and learn the technique, and then they went and built a lab together in Vancouver. And Dave had got money from someone to come for two months, so I had briefly met him on a trip that I made visiting labs, giving lectures, round North America, a few years earlier. And so I thought, yeah, that would be an interesting place to go and work, and Vancouver looked a nice city, so I thought, yep, I’ll go. And I went there with a suitcase for two months. During this time I heard from Nick Shackleton our grant application had not been successful, which was a bit of a blow ‘cause it meant I had no idea what I was going to go back to and – but at that time Dave Huntley suddenly came up and said, oh, I’ve just heard I’ve got money for another two years, do you want to stay? So I decided that, yes, I would stay. That meant my relationship with Philip sort of ended but it – long distance relationships just don’t work. So with regret I sort of closed down that in Oxford and moved to Vancouver and stayed – instead stayed on there for another two years. And after that two year period the research grant that Nick had applied for had been rewritten and resubmitted, and it got funded, so before I left Canada it meant that I could see there was a way forward to go back to the UK and a job to go back to. So that meant I could relax a bit and get on with the research in Canada.

[05:28]

But it was good, it was very good, that I went to Canada because again that was where another sort of major breakthrough was made because I’d gone out because I was interested in looking at these organisms, the calcite formation marine organisms. Dave Huntley had been looking at the silicious shells of things called diatoms that are also formed in the oceans and drop to the ocean floor. And he was working with a marine scientist that he knew, and they thought they were able to date this – the formation of silicious shells. I thought I was going to be dating the formation of the calcium carbonate shells but after about a month in the lab in Canada I realised that we were only getting signals from the dirty shells – little dirty shells. And therefore, if it was the dirty ones that meant it was the little grains of sediment, the little quartz and feldspar grains, that were adhering to these shells that I was actually getting the signal from. And this meant that I couldn’t possibly be looking at formation of
anything, what I was looking at was material of a very old geological origin that had
been reset. It wasn’t reset by heating like in pottery or in burnt limestone, it was
clearly being reset by another mechanism. And the only other mechanism of getting
energy into crystals that could do that was light, it was exposure to light that was
zeroing my signal, and that signal was then growing again as it grew in pottery but –
and at this point Huntley said, ‘Ah, that reminds me of some Russian literature I read
that was published about three years ago where they said they could date sediments
which were related to glaciers.’ And I think at that point he thought that it might have
been glacial grinding that had zeroed the signal but then we both suddenly realised it
was exposure to light. We had the evidence in our hands and they’d been getting
dates which seemed to get older as they went back down sections. And so we
thought, ah ha, and then we realised that we wanted to be looking at the grains which
we’d been previously washing off happily down the sink to get our little clean
silicious organisms. And so now we were collecting all the grains from these
sediments, and then we started looking at those mineral grains, the quartz and feldspar
grains, that come into the oceans, get exposed to light during their transport process to
– out into the ocean and then down, as they settle down into the ocean floor, and then
they build up with time. And their signal builds up, and that’s what we were – ended
up dating. And that’s led to a paper in Nature that we published towards the end of
the two years that I was working there in Vancouver.

So the grains that you’re measuring, were they – did they become stuck to the
creature’s shell while it was still floating about or afterwards, or does it not matter?

It was probably afterwards. The grains probably were drifting down to the ocean
floor at about the same rate as the little shells were, then they all got compacted on the
bottom. And so some of the – because these little shells have got – they’re very
lightweight shells, they’re made with lots of holes in them. They’re a support
structure for the soft parts of the organism which have long gone. It’s like looking at,
say, the bones in animals. You know, we’ve got bones of – but our bones are – they
need to be light enough that we can walk about, so we’ve got – and we’ve got lots of
holes in them but in their case they’ve got lots of holes on the inside and outside. And
so little grains of sediment will happily go into the skeletal remains, into any little
hole that’s there. In fact it’s quite difficult to get really clean grains, as I found by
trying to look at them. So, yes, those grains were coming in and getting stuck in here, and so when we thought we were collecting – you know, hand picking these nice clean grains, clean organisms, only the organism shells that were dirty were giving signals.

[10:35]

And could you describe in as much detail as you can actually what was involved practically in seeing and doing the sorts of things that you’ve just talked about? As a story, that fascinating story, of discovering that although you couldn’t measure using thermoluminescence, the age of the shell, you could measure the age of the bits stuck to it. But what was involved, I don’t know, day to day practically? What did you get out, what did you use, what did you put away, that sort of thing?

What we were doing is firstly you get the samples that we were looking at from the ocean floor. So one wasn’t going into the field to collect these, one was going to a core store, somewhere where the marine scientists go and bring back from their ship drilling programmes. They bring back in long cores which have been taken from drilling into the ocean bed. These are long continuous cores taken then cut up into sections, sort of stored so that people – other people can come in and say they want to work on a little bit of sediment from here or from further up or every ten metres or every five centimetres, or whatever the problem is that they’re trying to solve that they can come in and work on the material. These sediments that are collected by ocean going ships are expensive to take and therefore serve a very wide community. In this case we were working with a scientist in Halifax, Nova Scotia, and they had a ship that went out and collected the material, so that was how we accessed the material. But we started off with quite a lot of one sample and we thought that we were wanting to look at the radial area of these silicious organisms, and so what we would do, we’d take a piece of the core and we’d take it back to our lab which, as in the case of the ceramics lab, was a dark room. It was in dark – it was in dim red light because we knew light had an impact but we hadn’t thought about it being a useful impact. We thought it was just an irritation, that it would remove part of the signal to an unknown extent, and we weren’t really interested, we just didn’t want it to happen. So we took avoiding action by working in red light because those wavelengths were
less energetic, and so less likely to kick the electrons out of their traps. So we’d take
the sample back to our lab and very simply wash it through a set of sieves so that you
would have these organisms trapped on different meshes, different hole size diameter
meshes, that you can pour water through and you wash all the finer grains that you
think you don’t want through, and you end up with the radial area of a certain size
being trapped. And the you can tip – you can dry them and tip out, you know, a small
number onto one of these little aluminium discs that we use to support our sediments
for measurement, as we did with fine grains of – from pottery or quartz grains from
pottery. We can – we put our little radial area on those. And it was actually possible
to – one could use a microscope with red light and pick on the end of a paint brush,
pick them out. There were ones of different shapes, for example, some looked like
helmets with pointy bits on top, and some of them were more rounded. And so –
think, well, okay is there a species difference? Does this make –? You know, is this
important? So you’d sit there and you’d – with your paintbrush and sort of hand pick
them and then have a look at their response. And then you realised they were actually
quite scattered, that you could put, you know, like ten onto one disc and put ten onto
another disc but three times the amount of light from one disc from another. You
think, well, if they’ve got ten identical objects on each of them, they should be giving
more or less the same amount of light, what is going on? And that’s when I was
under the microscope thinking, well, those are dirtier grains. So I then started trying
to hand pick to get the really clean ones, and then the dirtier ones, and found that was
what was governing the relative size of the signal coming out. So the more dirt, the
more signal. The less obvious visible dirt, the much less signal I could get from these.
And that’s when I – it twigged. You know, I just twigged and thought, oh, well, the
thing that it’s in common is not the species that I’m looking at, the thing that’s in
common is are they dirty or not, is the dirt important? And then just took traps on the
fine material that I’d been washing through happily down the sink, and collected some
of that and put it on a disc and there was this huge signal. And I thought, ah, clean
ones have not got any signal, so – and it was very interesting looking back at the very
first small paper that Dave Huntley had published with Paul Johnson on their very
first measurements. And though the whole of it was written as though the implication
that it was the age of formation that was being dated, in fact they hadn’t actually said
that in the paper. And I think that Dave had subconsciously been slightly worried that
maybe he was looking at something else but couldn’t – he hadn’t quite been able to
put his finger on it. And then I’d gone along completely unwittingly and taken it from a very simple standpoint and found that, yes, it was the dirt that was important.

[17:28]

And then the next stage after this period of working for two –? Oh, incidentally, before we leave this, I wonder whether you could describe the nature of the interest in climate change that’s circulating here. Speaking as we are in 2011 there’s a very recognisable interest in climate change which is to do with concern about, especially about, global warming, about a certain kind of alarm about something going on. Taking yourself back to this work in Canada what was the nature of the interest in climate change operating here in perhaps in the proposal that you put together with Nick in order to look at these things?

I think that going back to in Canada, Huntley had originally been interested in archaeology and so he was coming about it from an archaeological dating technique. But when he’d been – gone to a meeting somewhere, he’d been talking about this, and then started chatting to this marine scientist. And so this marine scientist had said, well, you know, what else can you date, we have no ceramics on the bottom of the ocean floor but, you know, maybe you’re dating formation of something. And then the topic of being able to date stalagmites had come up, and then dating organisms became what they started work on. So that – that was trying to get something to date this long record of climate change that must be in the ocean. Nick had been, back in the UK, had been working on oxygen isotopes as a means of looking at long term climate change, and that was driven by the work at the time of trying to look at what happens on timescales of glacials to interglacials. So looking at climate change over a period of the last, let’s say, 500,000 years back to two and a half million years, so the whole of the Quaternary period. And, you know, it is known from terrestrial records that you have these large climate changes with the ice expanding and the – in the northern hemisphere, large glaciers coming out from the alps, large ice cover over England, and all these records on the land of this going on but then realisation that in the oceans you have continuous record of what is going on. But what is giving you the record? Well, the record is the isotope, the oxygen isotope record, because that’s relating to ice volume and so you’re looking at ice volume on land and its record in
the ocean water through the oxygen isotopes which are then – they, themselves, recorded in the foraminifera. These have fallen to the ocean flow and the ocean is there, like, forever, so you’ve got this continuous build up on the ocean floor, so you will have a continuous climate record. If you can put a timescale on it then you can see when these changes occurred. You can work out how long interglacial periods have been in the past, how likely is the current interglacial likely to last, are we going to be sitting here for another 10,000 years enjoying the climate we have today? Or, yeah, is the end going to come very quickly, er, and will it occur in the next 2,000 years? And so that was the interest in climate, it was not – it was not really with the immediacy that we have now with climate research. It was much more long term fundamental understanding of what was driving glacial, interglacials, would that have a long term impact. And so there was a different focus though of course by that time in – by the 1950s, though way back in 1957, was International Geophysical Year, and that was the year when Roger Revelle a marine geophysicist, talked about us as a world conducting a major experiment, and that major experiment was putting CO2 into the atmosphere in large quantities and not knowing what would happen next. So at the time it was known that the climate was likely to be changing but that wasn’t what was behind the oxygen isotope research at the time in the 1970s.

[23:07]

Thank you. So the application for work with Nick Shackleton was resubmitted and got.

Yes, it was indeed, the – what we did was, because the work with Huntley had shown that we could work with grains that were exposed to light, I mean that situation was within the marine sphere and so Nick was interested. But by then he’d also got his timescales coming in from the computing of the orbital forcing, these – the driving mechanisms were pretty well known now, so you could get the timing from – you could calculate what the forcing was from movement of the earth around the sun. So Nick said, ‘Oh, I don’t need your timescale any more, I can get a better timescale from this, you’d better think of something else to do. But we’ve got the money, how about you work on the terrestrial record because I can’t work on the land? And we know we have these records, these windblown dust deposits, so called loess deposits
around the edge of the major ice sheets in North America, Europe and in China. Nobody can date those at the moment, so why don’t you work on those instead?’ So I found myself coming back to the UK to set up a laboratory of my own, and with my focus suddenly going from marine environment to terrestrial environment, and though I knew a little about it I didn’t really know very much. So it was all a big new adventure, so that was me sort of set up then for quite a few years to come.

[25:24]

What was the first step, the first stage?

Well, the first step was actually finding somewhere to live. And that was turning up, went straight to Cambridge to Nick and said, ‘Right, I’m turning up, when do you want me to show up?’ And he said, ‘Oh, how about tomorrow? Oh, and by the way, do you have anywhere to live yet?’ And I said, no, so he said, ‘Oh, right, in that case just live in my house, I’m off to Switzerland tomorrow,’ and ‘What?’ And he was off to work in Zurich and left me his house and his collection of antique clarinets. So I had just over 350 antique clarinets to look after, not exactly fed and water, it wasn’t like a cat, but they had to be kept in a static environment with – I had to put, you know, bowls of water out so they didn’t dry out and they were humidified. But it was quite a responsibility, I think it’s probably the largest of antique clarinets in the UK. And so that was me with a base to live in, so that was great, and it was very convenient, it – I had a very nice, very musical, neighbour, which was, erm – so that was really good fun. And the next thing there was an empty space in a building and I had to set it up as a laboratory, and so it’s go in, order equipment. At this point you sort of are getting back in touch with Martin Aitken saying, ‘Oh, I have to set up my laboratory’ you know, and – but by this time fortunately one small company in the States had set up to manufacture the kind of equipment that Martin had home built in his laboratory, and this was now purpose built and you could order it and get it delivered. So – and the basic kit actually arrived in one piece, so that was really good. There was also equipment made by them which dealt with measuring of some of the uranium and thorium contents of the sediments. I remember that there was a laboratory out in the geophysics department in Cambridge where they had a potassium argon dating laboratory, so that got me access to analytical facilities for
potassium analysis, and so that was good. And so it took – I don’t know quite how long it took but it required putting in benches and I remember one of my very first visitors as I was still setting it up was a guy from China who had turned up at one of the meetings I think in Oxford, very early days. And I remember him coming and visiting and seeing us having a problem and trying to inset this equipment into the workbench. And he leapt up onto the bench with a saw, squatted in good Asian fashion on the bench with a saw, and sawed nice holes in to put the equipment in. So was very hands on and sort of, you know, no – no practical thing like this was going to stop me from getting my lab up and running so he could show me what he was doing as well. And so that was the start of my very first contact with scientists in China, which continued. And I’ve met him several times since and he only passed away last year, so these are sort of longstanding academic friendships that go on through time.

[29:52]

What other decisions did you make about the layout, given that you’re establishing this laboratory from scratch? You said there was an empty room to begin with.

Yes, well, the –

What did you want?

The room wasn’t very large but as I’ve already pointed out from Oxford, the space that you need is also not very large. But you do need a separate preparation area and equipment area, so my equipment was to be set up in a room that was basically two metres by three metres. It didn’t have a window, which suited me fine for my research but didn’t suit anybody else for any other purpose, and so that was good. I was able to convert a corridor at the back of the building into a wet preparation lab. It had an extractor fan, so I put a fume cupboard in, so I was able to adapt that. That was at the back of the radio carbon lab so, you know, not what you start off with if you were planning a laboratory with an open floor plan. It was fitting in the equipment and space to work in where you could but, you know, it was adequate for me and a couple of other people who, as long as you worked closely together, you
could share the space, both preparation space and lab running space. And then there
was an open plan office next to Nick’s office and that had a succession of interesting
visitors, some working with Nick on marine sediments, some working with Nick on
archaeological sites. And then as I managed to get myself a couple of research
students and also I had a technician employed on the research grant, then there was
space for them to have office spare, and for me the luxury of an office that actually
had a window rather than having a desk lamp in a lab. So it was – that was – it was,
you know, again going up in the world a bit, getting more – a bit more personal space
in which to work.

[32:09]

Now this was part of the sub-department for Quaternary research. Where in
particular was this laboratory being established, dual laboratory?

Right, the sub-department of Quaternary research was set up as a sub-department of
botany under Richard West. The actual physical location of the oxygen isotope lab,
and therefore my lab, was in something called the Godwin laboratory, which was
physically located across the road. It was not the Downing Street site, which is where
botany is, but it was on the museum site further into the centre of Cambridge. And its
– again, it wasn’t a custom built building, it was just space that somehow they had
acquired a few years earlier. Previously they’d been in an old Victorian house when I
very first visited Nick. It was a bit like home from home, from 6 Keble Road, to this
house on Hills Road, but they eventually got moved from there into a space which
was all belonging to the Godwin lab and had a space for radio carbon and for the
oxygen isotopes, and it had actually been inside that building, laid out especially for
them. So I was put in the bits that were not wanted by people at that point, but it was
physically right in the centre of Cambridge, which meant I could nip out for lunch and
– in the centre of town very easily and come back in again. So it’s right behind the
Corn Exchange. And on the days when the Corn Exchange used to have the beer
festival in town, then the smell of beer wafting in through my window was rather
tempting.

[34:09]
Could you describe Nick Shackleton’s lab, the oxygen isotope lab, that was already there when you came along to establish the thermoluminescence bit?

Yes. Nick had an office space and a lab space, the – his office space was piled high with papers but also importantly was the microscope bench at the end where he would sit and singly pick out on the end of a hair of a paintbrush the individual foraminifera that he – the species that he wanted to work with. And for him, the species selection was important. So he would – that would be his space, and if he was picking forams for subsequent analysis, that was when you certainly did not go in and disturb him.

On the other side of the central corridor of this building was his lab space with firstly one and then later on a second mass spectrometer, which was run, maintained and looked after lovely by Mike Hall, who was his research assistant for all the years that Nick was working there. And so Nick would give Mike the small glass vials containing the picked foraminifera from the different levels and the different cores, and the different species, and so there would be the mass spectrometer which is a device where – for measuring the forams you drop them into acid in an evacuated chamber and the carbon dioxide produced is then ionised and passed through the mass spectrometer. And you can then separate the ions that had come from – along with a mass with oxygen 18 and oxygen 16, so it’s a – basically there’s a large magnet and some … equipment for a vacuum pumped vacuum system attached to it, and a little bit of wet chemistry at the front end, and again a large box of electronics to run this and to collect the data. And that was running, you know, twenty-four hours a day. And there were usually one other person who was running full time as a technician preparing the samples so that Nick could then pick them, so you’d be washing out the material – the material that I wanted to work on – but from the point of view of dating, but we had to wash that away, so Nick would then have clear – clean foraminifera to hand pick and sort. So there’d be continual bustle from that work going on, and there’d be visitors coming in as well. Again, it – what was nice was that as in the lab in Oxford there were forever people coming through, people whose names you knew, you’d read off in papers that Nick had published with before or people that you just caught their name on a science paper. And they would come through and spend some time. All of the people who were new post-docs, they’d got their PhD somewhere else and they were coming in and – and to get experience
working with Nick. So it was a very lively environment, there were lots of people coming in. These people would give seminars and so it was like continuing education going on. And that again, it was similar in a way to the research lab in Oxford and so I felt very at home in this new environment in Cambridge.

[38:41]

*Thank you. And also the radio carbon and tree ring laboratory?*

Yes.

*How did that appear?*

Oh, that took up about twice as much space as the oxygen isotope lab. The sample preparation equipment was larger, it required furnaces and they required to be sort of isolated in the centre of rooms. So there was quite a lot of preparation space there. There were also two types of counting systems, one of which required the gas to be stored in glass – large glass bulbs, which would then be introduced into a gas counting system. But there was a line that would change the gas to acetylene and then to benzene, which would then be put into a liquid scintillation counter. And that would then be the way that was more convenient and becoming – taking over. And so Roy Switsur was in charge of the radio carbon laboratory and he would be both developing the gas counting system as he was going along, and still also making some measurements on the older gas counting system. So that – the gas counting system was in a large lead castle, it was something that took up about a cubic metre of lead to shield it, so that was very heavy and required to be definitely on a supportive floor and took up the centre of a room whereas the liquid scintillation counters were quite small, the liquid being very dense compared with the gas, it meant that you could get the same sample for the same number of Carbon 14 atoms in it, in a smaller volume than you could in a gas which even under pressure was going to be taking up more volume. So there were things on different sizes and this – so the radio carbon was the first major dating technique and then because a lot of work had been done previously on tree rings, initially to calibrate the radio carbon, to check out the radio carbon in its early days, but there were still some gaps in that record, and so some of those gaps
could be filled in by looking at really old tree trunks, and some of those had been found at that time in Norfolk and these were found in bog lands. There’s a lot of – in the fenland area. As the farmers are working the land they occasionally come across these tree trunks made of oak, and they are preserved by having been in a waterlogged environment and they end up as a very hard wood that’s very complete. And these are so called bog oaks, and these can be looked at using tree rings and then the radio carbon can be applied. But also that then led to other use of tree ring work and for using it for building reconstructions. So there was a whole sideline that came along with looking at tree rings and so called field dendrochronology, tree ring chronology production, by looking at the ring widths and getting the patterns and matching to a master plan, and that was going on. And then at the end of my time in Cambridge there was work going on looking at the oxygen isotopes in the cellulose in the trees as well. And so there was – there were always ongoing research projects there that related to organic materials.

[End of Track 6]
Could you start today by telling me about relations that you established with the potassium argon lab at the department of geodesy and geophysics in Cambridge, presumably at the beginning of your period at Cambridge?

Yes, I had to measure, or have measured for me, potassium content of the sedimentary samples that I was going to be working on. And I – this is usually done chemically and I really didn’t want to have to set up a lab to do that with appropriate standards. But I’d realised that from a meeting that I’d gone to previously in London, which was the dating of early man in east Africa, that there would be facilities to measure potassium in the laboratory out at Madingley Rise. And so I got in touch with Jack Miller and his wife Marcia. Marcia was the technician in charge of the potassium analyses, and so she offered to run these samples for me. So I was going out, back out to where I’d actually gone for an interview some few years earlier, I’d come back there. And this, besides having a friendship with Marcia, which has gone on until the present day, also Marcia was responsible for meeting my husband at that time. I was wondering how you sort of meet people and how you get to go to parties and she said, ‘Oh, there’s a party on at my department for one of the guys who’s just finished his PhD this coming weekend. Why don’t you come out?’ And that was when I met Jack Jacobs, who was then to become my husband. So it was really rather nice to – through a work contact to find the guy that I was going to marry. So, yes, it was a very good both working and personal relationship.

When did you learn of the history of that husband and wife relationship involved in that running of that lab, how she had come to be the assistant working in the laboratory run by her husband?

Well, I think that Jack Miller had come in having worked with mass spectrometers. Mass spectrometers being devices that measure the weight of atoms and can separate, erm, the atoms that come from the radioactive decay of potassium to argon, so measuring the argon atoms that come out. He’d been developing that, and that is the fundamental basis. And he’d got a PhD, which had enabled him then to get a lectureship in that field. Marcia had trained originally as – as a biological scientist
and had then decided she wanted to work, and it was easier to work or to find a job working with her husband. There seemed to be a very good working relationship and they made a strong team. The potassium argon dating back in the ‘70s and ‘80s was a little bit controversial, I remember at the meeting I’d been to when I first heard about the lab that there was a big discussion going on about whose dates were right. And it – you know, there was a lab in California and the lab here in Cambridge, and they were trying to work out what the chronology of the order of a few million years was. And there was a mismatch somewhere there, and there was a big argument, and I thought, gosh, you know, scientists really do argue in public, this is kind of interesting. But, you know, part of it was because the sampling hadn’t been the same. They’d taken a sample which was – appeared to be at the same level but wasn’t at the same location, therefore was it reworked material, were the crystals they were looking at reworked? So again, one became very aware of how important it was to go in the field to know exactly where your samples come from, and particularly if somebody else is going to be working on the material to make sure that you know exactly how their material that they’re collecting relates into your collecting. So I found that was – you know, these were bits of scientific information, scientific thought processes and procedures, that you learn and pick up as you go along.

[05:08]

Where did Stephen Moorbath’s laboratory fit into that controversy concerning dating?

Ah, Stephen, who I knew from my time in Oxford, he was dating much further back in time. And his method was not potassium argon, it was a strontium based method, and that was going back and he was dating the oldest rocks in the world. So many orders of magnitude further back in time, and his work was in places like Greenland where the oldest rocks can be found.

And I wondered whether there was any rivalry between the Cambridge and Oxford departments.
No, because they weren’t people dating the same period of time. There was much of an interest I would say in the laboratory here in Cambridge on more recent timescales, hence the work on records relating to the earth’s magnetic field where you’ve got sedimentary rocks that contain this record and also volcanic rocks. So they were wanting to be able to apply methods of dating volcanic rocks on a relatively recent timescale, say ten million years, and that was best accomplished using potassium argon dating.

[06:35]

**What do you remember of the party you went to?**

Erm, the – it was a sort of fairly typical party for what was then the 1980, I guess. It – sort of loud music, it was actually held in the department, there was a room that they’d cleared, which was normally a sort of seminar room. And there clearly appeared to be no rule for no alcohol on site, so alcohol was consumed. And I remember wandering outside and finding Jack sitting up – sitting on a flight of steps by the pond outside, looking rather lonely and out of it. I had no idea who he was, I didn’t find out for several days that he was actually head of department, which was a bit of a sort of shock to the system. But we got together sort of immediately after that and so it obviously clicked and worked.

**How did that relationship develop from that point?**

Oh, very quickly [laughs]. His then wife had gone back to Canada and abandoned him, so I’m afraid I at that point moved in. But it was – we were just very compatible and it was a great relationship that we then had for just over twenty years. And it worked well because he was a lot older than me and it meant that there was then no competition within our relationship for, you know, who’s going to go where with their career, and it meant that he was quite happy once he’d retired that wherever I happened to get a job and wanted to go, he would be very happy to go along. And so it was a completely stress free, argument free, relationship, which was great [laughs].
And are you able to say what it is about the two of you that made you compatible or that – a kind of reason for why you struck up this relationship at that time you think?

Erm, I think we’d both travelled quite a lot, so we’d both lived for various lengths of time in Canada. He’d spent much longer in Canada than I had. So we also found various colleagues that we knew in common from slightly different places in our careers, so we’d come up and say, oh, did you know so and so? Oh, yes, and so there were all sorts of points of academic contact which were good. There was an understanding that you have when you are a scientist and you go off into the field and go off to meetings that that’s what you do, and that you get stressed when you’re about to give a paper at a conference because that’s what happens to people. So there was a total understanding of how you work in your working environment and what – understand the kind of support that the other person needs for that. Apart from that I guess we had a very similar upbringing and therefore shared values, and that just comes out slowly over time. We liked the same kind of people, we disliked the same kind of people, so when that happens it – your life becomes like one. So, yeah, it’s – makes for a very easy relationship, which continued through time.

[10:42]

Thank you. Now last time you told us that you didn’t work on the data of mineral grains attached to the shells of the sea creatures that Nick Shackleton was working on but that you turned your interest to loess instead –

Yes.

In Cambridge. Apart from that we don’t have any sense of what this work involved, either in the field or in the laboratory, so I wonder if you would describe what the work involved day to day at Cambridge.

Okay, the – well, I guess it’s – when it all starts is in the field. As I said, one needs to go in the field to see what the context is. And so go into the field with – because I’m a physicist and therefore I – you know, I haven’t had the geological training that the people I go into the field with have, I always go with somebody who says I’ve got this
problem, I want to know what the age of this material is, relative to that material, I want to know what time period is represented by this thick deposit that we see in front of us. And I get them then to explain to me what they can see there. They can see that there are fossil soil layers, that there appears to be an erosional horizon of coarser material coming in, perhaps there was a river going across at this point, what are the markers that tell them it was a hot or cold climate. And using their field observation, also their previous laboratory studies which may involve looking at shells or whatever it is, or pollen in the sediments, then we stand and we’ll devise a strategy for sampling. This is to some extent limited by the length of time I know it will take me to process a sample. On average a sample will probably take about a week of laboratory time, you know, one person working on that sample. You process not probably one after the after, you process in a small batch of maybe five samples. But effectively at the end of the year you’d say you could do a sample a week, you could do fifty samples a year. Thinking about them in a way it’s – so, you know – so you’re in the field and you’re thinking, right, I will probably spend about six months on this project to answer that question for them, so I’ll take twenty-five samples. I might work on all of them or I might work on half of them, it depends – you know, you select which ones to look at first to get an overview of what’s there.

[13:43]

So that’s looking at and deciding where to take the samples. The next thing is how to take the samples, and the first thing that one has to remember is that the samples, the mineral grains and the samples which you’re going to work with are light sensitive so you can’t just go along and take a plastic bag in one hand and a trowel in the other and scrape the material off the face. You actually have to take something that’s in a solid piece, and so – also protect it when you’ve taken it from light. So with loess it actually is quite self supporting, so you can actually carve it with a knife or with a trowel. You can actually carve a piece from a vertical face quite easily, and that means you have something that you can take back, you can carve it, not worry about exposing the outside of it to light because you can scrape that off in the lab when you get back. So you can carve it, wrap it in aluminium foil, wrap it in a plastic bag, or you – if it’s slightly harder you can actually hammer specially shaped tubes into the face and collect that way as well. So there are various strategies that one can have.
Just very simple bulk sampling, taking something the size—well, the biggest you’d take would be the size of a small coke can or an average coffee cup, and take it back. You’d clean the vertical face that you’re looking at first and try and get back so that you don’t want any disturbance of grains being moved around and exposed to light just because some bee or wasp has decided it’s going to make its nest in the section, so you clean back. So it’s a bit of preparation of a vertical face before you sample. But then the sampling is relatively easy. At the same time, to measure the uranium, thorium and potassium content, or rather the gamma produced by those decays, we also augur a hole, drill a hole, into the surface, into the vertical surface, and put a detector in, a gamma ray detector. If it’s one that enables you to measure a spectrum then it’s called a gamma spectrometer. So you can drill a hole which will be about twenty-five centimetres deep into the face, put this gamma spectrometer in and leave it counting. You then move down the section and take the next sample, so you can get a measurement of the gamma dose rate down the section as you are sampling. And if the samples are not quite as consolidated as loess, for example, if you were working on sands later on, then you can drill into sand and take the sample. And usually you protect the sample as you bring it out by drilling out by going underneath a tarpaulin, dark tarpaulin or black plastic sheet or something, to make sure that you don’t get light on it. But that’s because that material is looser, the loess itself is quite solid. Solid to the extent that in China, for example, or in Austria, people carved rooms into it, will have lived in it or will have stored grain in it. So it’s something that you can—you can carve quite nicely, it’s got a small amount of moisture in it.

[17:45]

And at this point can you give us a sense of why the geologists involved here were interested in doing anything at all with these deposits? What was the reason?

Well, they saw them as the equivalent of the deep sea records. At that time Nick Shackleton and his colleagues round the world were constructing climate records based on what was going on in the oceans. They were looking at the oxygen isotopes of these foraminifera and they’re recording the temperatures, ice and ice volume records through the ocean water and the isotopes going into the shells. But, you know, man is living on the land so we actually would like to know rather more
directly, and here we have these deposits where you can see the climate change rather more directly. Was there no deposit there because at that time it was under ice? How did the climate change in the sense that you could look at – different grain size will tell you how close you were to the ice front. Erm, so you can get all sorts of subtle changes in the loess in terms of grain size, depending on wind strength and the source – availability of source material, like a retreating ice sheet will be churning out lots of glacial flour which can then be picked up and blown. So you’re able to construct what the environment was like and also within it, when there were the warmer interglacial periods like we’re in now, then you have soils forming in them. And you want to know when those soils formed, how long did they last, how long is our present interglacial going to be. It’s been around for about 10,000 years, you know, how rapidly will it end? How rapidly did the last interglacial end? And so when you’re going into a cold period what would happen? So all of those things are recorded there on land, and you can go and look at it. It’s inexpensive, it’s not like you have to get a deep sea drilling ship to go and drill. Anybody can just walk up to the deposit, look at it and say, oh, I can see that it isn’t completely uniform, I wonder why it’s not, what was going on. And that study has been going on – had been going on for a good fifty years ahead but again it lacked any kind of age control unless there was some material, organic material, that would be suitable for radio carbon. But that would only go back at that time about 35,000 years.

[20:53]

And so who were the, if there were, who were the British geologists who were calling upon your service?

The – the main loess experts in Britain were John Catt, who was partic – was a soil scientist and he was particularly interested in loess in the UK. And there are some small deposits along the south coast, going from a little bit on the Lizard Peninsula but then going eastwards. There’s small deposits on the Isle of Wight and the New Forest, and the thickest deposits are in Kent and also up into – on the Essex coast. And John Catt knew about these deposits and studied them, even though his main job was to work as a government soil scientist. So I owe a lot to him in being taken to these sites and to have his interpretation. So he’s somebody that I saw quite a bit of
and one of the first papers on loess in the UK and dating of it was with John. And then again there was a paper in Nature because suddenly here was a method for dating in the – in this loess for the first time, and so he was one person. The other one was Ed Derbyshire, and he was somebody who'd worked a lot in China and so I came to know him through a field trip later on to China and became involved with some projects that he was working on as well.

[22:57]

And so once you’ve collected your samples, whether they are the sand or the loess rocks wrapped in aluminium and then put in a plastic bag, what do you do then? What’s the next step?

Well, back in the laboratory, basically the laboratory is divided into two parts, there’s the sample preparation part and there’s the part where the instrumentation is. And these are two separate working areas because you don’t want to do any wet chemistry where you’ve got delicate instrumentation. So the first thing is the samples go into the sort of wet area. Here both laboratory areas are in dim red or in dim orange light, so it’s a bit like a photographic darkroom, and you just get used to working in that environment. I’d been used to working in that in Oxford and again here the lab I built in Cambridge was like that. So the first thing you do is scrape off the outer part of the block that you’ve got and probably put that material aside for making measurements, for example, of the uranium, thorium and potassium. So that’s where some of the sample for potassium analysis that I’d send to Marcia Miller would go to that. The – this would then leave you with a block which is made up of grains which had not been exposed to any light since they were deposited. And then one wishes to disaggregate that, removing firstly the carbonate, erm, by putting it into dilute hydrochloric acid. There’s usually quite a bit of carbonate because this wind blowing dust that makes up the loess deposits will have some ground up limestone or chalk in it. And so one wants to remove that because what we were trying to look at was the signal coming from the silicate minerals, the feldspars and the quartz. So the first thing is remove the carbonates. If there’s any organic material, treat it with hydrogen peroxide so that the organic material, er, reacts with the hydrogen peroxide and disappears. So what you end up with is a – grains which are organic material free and carbonate free. One
then wants to make grain size selection. You want to know whether you’re working with grains in a range four to eleven microns, which we would normally call fine grains, or with grains around 100 microns to 150 microns, which we’d call course grains. This is a follow on from working with pottery where basically the piece of pottery has fine grains which make up the bulk of it. And somebody might have improved their – the strength of their pot by throwing in some coarser grains, and it – one goes for these grain sizes because they will absorb different amounts of radiation. Alpha particles don’t go very far, so in fine grains, they’ll go through fine grains, but in the coarser grains the alpha particles do not penetrate those. And so there’s a reason, a physics reason, helping one from measuring radiation dose that you need to know what the likely source is. And similarly, the gammas will go through everything, the beta particles will go through the fine grains. They’ll go through but some of them will get stopped and they won’t all deliver their energy to the centre of grains which are 100, 150 microns or upwards. So we need to know what grain size we’re working with, so that means that these – the material which we now have, we will sieve and we may put it through a sieve through which we’re flushing water, wet sieving, or we may dry sieve it, dry the grains and then put them in a stack of sieves and shake them. So the stack of sieves have got different grains sizes and we can then leave it shaking and then will come out with – grains that we can select will be 63 to 100 or 100 to 150 microns, and we know what we’re working with. Erm, and initially the work was actually done with – on the loess was actually done with fine grains, with the four to eleven micron grain size, which is what goes through the finest sieve and then one puts it into suspension in – basically in water. And by settling through the column of water you can get grains of a particular size, and so that’s how one gets the grain size. You then dry out, ‘cause those grains are now in water, they’ve been settling in a water column. You then pull off the water, dry them out, and re-suspend them in acetone which – in which they will settle much more quickly, so you can then pipette one milligram in a one ml of acetone and pipette than and put the – deposit them onto one centimetre diameter aluminium discs, which are sat in the bottom of one centimetre diameter little glass vials. So what you end up with is something like fifty glass vials in the bottom of which is a little aluminium disc with one milligram of grains on each disc. And when you tip those out of there you’ve got these aluminium discs with virtually identical, what should be identical, quantity of the fine grain material that you want. And those are – those discs are how the samples are presented.
to the instrument. So all of that procedure goes on in a wet room, there’ll be fume cupboards involved and things like that but basically you’re ending up with the grains that you want to measure on the disc. At that point they contain both quartz and feldspar grains, when – as we’ve moved on we – and moved to larger grains, then we’ll be wanting to know whether we’re working with quartz or feldspar grains, and so we’d have to do some separation work using heavy liquids to make that separation. And that also goes on in the wet room and – but for the fine grain loess deposits, they are very, very fine, they don’t have coarse grains because they’re wind blown, so you don’t have – you know, you’re used to seeing the sand running along a beach. You know, you’ve got a beach, the wind blows the sand but it’s only going about – it’s only saltating, bouncing around, being carried along about a couple of feet above the surface. But this loess, the dust that forms those, is coming longer distance. It’s been blown in the air but it’s higher up and therefore it’s finer material. So if you get a loess deposit and it’s got large grains in it, then those will have got there by some slightly different mechanism. Maybe there’s a river nearby and they’ve got some local river grains moved in but usually loess is long distance travelled. It usually doesn’t go above about 60 microns.

[31:26]

And what techniques of labelling are involved in keeping track of, you know, which particular sample you’re dealing with?

[laughs] Well that’s why when I said we normally run them as batches, but small batches. We normally don’t – well, I would not want – I used not to want to run more than five samples at a time. Labelling was called a felt tip pen, and it was a felt tip pen on any glass that – glassware you were using, which had your laboratory numbering system written on it. You’d get the samples in, you’d give them a laboratory number, and they would have that laboratory number going through their whole history so that you could follow them, you know, in your notebook what you’re doing with them. So as in any branch of science, your notebook is of paramount importance. It tells you what you are every day, what you are doing, and where your various samples are at. It’s also where you put your thoughts as to what experiments you might do. Any silly ideas you might have, you put them in there. And that again
And so you’ve got these discs, and you said that you then present them to the instrument. Can you go into the detail of what is involved next?

Right. The equipment at about the time of about the early ‘80s, we were going through a transition from manual equipment, which is what I’d been used to in Oxford, what I’d used in Canada, and what I first bought in Cambridge where you would put in one sample disc at a time. Very labour intensive, you sit there with a pair of tweezers to pick up your disc and you put it into a small oven chamber in which there is – it’s called an oven because it’s where the heating is done for the thermoluminescence measurements. It has got a hotplate in it, you pick up your disc with tweezers, you place it on the hotplate, and then you put the light detecting device to get your thermoluminescence signal that you’re measuring on top of it. You would evacuate that oven, you would remove the air from it by having a vacuum pump and that would extract the air, so you had no oxygenation process going on. As you heat the disc you – before you heat it there you would backfill with an inert gas, something like nitrogen or perhaps argon, and then you would heat it up. You’d heat up at typically five degrees per second. You can – all the equipment was flexible enough to select what heating rate you could set, you know, how many – what temperature you want to go up to, how much time do you want to go up to it. So you can vary your heating rate and it gives you different information, a bit of different information when you do that. So you’ve placed your sample disc onto the hotplate, heated it up, observed the light, and then take that information. And at this point the information was now being collected using a computer very simply. So this was sort of when computers were just coming in, whereas before that we’d taken it out on a chart recorder and measured the height of the signal up the piece of paper with a ruler effectively. So now we’re actually getting numbers that we could then play with. And so then at this time, in the early ‘80s, the first equipment was coming from Denmark where they were using it for measuring radiation dose because it was in a physics laboratory at the place called Risø which is outside Roskilde and that is the
Danish facility for all radiation protection. So for measuring – monitoring radiation in hospitals or for monitoring things like when Chernobyl occurred, that was where the Danes were doing their research and radiation protection for the people there. So they’re always up on measuring radiation doses and so it was important for them to have equipment that would do this with the least possibility of any operator error. So if you’re measuring in hospitals situation, the people being given doses, are monitoring the dentist who’s administering the x-ray, for example, and they’re all having radiation monitors. The same kind of process as we’re using but, you know, they need to have their radiation badge monitored regularly and precisely in a controlled way, and so automated equipment is the way to go. So they were developing that and then it was only a short sideways movement there for them to produce what was then needed for us to make these measurements. So, erm, I was very lucky because I was starting to work with people there in Denmark and so would be able to get the equipment and have the equipment maintained and hear about the latest developments, because of the close personal contact you had with people in that group.

How was that established, that contact with the Danish group?

Erm, I guess I first had met them when I was back in Oxford, because there was a meeting that I remember being held in Copenhagen, and I remember flying out to give my first talk at a big international meeting and I was absolutely petrified. So I remember quite a bit about the flight out and then meeting all these people in this laboratory, and just realising here were another group of people around the world I can really easily talk to, so we just maintained the contact. In fact over the years I have been and spent two or three weeks at a time in that lab in Denmark really until very recently, until – until I retired but, you know, I still maintained contact and worked on joint projects with them, both with the physicist who was the person who was in charge of the radiation measurements there, he was the radiation physicist for – effectively for Denmark, and also with his friend and colleague who would come in to work on dating. So the first guy, Lars Bøtter-Jensen, was somebody who was, you know, trained as a physicist, a health physicist, and then his friend Vagn Mejdahl had
left school at ten and self trained in physics in college, done a degree, and got a job as a high school teacher in physics but then realised he was kind of interested in trying to do this dating technique that he’d heard about. And he managed to support himself to go into this lab in Risø and to be able to start a dating service for Danish archaeologists. And so these two guys were very important in the field and very good friends as well.

[40:21]

*And to what extent was this technology being produced elsewhere, in Britain for example?*

Right, well, the first – I mean the first lab where it all started in Britain was in the lab in Oxford with Martin Aitken. I guess that my lab was the … was the next one that came along, so I was working for quite a while on my own there. There was another lab that got set up, actually back at Sussex, back with Peter Townsend who’d been responsible for me doing a project there as an undergraduate but he had a colleague in geography, Helen Rendell, and they were set up. She wanted to set up a lab, so there was another lab coming along. And then again, there was another lab that was being set up in the British Museum in London because they were involved in their own digs and also in authenticating some of their ceramic pieces. So as part of the – of their science group there was a luminescence lab set up in Russell Square in London, and that was directed by one of my fellow students, Sheridan Bowman, so again – it’s a very small network. All these people, we know each other, we studied – you know, studied together, and on the whole it’s a very friendly community. In fact many people coming into it over the years have said, oh, it’s really nice, people are really friendly and supportive, they don’t backstab, they must – I guess this is probably because we’re small enough and, you know, we are interdisciplinary but we’re on the edge of other people’s fields all the time, so we need to support each other rather than shoot each other or we’d never get any funding or – and we’re just, you know, keen to help people to establish good labs. It doesn’t do anybody any good if you have a lab that’s got, you know, poor laboratory practice.

[42:46]
I was wondering to what extent Denmark was producing this sort of equipment and supplying the field, if you like, or whether there were instruments being produced by lab. You know, as the Oxford lab was producing its own equipment when you were there, do we have the development of this technology in each of these laboratories or is there a kind of central source?

No, the – basically there were three sources of – commercial sources of equipment. Erm, there was an offshoot under Teddy Hall from the research lab in Oxford. He had a company called Littlemore Scientific Engineering and they were producing thermoluminescence readers which they sold round the world based on the equipment and expertise of John Alldred who was in the lab in Oxford. And so there was that equipment but that never moved on, that was basically built and it wasn’t particularly flexible, it didn’t move with the times, so it didn’t have a very big market. When I was buying, for example, I had to get a quotation for it but it wasn’t as flexible as what I bought the first time, which was equipment built in America. There was a one man company, a company being called Daybreak and the man running it, Victor Bortolot was somebody who had trained as – well, he trained in astrophysics but what he was interested in was making equipment that was miniaturised, so he had a very small – his equipment was small and he was quite good at being flexible with things. And he was also interested in the art world, so he was very – you know, he wanted to know about authenticity testing and in fact also had a sideline in his company of doing that as well. So his equipment was available, and that was the first lot I bought. Then the Danish equipment went automated and then jumped in that direction. Nowadays, you know, some thirty years on, the Daybreak is still there, Victor is still making it, but it’s a bit too finely designed and so it often falls over and doesn’t work, and then it becomes a bit of a problem, whereas Danish equipment is over engineered, if you like, so it’s more robust. And that is still going strong, that is the big supplier. It – if I thought about it I would think that probably eighty per cent of the luminescence equipment in the world is from Denmark. There is a Risø reader in almost every lab. There are attempts I think being made by at least one group in China to make something that’s much cheaper because the Danish one is expensive. Just because the currency’s expensive, they have to cover overheads and, you know, it’s run as part of the service provided by the Danish nuclear energy industry, the site at Risø being part
of the original reactor site that they have there, the research reactor site. But the –
yeah, the equipment now is primarily the Danish one. In ten years’ time maybe
they’ll be a Chinese competitor that’s cheaper, more flexible and certainly more
affordable but we haven’t got there yet.

[47:04]

_Could you say how you were able to get funding for assistance and PhD students who
joined you in Cambridge? And by how, I mean what sorts of arguments did you have
to make to whom in order to argue that it was valuable to have PhD students working
on that?_

Usually the research funding at that time was through the Natural Environment
Research Council, NERC, and I was involved with sort of talking to Nick Shackleton
about this as he was head of the Godwin lab where my lab was basically hosted from.
So his name had to go on these, I could only be there as the researcher and it would
have to go in in his name, but I would write all these proposals. And the aims that we
had were to develop chronologies for the loess deposits. And one would be interested
in saying, well, what was going on in central Europe between 20,000 and 50,000
years ago. You know, where were the ice sheets, what was the record that we were
getting? So that would be the kind of scientific question so it would be all driven by a
scientific question, and then effectively you just needed manpower to do it. I was –
you know, I could do it myself and would spend a lot of time in the lab doing it but it
gets to a point where you’re spending so much time organising it or doing mundane
laboratory work that you don’t actually have time to think about the project so much.
That’s why it’s necessary to try and get a technician and – to help with preparing
some of the more mundane samples, doing sample preparation, and then, having
trained them to do that, to train them how to run the equipment and think about things.
So I would put in on a research grant, which would last for three years, I would put in
to employ a technician for that three year period to help. Studentships, well, I only
managed to get two PhD studentships in the time that I was in Cambridge. That was a
sort of separate route and the first student unfortunately was somebody who spent
three years and on the very last day just walked out on me and was never seen again.
I never got the – I never got a thesis, and I think it was basically conned. Er, he was a
very plausible guy who’d been – in fact he’d been put forward to me as a suitable candidate by David Bowen, who we come across later in my career, and David said, ‘This guy’s really good. He’s really interested in the Quaternary, he’s scientifically literate, so to speak, he’d be good.’ But obviously David was conned as well, so though he did some – you know, some good work I never ever got him to write up and get a PhD, so that was massively embarrassing, particularly when it’s your first student, and it took a bit of a while to get over that. The next one was a completely different route. He was a Chinese guy who I had met at a meeting in Belgium, and he was in Belgium doing a master’s degree, and the guy there who was his supervisor wanted him to stay on for a PhD but he wasn’t happy. And we met at a meeting in – I think it was in – I also met him in China, and he said he wanted to come and do a PhD on luminescence with me. And at that time I thought, oh, that’s great, I’m interested in the loess in China, to have a Chinese working on it would be absolutely perfect, and he was, you know, keen, enthusiastic, spoke excellent English. And I spoke with Nick Shackleton when I got back, and Nick was able to find – there were studentships from St John’s College that were available and back in the early ‘80s Chinese students were a complete novelty, so they offered him a studentship and that was wonderful. So Zhou Liping was my first successful PhD student and he has now gone on to be a professor in geography in Peking University, and I see him on a pretty regular basis. He is a sort of international player now and he comes over to Europe quite often, so he comes – drops into Cambridge from time to time still and we maintain contact. So that was very good. So that was how I ended up with him. Again, it was a fortuitous meeting him and then a slightly different way of getting the funding.

[53:10]

To what extent is it necessary in applications for grants to stress the climate change knowledge that could be derived by this work at this time?

Yes, it was – the applications would be a combination of development of scientific technique to – in other words, the development of methodology in the lab to ensure that the dating was as accurate as possible and testing out the methodology against known age materials. But the reason of course you are doing it is because there aren’t materials you can date, so it’s a bit of a vicious circle trying to develop something but
you can’t test it because people don’t believe the other dating, and that was a frustration. So – but there was – that was – one bit was the technique development, the other bit was looking at the application and what you could get from dating the sediments. You know, I wasn’t getting the other information like the pollen, that was being got by other people or been studied by other people, but it’s providing a chronological framework. If you don’t have a chronological framework you don’t have – know when things happened, then you can’t interpret how, you know, climate change is occurring. You can’t establish the rate at which things change and so it was important for that, and also to make links across with the marine record as well. So that was always there in the background, was the linking as well with the isotopes record from the foraminifera thing that this was going on, what evidence can we find, can we support this by looking at terrestrial deposits.

[55:19]

And can you tell me as much as you can remember about scientific visits to Poland, Czechoslovakia and Estonia at this time?

Yes, this was of course before they became independent countries and they were all in eastern Europe. They were – had communist governments and there was a great degree of suspicion also from the west as to what was going on in these countries. But these countries have got loess deposits, Poland – well, all around, right across into the Ukraine they have loess deposits because they’re beyond the margins of the ice sheets, so you have these records. And I became aware of one or two people – in fact one in Poland, in Warsaw, a family called Proszynska of whom the parents had their own small laboratory and their daughter, Hannah Proszynska who was taking a geography degree and was also working with them on the loess deposits, and I wanted to go and talk with them. And there was also – in Hungary as well there was somebody who I also heard his work and I wanted to go and meet. And one very good way of getting there was to apply to the Royal Society. The Royal Society are very keen on scientific exchange between countries. At that time they were strongly supporting exchanges between British scientists and eastern European scientists and there were all sorts of possibilities for short study visits going in both directions. So I had – for example, Hannah came over and spent several months with me and I was
also able to go and visit her and her parents. And that was – that’s really good, and also that’s been a friendship that’s lasted over the years. The Hungarian one, I – he didn’t come and visit but I visited his lab. And also through him I got in touch with some of the big loess experts in Hungary as well, such as Marton Pesci and these are all the contacts that you could make through this, so it was very good. They enabled me to go to the field with them, to collect samples, to see their deposits, so I got a much wider understanding of loess deposits by going to eastern Europe rather than, say, just going to France and Germany. It was just a bigger eye opener for me.

[58:46]

but it had its sort of slightly funny side when one day I was in my lab, having had Hannah over quite recently, when these sort of two guys in sort of fawn raincoats turned up and said, ‘Why do you keep going to eastern Europe?’ And we realised it was part of our security system in the UK and they were concerned about me going over there and these people coming over. And I realised that my passport must have been flagging up every time I went into an eastern European country, erm, but that was fine, they eventually got the message that’s what scientists did.

[59:29]

So that was good but it – there were also things like going to Estonia where again there was a very small laboratory run by a physicist, a Russian woman, called Galina Hutt, who was really an excellent scientist carrying out independent research. And again, I visited her a couple of times through the Royal Society and at that – the first time I went I had to fly in through Moscow and then take a train. And I had a minder from the moment I arrived in Moscow all the way until I got off the train in Tallinn. There was this person who was the tourist guide and basically they were making sure I only spoke to the people I should be speaking to. And I wanted it – so the train overnight goes through St Petersburg and I said, ‘Can’t I stop?’ He said, ‘No, you are going to Estonia.’ And I thought, oh, okay, I’m going to Estonia. But one of the more amusing aspects at that time was also the fact that it was recommended that you check in at the British Embassy when you go into the former Soviet Union. They’d like to know where you are effectively just in case you don’t come out again. So I
checked in at the British Embassy on the way out, and that was fine. We went to
Estonia and the laboratory was in Tallinn and I found that really – you know, again it
was a Hansiatic port and so I was fascinated by the architecture, but I really enjoyed
talking to this woman and to some of her colleagues. And then we went out, one day
she drove us out to Tartu which was the city where she’d done her PhD and there was
a physics institute there and I went – was invited to go to that. And when I signed the
visitors’ book at the end of the visit I realised I was only the second western person
ever to have visited there. But it was fascinating ’cause it gave an insight of how the
politics played a role in science there.

[1:02:00]

You could tell the people who were the party people, they had the best equipment,
they were able to get equipment in from the west. And then the next class of people
had equipment that was made in places like Czechoslovakia, East Germany, and then
there were the others who basically had sort of, you know, old Soviet made
equipment, and they were the ones who weren’t in the party. And so that was a bit of
an eye opener but, er, I found the whole of – yeah, my visit to Tartu quite fascinating
as well. So just a wonderful opportunity to be able to go to these places and see a
world that was very different, and obviously a world that is no longer there as well.

What, for example, on this visit to Tartu was the nature and extent of the people you
were meeting’s interest in the west through your stories of it?

Erm, they – there didn’t seem to be any great – you know, they were interested in
what I did as a scientist but the fact that I was from the west, they didn’t – I don’t
remember them being overly interested, not because they were told not to be but just
because it’s another world that they clearly weren’t going to be able to get to I think.
The – Galina Hutt, I managed to help come over to the UK for a conference that I was
organising, so – and it was interesting that when she came over she – you know, she
was interested in all the things in the shops ‘cause she said, ‘Oh, but you can buy
these things.’ And I said, ‘Yeah, these things are in the shops. They’re in the shops
because the shopkeeper wants to sell them to me, so I want to buy them.’ ‘Oh, we
were told’ she says, ‘that you have these things in your shop windows but you can’t
buy them.’ I said, ‘No.’ But, you know, you could see that in – when I visited the shops there, there was very little in them, they didn’t – if you said want that then they said, ‘Oh, that’s the one in the window, we don’t have any’ and you realised it was a different world. But also, you also realised that there was a pecking order in the social life in Estonia where because Galina was Russian, in fact she was of Jewish origin from the Ukraine but spoke Russian and therefore was considered Russian, and they were looking the rationalisation of Estonia and were not happy about it. So when we went into a record shop and she said, do you have so and so, because I was trying to buy a particular record, and they would say ‘No.’ And then she’d say, ‘Ah, no, it’s not for me, it’s for my friend here, she is from England. Perhaps she can talk to you about it.’ And so I talked to the Estonia shopkeeper who’d say, ‘Ah, I’m sorry, you wanted this, did you?’ ‘Oh, yes please, thank you.’ And of course they had – you know, it came out from underneath the counter but they were not going to search for a Russian. So there was a – I was very aware of the tension. And also other things in Estonia were things like the scientific institute where she worked, they tended to – people who did very well tended to have accommodation that was very good and would be separate from the others. So their children would go to a school where the other children in the school were also from academic or professional families. So there was elitism that was going on, which was party oriented, and there was this – there was also this differential between being a Russian and an Estonian. And it’s something I – again, I’d not encountered before and so I was interested to see how this sort of played out. And now – I went back – the second time I went to Estonia was from Finland on a boat for a meeting, and that just had a lot of bureaucracy going on. And I went a third time, again coming over from Helsinki, but that was after Estonia had become independent and that was really nice to see and to see how it was, you know, sort of panning out that they were able to have a viable independent economy.

And where Galina stand in the hierarchy in terms of the pieces of equipment with respect to the party status?

She didn’t quite have I think – she wasn’t particularly political but there was the man who ran the radio carbon laboratory who was the director of that group and he was clearly political. He was a party man but he was a party man because that – he wanted to get on as a scientist, and the only way you could, you know, get the best
equipment and move forward to get the promotions was by being a party man and he was, he played the game. And afterwards, when I saw him, he said, yes, I was playing the game like everybody else. You either played it and got on or you – and swallowed your principles or you, you know, kept your principles but didn’t really get on because other people were going to put you down because you weren’t a party member.

*And what was it necessary for him to do in order to play the game in order to be seen to be –?*

I – I had the feeling it was more turning up to party meetings rather than actually doing anything in particular. It was just being seen to be an active member of the Communist Party rather than somebody who’s inactive or just doesn’t belong, and that was how I saw it. I’m sure that in all these countries then the people who get to the top are political and that was also what I found in China, that the top Chinese loess scientist Liu Tungsheng, was the nicest possible person. A very, very good scientist, but he got to the top because he was also supporting the party. But, you know, that’s what people did.

[1:09:20]

*And could you say a bit more about the minder? What else – I suppose how you interacted apart from this, ‘No, you’re going to Estonia.’ How you interacted with the minder, what they looked like, what they said.*

Oh, it was a young girl who came along and, you know, initially it was, well, you’ll need somebody to translate for you so you don’t get lost and to be helpful and – but you’ll – I mean she was a perfectly pleasant young lady, she was practising her English. Erm, yes, she was able to make sure I got on the correct train because I didn’t know any Russian and therefore I couldn’t read the Cyrillic alphabet let alone be able to ask for what I wanted. So, yes, there was some need for that, er, but – and she was perfectly pleasant but one was just totally aware that, you know, she was going to make sure that she was – she’d been told that she had to deliver me from A to B and that no deviation from that was allowed. And one – you know, one was also
aware of how controlled everything was but from the other side. When I came to actually taking samples out on that trip, I wanted to take some samples that Galina had worked on, and I wanted to take them back to the UK to work – you know, do parallel work. And she said, ‘Oh, I’ll put them in a couple of coffee tins for you and you can take them back, and there’s coffee tins in your luggage.’ So I duly picked up these tins and put them in my luggage and got back to Moscow. But remember I’d been asked to check in with the British Embassy when I was coming in, I was also asked to check out when I left to make sure everything had gone okay. And they also wanted to know – you know, the scientific attaché wanted to know what it was I’d been doing. So, yeah, the British were monitoring what I was up to as well. And so I was, er, talking with and saying about I’d been to this lab in Tartu and they were asking again, you know, what was the equipment like and who were the people there, and as well as the lab where I was going. And I said, oh, I’m, you know, planning further collaboration and I’ve got these samples. I’m taking them back in a couple of coffee tins so that they, you know, don’t get taken off me when I fly home. And there was a sort of moment of sort of silence from the scientific attaché when he said, ‘Ah, yes, it’s about lunch time isn’t it? I think we should probably go for a walk.’ So, okay, let’s go out for a walk. ‘Right, can you just give me the coffee cans please and I’ll get them delivered to your lab in England? We have to go on the assumption that the whole of our building is bugged. We know our cars are bugged, when they go in for servicing they get bugged. So the only thing we can do is go for a walk [laughs], so please hand the tins over and that way they’ll make sure that they get back to you.’ And I said, okay, and I got back on the plane no problem at all. Got back to the UK and a week later these two coffee cans got personally delivered to me in Cambridge. They’d come back in a diplomatic bag and that’s apparently how various scientific samples move around, at least at that time. But it was – that had been quite an eye opener as well.

*And what was said on the walk? What was the reason for –?*

Oh, the reason for the walk was to say please will you hand the samples over and bring – you know, and we’ll bring them back for you. And so it was purely to get me off the hook just in case I got taken apart in the airport because somebody was
listening to the conversation and decided that these samples might be state secrets or something.

*Do you know whether your luggage was looked at on the way out?*

Don’t know. I wouldn’t know, I’ve only had – I’ve only once had my samples and luggage trashed, and that was much more recently when I was coming back from Israel and I had to fly through Germany and I got my suitcase destroyed by German customs, they just totally trashed it.

*Why?*

They were looking for a – it was a security occurrence. They – I’d come in from Israel, I had got a late ticket because I actually – there’d been a mistake about which flight I was on. I was meant to be on a direct Israel UK flight and I had to get changed at the last minute because I’d not got the reservation correctly done, so – and I had to get back to go on another flight, so they checked me in through Germany and, er, they trashed it when I was waiting in Munich airport. And no explanation, they didn’t call out on the Tannoy system saying please can you come and open your bags. And just when I got to London it was completely ripped around the zip and they’d obviously gone in and checked – you know, you could see they’d gone through – you know, one sample had been opened up and fortunately the others hadn’t been opened. So the one they’d opened I could throw away and work with the others. But I’ve – that’s the only time I’ve ever had a problem. When you say I am carrying samples of sand or, you know, yes, I know it looks like a white powder but it actually is sand. And on the whole you just get, ah, yeah scientists, can’t be bothered with this one, let them through. But obviously taking things back, usually if you’re working with somebody in the say Geological Survey then they will arrange for the material to be shipped back, in which case there isn’t any problem. But if it’s a small number of samples in your hand – in your suitcase then, yeah, you tend not to want people to go through it. And usually there’s no problem, you just declare what you’re taking through.
Could you also say more about the conversation that took place between you and what you thought were intelligence officers? If you can remember any detail of what they asked you and what you said back and so on.

Well, really I just remember being surprised that, you know, somebody came to the Godwin lab and knocked on the door and, you know, were asking to see me. And they just wanted to know why I kept going to eastern European countries, why I kept having eastern European visitors who at that point had to register at the local police station. And I thought that they thought there was something else behind it. I mean I couldn’t believe that, you know, probably a visit a year in each direction was going to cause any kind of kerfuffle at all. But I think in those days perhaps only people, very few people went to eastern Europe. But I remember just – you know, they just asked me for about an hour what I was doing, and I just think they were trying to find the stories like which countries I was going to because they full well knew exactly which countries I’d been to and they obviously were monitoring every exit and entry into eastern European countries for everybody from the UK. Anyway, they were just trying to sort out who was doing what and why, erm, but I never saw them again, they just came this one occasion. None of my visitors had any problems. None of them said, oh, we’ve been stopped or they just – you know, you just had to go register, it’s the rule, and nothing ever came of it after that. But, yeah, I had at least two Chinese visitors besides this long term Chinese student and – but, you know, I also had visitors from all sorts of other countries and there were always also overseas visitors coming to visit Nick Shackleton as well, so I suspect he was on their list. But maybe he just didn’t go quite as often to eastern European countries.

[1:18:24]

And could you describe the visit to the – it sounds fascinating, the parents who had their own dating laboratory and the daughter who was taking a geography degree? The image I have is of a laboratory in a house, I don’t know whether this is right.

Well, yes, it is – it was a laboratory in the house. That was what was so very strange about it. The father was a … an academic in the University of Warsaw and I went to his office. Er, he was also in geography. And his wife was much younger, it was
their second marriage, but they were just dedicated scientists. They had just come – somehow they had started – they had managed to get some equipment, and very basic equipment, but they were able to set this up and were dating for their own sake, they were doing it because they wanted to. I must have come across one publication where their names were but, yeah, it – and again, one of the interesting things was I had at that point to talk with the – either the daughter in English or with the father in French because he’d actually been educated in Paris. This seemed quite common in pre-Communist times that the young people went overseas; they went to Paris for their education therefore French was the third language, obviously second to – you know, it was Polish then Russian second, and then French. But they were absolutely sort of charming. In fact on my recent visit to Poland Hannah’s mother was still alive and she remembers me well. I went round to her apartment, she’s now in her late eighties, and she remembered me and we – again, reminisced on old times. And Hannah was a very – the daughter was very enthusiastic and wanted to go on and establish a career in Poland in geography, but she had already been in England and – on a fruit picking holiday, and on that fruit picking holiday she met her husband who was a Catalan from just outside of Barcelona. And they got married and had four children, and so she never was able to sort of manage to make it into the academic system at that time. She’s now – now the kids have grown up and are in their – all in their twenties, she is now lecturing in one of the universities but in tourism, she’s gone away from the physical geography, which is what she was doing, so she’s had a career switch. But, you know, dynamic, hardworking, and a pleasure to be with. I found that luminescence attracts these kind of people who seem to be quite dedicated but slightly oddball. I mean she turned up in Cambridge the first time, she hitchhiked. ‘What do you mean, you hitchhiked?’ And she said, ‘I hitchhiked.’ I said, ‘Well, it might be a little bit unsafe’ and she said, ‘no, I – I was training for the Polish shot putting team, nobody was going to mess with me,’ she said, ‘right, okay’ [laughs]. So, yeah, quite interesting characters in their own right besides, you know, being really enthusiastic about what they do.

[1:22.51]

Did you yourself think about children at this time, about having children?
Erm, yes, I’d sort of – I suppose when I was getting – got married at that time I sort of vaguely thought about it but then it sort of went out of the window. And my husband had – from his first marriage had two grown up daughters, so he’d done the family bit and wasn’t particularly keen on sort of doing it again later in life. And I still don’t think I really thought I could be really responsible for other people, and so it sort of rather passed me by.

What do you mean, you didn’t think you could be responsible?

Well, I sort of – a twenty year responsibility for small people, I just felt, erm, I don’t quite think I can do this. I didn’t think I was grown up enough. I don’t think I ever thought I grew up, which is probably a problem [laughs]. But also because Jack was older and, you know, it was a slightly unusual situation as to whether to do it. But, no, I guess I – it’s difficult to work out how to handle bringing up a family and having a job, and by then I realised I was going to be the sort of breadwinner in the family, so didn’t think I could handle all of that, you know, just – I could just about manage to handle my academic career, sort of, but didn’t think I could do the family bit as well and did I – and I don’t think I wanted to do that instead of an academic career, so took a decision not to.

[1:25:46]

And did you sense that it would have been instead of?

Hmm …

Could you have children and continued?

Well, obviously people who did, maybe I just thought they were more competent than I was. But I was quite – I was, you know, quite happy with the decision and, you know, have been happy with the decision. So I suppose I could have done and, you know, there would have been opportunities for crèche and things like that but I think I also felt that if I took a year out then probably I wasn’t going to be able to get back in
again very easily and I might have lost the incentive, lost the drive to academically achieve.

*And could you describe the visits to China at this time which I suppose must be even more unusual than visits to eastern Europe for scientists at this time? I don’t know.*

Yes, there was a meeting that had been set up by the major players in the loess field, people like Ed Derbyshire in the UK, George Kukla at Lamont in America, Roland Paepe in Belgium. These were all the sort of – Martin Pesci in Hungary. All the people who were working on loess had somehow managed to organise through Liu Tungsheng in China a meeting of probably about twenty people to go to China to look at the Loess Plateau, you know, the Mecca for all loess people. And I got invited along as being somebody who at that point was involved with loess, and it was just an amazing experience and I felt very privileged to have been invited along with this group of people. And again, I’d got myself some funding from the Royal Society for this and, yes, we all flew out to Beijing and then flew on to Xian. Xian being on the silk route and on – physically being at the edge of the Loess Plateau and where there was a dedicated loess laboratory where people were studying all aspects of loess. And, yes, I have some memories of that but also like when the plane was coming in, I was on the plane with Ed Derbyshire, he was sitting next to me and George Kukla and a few of the others were all coming in for the meeting. And I remember flying into this airfield thinking, gosh, this is a bit remote, coming down over the runway and looking down, thinking, oh, a field of cabbages. Then suddenly the plane roared upwards and I thought, what the hell happened here, and turned to Ed and said, ‘What was that about?’ And he said, ‘Hmm, maybe the pilot looked out the window and saw what I saw’ and I said, ‘What was that?’ And he said, ‘Well, there was a shadow of the plane down the runway and it clearly didn’t have any wheels.’ And sure enough we circled around and heard the undercarriage come down and then landed. I thought, hmm, there’d have been a lot of job opportunities around if that plane had gone down. The whole – virtually the whole of the loess community in the world would have been wiped out in one fell swoop, and lots of jobs. But fortunately we landed safely. But it was amazing we went – had a meeting, there were jeeps that took us up into – right up into the Loess Plateau. And I remember seeing these huge loess sections, far, far bigger than I’d ever seen in either eastern or western Europe,
and being impressed by the height, the depth, the erosion that was going on. They are
gullied by effluvial erosion processes, so water going across the surface, cutting deep,
deep valleys that your roads had to try and go across before they were eroded from
both sides you had like a little narrow bridge of loess to go over. It was interesting
engineering, seeing houses built in loess. And our trips were also quite amusing in the
field because we got picked up by a BBC team who were filming a TV programme
for transmission in China. It was a BBC programme which was called *Follow Me* and
it was to learn the English language. And so when this film crew realised that we
were going to be going around and we were all English speaking they said can we
come around and can you, you know, tell us about what’s going on? But what they
didn’t realise was that many of the people in China, even in remote rural China, knew
them from the television. And so we’d all arrive in town and they’d recognise this
one woman, whose name I’m afraid I’ve forgotten but she was the presenter, she was
the face who did the talking. And so they would recognise her and they’d all come
running up behind and go, ‘Follow me, follow me.’ I think the only words they’d
actually ever learnt were follow me, and perhaps hello. But it was really quite
amusing but it was an amazing experience because you could also see the effects of
erosion from farming practices, intensive agriculture on hillsides that shouldn’t have
been farmed. And going back there twenty, thirty years later, the – the whole
situation had changed because the government had been able to stop people farming if
the slope was greater than so many degrees, and they paid the farmers instead to plant
trees. Also there’d been a – there must have been some climate shift in that there is
now more rainfall in that area and also the Chinese government overfly areas where
there’s been rainfall and drop seeds, and have people go out and plant plants. And the
whole area was vegetated, it’s just changed enormously. The sections, these vertical
sections, exposed by the gullying, they’re all vegetated. You have to hack back the
grass and the shrubs to actually look at – you know, to be able to see the fossil soil,
the paleo soils, and that’s all happened in thirty years. I just couldn’t believe how
much had changed. The cities were less dusty because they’re not – the land isn’t
eroding as fast so there isn’t – you know, there isn’t the dust blowing around.
They’ve planted trees in the cities, along the streets, which trap the dust on the plants,
any dust that does come. So you could just see what you could do with a central
system. And also the little roads and riverbeds that we drove up thirty years ago,
nowadays have got four main highways going up them to – you know, with a big
infrastructure road network. And, you know, before it was – you know, take you a day driving on – in jeeps up riverbeds, now you can get there in a regular car in a very short space of time. And so enormous changes but also, you know, being able to appreciate the people living on the loess plateau what – you know, how they existed, notice the apple orchard area of China, so see these big apple orchards. Seeing people live in small houses carved into the loess itself but also in – going back, seeing what things had actually gone. The small old style hotel built round a courtyard that I remember distinctly with the kind of rooms that were the same shape as the rooms that were dug into the loess. That hotel had gone, I was looking for it and it had gone, it’s now – a sort of rather ramshackle 1980s poor building had gone up and replaced it, and felt a bit sad that that change had occurred.

[1:34:18]

And what did you do in the field on this first visit, which was in 1985 I think?

Yes, this was really looking and learning and getting – there was a small amount of sample collection for Zhou Liping to work on but he was able to go back himself and to collect the material he wanted to but for his projects. So it was really looking at – for me it was to see what the loess was like and to have the discussions of scientists coming in from their own different countries. You know, they hadn’t been there before either. So it was just seeing the massive scale of the loess deposits, looking at the time record which was going back to about two and a half million years, and you never get that thickness of deposit. The thickest deposits I’ve seen before were in Hungary where they went back to just about a million years with the magnetic reversal at the bottom that gave you the timescale. But these were older and thicker because they’d been there for longer, and so it was more just sort of seeing more general context. It was – but it was a look-see type of trip rather than a hands on actually doing anything, but just having discussions what – how people, different people, saw it in the light of their own particular experience.

[1:35:57]
And were there, given that you had loess experts from various countries, were there national differences in a) the approach to studying loess and perhaps b) the approach to using the particular technique that you were a specialist in, that of luminescence?

Erm, I think that at that time that there were not really many other people setting up luminescence in the different countries. It still hadn’t really taken off as a dating tool, so people were saying, oh, no, but I’m looking at the soils here. I mean there are differences in interpretation. I remember particularly going to Belgium and there were three different scientists in – Quaternary scientists in Belgium who really didn’t speak to each other at all, Paul Haesaerts, Roland Paepe and, oh, now I’ve gone and forgotten his name, he worked in Leuven. And they just sort of carved up Belgium between them. I mean I remember walking around at the time thinking, hmm, it’s a bit like sort of the beginning of, er, Caesar’s Gallic wars, you know … divided into three parts, you know, in tres partes divisa est and you thought, yeah, absolutely, they’ve carved up Belgium. And Belgium doesn’t really – Belgium itself is a carve up and it’s how interesting how stupid national boundaries were, let alone, you know, one guy based in Brussels and one guy based in Leuven and the other one in the – based in the museum in Brussels. And these – this, you know – seeing these people just didn’t – they didn’t interact, they didn’t get on. I thought, what a waste of effort, you know, if they actually talked to each other in their own country instead of just saying, oh, well, you can go off and talk to Roland about his site. You’re going, ‘What? Why can’t we just go together?’ And I think I was a bit surprised at the amount of competition which I guess is why I actually like the luminescence community because there isn’t – there is very little of that. It really is a much more open society but there everybody was, you know, protecting their own territory. But, yeah.

[1:38:49]

So there weren’t sort of identifiable national differences in the way that different nationalities went about studying loess or studying environmental history?

I don’t think so. I think they all have their people who looked at the magnetic susceptibility of the loess. They each had their own people who looked at pollen or at
the snails, things like that, they – on the whole they would have read the literature and would have gone and done the same sorts of things. How different it was if somebody went to a different lab, there might have been differences in technique there, but I could only see that from my own point of view of going to other laboratories, there just weren’t enough of those around to see how different things were done, so – and then the interpretations. I think people tended to – you know, there were discussions like if you have these three fossil soils, you know, do they represent three interglacial soils, so is that therefore covering a period of 300,000 years? Or are these three soils, oh, maybe they’re from the last interglacial which was not just perfectly warm from the marine isotope stage five but we were going into really warm in 5E and then warm again in 5C and warm in 5A, but to different extents. So was this sort of three soils are they really a soil complex but formed within about 40,000 years or were they three different soils covering a period of 300,000 years? And that controversy was there, people would argue it backwards and forwards. The same arguments would be going on about whether you’re looking at the fossil soils, for example, in Austria. Erm, it was slightly clearer cut in China because the – you were looking at things in the context of two million years’ worth of the history. So you could actually sort of see all these interglacial soils and then realise that this soil complex must be changing climate in that 40,000 year period, around 100,000 years ago. And so in fact one was learning about that, whereas back in Europe you didn’t because the perceptions are shorter, there’s less sediment being deposited, there’s been more perhaps erosion, it’s not continuous. So it’s difficult to interpret, it was a bit more easy to interpret in China. And that was what – that’s why people were then going back and saying, well, maybe I’d better look at my own country in a different light. But that was certainly some of the argument that was going on, and why being able to provide a chronology would actually help that. And that’s still going on, for example, in Romania. Their loess deposits, they’ve been looking at it from somebody who was doing work on it in the ‘60s and she said, ‘Ah, this is referring to a relatively short period of time.’ Well, now luminescence dating’s come along and shown that it’s different. So unless you’ve got the dating you can’t separate that out. But that was where the frustration was coming in with the dating, is that we realised that we were running – ourselves were running into a limit as to the applicability of our technique. And it was occurring round about, you know, going into 100,000 years, so there was this great frustration. We weren’t able to go back beyond 100,000 years and we’re only now
extricating ourselves from that scientifically, so that’s where I am right now. I’m trying to do that different ways, so, yeah. You know, one – yeah, two steps forward and one step back [laughs].

[1:43:28]

*And what did you notice? What was your experience of China more broadly on this trip?*

Hmm … I – yeah, there were lots of people and that was – even then that was quite obvious. People were very friendly, they were very curious. We went into areas where they’d clearly never seen a Caucasian before. They were very polite, so in – and that was good. But one was aware that there were areas that you were not allowed to go. There were military zones that clearly you didn’t have access to or you had to get special permission for you to drive through. No particular reason as far as you could see when you drove through it but, you know, we had to go in as a group and that permissions had to be got in advance for that. Er … I came into contact with herbal medicine. I had a stinking cold at one point when I was in Beijing, either on the way in or the way out, probably on the way out, and they took me to the doctor in the hotel and she sort of prescribed this for this cold and it was the most foul tasting stuff. Er, I’m sure the cold would have gone in any case but I just remember thinking, God, I don’t think I want to be ill here, not really ill. This if for a cold, I can just about manage to take this. But, you know, the system seemed to work, so yeah.

*And what did you learn of the sort of organisation of Chinese science? You mentioned the sort of status of the key Chinese academic that you were visiting but what –?*

I think it was hier – I think I was aware of hierarchy, and they do – you know, there was a lot of respect for the senior scientists. And I think that you would need to be very – you were probably very foolish if you were going to challenge some science that had been built up over the years by the guy who’s now a member of the – he’s now an academician, for example, that’s their – the highest accolade that you can get in China is to be a – made an academician for the Chinese Academy of Sciences. And
you – so you – the younger scientists tended to be very respectful and making sure they didn’t challenge anything, or not very openly or very carefully. But, yeah, the system seemed to work. Again, I think like in the Soviet Union there was a tendency for those who were with political awareness to, you know, be a member of the party, to be seen to be a member of the party, and therefore a trusted member of the party and that those would be the people who’d be allowed out. I – thinking back I thought, you know, so how do I manage to get this young Chinese student, Zhou Liping – I mean he didn’t seem to be political in any kind of way. And, you know, this was all just shortly after – it when the Red Guard were running around, creating mayhem and so I – yeah, during the time he was a student I must have said something like, well, you know, what do your parents do. ‘Cause, you know, you want to know what makes the person tick, you know, what is their background. And he said, ‘Oh, my father works for the Bank of China.’ Oh, okay, bank manager, yeah, middle class. Yeah, you know, probably he’s – you know, he’s probably – a trusted political position that his father’s in so he’s going to be okay. And it wasn’t until many years later when I was in Aberystwyth and I got my next Chinese student and I said to him, oh, you know, we were chatting about his background and I said, oh yes, Zhou Liping told me that his father was a – worked for the Bank of China. And he looked at me and he smiled and said, ‘Hmm, yes, worked for the Bank of China. Yes, well, you know in your country on your bank notes you have this signature by the guy who’s the governor of the Bank of England? Well, Liping’s father does the same thing for the Bank of China.’ And I thought, ah, okay, that accounts for why his parents were travelling. His father had been based, it turned out, in the headquarters of the Bank of China in America and, you know – but then he’s also back home signing the bank notes. So, yes, that was why this guy could come out with no problem at all, he had a very clean political background. I found it interesting but, you know, typically modest and he’d – he never told me, he never did tell me, but it was only this other guy who let the cat out of the bag later on.

And what evidence was there of sort of national security when you were over there or, you know, the evidence of the state?

Erm, I suppose only because one was aware that certain areas you had to get permission to have gone into. No evidence of military activity apart from the fact
there would be, you know, a fair number of people walking around in uniform but they wore – in those days they wore very drab clothes, very little Mao suits anyway, so seeing somebody in an army uniform or a police uniform, it was just part of the limited clothing. When they were off duty they still wore it because that’s probably, you know, the only clothing they had and it did give them certain status. So rather more military uniforms around but – and you see military guards obviously outside of Tiananmen Square, for example, or outside of the imperial city where the gates were. You’d go in and there’d be definite guards. You were aware, you know, if you did something stupid like going – jump around in a fountain or, had there been one, you’d have probably been carted off somewhere, so, you know, it wouldn’t have been a particularly good thing to do. So you were aware of it quietly, I don’t remember it being overt at all. I didn’t feel oppressed as a visitor or really being prevented from doing something but realised that if it was something slightly off track then you’d probably have to ask permission, and really it probably wasn’t worth it in the end anyway.

And what was there in the way of sort of international socialising on this visit between this group of loess scientists?

Oh, the – the people from the west all more or less knew each other pretty well beforehand, so amongst the group it was very sort of – very easy. And there were – besides, you know, Brits there – and the Hungarians, there were Germans, there was an Israeli who I was amazed had managed to find himself a visa and permission to get into China, which might have been a bit difficult. But, you know, everybody got on because they had a common interest and the Chinese did as well but they were limited by – in those days by the language. There were – there was – certainly compared with having gone there three years ago, now the young people speak English and will – they will cluster round you to get you to discuss something in English. Whereas I think in the past they would have done but they didn’t have the English to do it, and I think that’s been the big thing that has happened is English is – you know, it’s not just the BBC doing it for the general public but it’s much more – you know, there is English taught in school, so they can now all communicate and want to do so. But in the past it – on that first visit we were interacting. I mean I remember, for example, on this very steep loess section and I was going out on a little path that had been cut
and the academician, Liu Tungsheng, he was ahead of me and he clambered up somewhere and then started to slide down. And I remember having this sort of moment of sort of crisis, you know, sort of the etiquette for the situation was, right, if he slides down he’s going to fall, he’s going to fall several hundred feet and he’ll hurt himself. However, he is sliding bottom first towards me. Do I put up my hands and sort of grab his bottom and stop him falling, which I can do, but what if somebody sees me handling his bottom? This isn’t going to look very good. All this remember taking place in about, you know, the one second there was on making the decision. And I sort of caught him and lowered him gently to the ground, ‘cause he was a small man. And he just turned round with a beautiful smile and said, ‘Thank you’ [laughs]. So, you know, there was no stiffness there at all. I mean he was in the field and, you know, it was his country. He was in charge and he could be absolutely charming, so … his successor has been much more formal and much more overtly ambitious and more reticent with foreigners, but this guy was totally at home with all these western scientists because he could, you know, hold his own. He’d got higher up in his country than almost any of them had got in their country, so he knew he was top dog and that was absolutely fine.

[End of Track 7]
Could you say something about other international collaboration experience?

Yes, I think the number of people who came to the lab to see Nick Shackleton gave me all sorts of interesting experiences. But probably the one that sticks most in my mind was a visit from John Vogel from South Africa. Nick had been doing a little bit of work with him because Nick was involved with isotopes, not just in the marine environment but also in shells from archaeological sites on the coast of South Africa and had come into contact with John, who also back in South Africa, ran an oxygen isotope laboratory and – but also had a radio carbon laboratory and a uranium series dating laboratory and was also just starting to think about a TL laboratory had just got a little bit of equipment and was playing with it. And he was a one man dating laboratory for the whole of South Africa. He had this lab set up in the CSIR, the – in Pretoria, which is the big research – government research, laboratory, and here was this one guy running all these labs on his own with research technicians who did the day to day running. And I learnt a lot from him, both about South African archaeology, dating, how dating techniques interact, and his enthusiasm for archaeology and his knowledge of South African archaeology. And he came to play an important role later on when I managed to get a student to work on the material from South Africa. But in the first instance he was coming to visit, he’d heard about me from a previous pollen visitor who’d apparently told him he had to go to Cambridge, Nick’s lab, not just to talk about isotopes but to talk to this woman because if you want to get a luminescence lab up you ought to see if you can try and recruit her, which is what he was primarily coming to do. But he is a physicist but he was always interested in the end point, and the end point was providing the chronology for – primarily for archaeologists. So he’d be running the radio carbon dating for archaeology and he trained in a lab in the Netherlands which was where the radio carbon had been – the main development laboratory for radio carbon. So he’d trained in Europe and then gone back. But he was somebody who was sitting in the middle of a land while everybody else was doing commercial physics research, and here he was doing dating in a kind of esoteric kind of way but a very careful way. He was a very careful scientist. And I went on, erm, colla – oh, discussing things with him, and in particular he was really keen to see if we could use thermoluminescence
dating for dating middle Stone Age archaeology, pre-radio carbon dating. He just wanted to nail down the site, he wanted to know when man was there. And in fact he was the first person to talk about out of Africa and, you know, a theme of people moving out of Africa about 70,000 years ago. And he had coined that phrase before it actually became in general currency because he was convinced it was what happened, but he couldn’t prove it because he didn’t have the chronology that went – or chronological tools to take him back that far. His work on the uranium series went back that far but it had to be applied to stalagmites and – or calcium carbonate materials. There weren’t a lot at the sites where the evidence of early man was. He couldn’t go back with radio carbon, it was back beyond 40,000 years, and that was why he was interested in getting me to go and work with him on luminescence dating. So what he did was he organised a trip around the whole of South Africa. There were half a dozen of us in the minibus and there was a radio carbon person up from America, there was the ESR person that I was working with in Cambridge, who I’d just got over to the Cambridge lab from Canada and his oxygen isotope person. And we all piled in to this minivan and we spent six weeks driving – I think it was six weeks, driving round every middle Stone Age site that was open. The archaeologists involved were there on site, er, we had great discussions and I could really see why it would be very important for TL dating, or luminescence dating, to be applied there. And I decided together with Nick, who supported the idea, to write a grant application that would enable me to spend three years working on the material. And we collected material on that trip. Erm …

*What sorts of material?*

These were all sediments rather than heated materials, they were sands in which the archaeological material was found, the tombs were found. Most of them were cave sites because that’s where people go to live, to shelter from the elements, shelter from the animals. A few of them were open sites but most of them were sheltered cave sites, and so they act as sediment traps. They don’t – the sediments don’t get eroded away, and so that’s where we went. And they were just amazing sites, it was just amazing to sit there outside them and just sit where man must have sat, you know, pre-50,000 years ago but how far pre-50,000? And so I wrote together with John and with Nick a proposal that Nick then submitted. We thought it’s got to fly, you know,
if people were going to become aware of, you know, where was modern man coming from. And anatomically modern man like us, where was he coming from? Presumably coming from somewhere like Southern Africa, and these sites could provide the answer. And it was a bit devastating when the science based archaeology committee of the Science Research Council emailed back and said, or wrote back probably in those days, and said, ‘Oh, sorry no, we are not going to fund that. The South Africans can fund their own research.’ It was seen as a South African project for South Africa, and it was in the days of apartheid, so any collaborative research was frowned on and I think politically it was squashed. And that left me in a bit of a problem. I was upset and annoyed and embarrassed because we’d had this big field trip and we’d gone round and collected material with the, you know, potential promise that we’re going to provide chronology, and then suddenly there is no money to fund me. And I was coming to – well, I was at the end of the second three year period that I’d got money for, that Nick had applied money for, and suddenly no future for me, no future for the project. So it was a very depressing time. I realised I had to move on, and so that was all a bit of a worry at that time. But fortunately later on we’ve been able to go back and interact and a great project’s come out of it.

[End of Track 8]
Track 9

*Could you tell me how you felt at the time at Cambridge when you realised that the second three year period of funding was coming to an end?*

Yes, well, I was very disappointed ‘cause obviously for several reasons, the most obvious one was that Cambridge was a great place to work. I had a lab, it was working, I had great opportunities, I didn’t have any teaching or administrative duties. So, you know, I realised I was going to be having to move into the real world, and so there was a bit of reticence there. But I think what probably I found most irritating was the fact that in 1985 Dave Huntley had published a paper developing a new technique. This was the optical stimulation technique instead of thermal stimulation, so we were measuring the optical stimulation luminescence signals from our quartz and feldspar grains. And this approach was particularly useful for sediments which had never been heated in the past. And so the signal we were looking at was being zeroed by exposure to light, and now if we could measure it by stimulating with light we have a very efficient system that would give rise to really good zero ages to zero age samples. And here I was with only the second lab – well, the second lab in the UK and I was having to leave, whereas what I really wanted to do was to take this technique and run with it. And I think I felt very disappointed and, you know, didn’t know quite what I was going to do next.

*Apart from the application concerning the South African work, what efforts did you make to stay there?*

Well, I was trying to get money from the European community because that was a good source of funding at the time to develop collaboration. And in fact it didn’t need much development because I already was collaborating with people in Denmark. I had people coming from the Netherlands to spend a year of their PhD time working on projects on sand dunes. And so now I was into sand, and so I would have liked to have worked more on that, looking at desert sands rather than the kind of fluvial sands or the sands round the edge of ice sheets that these guys were interested in. I wanted to do hot climate kind of research and, you know, I knew there were dune fields everywhere that nobody knew the age of when they’d been stabilised and that was
what I was interested to do. So the European Community seemed a good source of money, and it bought me about a year or so. But then I ended up in a position that it couldn’t pay me because I was a Brit working in Britain but I could pay somebody else. So I ended up getting a German guy, Rainer Grün, to come and work in the lab and effectively to take over from me because I could keep on paying him long after I could pay myself. And he stayed in the job for a number of years before going eventually off, well, for a coup – for about a year before going off to Australia. So, yes, that was another source of funding but otherwise I couldn’t see what I could do. I was very worried that as a physicist I wasn’t going to be able to get a job in the botany department and I had put in an application for the Royal Society funded lectureships, new blood appointments at that time, a new initiative. But there was a geographer in Cambridge who was working on sediments, Phil Gibbard, and he put in at the same time and he got it and I didn’t. So again, I couldn’t see where I was going at that point.

[04:25]

I tried for – again, I tried for a job, they wanted a scientific archaeologist in the museum of – National Museum of Antiquities of Scotland, in Edinburgh, but I went along for interview for that but the problem with that was they – though they had a small luminescence lab they wanted to build on, to work on their own archaeological materials, they also clearly didn’t want somebody who had an independent research agenda of their own. They wanted somebody who would say, yes, and so I didn’t get the job. And the person who did sort of vanished and was never – you know, was never seen at an academic meeting again, so I was probably well out of that one, I’d have probably fallen out with somebody if I’d gone into that kind of regular job. So at that point I decided that since my husband had retired a couple of years earlier that we could actually go anywhere and might as well jump ship and get out of the academic rat race, and go and join a friend up in Scotland who’d got his own private lab. In fact he’d been a previous incumbent of the job I’d gone after and he wanted to do private research, and we actually went and found him on the Isle of Arran. And then even bought a house on Arran prior to move – thinking prior to moving there but we didn’t get that far. And I really wanted to, you know, continue doing research. I
just also had the excitement in – at that time of running the luminescence meeting and
so I really again was wanting to stay in the field, so –

[06:22]

*Can you tell me more about the friend who set up a private laboratory on the Isle of
Arran?*

[laughs] Yes, he was called Hugh McKerrell. He was definitely an oddball character, one of the great eccentrics of the world. He’d actually been asked to leave the position in – in the museum and he’d had a fisticuffs with one of the security guards then, and then he’d done something else he probably shouldn’t have done and was asked to leave. And he and his wife moved to Arran and they set up a field study centre where they had people from schools come and learn about the geology and the natural history on the island of Arran. And he had a small weather station and, you know, he was very much into equipment but he want – he still – again, he’d got this addictive bug of luminescence dating and he managed to find money to set up equipment that he just wanted to go to play, and he was quite happy to share his equipment to play with me. And I think that would have been quite fun. He had contact with Vagn Mejdahl in Denmark, and so they worked together for a short while and so, you know, there were – you know, we’d known each other for a few years before this was even thought about.

*And where had he been trained in luminescence dating of –?*

I think he must have been self trained, erm, or he had gone to Denmark for a short
time before – I first came across him when he was in the National Museum of
Antiquities of Scotland, so he already had a lab there. And he’d also had a visiting
student from Greece at the time as well, so he’d somehow self trained but I can’t
remember the history of where he got his experience from.

*And what was your husband saying about decisions about the future at this time?
What were his views and –?*
He was quite happy to go wherever I went and because he was older than I was and had retired he didn’t – there wasn’t a competition for careers there. So he was – and he’d moved a lot in his career, he moved through three universities in Canada. He’d – so he’d gone on from the UK to Canada, where he’d gone to Toronto, then he’d gone to Vancouver and then he’d gone to Edmonton. So he was used to a somewhat mobile lifestyle, so then moved to – when he moved to Cambridge that was probably the longest time he’d ever been anywhere, so he was ready for a move and was really not that fussed where it was, so that was very good.

[09:44]

*And so then what do you –? What was the next stage?*

Well, I guess at that point I was just realising it was all coming to an end. And I – every year in the Godwin lab there was a party at Christmas time, and it was a fancy dress party in that year and we all dressed up as something related to the work we did. And I went dressed as a loess section, which meant that what I was doing was wearing a beige sheet with brown soil lines painted on it with little white Styrofoam worms attached – glued onto it for the little loess carbonate concretions that occur in loess when you’ve got soil formation. And so I turned up at the party like this and one of those sort of casual moments when we were joking around, Nick sat up and said, ‘Oh, bet you won’t wear that to the meeting in London.’ Because in the January immediately after the new year there was always a Quaternary Research Association meeting that’s held in London so – in other – not just in London but in other – this one was in London at the Geol Soc and I, being someone who usually takes up a bet and if somebody says bet you won’t, that is almost guaranteed to mean that I will give it my best – best attention. So I said, ‘Yes, bet you I will’ ‘cause I had nothing to lose. You know, I didn’t see myself as getting a job, I wanted to go to the meeting to find out what the latest things that were going on, and thought, you know, it’s a two day meeting, I might just as well turn up in fancy dress, so I did. And much to my amazement, somebody came up to me at that meeting and said, ‘Oh, when does your job finish?’ And I said, ‘Well, actually it’s finished and I don’t have one.’ He said, ‘Oh, are you interested in the lectureship?’ And I thought, yes but, you know, you must be joking. What, you know – and he said, ‘Well, there’s a lectureship in – which
will involve you teaching some form of climatology, climate change, erm, the job’s at the Royal Holloway College in London, would you be interested in applying?’ And I thought, well, sure because, you know, I could apply. He said, ‘Well, I want you to set up a lab of course’ because that’s what he really wanted was a luminescence dating laboratory as he’d seen that, you know, luminescence was starting off. He’d read the paper in *Nature*, he knew that’s where it was going to go and just wanted to get somebody who could do it. So that was why I got approached to apply for this position, which was a regular lectureship in the geography department. So David Bowen was the guy who came up to me and approached me, and he didn’t seem at all fazed by the fact I was walking around dressed in a sheet with little white blobs on it [laughs].

[13:07]

*What was the other reaction, the reaction of others to it?*

Oh, there were some who definitely thought, what the hell is she doing? And you could just tell, some were sort of smiling, some were looking very sort of po faced because they thought you shouldn’t turn up at a scientific meeting, you know, dressed up as something. But, you know, how boring if you can’t [laughs].

*And can you describe the Christmas party at the laboratory, and in particular what you can remember of other people’s outfits?*

Oh, erm, unfortunately I can’t remember what other people were wearing but the parties were – you know, they were sort of modest affairs where it was basically people brought in food and some wine, and we just took a chance to completely relax and socialise with – you know, talking about work was banned. And it was an occasion, you know, when everybody talked together. I mean it was a very egalitarian place, I mean even coffee mornings, you know, the lady who came and cleaned sat down together with Nick Shackleton and anybody else who was around, we all sat round the same table and had coffee and conversations could be about anything. And these – this annual party was part of the general egalitarian approach. It wasn’t a hierarchical structure at all, it was –
What led to that, do you think, being the culture of work?

I think because it was very small, part of working in a small group, but also partly where you’re not having direct competition between people. You know, Nick very clearly was the, you know, pre-eminent scientist there, and the rest of us were postdocs or graduate students. Roy Switsur was there as radio carbon and – but, you know, nobody was in comp – nobody was really in competition, we were all doing different things and we were at different levels in our career and we weren’t going to be applying for the same money. So I think partly that lack of competition in the workplace then leads to more – more equality in personal interactions.

[15:34]

And had the sort of economic environment of the ‘80s any effect on the funding for science as you perceived it? I realise you’ve got a particular case of difficulty with funding but was there a general sense of anxiety about funding at this time?

I think people were realising it was getting tighter but I – I think I was more aware that I wasn’t in a regular path towards a job, whereas some of the other people there who were more straightforward geologists or geographers or zoologists, they had a career path that they could see more clearly than I had. And so I think they were trying to get themselves into academic careers as soon as possible rather than like me, sort of hanging around being a post-doc for a long time. But I really enjoyed being a post-doc and felt I gained a lot by being a bit peripatetic, having first being in Oxford and then moved to Canada and then back to Cambridge. I felt that I gained a lot from all the people I interacted with and the different places I found myself living.

[16:50]

It surprises me then that you considered moving out of the academic world and going to this private laboratory on Arran, and you said dropping out of the academic –

Yeah, rat race.
Rat race.

Yes, I think – I don’t think – I mean you’ll probably laugh, and people do laugh, and people do when I say it, but I don’t actually think I’m ambitious. Erm … I wouldn’t say I wasn’t competitive but I think I would probably agree with people when they laugh about it because I probably am competitive, but I don’t think I have a driving ambition, I don’t have an ambition to become, you know, a head of department. I was just happy to get a job doing something I enjoyed doing or even if it wasn’t a job, to actually be able to do something I enjoyed doing and live somewhere where it was cheap to live and therefore not have a lot of outgoings and could probably survive – the two of us could survive on my husband’s pension. So, you know, we didn’t have vast outgoings and so had a modest lifestyle, so I think I, yeah, I was quite happy to do that. I mean, yeah, I still feel the same now that I presumably could have been running around heading up a department somewhere but it just doesn’t interest me and I’d rather do what I’m doing now and interacting on exciting projects when I want to, and not having all the hassle of administration or teaching. I just really wasn’t interested then in – particularly in teaching, just in interacting with people in research projects.

[18:54]

Let’s then – given what you’ve said then, can you talk then about starting at Royal Holloway? And perhaps we can start in particular with what was involved in the teaching commitment there.

Yes, well, I had to get interviewed to get the job at Royal Holloway. And I was, I guess, certainly apprehensive because I hadn’t done any undergraduate teaching at all. Here I was as a physicist trying to sell myself to a geography department. Whereas, you know, yes, David Bowen was really supportive and would probably have been lobbying the other people on the committee but I still had to sort of perform in the interview, and it meant that I had to then follow through when I said, yes, I could teach about climate change. And suddenly I was going, oh, okay, and I had no idea that in fact it – university teaching is fairly unstructured, that you can actually set up
the courses in an academic field pretty much in what direction you want to. And I
was very lucky to get some help with how to plan courses from a guy called Tony
Carter who was in the Godwin lab and who had been working on tree rings in his
retirement. And he’d retired from Cambridge College of Arts and Technology and
said, ‘Well, these are the lecture notes I used. You’ll need to update them but this is
the kind of structure and kind of information at this kind of level that you will need.’
And so I had a very steep learning curve going into that but I realised fairly soon that
you just had to keep one step ahead of the students and then you’d be okay, but it was
a very scary time that first year. And at that same time I was obviously being
expected to set up a laboratory. I had to buy some equipment but I didn’t have a lot of
– wasn’t given a lot of money, so I had to get some second hand American equipment
over from the States to set up the lab. But I managed to get a project going in Alaska
and I managed to take on an MSc student, Michele Clarke, to work on that material.
So managed to do that and still stay fairly sane. What helped was we were actually
living very close to Royal Holloway College, so we were within walking distance, and
so there wasn’t a lot of time travelling. But that also meant that there wasn’t much
social life there because the people in the department all lived all over London, so
they’d commute out to Royal Holloway then in the evening when we said, oh, can we
go for a beer, ‘cause that’s what we were used to in Cambridge, they’d say, oh, can’t
do that, I have to go on the M25 to get home, or I have to take a train journey the
other side of London and my wife’s expecting me home, or whatever it was. And so
we found it was pretty nil social life and compared with Cambridge it was a pretty
sort of lonely time. I think the only friend we managed to make was the local
carpenter in the local pub, and it was – it was really quite difficult we found. But that
soon changed because David Bowen then announced that he’d just been offered a
chair in Aberystwyth and if I wanted he could actually arrange there’d be a position
there, that he could get me transferred. It was the time when there was a lot of
rearranging of departments going on, and so he – this was like 1988 and he said, right,
you know, you can stay or you can go, you still have a job. And then there was no
question, Jack and I just looked at each other and said, oh, we’ll go to Aberystwyth.
He’d never been there in this life, I’d been once to give a lecture, but we were not
particularly happy socially living in the area of – you know, Windsor Castle, that sort
of area, expensive area that we really couldn’t afford to live in. We had bought a
house but still, erm, not a place that we particularly enjoyed living. I mean other
people liked us living there ‘cause they’d fly in from the States and come and land and de-jet lag at our place, and we had to entertain them. But that was sort of often time taken up and it was – that was a – it was a fairly difficult year but getting the chance to opt out after about six or eight months meant the total time we spent there was fifteen months. I’m really glad that we made the move.

*And so could you describe that transition, that move?*

The move to Aberystwyth?

*Mmm.*

Well, it was quite different place. Erm, our first problem was getting a house and then of course the housing market had gone, so we ended up with a house in Englefield Green, near the Royal Holloway College, that we couldn’t sell. We had to buy our house in Aberystwyth. Fortunately the prices were cheaper there but it was difficult trying to go and look for houses at the same time as, you know, complete one’s academic requirements in the university. So again, that was quite tricky. And we eventually turned up and it – it was actually very nice. Aberystwyth is a small town, at that time it had about 12,000 inhabitants, which was then boosted by the number of students by about another 8,000. So it was definitely as a small town, definitely a university town. And everywhere was within walking distance; we could walk from the house through the woods to the university, or you could walk down the hill to the seafront. We could see the sea out of both sides of our house, so it was a very nice place to live. We found the culture, the Welsh culture, very nice. We had – never in the twenty years we stayed there never encountered any hostility towards us being English incomers. People would switch in and out of languages for us. We both signed up for Welsh lessons, got through one Welsh lesson, decided we weren’t going to make it anywhere ‘cause neither of us were linguists, so we quit at that point. I realised you just don’t have the time to do it. And so, yes, we enjoyed being a part of the community. Its small shops, so you go along and you go to the butcher and you’re likely to bump into the butcher somewhere else. I mean we used to go and stay up the coast for my birthday, and the same – often at the same time we’d find out local butcher up there staying ‘cause it was like his anniversary and he and his wife would
go up there. So a very small town, you get to know one or two people in one or two of the pubs. And yet it’s got culture, it’s got the arts centre on – for the area on campus, so you get plays coming through on a regular basis, touring companies. There’s a music – you know, both classical and pop music, forever changing programme. Art exhibitions, there’s a cinema up there which does a wider – a different range from the regular cinema downtown. So it’s there, it’s self contained as a community, and so it’s very nice to live in.

[27:36]

And it is at the end of a line, a long line, railway line, from Shrewsbury. So any journey you make out, you actually have to think about and plan very much in advance. So you really think do I want to go to that meeting because you know it’ll take you a day to get there and a day to get back. You can’t just drop down to London for a meeting or go up to Edinburgh or Leeds or wherever it is. So it’s – it forces you to make decisions but coming back from meetings on the train, you just feel you’re just relaxing, you leave behind all the city and the stress, and that was what was nice. And the same with driving, you know, you’re sort of driving hard on the motorways and all the rest of England, and you come over the mountains into Wales and you’re stuck behind a Welsh sheep farmer with his sheepdog in the back of his four wheel drive converted van that he’s just swung out in front of you. And there’s nothing you can do, you just sit there and you go, ah I’m home, I’m back in Wales, that’s fine. And so it’s a different pace of life. I suppose in some ways in the university it’s probably a bit of a cop out because you can very easily become a big fish in a small pond but from a way of life point of view I think that’s better than being a small fish in a big pond with lots of sharks swimming around. And one might say that, you know, somewhere like Cambridge or the Royal Holloway was a bit like that, so I think I felt much more secure in Aberystwyth, in the university situation as well.

[29:24]

*Could you describe your – take us on a tour of your home?*
Oh, yes, we had a house that didn’t look much on the outside. It was brick built, timber frame inside, built in the 1970s, erm, it had a very nice open plan downstairs, big windows, sliding doors to go outside. Upstairs there were two bedrooms, and also two bedrooms turned into studies, and so spacious. It faced – the front of the house faced south, overlooking the town, so we could look down the coast, just about see the sea that way. And out the back it looked straight over a field across towards the golf course in the distance, so it was all green and open, and the camera obscura was on the opposite hill and we could just about see the sea next to that as well out that side. So lovely views, lovely house to live in, plenty of space. Relatively small garden but that was okay as nothing grew because of the salt on the winds came in and just scorched everything. So there wasn’t a shrub higher than four foot anywhere, even though they were there for – you know, had been there for like thirty years by the time I’d left. Nothing – nothing was ever higher than me, it just couldn’t get there. So it wasn’t a gardener’s paradise but fortunately we were not particularly keen on gardening. It was nice having, you know, a lawn, somewhere to put the washing line, nice views, but we just enjoyed the views so much that we didn’t feel the need to garden in the sense of be neat and tidy and to get things to grow. I think if one was a gardener one wouldn’t live in Aberystwyth, it’d be a big disappointment.

[31:33]

And what did you do together?

What did we do? We used to always go walking along the seafront at least once in a weekend. We used to go walking up in the hills as well. In those days you couldn’t have a drink in that part of Wales on a Sunday, so if we were walking on a Sunday, which we often were, and we wanted to walk to a pub for a beer and then walk back where we left the car, we had the problem that we had to drive for about half an hour out of Aberystwyth and get across the county boundary so that we could actually find a pub that was open and we could have a beer and lunch there. But walking was our major recreation. Erm, we would probably go away somewhere not too far away, perhaps somewhere like Ludlow. Perhaps we’d come back to Cambridge and visit friends here. So we’d go away and spend, you know, a couple of nights away at a weekend. Didn’t really have major holidays. We tended to attach holidays to
conferences I was going on or to places where I was doing fieldwork, and so Jack would come along and then we’d spend a few extra days and take that as holiday. Didn’t really do – organise big holidays anywhere, we didn’t travel in the continent on holiday, but we used to sort of visit friends and take that as holiday, so a very modest –

[33:30]

And to what extent and in what way did Jack assist you in your work?

Oh, well, he – being retired he didn’t actually have to earn anything but because of his interests in geophysics and the – particularly the interests of the earth’s magnetic field, mathematical modelling of it, he was always being asked to give lectures or short courses. And so he was always given a desk and an office in whichever department I was in. So that happened at Royal Holloway and happened again at Aberystwyth. And he was very sociable and would like to discuss science with whoever, particularly with graduate students, but he – you know, he would occasionally teach an undergraduate course even when he was retired just because he enjoyed putting over the information to students. So he was, erm, around. And he would – if I needed to have something I’d written that I wasn’t particularly happy about the English, I’d give it to him to read and he would read it through and say, ‘Well, that isn’t very clear, I don’t understand what you mean there.’ And so he would do that but basically he was just a sort of calming, reassuring influence on me, pointing out if I got upset about something there was no reason for it and, you know, that’s what life was like and sometimes things went wrong and that was okay. So, yeah, just more of a totally sympathetic person to have there when, you know – at the end of the day.

[35:19]

Thank you. And could you describe the setting up of the laboratory here, taking in, you know, the sort of spatial arrangement of the things, the particular pieces of equipment installed, and so on?
Yes, I arrived obviously in a place where there wasn’t a luminescence lab and where they didn’t – people there didn’t really know what was required, so I had to sort of fight for the space that I wanted, a wet preparation area and then an instrument area. So the first thing was getting space and of course nobody likes giving you space in university departments. And the – so that was – the first thing was the shock, having to fight for my own space. And equipment, because there was a rearrangement going on, there was money so I was actually given money by the department to buy the latest piece of equipment. So I was able to buy the Danish reader with a light source attached to it that I could go optical stimulation with. So I was – you know, felt very pleased I could do that. And I was also given money for a studentship and again I was then starting to apply for research grants again to get more research students, and again trying to get a technician or research assistant to come and work with me on various projects. So the equipment was – I was able to set it up and get up and running fairly quickly. It’s tough when what you walk into is a room in which everybody has been dumping their rubbish for the last sort of six months or so ‘cause it was an empty space. And then you have to sort of sling this lot out somewhere and then organise to get, you know, power points and gas lines and all of these things, and you don’t know who to – you have to keep asking people how do we do this, how do I get this done, how do I get that done. And, you know, I’d already done it once on a small scale at Royal Holloway and then left it, and I’d done it before in Cambridge, so this was the third time. So it did get easier but it’s still frustrating ‘cause you lose time when you’re trying to get all the kit together. You can’t actually do any dating work until – or any experimental research until it’s all there and up and running. But, you know, I got there, so that was good. And the lab I had was on the ground floor of what was the geology part of the institute as – and even though I was actually employed in geography, and they’d given me space in geology because the two departments functioned together but not I would say as one. I think it’s how I’d express it. But I was considered something of an oddity because I was a physicist anyway, so I was more or less left to get on with it, which was quite good. And it was on a ground floor corridor and it had the geochemistry labs round it, which was its sort of perfect natural home, and I felt that was exactly the – you know, the right place to set up a lab, so that was good.
Could you describe the wet preparation room for people who wouldn’t have seen one?

Well, it was just like the one in Cambridge really. It was again in dim red light. It would have lots of benches with glassware and water to – a fume cupboard so that one could treat the samples with acid. We were also doing some work with getting some – starting to get quartz and feldspar, so we moved on, we needed to get a better fume cupboard than I was used to before. But basically it was just the same. Every little lab looks identical. And then the instrument room had – well, pride of place was this Risø reader that I’d got. I think by the time I quit later on I think I’d managed to have bought five of these things. They now retail for the best part of 100,000 pounds, so I’d basically got several houses’ worth of equipment by the time I’d finished, so it’s not a cheap thing to set up. But they do run forever, so that’s the good news, they don’t break down and they just keep on going so you don’t have to buy new ones. You only buy new ones when you want to be able to get more graduate students in and you can effectively run two readers between three people quite happily. And so if you want to expand the number of people then you’d get more readers and it becomes a little bit of a strategic planning game but I became fairly successful in that, I think I’d learnt how to go about this and steered clear of politically incorrect sort of projects. Like working in South Africa, I just had to keep off that for quite a while until such time as that – there was a time in the regime. But I still did some work, I was calling on various colleagues I’d met through my career to come up with joint projects, so the aim being to have each person in the lab doing something to do with luminescence, to develop something in luminescence, but also to have a clear application that was clearly theirs, and often being in a different country. So there were – that’s how I sort of had the background planning. I think it may have been subconscious to say – now that I look back at it and I think, yes, you were actually planning all the things, doing that, but you didn’t realise what you were doing, so it was pretty subconscious.

[42:04]

And standing in front of the Risø reader, could you sort of imagine it in your mind? Can you say what we would see if we were standing there but also what made this a
good example of a luminescence machine? What was, you know, what was there about it that you could be enthusiastic about as a machine?

Right. Well, describing it first of all. It looks like a rather complicated black box. Well, firstly it was built in a way that the outside was painted in black, and so it was literally a black box. Erm, it was about – left a footprint on the bench of about, I guess probably … half a metre by half a metre. It was very heavy because it was quite solidly built, and that was nice. It had – on the top was the light detection device. That looked like a tall chimney coming out of it with wires, and this is where the photomultiplier tube was for detecting the photons that were coming from the sample which was again on these little aluminium discs. And also around that photomultiplier tube on a lid which fitted with the top of the box, if you like, there was a radiation source, a beta source, and one of the reasons why this thing is so heavy is because you have to put a lead shielding around that. So there was a lead shield built round that. And then this lifted up like a clamshell open – the lid lifted up, opening like a clamshell off the top of the base, which is where the oven was. But above that little heating strip on which the discs go there was a carousel, a round flat circular plate, into which you could load up to forty-eight small discs. And under computer control these discs would be taken round one at a time and put on the hotplate or under the radiation source. And so it was all done automatically, and this is where you could then set a sequence on the computer to go round and to make measurements. You could change all sorts of parameters and also in there you – in that lid as well you had the light source coming in, so you could have infrared diodes which is what we were mainly using initially. So you could have the light source shining onto your grains at the same time as looking at a different wavelength of the luminescence coming from those grains that was detected by the photomultiplier. So it’s quite a big – it’s quite a large piece of equipment, had a lot of wires coming out of it. You could evacuate it so there was a pump sitting underneath, there were gas lines going into it, to fill it and empty it. There was a gas – another gas line going into activate a shutter in front of the beta source. So it’s a bit like a sort of Christmas tree, it’s got things hanging off it. And as time has gone past, more and more things have got added to it. The basic model is pretty similar but as new developments come along, new ways of making measurements, then you can modify it. They’ve made it so that you can take it, you know, just move that up, and add something extra in in a
ring above where the sample is. You can do other things to it. So it’s pretty flexible, even though it looks like a black box, you are telling it what to do, at what measurement sequences, the heat to this, do I want to look at the light I’m stimulating at another temperature or this temperature? And the software is such that it’s very flexible, so it can enable you to do this. So these – these readers from Risø are very flexible and they just tend to go on forever. They’re well machined and well made, they have a – they must have designed into them quite a lot of capacity for – overkill capacity so that you don’t stretch the system ever doing anything to it. It just keeps trundling on.

[47:21]

And is the computer part of it or attached to it?

It’s – it’s physically separate from it, so you can update your computer and it’s just at the end do of a length of wire. So it’s –

And are they ordinary – were they, sorry, ordinary PCs?

Yes, yes.

So you could run it off an ordinary PC?

Yeah, exactly.

Do – some people are interested in this sort of thing; would you remember the computer that was running it at this time?

Nope.

No, okay.

Nope, to me that was another box [laughs]. So, no, I’m afraid I – it’s not – as long as it worked I would – all I knew is when we were not using Apple, we were using PC,
but apart from that I suspect we – we were using just regular ones, there was nothing special about them.

*And do you remember how you would set up it to do a run on some samples, what you would have to type? In other words, how you interacted with the machine through the computer.*

There are a series of commands that you could select that even I, as somebody who was not into computing or programming or anything like that, I could actually manage to get – just to write a sequence because it had commands that were in sort of English so I could work out whether it was heat to, and give a temperature, or expose to light or irradiate for so many seconds or – and that – I could get it to do that. Though I must admit after a while I wasn’t – when I’d got graduate students and post-docs and I was busy teaching, I tended to be more organising and not going back in the lab. And so many of my colleagues now laugh because they say, ‘Ah, you couldn’t run a sequence any more’ and they’re absolutely right [laughs]. You know, I would get in the way, I’d much rather say to a student, well, have you thought of doing this, this, this and this, and, you know, what’s the best way of doing that? You tell me if you can do that, that and that. And then they’ll go off and come back having done that, and I’ll say, are you sure that was – you got that right? Because that wasn’t what I was expecting. They’ll say, no, I did this, and I’ll say, no, that’s not what you should be doing, I think you should be doing that instead. And so I knew what I was expecting to come out, so I’m afraid I left – tended to leave them to get on with it. And I realised I couldn’t be hands on any more, so I just backed off but kept very much interacting on the data front and experiment planning, and thought my time was probably much better spent doing that than going into the lab and making a mistake in the programming.

[50:19]

*And what did the actual output that by now look like? So you’ve run a program on a sample, or a number of samples, what does the output look like? Is it a list of numbers, is it chart, what is it?*
Well, in – the data collected is basically a list of numbers, so it’s a long string of numbers and then you’ve – there’s additional software for how you handle that. So you’re getting the list of numbers coming out on a – first of all they were on floppy discs and then they were on the small discs. And now you’re taking the data and putting it onto the CD to analyse. But there’s – you know, you have separate computers, one for each person to do the analysis individually. And I was very lucky in that quite a lot of the software for this was actually developed by my first PhD student in Aberystwyth who was clearly – Geoff Duller, he was clearly very good at programming and he didn’t think too much to the software that – rather elementary software that it sort of came with. And so he said, well, we’ll write this and now his software is what is actually supplied for data analysis, straightforward data analysis, with the Risø system. He’s worked with – he took on the connection that I had with them and – but his interaction’s been on some equipment development and also on the software. And in particular, the software related to making measurements of the OSL where you can make lots and lots of measurements on the same sample disc and run it along sequence and get more and more information out from that one disc. And so you can actually get an equivalent dose, that’s the irradiation dose those grains receive for a single disc, and that’s what he developed for his PhD and – but then that required him to write the software to handle all of this, so he then did the software and made it into not just something that he could use, but something that everybody who had a Risø reader could use. And then it became part of the sort of package that they sold with the equipment.

[53:15]

*What was the role of the technicians or assistants here?*

The – I took a little while to get money to employ a research assistant and – or later on a technician. Again, it’s all part of – the money has to come externally, it has to be research grants, or it has to be earned. I mean fortunately in Aberystwyth we were not being charged for room rental or anything like that, which was happening in some universities and there’s still no move to that in Aberystwyth. But if you have – you don’t have a technician you have to get money to employ a technician, and you may get through a research grant on a particular project. Or if you can provide a dating
service to geologists, whether it be in the UK or abroad, you can use that money to produce the dates, then you use that money clearly to pay the technician because that’s what the major outgoing is. The cost of the chemicals are – it’s small. You already have the equipment from some other research grant so there’s no capital outlay but it’s the manpower. So the technicians at this point were – right, well, I’ve got a technician which I did after a few years. I was able to get a technician who came in on the back of a project from the United States where they had the money. There was no lab doing any kind of promotional work in the States, and so they had this project working on sand dunes and I used that to employ a technician, Susan Packman, for a number of years. But it was always where’s the next money coming from? You know, you’ve got fifty samples, so you can say that’s a year. And it’s always then looking for the next year’s money, always planning it. And that again is how I spent a lot of my time was planning how to get money to employ the people in the lab so I could keep the lab running, ticking over efficiently, and doing science and getting new materials in that one could, you know, sort of move off sideways. You were date – providing dates but you were getting access to other materials that you might want to carry out some particular research, you know, how were they behaving, how were they different from the ones you had from Europe if they were from America? So it just gave greater experience. So, yeah, that’s – that’s how I was doing that. So I was trying to run – basically there’s three people in the lab at any one time and it would be a different mix of a technician or a research assistant or – and the research assistant may came out in [ph] a grant. And one of them who came in, she had been a dentist, fully qualified dentist, brought up some kids at home and whilst she was doing that she was doing the Open University course in physics and then was looking for an interesting job. And I said, well, you know, I think you could probably do this, you’ve got the manual dexterity to handle the material and you’ve got the interest in the environment and you’ve got the physics to carry everything out. So she was doing that and then at the same time she was able to move the project a little bit so she could actually get a PhD out of it herself. But all these things, you know, you have to sort of organise and facilitate, and I think that’s probably what I do, see the opportunities, manipulate them and take them. And then soon it was getting students, you know, students – just going every route I could to get students, whether it would be on any RC student application – you know, supplies or having an overseas student who might come in with funding, like another one from China. You know, each
student came in from a different situation, different source of funding. But, you know, it was – it ended up with an interactive and lively group of people.

[57:51]

And so, just trying to keep a few people going is – interacting with three people I find enough. I don’t think I could intellectually handle more than three people, their data, and how they’re interpreting it. But I think I was pretty hands on as a supervisor. I wanted to know what they were doing, which direction they were going and why, and what the data looked like. So I could see the data, I could say, well, don’t you think that might be something to do with that, why don’t you go and look at that? And try and point them always in the direction of something that was new and different, and save them from going up any blind alleys and say, well, you know, if you looked at that paper you’ll find that’s what’s happening, that – you know, we can’t solve that problem so I suggest you just move off in another direction and – but you can do that with three people but I wouldn’t have like to have done it ten.

*And were you able also to do your own research during the Aberystwyth years?*

Not really, it was really being done – I sometimes describe it as having – getting vicarious pleasure because I was – then I was applying for research grants for things that I really wanted to see done, and getting involved with people doing – trying to develop the technique in different ways, I found it very difficult to find enough time to concentrate to do that, and so I was always having to do it jointly with other people, be it graduate students or post-docs. And I think that probably is reflected when looking at research output in the sense of looking at publications. Erm, I started at that stage of my life to go very much into second authorship because the other person was doing all the hard work in the lab and was often having the ideas but I was always right up there knowing what they were doing and making sure it was going somewhere sensible. But, no, I then appreciated why Martin Aitken, when I’d been a student in Oxford, why he would say I do not want to be disturbed, you know, in the mornings before ten o’clock, that he’d come in like at seven and he’d be in his lab and doing his own research. But then he wasn’t teaching, you know, he didn’t have an administrative – you know, he wasn’t part of the teaching in the university in a wider
sense, he was just the deputy director of the lab. But he had more people working for
him, so he still had all this – that sort of administration. But I could see how he did
that but on the other hand if I went in and tried to use a piece of equipment that was
like communal for like three people, they wouldn’t want me just coming in ‘cause
they’d have a run that would go – the equipment runs all the time, you’ve got a
carousel that’s presenting sample discs and is programmed. You can get – you might
get a run all night, so you can’t say why I want to be on the equipment between, you
know, eight and eleven in the morning. You can’t do that ‘cause somebody else’s run
is finishing, so. Whereas when you were doing it manually and everybody had their
own little system you could all sit there in your own room and do it when you wanted,
and nothing happened at night. But I found that – I found it frustrating but then
realised I probably couldn’t have coped if I was able to go and actually sit and play
with the equipment or prepare my own samples.

[1:01:45]

Were there any disadvantages of a kind of automated system where samples are
analysed in a programmed run in terms of losing track or becoming confused about
how numbers relate to the original sample and that sort of thing? I can see that if
you’ve got one and you put it under, and you do something manual and then you’re
using a ruler and you’re measuring it off, I can see why that’s difficult but I sense a
sort of close relation all the time to the sample. I wondered whether there were any
disadvantages of something that you’re slightly removed from through a computer.

Yes. No, because the software is all set up so that you have to enter the name of the
sample and what the sample disc number is, so – and that stays with it, stays with the
numbers that come out, so there is better accounting using that kind of system. I think
the problem that you get now is that many people – if they’re primarily interested in
dating and they want an aid at the end of it, then – and they know that there is this
software that calculates this and this and this, and it gets the equivalent dose which
goes in the top part of the equation and then you feed in the dose rate in the bottom
part of the equation, and it all calculates the errors and it does it all for you, you get a
number. It does mean that you don’t actually think about what could have gone
wrong, you know, when you first switch it on. And I was always asking students to
give me the output or – I always wanted to see it graphically, I wasn’t going to sit and look at their computer or have them give me the data and me sit at a computer. I wanted the graph visually there, I wanted them to come in the room, one to one like we are now, with what they think are the important graphs and then go back a stage and say, ‘Right, now I want you to show me a graph of what the raw data would look like.’ Your comp – you know, the system took it and it stored it, and you’ve just been manipulating it but do you know how you’re manipulating it? And so I would always get people to show me what the raw data looked like, get them to think about it. Well, why do you integrate the signal from here to here rather than integrate the signal from there to there, what’s your justification, what does that graph tell you? You know, and then with each student say, right, your graph there is telling me this, it’s telling me that. You know, that one – just that simple output just tells me you’ve just done a completely rubbish chemical treatment on it. You’re not looking at quartz, you’re looking at feldspar signal. And, you know, when they first come in the lab they go, ‘How you know that? That’s magic.’ And you’re going, no, it’s just many years of experience of just looking at raw data the whole time. And, you know, so that’s why I try to instil in the students who’ve come through with me to always go back and look at the raw data. I don’t want the end point, you shouldn’t want the end point, you should go back and look at it, question why you’re doing every step. If you’re – why are you following a formula, why aren’t you thinking about something that you’ve devised, you know, where do you feel the weakness is in this procedure? And after about a year the students get the message and they come in with the graph that you’re anticipating. They don’t show them to you, they just sort of sit there and say here’s the graph you asked for. You go, right, yes, and – but what does that mean? What happens if you do that? Well, now you know, so the next thing is the graph that you were about to ask them for comes out of the briefcase onto you. And you just keep playing – you play this game and it eventually becomes second nature to go off, question their own data, and by year two they’re doing it. You know you don’t actually have to go through this process any more because they’re doing it for themselves and I think that’s great. But I think there are many labs where the dating is the end point, they don’t look and you go, so it’s a number, so do I believe it? Why should I believe it? You tell me. And they go, well, but that’s what it calculated and you, yeah, you know, rubbish in, rubbish out, that’s all the computers do. It’s what your hand calculator does, is it right? How do you know? And so I think the danger
of having a piece of equipment with some good software at the end of it is that if something is wrong you might become – you might be unaware of it. But that takes time to go back in and look at the raw data and think about it.

_Were there any laboratories then where you felt that the end answer –?_

Ooh, that’s a bit of a naughty question to ask [laughs]. Well, there were certainly laboratories where, if I walked in I’d have said, ‘I want to know what that looks like.’ And they’d say, ‘Well, yeah, but it’s in there and we’ve handled the data.’ And I’d say, ‘Yeah, but I want to see it.’ And they’d say, ‘Why do you want to see it?’ ‘I want to see what it looks like.’ And you think – and they’ll think you’re completely nuts. So I wouldn’t dream of telling you which laboratories they were but, yeah, there are – you know, there are some times when you think do they really know what they’ve put there, do they think about it for long enough?

_So you’re just asking to see further back in the process?_

Yes, exactly. But further back, look at what exactly the very first measurement that you will take on your – when you’re doing it manually and you had it coming out on a piece of graph paper, that’s the raw data, that’s what you are measuring. Erm, and –

_And what happens after that then to get to this final figure?_

Oh, well, that might – the first thing you look at is – well, what you’re looking at is the luminescence signal and you want to know whether that is coming from the mineral. If you think it’s coming from quartz or feldspar, you want to know which it is because that can have an effect. But you also – that signal, you’re then comparing that signal with other signals from those same grains that you’ve induced by your beta source. So you’re looking at a sensitivity. So there are … I don’t know, how many manipulations of data that would go on. Erm, you are probably doing something like twenty – twenty steps where your data is taken out, and then – so the results are something you’ve done to the sample. It may be you’ve irradiated it, you maybe have exposed it to light, you maybe have heated it, what – you want to know what it’s done to the signal. But then what you’re actually measuring as the signal, what you’re
actually measuring, is the light output when you stimulate for let’s say 100 seconds. So do you want the whole of that signal? Do you integrate all the light? Do you sum up all the light? Or do you just want the initial part of the signal, that’s the most light sensitive bit that comes out right at the front, do you want that? Is there any baseline signal you should be subtracting off it? Which part of the measurement you’ve just made gives you that? There’s all these kind of decisions that you have to make for good reason. And so it’s those kind of things that your computer doesn’t always automatically – you set it, you can set it and say I want the first one second of signal, and I want to subtract off the background from between 99 and 100 seconds of my signal, and take the difference and work with that. But maybe you might be wanting to do something else with the data, so – and you can set those values for anything you want to in the analysis program to say, right, take that part of the signal and take that part, subtract. Now manipulate everything after that. So there are things that – you know, you’re handling the signal whereas if you’ve actually got the graph paper in front of you, you’re thinking – you think more when you see it all. You think, I wonder why that doesn’t look like what I got out when I made the same measurement on that sample. What’s happened, what – you know, and the classic one that comes out is usually, well, why don’t you take a ratio of all the data that you’ve got? So I was always known as, well, Ann will always want the ratio, so even if I don’t understand it I’ll plot the ratio and give it to her ‘cause she’s bound to ask me what the ratio is. So I was – I think there were probably bets going on as to – you know, how many minutes it was going to be into supervision discussion before I was going to ask for a ratio of something. I suspect they were probably running – running a book on that. I didn’t like to ask, so I never found out.

What would a ratio of the results be then if you –?

Oh, it’s like a ratio of, erm – if you take the signal, the natural signal, and you compare it with something you irradiate in the laboratory, then initially you’re getting two decaying signals as the light – as the electrons get released, get used up, the signal decays. So you’re getting a decaying signal, but it’s not coming from just one electron trap but there are more electron traps, and maybe slightly – these will respond slightly differently in the laboratory as in nature. In nature some of them might be less thermally stable. You’re going to want to know that they’re there, so if you take
ratios in some cases you can see these things, how bleachable they are and if there’s – if you do them after different thermal treatments you can see what the thermal stability is. And it’s just the quickest way to compare data is to just take a ratio of a set of numbers. It’s much the quickest way if it’s – if the ratio is flat, if it’s a single value ratio like, you know, point five or nine or whatever the numbers will be for everything, then you know that everything’s behaving the same way. But if there’s a – for example, as you get the electrons out in these measurements, if something’s changing your ratio will change as you go to a longer stimulation time. And you go, hey, I wonder why that’s different, is it because –? So I’ll do an experiment or look at that or is it because of that? And I’ll do another experiment. So it just makes you think. But I think that any sort of training as a graduate student in science you should be thinking all the time, just simple thoughts but you should be thinking about the data that you’re looking at, but maybe that’s an old fashioned view [laughs].

_I am old fashioned view here? Is that less likely to happen now than when you were starting this laboratory?

Erm, I don’t think, in – I think it depends upon the student, their environment, why they’re doing the project, as to whether they actually look and think quite hard enough. They might think at one level in which they’re involved. Okay, if you’re thinking about the dating, about what the dates actually mean rather than are these dates obtained correctly. So there was one student who – I remember who said, well, that’s the date I got. I said, well, yes, but can you justify it? Have you really thought that that is right? I mean, you know, what happens, for example, if you’re looking at river sediments and it’s in a limestone area, so you’re getting little bits of small limestone and you want the signal from your feldspar, so you dissolve up your limestone. But what happens if that limestone contains little bits of quartz and feldspar? You’re now getting a geological signal. They weren’t exposed to light, so that’s not – you know, you’re not getting the age since they were exposed to light. You’re going to have geological age. That would be very silly wouldn’t it? And this particular student hadn’t actually thought about that and said, oh. So, you know, you have to think – and it’s going right back, you know, back even before you’ve made your measurement. Have you appropriately selected a sample preparation procedure that is aimed at giving you an age, would hope to give you an age that’s appropriate
for the question, the geological question that you’re asking? So … maybe I’m being unfair when I say people don’t always quite think in depth about some of the simple things that are there. But I just try and make sure that all mine do – all my students did.

[1:16:30]

*Could you give us a very good sense of what you were doing in this geography department? Could you say a little bit more about how it was seen by geographers and – I mean by academic geographers?*

Yes, I think that at this point that people were starting to become interested in the fact you could have a dating technique that would provide ages that would answer useful questions in the geographical world. So I think they – yes, there was a lot of interest in it, and that’s why a number of laboratories got set up. And now there are something like, oh, probably fifteen luminescence laboratory – dating laboratories in the UK and probably something like the best part of 100 I would think worldwide, so there is a need. The problem is that people who’ve not actually spent a year or so in a luminescence lab don’t really have a feeling for the amount of work that goes behind it. All these thought processes I’m talking about, they just think effectively what you’re doing is tipping sand in at one end of your black box and getting a number out at the other, because that’s what it can look like if you only visited a lab for a short time. You see a wet lab where people are sieving and preparing grains, you see a piece of equipment where people are loading it up with little sample discs, and then you see somebody at a computer producing a number and that’s how it appears. So it was starting to become that you are almost seen as a technician and therefore that because you’re putting in the technical expertise the assumption is that you don’t have any interest really in the application. And I think that one – well, I certainly tried very hard to say no. You know, that’s why I have to go in the field, I want to see what it is you’re trying to date, how the grain – what I’m interested in knowing about is how the grains got to where they are. And I can see that when I get into the field and you’re talking about it, so I think it’s important whereas other people will say, oh, I can just send my sample off to such and such a lab, they will produce a date for me. And I’m going, right, yes, and the age you get, and you think it is that? Hmm, maybe, but I
know where the problems are that lay behind that and they probably glossed over those. And one of the things that you find is that, you know, you come up with a technique for dating sediments, great, wonderful, but if somebody wants you to go – much older sediments. Okay, so you can date to 50,000 years but I want to go to 150,000 or I want to go to a million. So every time you are – you’re just working your way back and expanding, somebody will want to push your boundaries or they’ll say, I don’t want you to work on the eolian deposits, I really want you to work on river deposits, fluvial deposits. And they’re sediments aren’t they, can’t you take those? And you go, yes, they’re exposed to light but, you know, you have to imagine what is a little grain of sand, you know, it’s been transported. If it’s with a lot of other grains of sand it’s going to – to be like a slurry, you know, is it –? You know, see a river in flood, for example, well, you can’t see the grains at the bottom so the grains at the bottom can’t see sunlight. So how do we work with that one? There’s always somebody who’s wanting the application to go further than the technique currently is, and that’s why I’ve been able to stay in the field for so long is because that’s what you’re always doing, you’re always trying to push the limit, go back further in time, take different materials and eventually even take them apart grain by grain, so there’s – you know, it is a constant challenge to push out the best possible date that you can.

[1:21:03]

Thank you. Could you describe your work in teaching undergraduates, both in terms of the planning of courses and the response to, you know, being told we need a course in this or we need a course in that, but also the sort of practical experience of it, of lecturing and holding tutorials and so on?

Yes, again as I mentioned earlier, I was quite surprised that there is no formal structure to the courses. You are not actually told ‘you must teach a course on’ – what you do is rapidly think what could I teach a course on, what – where is there a gap in the curriculum at the moment but a gap I’m actually able to fill, something I can do. And so I – in Aberystwyth I was lucky. I was able to set up courses on climate change from a harder science point of view, so I could do, you know, geochemical records of the Quaternary for example. I shared a general course in the second year with somebody who worked on lake sediments, so he would do the sort
of sedimentary part and I’d again do some of the more geochemical parts. I could set up an ident – a third year course in Quaternary dating techniques, you know, I’m totally happy with things like radio carbon and potassium argon, uranium series, a load of techniques I could talk about with a fair amount of competence and just get the level right for undergraduates. I – I sort of got there and got there eventually. I discovered I had a nickname though, that was one of the slightly amusing things. Er, I’d – the colleague I shared the course with in the second year, he asked his students in his tutorial about some aspect and they said, ‘Oh, yes, Kate told us about that.’ And he said, ‘Kate? There’s nobody on the staff called Kate’ then realised that they were referring to me. He said, ‘But she’s Ann. Why are you calling her Kate?’ And they said, ‘She’s just like Kate Adie.’

Yeah.

So I never quite got why but I think it was meant as a compliment but that was quite amusing. And what else? I also shared a third year course on, er … atmospheric changes and – with another, with a climatologist. But again, I was using the physics back – my physics background to get myself understanding about popular topics that would be suitable for geographers, like looking at the greenhouse gases and ozone hole and things like that. I could manage to teach that, put some – try and put some rigour into that and yet maintain it as an up to date sort of topic for discussion. So that was what I was covering in teaching one way or another. Tutorials I found extremely difficult. Erm, I was having tutorial groups of four or five students, two tutorial groups in the second year and two in the third year, meeting every two weeks, trying to get through that one hour, I often found extremely hard. And in spite of what you’re finding from this interview it’s – well, I can talk, I found it very difficult to get them to talk without just trying to look as though I’m just asking difficult questions. And so I did find that – I found undergraduate teaching of tutorials extremely difficult.

[1:25:45]

When you say that you were able to add some rigour to, for example, the atmosphere changes course in the third year, did you feel that were –? No, that’s not a – what
was your view of geography as a subject or geography as a way of examining the environment?

I think it’s very important that geographers have some science. Well, physical geographers, those who are coming through with either a physical geography degree, ‘cause they could do physical geography, human geography, or they could do a geography degree which enabled them to combine a mixture of the subjects. And one of the problems I found was the number of students who had dropped physics, chemistry and maths as early as possible in their school careers and you had to try to find out what it was that they had learnt and what they knew about molecules and things like that. And it – and there was – you know, if there was a remedial – if there had been a remedial science course, that would have probably been pretty good. But one felt often that they were not quite there and I had to use my tutorials to try and find out what the students were – you know, whether they actually understood some of the concepts but – so I think it was a little frustrating, the lack of scientific background that students had. But, yet, I had to try and put it over as to the science rather than them just getting popular information from the TV or from popular journals. So I think I succeeded with that.

What did you discover about their scientific awareness through tutorials?

That there wasn’t – it was very like compartmentalised. You know, their school was I did physics or I didn’t do physics or I did chemistry and I forgot all about it, and now I’m at university, oh, gosh, is it relevant again? And you’re thinking, yes, I mean, you know, lifelong learning and integration of ideas is – you know, it’s not – they need to realise that, you know, the idea of schooling is not something you just tick a box and you’ve got it. It’s trying to build yourself as a person and help you to develop as an individual and be able to – these skills enable you to take on board new information. And I think many of them didn’t realise that and perhaps I helped some of them get there, I’m not sure.

Was there any evidence that they occasionally found what you were presenting them with was too scientific or too technical or that –?
Just occasionally they would say I really didn’t understand what was meant by that. And then it’s something like – I mean I would say, well, if you have something that’s decaying exponentially what does that mean. And then there was nil response on that one or how do you – would you plot that? And again, there’s a sort of – or how would you calculate something? And there’s the, well, I put it into a calculator and this is the number I got, so there’s a little bit of that and without again knowing what the manipulation stage is in between. But – so I think I just find that sort of slightly frustrating and maybe it’s something that’s coming through from the school system but, you know. But I mean certainly they weren’t all like that, some of them were – you know, were incredibly good and I – you know, it’s been an absolute joy to teach and would ask questions that quite surprised me, so that was always good.

[1:30:05]

*And was there –? Was it remarked upon that you were the only female member of staff at the time you started in the geology and geography department at Aberystwyth?*

Again, I didn’t realise. There had been a woman who’d retired a few years earlier as a geologist but she was retired when I got there. And I – took me a bit of while to realise that in – you know, when you’d have a departmental board meeting and sort of suddenly look and think, oh, the only other person here who’s a woman is the secretary taking the notes. And you’d go, oh, okay. But again, maybe I was just seen as a novelty in the department and – but I, you know, I didn’t feel any – I didn’t feel that there was anything happening either way. I didn’t feel that I was getting preferential treatment because I was a woman and I don’t feel I was being discriminated against because I was a woman. I was – just did the job and that was fine. You know, it was nice obviously when, you know, as time went by more women were recruited into the department, so – and there’s now quite a few. In fact interestingly, two of them are also in Quaternary science. It’s good.

[1:31:41]

*Over the period that we’ve been talking about in this session and the previous one, and that is really from degree onwards, degree and then the early part of your career,*
could you tell us something of your relations with your parents? Because what we’ve tended to do is to leave them sort of at home when you went away to university and I wondered how your relationship with them developed over.

It sort of – they – you’re right in seeing that as the theme. Er, I mean they came over and visited me when I was in Canada for two years, and I drove them on a trip all up and down the west coast and that was fine. But I think my mother never quite understood what I was doing. She wanted me to become a teacher just like her and so she never quite understood why I was doing what I was doing, and why I didn’t have a real job. And then she – well, she never actually got to find out that I got married because I just whizzed off with Jack to a registry office in Cambridge ‘cause my father had said, oh, just go ahead and get married, you know, he’s older than you are, she won’t approve, she’ll probably have a breakdown, and so will you please just – just not bother. So whenever they came and visited I always sort of put Jack’s stuff in the car, he would then drive off round the countryside in it somewhere, wait until they’d gone and then come back again, and so I’m afraid that we had a slightly odd relationship. So I would go home, I would visit my parents probably once every three months or so. I’d then go out with my father for a beer before lunch and we’d chat about, you know, everything, so that was fine. And then go back and have family lunch and it was with grandmother still there, and it’d be very – a very selective conversation was held. My mother carefully didn’t ask me about my – any relationship with any man and I didn’t provide any information. So it was a slightly odd relationship. Yeah.

When you did talk to her about your – you said that she didn’t understand what you were doing. Do you remember conversations with her where you might have attempted to explain it or to –?

Yes, I did. I mean I did explain and she understood that I was involved in dating techniques but she couldn’t work out why I could spend the whole of my life doing this. Surely that was just like, you know, maybe a year but more than a year she just couldn’t understand it. But even right until she died, which was last year, she would still say can you tell me what you’re doing? And I would explain. I would usually explain along the lines of something that she would understand, like she was
particularly interested in archaeology so I’d keep telling her about the archaeological work that I had been doing. It might have been five years earlier but, you know, by now she didn’t – she’d lost track of what it was, so I could always tell her exactly the same story all over again. So she did understand about archaeology, and she thought the archaeologists probably did want to know about how old things were. And so that was okay, so I got around it that way.

[1:36:07]

And what was your – the level and nature of your father’s interest in what you were doing?

Oh, he was – as long as I was happy doing what I was doing, he was happy with that. Erm … he was interested but not wanting sort of detailed information but realising that I could keep looking at materials in different ways. And, you know, he thought that would be – you know, he realised that that was interesting to me, and so was quite happy I was doing it. And so that was fine.

You’ve spoken in general of your research students and of research projects conducted by research students at Aberystwyth but what could you tell me about the individuals, the particular people there?

Well, the first student I had was Geoff Duller, and he – I’d met him by going to Oxford and giving a lecture in the university there, and he came along and thought, oh, that’s interesting, I think I’d like to do that. And I had a – I was just moving to Aberystwyth, so I had a studentship available and he in the meantime had gone off to New Zealand to teach for a year, like a late gap year. And, well, actually he thought he was coming back to the Royal Holloway College but when he got back he discovered the studentship had moved to Aberystwyth. But he came – he came with the material he’d collected when he was in New Zealand, so he’d seen New Zealand as a good field area. It’s got some volcanic ashes and some radio carbon dating, and so he thought, ah, you know, I can test things out here for this new technique I’ll be going into. So he was working for his PhD on feldspar signals from actually more sands than loess, only the sands were from New Zealand. And at this time we were
all in the lab working with the optical stimulated luminescence signal from feldspars. We weren’t thinking about quartz for a variety of reasons, we were all – well, the main reason is we didn’t have the laser system that the Huntley had set up, so we didn’t have the money for it or the technical expertise to run it. But because Galina Hutt, the Estonian had looked at different parts of the stimulation spectrum for feldspars and she’d found that she could use infrared stimulation, and infrared stimulation is easy because it’s the little diodes that you use to turn your radio, TV on and off, that’s what they are. Those are the things that we use to power and to stimulate. And so we could use those easily on feldspars and that is what Geoff was working on, and he developed an approach where you could get all the measurements effectively made on a single aliquot measurement methods, and that’s what he developed and developed software for.

Sorry, what’s an aliquot?

Oh, sorry, aliquot would be a small portion of material, so a single portion of material. Firstly it would be like a – refer to a single aluminium disc on which you’ve got a number of grains but you could use – you could apply it to larger amounts of material or smaller amounts of material. But the procedure that was developed was using just measurements on one lot or aliquot of material. And so he developed that and applied to his New Zealand sands, and so he was the first PhD student. I’m trying to think, the next one, he was a geographer. The next student coming in within the year was another Chinese, Li Shenghua. He’d been invited over to work with Martin Aitken in Oxford for a year but he hadn’t yet got a PhD and he was keen to get one. And we – I somehow managed to cobble together funding for him from the university because he wasn’t eligible for a NERC British research grant but managed to get the money and – eventually, so that was great. And he was working again on feldspars but for his project, again something different, I had him working on sediments from river cuttings in South Africa in fact to look at erosion history in a particular area in Natal. And so that was something different, so he had a project that was physically based somewhere different. And then about the same time I got a research grant to work on Chinese loess, and then employed a research assistant, Fiona Musson, who had trained as a dentist originally and then had taken a physics degree but wanted to do some research. And so I was able to take her on, and her project was quite applied onto the
Chinese loess but again enabled her to get a PhD through that. Erm, and then there were a number of people who came for a relatively short time. There was one student who was desperate to get a master’s degree, and he’d got a geology degree but he needed a master’s degree from the geography department to teach in a school. So I was able to put him on the project where I got some funding from the States to work on some dunes, and so he and Geoff Duller and I went out and worked on dune fields there, and he came back and did some developmental work, but that was just like a year’s project. And then Michele Clarke, who’d done a master’s with me at the Royal Holloway, came as an ex-research assistant, and she was working also on some Chinese loess and some British material and also some dune sands, more dune sands, from California. So it was a bit of this and that kind of project. And then had two more PhD students, Ian Fuller and Kate Richardson. Kate worked on river sediments from the UK, Ian worked on river sediments from Spain.

[1:42:47]

Ian was an interesting case because he was a born again Christian and he had a very absolute view of the bible. And once he’d given up trying to convert us he then let that go a bit, but the problem was that he believed that the earth had been formed, you know, 5,500 years ago and yet here he was producing ages for his sediments which were, you know, over 100,000 years. And, you know, I was aware of this and I thought, how does he handle this one? I didn’t want to ask ‘cause it would get into a long discussion. I’m afraid that evangelical Christianity, I find is not something I can handle and please go away. And anyway, he wrote up his thesis and then he came as a – he wanted to put a note in saying – a disclaimer in saying he didn’t believe any ages over – and I thought, what? You’ve spent three years of your life producing these ages and you’re going to say you don’t believe them. I said you can’t do that, you know, you either believe your work or you don’t, you know, you should have opted out earlier. Anyway, he didn’t put that in and he defended it and got the PhD, and he went off to work in New Zealand, a lectureship there in a geography department as a physical geographer but working on modern processes. And yet, he obviously still – you know, adheres to his fundamentalism ‘cause he had some – there was an article that he’d been interviewed for in the Times Higher Education Supplement where he was saying that, you know, he was a Christian and he didn’t –
you know, he didn’t believe in ages beyond this. And I was being phoned up by
*Times Higher Ed* saying, ‘Your student, what do you think of this?’ And I think, I’m
sorry, I’m not going to put anything in writing about what I think about it but I must
admit I – privately I thought that was an incredibly hypocritical thing to do. You
know, if you later think, well, I don’t believe it, well, please get yourself a PhD in
another topic which you do believe in. If not, just, you know, please don’t refer to
yourself as Dr Fuller again. And you think what a strange mentality that has been
brought about by this, but it takes all sorts I guess.

*In what other ways was his evangelical Christianity apparent in the laboratory?*

Oh, it wasn’t so much in the laboratory, it was more he’d go off at weekends. His
idea of a good weekend out was witnessing, converting people. And he tried that on
Kate, who’s a contemporary of his, and Kate Richardson was brought up a Catholic
and he didn’t get very far with her ‘cause her arguments were far stronger and even
though she – you know, she was what I might call a lapsed Catholic but it’s just – you
know, it’s just sort of interesting but I just found this bizarre that he – you know, he
could deny the dates and yet still keep the PhD that went with it, yeah. So anyway,
he’s doing modern processes now, so that’s okay.

*That gets him out of it.*

Yeah, indeed.

[End of Track 9]
Track 10

At the start of today’s recording I wonder whether you could say a little more about Nick Shackleton’s house, having lived there. I was listening back to the recording and you talk about the looking after the clarinets by putting out the bowl.

Yes.

And I wondered whether you could say any more about what was distinctive or noticeable about his house.

Well, his house was a large house up near the station in Cambridge, and I was able to fortunately live there when I was looking for somewhere for myself to live. My first memory of going in was going in with Mike Hall, and Mike coming in and saying, ‘Oh, my gosh, I’ve cleaned it.’ And the dust balls that were floating down the corridor, just seemed that they were not very friendly for you. So Nick clearly, housework was not his forte at all, he just lived in the house. But it was a very pleasant house to live in because next door was Christopher Hogwood from the Academy of Ancient Music, and there were lots of musical people coming and going. And because Nick was musical these people were coming and going, not just in Christopher’s house but also in the house that I was living in. It was open house, so very much part of how Cambridge, I guess, ran in those days and maybe still does. People crossed disciplines, were very open with each other, and enjoyed doing different things like going to concerts and making music.

And are you able to say more about the relations between Mike Hall and Nick Shackleton, implied by the fact that he had cleaned his house for your arrival?

Oh, Mike was wonderful. He, er, was sort of Nick’s right hand man, I mean – and I think that without him Nick would have – well, mass spectrometers would have gone down, that’s for sure, and that’s all the measurements that Nick was making. But also sort of arrangements for visitors coming to the lab, again, Nick would say, oh, so and so is coming to visit me. And at that point Mike knew that it was probably up to him to, you know, try to find accommodation for the people perhaps and would – if they
were in apartments he’d say, oh, we’ve got this sort of collection of knives, forks, spoons, saucepans, and wouldn’t – move them on. So there was a – there was that personal aspect to it but also Nick very highly regarded Mike’s work in the lab with the mass spectrometers. And so it was – although Mike was not on the academic staff he appeared on some of Nick’s paper – academic papers and they worked together as equals, they treated each other as equals. But it was a – there was also a sort of very personal friendship between them. That’s what I saw as well.

But when you said the mass spectrometers would have gone down, if not for Mike.

Well, they’re very sensitive instruments, they’re – they were maintained so that they always had the really best results coming out from them, and that was down to Mike. I mean you can get the equipment in, you can get the company to install it, but when it comes to keeping it running, to make it totally reproducible, then you require somebody who knows the equipment backwards. And when a component fails or a piece of glassware breaks, you know, Mike would be right in there, fix it straight away so there’d be very little down time because the mass spectrometers were running, you know, twenty-four hours a day. And particularly once the – you know, there was really early automation of the system rather than Mike having to come in and sort of feed the equipment, which he would have done in the early days, then automation came in. But again, you know, automation only works when all components are working. And Mike certainly was able to keep it up and running.

[04:31]

Thank you. Last time you said that you felt that luminescence attracts a certain kind of person, and you said highly dedicated, slightly oddball [AW laughs]. And I wondered whether you could expand on that perception of the field.

I think it’ because it’s interdisciplinary. I think it brings in people who initially might have thought themselves as being archaeologists, people who came in as physicists, people who came in as geochemists. And they at some point maybe go to a lecture where chronology is important, and then suddenly they think we need to get dates for this archaeological event. And radio carbon is inappropriate because there isn’t any
organic material or it’s going to be older than radio carbon can go back. And so then people say, well, what else is there? And then they see luminescence as being a potential, and then realise that you can’t just buy luminescence ages off the shelf like you can with radio carbon. You can’t just send your sample of material off to a laboratory and get a number back because it’s very complex, frustratingly complex, when you’re working with quartz or feldspars. And there is no one way to do things like there is in radio carbon. And so it’s people who are – they see a need, they realise they have to do it themselves or just not do it at all and are willing to bang their heads against brick walls for days on end trying to understand something. So I – but because we’re all trying to have the same goal we tend to work together as a community of maybe now a couple of hundred people around the world and we tend to cooperate rather than be secretive or shoot each other down. So it’s a friendly community, it’s an open community from academic exchange. I mean, yes, you get rivalries because there always are but they tend not to be major problems. You know, the field advances because we all want it to advance. But it’s this interdisciplinary mix of people I think with a goal and with a clear interest in either the archaeological or in a geological, recent geological problem.

Thank you. And I was reading one of your reviews of luminescence dating and you mention that starting in 1978 the symposium on thermoluminescence dating started by Martin Aitken was called a symposium on the basis that it was – that it really meant drinking party.

Yes.

That made me curious about – to know a little bit more about Martin Aitken as a character but also about the – I suppose the informal times on these sort of conferences or, you know, the times outside the sort of formal giving of papers. So a sort of sense of that social culture.

Yes, erm, well, Martin again was very unusual in that I suppose he’d fit into this oddball definition that we’ve just been talking about in that he was – did his PhD in
nuclear physics after the war. And so here he was, in a research lab for archaeology that had been set up through discussions between Lord Cherwell in the Clarendon lab, in the physics lab in Oxford, and the head of the Institute of Archaeology in Oxford. And they thought it was good to apply science to archaeology, so they got in Teddy Hall who was a physical chemist with analytical skills. And Martin Aitken is the physicist who could then apply his physics to both dating and to magnetic measurements. And Martin was somebody who enjoyed Oxford life, he enjoyed being a fellow of Linacre College, he was a very sociable person, and he enjoyed his pint of beer in the Royal Oak along with the rest of us. So I guess, you know, there was a culture of enjoying a beer, enjoying a glass of wine, there wasn’t a – it wasn’t a culture of heavy drinking at all, it was purely sort of social, just a way of relaxing with people and therefore getting to know them. So there was always – Martin was always one of the group, slightly always in the senior role but then he was older so that would be the case. But, yes, I think he had a sort of classical education and thought the idea of a, you know, Greek drinking party was a kind of fun thing to call it, and he just got bored with the word conference. But these – you know, these conferences which got longer and longer, initially they’d be set up and they’d be like two days of papers. And now that because so many people are involved, they’re now up to four or five days of papers. But there’ll always be now an afternoon off, so there’ll be maybe a field trip or maybe visit to a famous castle or something like that, and there’ll be a dinner. And again there is always time for discussion and people mix around at these, have discussions at lunch time and coffee, and discussion time is always on the agenda of the sort of scientific community. And we say we want – you know, how are we going to organise this meeting differently, what didn’t we get quite right last time? Should we be putting up more posters? And then, you know, again there is this sort of informal committee that runs behind these meetings now that tries to make sure that the room space is adequate. People might realise how many posters are going to get put up and they can’t have them, you know, miles away. You know, we need to have them so that people at coffee can wander out and look at them and talk about them, and then maybe not go back in the formal spoken session but actually talk with somebody about their poster and they really – or some people just go and look at the posters quietly when everybody else is in the lectures. So there’s – and we try – well, we’ve now stopped having any parallel sessions because it just got ridiculous. We just said, sorry, you’re going to have a finite number of oral presentations. We
have a certain number of slots, that’s all there is, and we will decide who gives the oral presentations and who presents as posters but – and again, getting up the – you know, we emphasise getting up the quality of the posters because they can provide very good discussion, in fact better discussion than you get from a presentation. I mean, yes, you can be seen talking but if you want to learn about why your data is showing this and, you know, what does this really mean, are you happy with it, then it’s better to get somebody who’s got a bit more experience and you’ll spend quarter of an hour or half an hour with you in front of your poster just discussing as much as possible, so. And so discussion at these conferences is important, both in front of posters and over a beer in the bar.

[12:38]

Thank you. I wonder whether you could also say a little more about your feeling once you’d moved to Aberystwyth of almost preferring the feeling of not being, I think you said, being a small fish in a big pond with sharks, which is the way that you described Cambridge. And so I suppose it’s explaining what lies behind that comment.

Yes, I mean I got the opportunity to sort of look at being a small person in a department with – for the first time when I went to Royal Holloway College and I – you know, I felt a very sort of small person there and sort of thought, hmm, not – don’t really like this, I’ve going to have to be fighting for everything all the time. Whereas when I got to Aberystwyth people actually wanted me there, and therefore it was easier to get internal funding because people could see that you were coming in with research potential, you had a good publication record, could get other funding to get people in but needed infrastructure funding. And I found that relatively easy to get, and I think if I’d stayed in Royal Holloway College or, you know, never got a position in say Cambridge, then I wouldn’t have had that. I’d have been fighting a lot of other people who also had good publication records. Maybe it’s the cheat’s way out of going for where the money’s easiest but if want you want to do is to have graduate students and produce papers and do research that’s going somewhere and you’ve got time to spend on it, and that’s the way to go I think. I’ve seen other people get permanent positions, for example, in Oxford and they get swamped with administration. Their research is not as highly regarded perhaps as – you know, it
should be in that institution, and I think that is frustrating for them I suspect, it certainly would have been for me. So I, you know, feel very lucky that I’ve been able to have the research time, have the students, and get really good people. It hasn’t stopped me getting, you know, first class research students by being in somewhere as remote and sort of off the map if you like as Aberystwyth appears to most people.

[15:22]

Thank you. And last time you talked about your husband’s support that he gave you a) in terms of sort of personal support, talking to you about things you were worried about or saying don’t worry about this, just carry on with what you want to do, that sort of support. And you said that he sometimes offered sort of proofreading and looked at manuscripts and things, and suggested changes. But I wondered to what extent you discussed the sort of technical problems of luminescence dating of various kinds within, you know, the behaviour of particular minerals or, you know, particular ways of counting and problems with dosimeters and things like that, the actual technical –

No, I didn’t. Mainly because he was really a theoretical geophysicist and he was always amused to say that’d he come here to be professor of geophysics in Cambridge a) never having set foot in Cambridge and b) never having taken a geology course in his life ‘cause he’d trained as a mathematician. And somebody who’s trained as a mathematician is not the person to discuss anything technical with at all, it’s – they come at it from a different – different point of view. And so, no, it was more on – as you said on the linguistic side and also very much on the personal support side in saying, yes, well – I had difficulties when I was setting up a lab here, and don’t worry about the personalities, you will always come across somebody who’s not going to fit in or is – and you don’t always see, or you’ll always come across a student who is basically conning you for three years and then sort of – you know, and they take the money and then they run and you – you know, this is life, this is how people are. And so it was always on that – at that level that I got the support.

Can you say –? I don’t understand why someone trained in mathematics isn’t the person to talk –
They’re just not very practical [laughs]. Erm, it’s they’re … yeah, it’s difficult to explain exactly what – why I would say that but I guess they want to see everything neatly proven. And when you’re sort of thrashing around with signals coming out of materials that you really don’t know what they are and how variable they are, then they – you think, why are you working on this messy system? And I think they then sort of also back off a bit because they see they’re not going to have a neat solution, you know, whereas I think the rest of us all in luminescence accept there isn’t a neat solution. We just try to look for the patterns and I think that is what people do in – you know, in geochemistry, for example, where they come in as chemists. But a mathematician doesn’t have that – doesn’t have that sort of background at all, everything is – you know, you’re – it’s sort of proven.

[18:33]

And perhaps over the course of the development of luminescence dating, what’s been the relative status of archaeology on the one hand and sort of environmental change on the other in terms of its application?

Erm, I guess when luminescence dating started out with Martin Aitken in the ‘60s it was – everything was very much aimed at archaeology. It was – or we were aware that there might be aware there might be some sites which go back beyond radio carbon or we have pottery and no suitable material for radio carbon, and we need a dating technique for the pottery directly as that relates to man. And so that was very much an archaeological period. I wandered in as the first person to think about wanting to do something geological or environmental to work on the volcanics, and that again was suggested by – that I already had an interest in because I’d thought of going to geophysics. Because I’d heard about paleomagnetism, I think that was really fascinating continental drift, wow, you know, can I get involved in that? And Martin Aitken was also interested in the magnetic field as well on a much shorter timescale, on an archaeological timescale, and that was why he was interested in working on volcanic rocks. So there – that was the first sort of interest in geol – in something geological, if you like. And I think – my interests I think were there, I think I’d, you know, done some burnt pottery, I’d worked on some burnt flint. But
somehow there was this – I was just aware there was this whole recent geology field that needed a chronology just as badly, so was pushing for that. I mean the following the lava flows and the problems with anomalous fading at the feldspars, which sort of scuppered that rather, I then moved into dating stalagmites. So again from, you know, looking at caves but not particularly with an archaeological viewpoint. There was a little bit of archaeology and thought in the background because you’d get calcite layers formed in caves that seal archaeological layers underneath them, so you can put limiting age. And so there was a bit of archaeology behind it. And then it was interacting with Nick at – Nick Shackleton at these meetings of archaeological science coming out of Oxford and realising, oh, people need chronologies for deep sea sediments and then thinking, ah. And then when I went to Canada and found we could date sediments and came back and realised I could date the windblown dust deposits, then that suddenly – I became excited, lots of other people did, and that’s when there was like a rebirth of luminescence dating. It had set up - set up in a few archaeology departments or museums, a bit of routine dating at the British Museum, for example, there was a lab. But I think it was the sudden realisation that our environment history was important but we couldn’t make use of it unless we had a chronology. And so anything that provided a dating method would be really important. So I think – and that’s certainly taken off now. Yes, there are still some archaeological applications. There was a paper last month which was the ongoing work at Blombos Cave in South Africa, where my student, Zenobia Jacobs, had been working there on the material going back 70,000 years and now she’s come up with the dating of shells that have been used as pallets from mixing ochre to make material for painting, if you like painting perhaps yourself or your cave site. And so again, there’s now a swing back towards archaeology but using the geological sedimentary material surrounding the archaeological artefacts rather than – because there’s no heat involved, it has to be an environmental process that zeroes the signal.

[23:19]

Thank you. Now I think we’d got to the mid-’90s –

Hmm-hmm.
And you’re at Aberystwyth. And I wonder whether you could tell the story of the visit to Canberra.

Ah, yes, that was a sort of rather traumatic event but also a very significant event from the luminescence point of view. I’d been aware for a couple of years that there were two labs in Canberra which where carrying out luminescence dating on sediments. And they were looking at quartz whereas up until this point in Aberystwyth we’d been dealing with feldspars. Even though they had fading we would make corrections for fading but quartz was always a purer system that – purer mineral system, and if we could work out how to cope with various changes in behaviour during its measurement we’d be on a winner, so these labs were doing it. And I thought, well, I’ve got a study leave coming up, let’s go off and see whether Canberra’s a good place. And my husband had friends there in Canberra and he was happy to go off and see whether again he would be welcome there. So we went off but within a week of arriving Jack went down with something called Guillain Barré syndrome, which is a post-viral syndrome, which had him hospitalised, and really unless he’d been hospitalised he wouldn’t have made it. And that meant that because he was in the hospital and paralysed for a couple of months, you know, what was I going to do.

[25:20]

We had some mutual friends who put me up at their place but from the work point of view, one of the labs said, yes, you must, you know, come and work with us. You need to get your head round something else during the day and, you know, not – you can’t spend all your time at the hospital, so they took me in. And that was where we started looking at quartz in great detail and I was working with a guy called Andrew Murray who’d actually been a graduate student in the lab in Oxford when I’d been a post-doc there, so we’d got to know each other at that point. We lost touch because he’d emigrated to Australia and was working in a slightly different field but then he’d come back and started working on luminescence dating again. And we get on very well at a personal level and we – we are complementary in our views, and that work was great. And we continued working even after Jack and I got back. Jack and I did not go out for our study leave, he never wanted to see Australia ever again and didn’t want to travel that far either because it – the problem was he was ninety-five per cent
recovered but there was still a five per cent. And so we didn’t go back but continued working long distance because, you know, through email you can do that. And that led to some ten papers between us over the decade I guess, and we developed a measurement protocol for quartz that is now widely used and is – has a large number of citations. And, you know, it is very, very rewarding to have done that.

*Could you describe in as much detail as you can, step by step, what you were doing in Canberra in the development of this procedure for using quartz? I think you described it as single aliquot approach.*

Yes.

*And the last time I think you explained an aliquot is sort of an amount of sample, is it?*

Yes, it’s the amount of sample on which you make an individual measurement. So you are – we’ve prepared the quartz, purified the quartz, by using hydrofluoric acid to remove the feldspars and other minerals. And so we’re coming up with a really pure sedimentary quartz and these measurements then are made on something like five milligrams of the quartz. And the equipment that we were using was exactly the same but we were trying to make sure that we could measure a natural signal, monitor its sensitivity, and then give it some dose that increased its signal and monitored any changes. But there are – what one is trying to do is to isolate a very optically sensitive signal, so something that’ll be well zeroed at deposition, so it wipes out its previous history. And this is where we identified that there is a particular component that fortunately for us was very pronounced in Australian quartz. So we had beautiful material to work with, a whole continent of beautiful sand to work with, whereas if we’d actually started life in New Zealand the quartz there is horrible, it’s coming straight out of the – by glacial action it’s been removed directly from the mountain ranges, it’s relatively young, whereas the Australian quartz has been through lots of cycles of erosion and transport and sunlight exposure and more irradiation. And that we find sensitises the signal, it makes it brighter, whereas the New Zealand quartz, it’s really dim, you struggle to get a signal. And that would have been very frustrating, had we actually started there. And so we got this very nice Australian quartz and so we could identify a really strong fast OSLD component, a fast decaying, rapidly
removed, easy to measure in the laboratory. So that was what we were starting to work with. And then you have to apply various heating procedures to try to get a thermally stable to make sure that your fast component is as thermally stable as you think it is. And so we carefully were working through what happens when you apply heat, when you apply light, how does this signal behave, what is the best way of measuring it, what test criteria can you set up to be absolutely confident that your measurement of past radiation dose using that signal is correct and there’s no problem with it? So we were setting up criteria and trying to make it as watertight as we could as a method. And so that was what we were doing, and it’s amazing how much time you can spend doing that, carrying out experiments to check things out and then writing up the work and synthesising it and, you know, it’s – and there are – you know, there are still samples from different places in the world which don’t behave like nice Australian quartz. You can apply the basic methodology but occasionally it goes a bit pear shaped and it’s a case of knowing when it’s gone pear shaped. So that’s why there are still many papers coming out on the luminescent properties of quartz.

[31:46]

What would have happened do you think if you had started working on this using New Zealand’s samples?

Hmm …

Would you have developed the method?

I think it would have taken longer or we may have just said, oh, we can’t see what’s going on, we’ll work with the multiple aliquots where the signals are, and we’re not changing the signals by any of the procedures that we apply the heating and the light exposures in our measurements sequence. We’re only doing that twice rather than maybe ten times. And if we can’t quite see how our material is behaving then we – I think we’d have got very frustrated with that and there would probably have been a different – we would have come up with a different conclusion but then somebody else would have said, ooh, you know – in Australia perhaps would have said, well,
let’s try this. And then they would have gone, aha, we can do this. So we – I think we were just fortunate in being in the right place at the right time, and I think that’s – again, it’s something about science. There is a degree of serendipity about being in the right place at the right time that you can – you have the right materials, you’ve come in with the – in my case with how we’d been working with single aliquot feldspars, come in with that. And I think that when those things come together that’s when you can develop things. And it’s often easier with two of you because you come in with different histories, if you like, different experience histories that you can then see where things could go and then you can check each other and say, yes, but you thought that but you didn’t ever prove that. You thought you proved it but you hadn’t.

[33:49]

And so you’re – if there’s two of you it actually works, I find, much better and I – often I find that I don’t think things through far enough when I’m just doing it on my own but if I’ve got somebody else to bounce ideas off or they’re bouncing ideas of me, that’s when it becomes more – your thoughts are more rigorous. I mean, yes, it should be picked up in peer review of papers but that isn’t always the case either, so it’s – I find it really good to work with people, which I suspect is really obvious from my sort of publications. I find it more rewarding at personal level and academically I think things come out better if you’re doing it where you can check each other out with people who can, you know, just say I really don’t believe you, what are you saying about that? I disagree because – and then you can have a really good argument and come out the better for it at the end.

[34:46]

*Why were you – for a sort of lay audience, why were you applying heat to these materials? And in previous descriptions of procedure you’ve had a sample and you’ve been getting the signal from it and then thinking about the interpretation of that, but it seems with this you were really almost sort of playing with the sample a bit more and seeing how it played. Could you tell me why that was the case with the –?*
Yes, the – if we just take why am I heating the sample. That’s because within the quartz there are defects which act as electron traps. And it’s the – when the electron trap is – the when the electrons are able to be kicked out of the trap by being given energy, they recombine in the crystal and give out the luminescence signal. And so if you have a number of different traps, then these will each have their own individual energy associated with them that you – the amount of energy that you need to put in to kick those electrons out. And so some of them will need less energy and we talk about those being in shallow traps, they need very little energy to get them out. And then there are other traps which require more energy for the electrons to be kicked out. And if you think about that in terms of time, then you will – if they’re in the shallow traps at ambient temperature so, you know, outside in the environment, they’ll – they will need some time to come out but they will come out in a matter of say years or maybe tens of years. And so you’ll have electrons going into the traps, coming out of the traps, into the traps, out of the traps, going on during the geological or archaeological period that you’re interested in. So the information of how many electrons went in those traps all together is lost because it’s a balance, it’s a coming in and going out. So what you want to find to work with are electron traps that are deep enough that they require more energy, and therefore on a geological or archaeological timescale they don’t lose any electrons. All the electrons that got trapped in them through geologic time or through the – geologic time of interest or the archaeological time of interest, that they are all still there. So when you come along and measure you just want to make sure that you’re looking at those, and the easiest way to do that is to heat sufficiently high that you remove all the electrons out of the shallow traps but do not touch or scarcely touch any of those in the deeper traps. So it’s getting that – the temperature correct. And the problem is that in some cases you have maybe only one shallow trap and – or one that you can give a significant contribution to your OSL signal, but there are other quartzes where you know there are other traps that are maybe empty on thousands of years. And you can see this by looking at the thermoluminescence because as you heat up those electrons will come out, recombine and give some thermoluminescence signal. And you – so you will get peaks in your TL signal that are telling you that there are some thermally unstable traps. And so you want to be able to work out where the heat is, and you can’t just – but that isn’t the only part of it. The problem then is that ever – when you heat you also change the luminescence sensitivity and that’s why you have to make some monitoring
measurement, some – for each of the measurements you’re making to construct the
dozen response curve to get the equivalent dose for the age equation. So then you’re
having to work out how to monitor it without changing things again and so there’s
these things of – there are three things that you’re doing. You’re heating, you’re
optically stimulating and you’re also irradiating or putting in for test doses as well as
the big doses. And all of these things act in ways that you know what could happen as
the electrons get shuffled about as you do these things, but you need to make the
experiments to demonstrate clearly this is what happens if you do this. And
Australian quartz is very well behaved from that point of view, you can characterise it
quite well. Other quartzes from other parts of the world have a different range of
electron traps because they have different defects present. They can cause you to
have to think again a bit and test out, make similar tests, as we did for the Australian
quartz for the, say, African quartz or, you know, Spanish quartz or whatever it is.

[40:32]

Are there other times in your career when like the Australian quartz the particular
material that you’re using has sort of played along well, it’s been –?

As against the feldspars which didn’t because of anomalous fading?

Aha, yeah. But fortunately the – you realise later that it had been fortunate that you
were using one particular material, or one particular site, rather than another?

Erm, if I think about in South Africa, we were lucky there. Again, it’s an old
continent that the sands there have been moved – going through many, many cycles of
erosion and deposition. And they are from very old quartzes, again unlike New
Zealand for example. So working in Southern Africa was good from that point of
view. It didn’t look quite like the Australian quartz but it tended to behave well,
which was just as well from the point of view that we were trying to date the early
modern humans in South Africa. So we were lucky that, you know, again they were
not in New Zealand, that man was developing from a population in Southern Africa,
so that was useful. And then there have been other times in other places where you’d
have thought it would work well, like in somewhere in – like Saudi Arabia, big sand
seats there but, you know, there have been problems there with the limited number of electron traps and so the signal runs out much too early there. And so if one was trying to date early man there, then the straightforward application of the OSL, optically stimulated luminescence, signals from the quartz, then that would have not enabled us to go back and date any archaeological sites there. So again, trying to get around that problem that the signal saturating it, it running out of steam, so the signal isn’t increasing with any added dose. You know, you then sort of have to fight hard. You know, you become convinced there has to be a signal there that you can access that goes on forever. And again, you have to go through all the fundamental tests, that it’s light sensitive, that it doesn’t – you know, it really is zeroed at least well in a desert environment, and that it doesn’t saturate, that it’s thermally stable, you have to go and do all your thermal stability checks. And so that’s what I and quite a lot of others spend our time thinking about now. So, yeah, we could have started off in Saudi Arabia and then gone out and said, oh, we can’t date early man here. But again, we were lucky in South Africa, we were just at the limit of fairly conventional OSL. So again, things all came together. The single grain work that my colleague Geoff Duller developed, the signal aliquot procedure that Andrew Murray and I put together, worked so that we could apply it to the South African archaeological record. So I think I’ve been very lucky in being – most of the times things were in the right place at the right time.

In what way was the South African quartz cooperative? What was –?

It was bright, it gave a high amount of luminescence, the amount of dose that you put in. And that meant that you could look at it at a single grain level, so we could look – make single grain measurements and then we could be sure that, you know, we could see a population of grains which gave consistently the same story. And that enabled us to get the same age for those grains. But if they’d been dim like New Zealand quartz, no, couldn’t have worked on single grains and would have had – and would have been struggling to make sense of the multiple grain aliquot measurements as well.

And does it have a responsive signal because it has suitable electron traps or traps that, I don’t know, collect a lot of electrons and hold onto them?
Yes, it seems to have the right – we don’t know exactly what the impurities are but whatever they are, they are ones that – they give the ability to be a lot of the traps of that type, so they continue to grow when we add dose so we can observe them. And so they’re bright but they also must have appropriate luminescent centres. Again we don’t know exactly what they are. And they are light sensitive, they have this so called fast component that we can identify. We can measure the rate at which the OSL signal comes out of it, and that’s the fast component that’s common to almost all quartzes but in some it’s just a lot brighter, a lot more obvious, to enable – one can measure well very easily. And it’s partly – it seems to be being sensitised also by repeated over millions and millions of years, repeated exposure to light and irradiation. And it’s like in a major sandstone, for example, if that’s been reworked and the sand grains just blow away and get stuck somewhere else and then they become sandstone. And then they get eroded and then they – by water sail or by wind, and then they go away and get deposited somewhere else. Those ones that go through many cycles of just ambient temperature and sunlight bleaching, they appear to be the ones that are brightest. So there’s something in – it’s not just their geological formation but it’s also part of – so it’s not just the trace elements during the quartz but it’s also how those have been affected by multiple cycling in our environment. We don’t know why. People have looked, for example, down a river system where you’ve got some quartz grains coming out of a head – the head of the valley, out of the bedrock, and saying, oh, that’s not very sensitive, it doesn’t look a very strong, fast component. But then moving off, you know, kilometres downstream and seeing that the sensitivity appears to increase as the grains have gone out onto a river bar, sat there for a long time and then moved on a bit, it’s a bit – you know, you can try, you can sens – you know you can sensitise things in the lab by applying heat and by applying radiation. You can force the systems but exactly how that is equivalent to what goes on in nature, again, we can’t demonstrate, we can only do it by analogy. And this is part of the frustration, this is why you’re banging your head against a wall from time to time trying to understand what’s gone on but you can never really quite work out what it is. And I think I said earlier, all this work is just like a detective story. The clues are there, you have to try and find them and interpret them and you may be able to do something by taking a modern analogue and – situation. But ultimately, you know, you’re not there for the whole of the geological
or archaeological time period, you know, being that quartz grain, so you never quite know what’s gone on [inaud]. And that’s the fascination and the frustration combined I think, but we all still do it.

[49:30]

In that last bit when you said bleaching, that’s the zero for the optically stimulated –

Yes.

Luminescence, that’s the zeroing of the signal?

Yes, it’s the optical stimulation, either by – in that situation it’s by sunlight. And again, sunlight’s got different wavelengths. You know, what happens to your grains that travel underwater and see a different spectrum? So this is where you – again, if it’s a very – you’ve got water absorbing certain wavelengths, you’ve got splattering by other particles in there, so in the water of the river system or in the lake, you know, how did – what did an individual grain see that zeroed it? And that’s why one’s looking for the most light sensitive signal, to say, well, this one’s – this signal has the best chance of being zeroed at the moment that you are interested in, i.e. deposition. So that’s – it’s always going for that signal. But occasionally one has to go to less light sensitive signals but then you say, I can’t work in rivers, I have to work with windblown sediments from desert areas.

[50:49]

Thank you. Could you describe your – I suppose the pattern of your day then when you were working in Andrew Murray’s lab but also presumably visiting your husband in hospital? How did you sort of organise your time for those two months I think it was?

Yes, I tried to get into a routine. I was staying in the basement granny flat of some mutual friends of ours, academic friends in Canberra, who fortunately lived in walking distance of the hospital in one direction and within walking distance of the
lab in the other direction. So there was – in any hospital most of the routines go on in the morning and so there’s really not much sense in going – spending the morning but – so I would go to the lab and sit and discuss with Andrew or carry out an experiment or plan experiments together in the morning. And then after lunch or late afternoon, we’d go and visit Jack in the hospital. Initially he wasn’t able to communicate at all, and that was fairly scary because with this syndrome the whole of your peripheral nervous system closes down and basically tries to destroy itself, so you end up not being able to move anything at all, arms, legs, you can’t breathe, you have to go on a ventilator, which means all you can do is blink, and that is the only movement that you can make. But at that point, that’s when somebody needs the greatest support, you know, that they feel that you’re there and you’re attempting to – you know, you can hold a conversation and they can hear it perfectly well but they are unable to reply to any question and – or unable to instigate any conversation or any question or any wish that they need to do. So – and it will take a long time to try to communicate in the afternoon but it’s very important that obviously one does that so the person is reassured that, you know, they will recover and this will get – you know, this is going to – it’s a condition that reverses itself on some unknown time period but it does almost always at least ninety-five per cent recover itself. But when people are in that situation they don’t know that. You know it because you’ve been told that or you’ve read – or you’ve been given literature in the hospital to read this, to say, you know, it will come back. But it’s – you know, it was quite difficult and that was why it was great staying with these friends who had the granny flat because they just – there was no kitchen in the granny flat, it was basically, you know, to sleep and a bathroom. But they were very good about having me just wander upstairs and just feed me and put on a television and entertain me, so that was – in the evening, so that was good.

_Did you know straight away then what it was, that it was recoverable?_

Yes, within about three days when all the symptoms were described to the – in the hospital they said, yes, we – this – what you describe as happened to him is exactly what happens with this. It isn’t common, it’s like one in 300,000, so in the hospital there, there was – in Canberra there was like one other person who was recovering from it. And so they were very good and saying, yes, it will get worse first and then it’ll recover but we can’t give you any timeframe. But they knew what it was, that the
symptoms are very unlike anything else. What they didn’t tell me fortunately, there was a chronic version from which you don’t recover and you’re totally paralysed. And what had been – what I didn’t know was the person that we’d had dinner with when we first – well, we actually stopped off in Adelaide on the way out and my colleague there, his daughter had had the chronic version but, you know, she came to dinner and she clearly was in a wheelchair and we didn’t ask what it was. But this guy, when he heard about Jack he just said, oh. And he didn’t actually communicate with me at all because he didn’t want to put the wind up me that it might be the chronic version that his daughter had but it’s – you know, it’s quite unusual but you really do need to be in a hospital which recognises what it is because it’ll not – if you suddenly stop breathing then you’re – you know, that’s it. But at least if they recognise what it is, you’re going through a week of progressive paralysis then they know that what goes finally will be the lungs and their ability to work. So, yeah, it’s very scary and obviously the person – there are various other things that go on that require them to be on morphine as well for a bit, so you have all the problems of the hallucination as well, which again is something that stays on in – stayed on in his dreams for a long time and needed reassurance. So, yes, it’s – Joseph Heller had it, you know, the *Catch 22* author? And he wrote a book about it but I’m afraid I didn’t really want to read the book. I was quite happy to take the medical facts but not go through, you know, somebody with a good written imagination writing about it. I thought that would probably freak me out, so I’m afraid I didn’t actually read his book on it but somebody had one and they said it’s here if you want it.

*Did you work out a way to communicate just with the blinking response? Was it possible to?*

Yes, you have an alphabet board and you put up letters but it’s when – the bit that I remember as being particularly frustrating when clearly he wanted his glasses on to – he needed it for reading and he wanted to look at something close up. But, you know, he was blinking furiously, which meant I need something. I said, you need something? He’d blink, yes. You know, where do you start? You know, do you need a nurse? No. You know, so you get the blink for no. So you’re just going through all these yes, no answers, and then you’d have to try and start spelling a word. You know, you can imagine how long it takes to spell the word glasses when you don’t
know what it is you’re starting with or what it is he could possibly want. But, yeah, so that period went on for – I’m just trying to think exactly how long, the sort of period he was on the ventilator. So it would have been about a week to ten days but it’s very frightening and you just realise the person there is all – 100 per cent there but they’re absolutely scared shitless. I mean it really – he was just very, very frightened. And, you know, the thought of being trapped in your body when you can’t do anything, I think just really, really scared him. But fortunately, you know, it did come back out, and it comes back out with the ability to breathe. And so then you can come off the ventilator, then you can talk once your throat’s got back to normal again. And then it’s a long sort of recovery process with your – first your arms and then your legs start to move and you just wait for a sign of somebody’s little finger twitching at you. And you think, aha, you’re in control of that finger, nothing else but just that finger, that means it’s on the way back out. And then the hospital do really good hydrotherapy. They have pools where they lower people in so they can start kicking and moving and, you know, they can’t support their body weight but, you know, they can start to try to build up some muscle tone that obviously has dropped off in a period of three months, but. And then people were very kind over there. Various colleagues had got the odd car, they were either going to go away and so I could then take you, sort of get – once Jack was able to get into a car I could put a wheelchair in the back and then we could actually get out but he just wanted to get out of the hospital, it was get out anywhere, do anything that wasn’t confined there, so – and people were very good about lending their cars, so that was – and so on, until he was then deemed fit enough to go onto an aeroplane, which took a bit of time. They were reluctant to let him out of the hospital. That day he just wanted to get home and get back to his normal environment, so that worked out eventually.

**What did he say about it once he had fully or nearly fully recovered?**

He said how frightened he’d been. And just found it so frustrating, the inability to communicate and not knowing whether he’d be able to get back and do the things he enjoyed doing back home, whether he’d be an invalid. He was just worried he was going to be an invalid and – but fortunately over a period of the following year, once we got home, was able to do almost everything that he could before. Still had some sort of tingling sensation in the nerves in his feet which would be frustrating at night,
it’d wake him up, and that was just the last lingering bit that never ever got healed. But, yeah, it’s – as I say, it really is very unpleasant, obviously for the person but also when you’re with that person. I think also being far away and – but it was really so nice there. All my colleagues and friends there just rallied round and, you know, scooped me up in various ways and helped us, you know, get sorted out with things like cars or accommodation for me. Or even before Jack was let to go back to the UK he – we were able to stay in some university accommodation that was for disabled people, so it was on the flat and had a, you know, walk in shower room and things like that, so we could do that. But, yeah, it was just nice to be able to get back and he could sort of, you know, be back home. But he certainly never, ever wanted to go to Australia ever again.

[1:02:22]

But, as I say, the bond between Andrew and I became very strong, so we could actually work together at long distance. And that’s continued now that Andrew moved back shortly afterwards to work in Denmark, and take over from Vagn Mejdahl in the luminescence lab in Denmark. And that then made communication much easier, so I was forever going over to Denmark to work there, so that worked well.

[1:02:52]

And you said that when you first came back from Australia you were able to write papers using email.

Yes.

This was the sort of mid to late ‘90s. Would this have been your first experience of starting to write papers in that way, over the – specially over the internet?

I guess I must have been doing it before but maybe I was working closer with people who were in Europe rather than so far away, so maybe one was doing it by writing. I was probably a bit slow on taking up internet type facilities, though now I just find it
sort of wonderful that one can do everything and particularly sort of – what I would have liked to have had then would have been the ability to do sort of Skype texting, so you can actually do instant texting backwards and forwards, so it’s not as slow as email, it – you can just chat away and you have a written record. And so it’s better than the telephone for when you want to discuss things because you can go back and say, why did you write that? You know, and didn’t I mention this, and what do you think of that? And I think that’s where communication now is good, it’s instant and has a written record.

**When did you first start to use Skype to work?**

Probably actually only about three years ago here. You know, I was aware of Skype and thought, well, it’s a way of people communicating visually with – and chatting to people in another country as well. I don’t really see a need to do that, I’m quite happy on the telephone, but suddenly realised I could do this texting on there and that – suddenly realised how much faster it was than sending backwards and forwards emails. And there are times when it’s nice not to have it on, and so you have to go back to email and people don’t bug you all the time, ’cause the thing is you can come up on Skype. Though you can appear to make yourself invisible, in fact I’ve found I wasn’t even though I thought I had. So people just sort of butt in, in the middle of something I’m doing with somebody else, and you have to say, oh, you know, go away, I’m trying to communicate with somebody else right now, you know, try and get me later. It’s – I haven’t quite got that one sussed but, no, I just really find it very good. You’re think – instantly thinking on your feet, which is good. But again, as I said, you have the written record.

**And is it necessary to have the picture of the person?**

No, it’s without the picture, it’s purely just on – it’s just a text screen and with no sound, no vision, just a text screen. And that is absolutely fine. You know what the person looks like, you know what they sound like, but it – you can go as fast or slow as you want on it. You can, you know, go off and make a cup of coffee and say I’m going off for a coffee, I’ll come back and reply – I’ll get back to you on this one, and they’re still there waiting for you [laughs].
[1:06:27]

*So when you came back from Australia what was the next sort of step in terms of your work at Aberystwyth?*

Hmm … well, I guess the thing is that having got what was effectively an almost 100 per cent reliable dating procedure, I was then able to say, right, we’re going to move the lab into looking at quartz. It doesn’t have the anomalous fading problem, we appear to know how to measure doses very well with this. And so I started applying for research grants and went through a very productive time when they came in. There was work to – working on loess in China. And that enabled me to get Helen Roberts, who I’d part supervised as a PhD student, but get her back in and working on the loess. And there was also – Geoff Duller had come back and had now got a position in the department, and so he developed the single grain system so we were able to explore single grain measurements of quartz. Until that time everybody had been picking up single grains under a microscope in the dark and putting them one by one onto a little disc. Now we could just pour grains over a disc that had got holes in and put 100 grains in 100 holes very quickly, and zap them individually with a laser, so we were able to put in much power into our grain, get more light out, get everything coming out much more quickly, so increased the signal. Instead of spreading it out over five second measurements, we were able to do it in basically a fraction of a second we could get the light out. And so that opened a whole new situation. I was able to get graduate students who I’d got to work on quartz, so I got Simon Armitage to come and work on coastal dunes in South Africa, so I was going back to explore what could be done in South Africa again now that we’d got an OSL dating lab rather than TL, and also Zenobia to work on the archaeological material. And again, the quartz grains in her coastal archaeological sites were coming from sand that had blown around when the sea level was low and blown into the cave or been taken in on people’s feet or in vegetation that they used for bedding, that sort of transport into the cave and that, you know – she was able to work on that. So we did – the lab just moved into working on quartz and also working on combined projects with people in the US, in Michigan, working on the sand dunes round the great lakes as well. So it was a very active time. Labs go through periods when you think, gosh,
I only have one student left and this isn’t good because students learn from each other, they learn responsibility, they learn sort of simple laboratory technical things from each other. And they feel they’re not alone, they can look at the next student along who’s, you know, making it through and graduating. And so it was really good at this point to suddenly go, right, now the lab’s expanded and I’ve got, you know, a post-doc in as well. And so it – you know, it was a very productive time.

What was involved in terms of technology in converting to a quartz focused optically stimulated laboratory?

Well, we’d been doing the infrared stimulation luminescence from feldspars since the lab in Aber got set up. But now it was quartz and now we had to have really good fume cupboards for acid treatment of the sediment to get pure quartz out. So it was a time of also rebuilding the infrastructure for the lab and making sure that, you know, health and safety was paramount because it’s a really nasty acid, you use it for etching glass, it’s hydrofluoric. And so it required, you know, getting money to – from the department to reset up the lab, and all the time trying to increase the number of laboratory instruments, these readers that, you know, initially I had one and then I got two and then I got three. And having just visited Aberystwyth I think there were – I think there’s now six there, and these are expensive pieces of kit. So the thing is that when you get more people, you know, everybody says, oh, I want one for myself and you say, no, you can’t you have to share one between two. And plan, you know, you have to learn to plan yourself and work with the other person. And so, you know, again it – you’ll get more people in but then you have to get more instrumentation, make sure the lab space is efficiently used, they’re not falling over each other preparing samples. So there’s quite a lot of lab managing to be done and that takes more time than one thinks it does ‘cause you’re also in charge of ordering all the chemicals and making sure that everything is running smoothly. And it’s only when you think you’ve got a person there, you know, as a post-doc or as new faculty member then you think, right, okay, your responsibility now, you can deal with all the ordering and here are the books and here’s how it’s done. But you can get people tell you when they have run out of something, and they shouldn’t run out, they should tell you before they run out. So, yeah, it’s – then when you have a lot of people and you’ve got a lot of projects, and some of them, when their money’s coming from
outside like from the US for a US project, then it’s got deliverables that you have to work to deadlines and write reports as well as write academic papers. So I found I wasn’t going into the lab at all any more, I was just being the facilitator and, er, a little bit of frustration there that you can’t do your own experiment. And I now remembered why Martin Aitken would always come in at, you know, seven o’clock in the morning and work in his lab for three hours with his own piece of equipment, and then he would open up his day to whatever else really needed to be done or people to be talked to. But when you’re in a university department where you have teaching commitments as well and tutorials and, you know, you really don’t get any sensible length of time to sit, think, prepare a sample. You can’t just stop sample preparation in the middle, you have to – you know, it takes so many minutes or hours to do some particular procedure and you have to be able to do that. You can’t say, oh, sorry sample, I’m just going to run off and do the tutorial. And so it’s a bit frustrating but you do withdraw from the lab. I swore I’d never do it and of course did it.

[1:14:32]

_And how did you find that teaching of the tutorials and the lecturing?_

A mixture of enjoyment and frustration, the – what I enjoyed was actually the learning part myself, was going off and doing the research to go and get – to widen my knowledge that I could then pass it on, on various Quaternary topics. So I would – I would organise that, enjoy setting up the lectures, though it was always a bit of a scramble in the first term around and you want to improve it. PowerPoint hadn’t yet come in, so it was a mixture of slides and overheads. And then as soon as PowerPoint arrived I went, oh, yippee, this is fun, so I was able to put together lectures that way. So I enjoyed putting it together and learning, and the frustration was when it came to the exam marks and they weren’t as good as, you know, they could have been. And you think, well, I told you that, how can you possibly not even get what I told you right, you know. But I think that’s true, you know, of every university teacher, you get frustrated. So that’s why I always enjoyed working with graduate students more, they were really enthusiastic, whereas undergraduates, you know, they might be in the course ‘cause it’s just another one to fill in whatever it was that they – maybe they’re interested in river systems and, you know, this is still physical geography, it’ll fit in
but I’m not really interested. But then trying to set up a sort of course for master’s level students, that again is more depth, they’re more enthused and focused, and that I found – found good. And I think then it was then that I sort of went off to Sweden and got invited to go over there and teach a master’s course on Quaternary dating techniques as well as give me the chance to actually write a book that I’d been asked to write. Then it was – then I realised that I really wasn’t that keen on teaching undergraduates. Initially it was fun and interesting but it was the frustration of the level of engagement of some of the students that just got to me eventually.

*Do you have examples of that sort of disengagement with the undergraduates or certain undergraduates?*

Hmm, there was one who said that, oh, dating techniques are just like collecting postage stamps. And I thought, well, you can apply that to any education that you’re getting, and I thought that was a bit unfair. And somebody just said he found all his undergraduate teaching boring and you think, what are you doing here? Or when in the classes where people would have to read a particular paper that you’d chosen and then you give them the background reading. Then some of them would make a really good job of their presentation to their peers and you think great. And then the peers will all sit there looking like lemons ‘cause they haven’t even read the abstract. You say, go away and read the abstracts of the paper your friend’s going to be talking about. And you’d find they hadn’t actually read the abstract and sat there bored ‘cause they didn’t understand where it was coming from. And you think – well, some of them did and that was great but, you know, some of them didn’t like that kind of teaching. This is trying to get them to read research paper – original research papers, trying to get them to make presentation about it so that they get their presentation skills up. And try to make them think by putting it in a wider context and trying to get that message over at a level they understand and that their peers will understand. And some of them clearly present something they’re not understanding, therefore their peers aren’t understanding, therefore their peers go to sleep. So, you know, trying to get these skills. And you only get one chance in a course like that and then you think, oh, how can I do that better? And you can’t really think of a way of doing it better but, yeah, it takes all sorts.
And how did that experience compare to teaching in Sweden?

In Sweden, what was really good was that the students there were really well motivated students and they – some of them were physicists. One of them I remember distinctly was Russian and he was a physics student. And there were some other Swedes who were physical geographers and a German who was a geographer. And I was trying to pitch this at all of them and they were all – it was good, they all came together, it came – they weren’t all from Uppsala University where I was, you know, some came in on the train from Stockholm, for example, or up from Copenhagen, or from Lund and Copenhagen, and they’d come up once a week for this. And they – you know, they were already gripped by a desire to know things about the Quaternary and realised that dating was, you know, how you put it into a timeframe. So they realised that dating was important and that worked well. You know, again we had sort of seminars and projects that I set and they all performed – came up with original research that they’d done, so I was – I found that very, very good. And I thought, yeah, graduate students are – they’ve got the motivation that you can throw something at them and then they’ll pick it up and run with it, and when that happens it’s wonderful.

[1:20:54]

Could you talk about some of the work of the research students and post-docs that you worked with at Aberystwyth in the late ‘90s and early 2000s? So after you’d re-established the laboratories centred on quartz and so, for example, Helen Roberts’ work on Chinese loess, the particular problem that was being examined there.

Yes, the – one had been looking in several groups at dating of loess well before that but suddenly we could work with quartz. We could get the quartz out from the fine grains that there are, it’s – the problem is if it’s sand size quartz then you can sieve it and etch it quite easily. If it’s fine grain dust that you have in the loess deposits, then the problem is that you – if you’re not careful you’ll dissolve away totally your quartz but, you know, we could get around that. And we working together with Barbara Maher from Lancaster University because she was interested in the magnetic record, I was also given the information on past climates. And so we went into the field to
look at a number of sections that Chinese colleagues had suggested would deal with a particular timeframe, particular soil formation, and this was relating to a period when we were able to be sure about the luminescence responses. So we went into fields and we also interestingly found the site which gave us information about early agriculture as well. We realised that we were not looking at a natural deposit in that it – the loess had come in and formed and this had a history of the environment. We realised that in fact, as in most parts of China, people had come in and made terraces, dug, reworked, and from the way that they rotate the soil and dig back and move it forward and dig back and move it forward, we could actually see that in our luminescence record that these grains were being exposed to light when these men were making – using these terraces to – to grow their crops of wheat. So we were interested, we could actually move onto another sort of timeframe. We hadn’t planned to do that but this one particular site enabled us to do that. So, yes, we were trying to – at that point the main aim was to link up with the magnetic susceptibility records which would tell us – which Barbara was measuring. And that would tell us about when soils were being formed because you have a magnetic signal which gets enhanced when you get a soil form. So when it’s warm and moist, when there’s organic material, then you get enhancement of your magnetic signal. And so if you see – if you measure your magnetic signal down a section and it suddenly increases then you’re almost 100 per cent certain that will be a fossil soil. So again, that’s something that’ll be telling you about the climate. So that’s what we were looking at. We tried to find some really modern soils but because the agriculture there is so intensive we actually didn’t find a modern deposit. All we could do was capture dust coming out of the atmosphere today to ask as our modern control sample but – so that was – that’s what Helen’s project was. It was working the Chinese loess.

What did Barbara do in the field, what did you see?

Okay, Helen and I were taking samples down the section to provide a timeframe. Barbara was using a field magnetic susceptibility meter, a Bartington meter, to measure the susceptibility by putting magnetic fields up – making a magnetic field and seeing how the material in the section right next to your instrument was measuring it. So she was able to make measurements in the field and then was collecting small cubes to take back to the laboratory in Lancaster to just tidy up those
measurements, remove any signals that were not the primary signal, and then get a really tight measurement of the susceptibility down that particular section. So there – she’s measuring it in the field and saying, ah, here’s the signal, it’s increasing rapidly here. You probably want to change your sampling around this, so we can tie a timeframe to that susceptibility signal.

[1:26:41]

And could you talk about the experience of the three of you in the field, in particular I suppose the reactions of local people around you while you were going about this work in the –

Oh, yes, I mean the local people, they hadn’t really – in some of the more remote areas they hadn’t seen many westerners, if any – certainly none close up, though by now they would have seen them on the television, so we weren’t completely unknown. But they were always absolutely curious and would – you’d go in with a Chinese colleague, you’d arrive in your jeep and you’d go and say, right, well, this is the – you know, the local guy would say this is the section I think you’re interested in because we appear to have this record, but we’re not sure. And by the time you’ve stood there for a little while, word has got back to the local village that there are these funny people, these funny westerners, standing in front of somebody’s farm, not – well, in front of their field, looking at it. And so people would just come in their tens, they would appear and cluster round you. Or if you want to – if the section is quite high and you need a ladder, then you just have to somebody and somebody will appear from their farm with a ladder that is constructed of basically bits of tree that have been hammered together which is, you know, nowhere near like a nicely constructed modern ladder in the west but perfectly okay for climbing up the sections with. So, yes, total curiosity as to why you were there and why you wanted to look at this and were you looking for gold or for treasure because, you know, there must be some reason, there must be some financial reason why you’d be doing this. But trying to explain it wasn’t, it was for science, was a little baffling for some of the people, but … interested and helpful, I would say is what that they were. And going back more recently what is interesting is now, for example, they will have a mobile phone so if you have problem, you know, the local farmer who’s come out to see, oh, what are
you doing, now whizzes out his mobile phone and calls his friends round. Says, right, you know, we need, you know, a couple of you with shovels, please can you come and join us and – whereas before, you know, the guy would run back to his village and then come back with his mates with shovels, now it’s instantly mobile phone country. And so that’s something that’s also changed from the first days that we went there.

[1:30:33]

*How exactly do you communicate them in order to know that they’re thinking that perhaps you’re looking for treasure or perhaps you’re looking for gold?*

Oh, you’re with a local person so they can explain that, you know, they are a geologist and a geologist is somebody who’s interested in the rocks and how they got there and that no, there isn’t – you know, there is no financial point to what we’re doing. But obviously it’s a little – I mean it would be a natural assumption. I mean it would have been what people thought, you know, in any country where archaeologists have been, and in some cases would have been right, there would have been sort of gold and everybody’s hopeful that they will find something that will make them rich and make – well, at least raise their standard of living, but –

*And can you say something about the sort of informal relations in the field, the things that you do when you’re not focused or really working? I think – are you saying that the three of you went out together on a visit, Barbara, yourself and Helen?*

Yes.

*Was this in a particular year or over several years?*

It was one particular year, and Helen has been back many times since. And I’ve also been and worked with her in America as well. She’s worked on some of the major loess deposits in the US. But, yes, in – yes, I mean there are all sorts of things about going into China, for example, that you – because you’re three western women together you tend to sort of, you know, go off in the evening and find out how to buy
something to eat. And maybe you might surprise locals ‘cause you’re bigger than them and so their little stools that you’re sitting on are a little small. But, you know, there was one amazing occasion when we had a meal, the three of us, because our Chinese colleagues were going off to find noodles. And in fact we were in an area which had a high Muslim population, it was to the west, and we realised in the market there were people selling street food which consisted of small strips of lamb that they’d put on something that might have been either bicycle spokes or umbrella spokes, we never quite worked out which. And they’d put the lamb – skewer the little bits of lamb on them in sort of like a ribbon of lamb on these skewers, put them through hot – through a dish, rolled them through a dish which had hot pepper and some salt on it, and then they would roll the handles in their hands, keeping the pieces of meat over a brazier. And then you’d be given a sort of fistful of sticks on which these bits of lamb and, you know, most enjoyable to have lamb but our Chinese colleagues didn’t like lamb. They were Han Chinese and they don’t eat lamb whereas the Muslims in this area did, and we just loved that, to just have something there. So I have a very happy memory of these braziers as it got dark. And we also discovered that you could buy bottles of beer and it was clearly not the done thing for women to drink beer but we wanted beer with our lamb. So we sat there and all these people came and looked at us. And then there were wonderful local dessert that was sort of – basically must have been something that was a rice based junkety type of thing, and that just made a wonderful end to the evening. So there were some great sort of experiences and the three of us got on very well. Barbara would get out her – her sort of flute, not really a flute, really a penny whistle kind of thing, ‘cause she normally played the saxophone but it was too heavy to carry into the field, and so when she was wanting to go away and think, you know, you’d hear this musical sound coming from, you know, sort of a hedgerow away as she chilled out like that. But, yes, I mean these are shared experiences that, you know, will forever bond the three of us. It’s what you do when you go on field trips, it’s – you know, you get into a little scrape, nothing ever goes quite as smoothly as you expect. And then you remember, you know, you obviously return home eventually and you all have this shared experience. And I think that’s one of the great things about having field work experience or experiences as well as working in the lab. In the lab it’s much more solitary. You get your interaction from your discussion with your colleagues and your students but
some of the fun occasions are what happens when things aren’t quite what you expect them to be, and they absolutely never are.

[1:34:54]

Even in America I mean there are amusing things like Helen and I were collecting samples of loess there from the big loess deposits in Nebraska, and we returned to our motel room in the evening and we were cut – we’d taken large chunks in the field and we were cutting them down to pack up to ship home. And we totally changed the colour of the flowerbed outside our motel room because of all this loess which is sort of pale buff coloured, which we then sort of scraped off our samples and now didn’t know what to do with it. You know, we couldn’t put it in the waste bin so we put it out on the garden and then – which was outside our motel room door, and in the morning we came out and realised the flowerbed had originally been black, it was an organic soil, and we just put this very pale buff coloured stuff all over it. So, you go, ah, I think it’s time we left here. I wonder what they’re going to think when they come in in the morning. So all these little strange things that you go, oops.

This must be the window box gardening that Helen mentions in the book of the sort of memories of past trips.

Ah, yes, I’d forgotten that she’d mentioned that. It’s exactly what it was, trying to – trying to get rid of it. You know, you didn’t want to wash it down the toilet or the bath because it would clog it and it’s – that wouldn’t be a good idea but you thought I’d be safe in the – in this sort of raised bed that was outside the motel room.

[1:36:22]

Is going into the field with two women and working any different to going into the field in a mixed group or with a male [inaud]?

No, I don’t think so. You just – it’s the, erm, camaraderie which comes first. I mean the comparison would be, for example, going into the Kelso dunes in California with Geoff Duller, Stephen Edwards, the master’s student, and Nick Lancaster who was the
local geologist. And there the three of us – it was similar kind of things like
discovering how cold it is in the desert and finding that all your water going to the
place where you’re staying is frozen and – or finding that when you are auguring
down into something that’s – into a sand layer that’s very deep, finding you’re just
about to get your augur stuck and then you don’t know quite how to get it out. And so
I don’t – I don’t think so, I think you’re now basically interacting like a group of
friends in the field. That – in those two situations it certainly was but if I think back
to going into loess, looking at loess deposits in Europe, in eastern Europe, then it was
always – the eastern European scientist was clearly not part of the group. He was
coming in, he saw himself as saying, well, I know this, this and this about what we’re
looking at, and I don’t care what your chronology is, it’s probably not going – you
know, it may or may not support my view, and was always a bit aloof from what we
were doing. And so I’d be going in with one or two other people and we’d be, you
know, getting dirty and taking samples and trying to work out what we thought we
were looking at as well as being told what the senior scientist thought. So that was a
little different but I don’t think the gender mix is – again, either I’m unaware of
gender issues or I just ignore them and then everybody else ignores them, so we don’t
have them.

[1:39:10]

So I wondered to what extent men and women behaved differently in the field, if
there’s any detectable difference in the way they go about it … conduct themselves?

Erm, I think – I mean in China then I know that Helen got a little bit irritated by one
of our young Chinese colleagues who always wanted to take the hammer from her,
whereas she wanted to take her samples and, you know, was a strong and fit woman
who was going to be quite happy to be taking her own samples and this guy,
Gongming, would leap up and sort of, ‘I will do this for you’ and she’d go, ‘No, you
won’t. I’m doing it.’ You know, but it was part of his culture that he wanted to
demonstrate that he was the male and he was the strong and the protective one. And
so it was more a sort of cultural difference whereas I think with a western group the
men will – you know, if it’s something that really hard they will just do it very –
they’ll do it more subtly and will say, well, I’ll just clean this trench out, which will
mean, you know, throwing a pickaxe about. And they’re just doing it very subtly whereas in eastern cultures it is a – you know, it is a slightly more macho, but not an aggressively macho, situation. So I think it’s more cultural than again gender related but I think the men just subtly do it and, you know, Nick Lancaster would then happily say, ‘Well, we’ll augur here’ you know, ‘I’ll take the first goes.’ And you real’ – and then you have a go ‘cause you feel you ought to and you realise actually I’m making very little progress here, I just don’t have the muscle power that these guys have got. And so you just – you sort of say, I don’t think I’m very good at this, you can keep on going for a bit. And it all works out okay, it’s never an issue.

[1:41:03]

*And I thought I detected in some of those notes in the book that your past students put together, I wondered whether there was any slight teasing about sort of male incompetence. One of the students, I think it might actually have been Geoff Duller, wrote thank you for being so patient when students made mistakes and were being patient with ‘usually male’ [requests commas] incompetence [AW laughs]. And I wondered whether that was a feature of if only the sort of jokey conversations in the laboratory.*

I think that’s a laboratory situation. I think boys tend to be less tidy and so you’re – and it’s almost always the women who come into the lab and say, ‘I think we’re going to have to have a cleaning day today, I can feel the sand on the counter and I bet it’s so and so who’s just been in here preparing his samples.’ And so there is a little bit of that but certainly I wouldn’t apply that to Geoff who had also a bit of training in Australia where the professor he worked with there for a year always wanted his tweezers in the same place, and there was one set of tweezers, whereas my view is, you know, who wants tweezers, we’ll have a set each and put your names on it, and then you’ll find them. Whereas, you know, in this lab it was ‘There is the set of tweezers.’ So I think he got well trained in that one but, yes, that was – I think guys tend to be a little bit messier in the lab than the girls are. But … no, I think it’s more of – it’s more that the writing, trying to be patient and making sure that people are writing things well and I think that’s then down to the individual, that’s not – again, it’s not a gender driven thing there. You know, men who write well and carefully and
produce graphs that look appropriate, and there are some men who just can’t get their heads round that for some reason. They’ve got the information there and they can think about it but they can’t put it out onto paper and that might have been one of the students that was – Geoff was thinking about but it wasn’t him. But you get all sorts, you know, you learn – I go in thinking, right, which person do I want, and I first – the first thing I want is absolute enthusiasm, and for me that’ll beat whether somebody’s got a first or second class degree. I’ll take the person who’s got the second class degree with the enthusiasm over the person with a first class degree who’s not really sure if they want to be doing this. And so that’s what I look for when I’m looking for a student. And then it’s just sort of really random as to whether it happens to be a man or a woman who applies for the studentship. But you know that those who are coming in enthusiastically, they’ve got a goal, they know what they want to do. They don’t usually know how they’re going to achieve it, and that’s what you’re trying to show them, is how to achieve their goal. But they will come in with perseverance and that perseverance comes along with the enthusiasm I think, the two are intimately linked. So if you’ve got somebody who’s got the enthusiasm, you know they’ll have the perseverance to make it through to the end even when it’s sort of tough and you’re saying, ‘No, no, you’re really doing okay but you perhaps might like to look at this bit instead.’ And you’re just trying to get them through it as – you know, as comfortably as possible for them.

[1:45:21]

*And was this the first time that you worked with Barbara Maher?*

Yes, I think it was, yes, actually working on a combined project. I knew who she was, I’d heard her give talks, erm, but that was the first time. So, yeah.

*I wondered whether you knew anything of her work. I think her name has come up before in relation to geomagnetism in – in this project on the history of science, I don’t know where … where she stood in the field or in relation to your field.*

She’d – yeah, she’s – she’s the person in this country who is working with environmental magnetism and is not just using it for past climates but has been using
it in modern environments too, looking at where magnetic properties might have changed in the environment as a result of man’s activity. So she has carved out that niche for herself and is the – yeah, certainly the foremost person in the UK if not the world on looking at environmental responses to magnetic fields in one way or another. So I’d known of her and met her at meetings where – some meetings but not just – not luminescence meetings but Quaternary meetings, and so we’d got to know each other. And then you start trying to work out – you know, realising that she’s working on Chinese loess but needs a chronology. I can look at Chinese loess but need a reason for providing a chronology. Erm, I can look at the material for its own sake but I really want to have a focus but, you know, what can it do, can it answer an archaeological question, can it answer some sort of climate change question? So that’s – and then we realised talking to each other at meetings that we actually could come together and collaborate. Well that’s how sort of these projects get set up; they often come through somebody saying, oh, you know, you must meet so and so, they really need some help with chronology. And so you end up with this unplanned combined research agenda but it’s something which you know will work because you both have a combined common goal, if you like. And that’s how all the people who go to meetings, it’s why it’s important to go to meetings that are beyond just your field and then you get an awareness of where people are having problems that might – that you might be able to answer. That means that you can then both work together. You also get a chance to suss out whether they’re going to be people you can work with or not as well. I think it’s important to have people that you can interact with and feel comfortable with. Occasionally you come across somebody, you think I really don’t want to work with that person, they won’t – they’re not open, they won’t share, they won’t write papers. And then what’s the point? You know, at the end of the day you want to put out the knowledge in the peer reviewed literature and you have to be able to work with that person in a way that you can come up and write a paper and is – you know, everybody feels happy about the paper. You don’t want somebody saying, well, that was my idea and I don’t think it should be written like this. And you think life’s too short for that, I want to make – I want to know in advance that the person I’m going to be working with, I’ll be able to come out the other end and write some papers with.

*How do you manage to assess that in advance?*
I guess it’s how – it’s sort of how they present their work. It’s not that they put it in a general context and it’s not this is mine, so their spoken word at a conference. And I look at what their publications are, so you can see whether they’re almost entirely single author papers, in which case you know you’re not going to come out with anything at the other end. You may have something that they want but you know that the chances are it’s not going to go anywhere, you’re not going to gain anything, so you just sort of gently let that one slide. So I think that’s – yeah, that’s the other way it – looking at their CV and then also obviously the obvious one of, you know, chatting with them in the bar. You know, are they – you know, can you spend you spend a week in the field with this person if it’s a project that you’re getting engaged with? So I think those – those three things, you can suss out very fast.

[1:50:35]

And could you describe Zenobia’s work or your work with Zenobia and Geoff I think on the early man?

Yes, that’s been great ‘cause it got me back to working on South African archaeological sites which I’d become interested with John Vogel back in the ‘80s but then didn’t get funding for. Er, she’d been working – she’d done a degree as an archaeologist, done an honour’s year in a lab with John Vogel, and that was where I’d met her, and she’d realised that luminescence dating might be able to answer the questions that she wanted to answer from her archaeological experience. And so that’s – that’s how we came to get her into the UK, into Aberystwyth, and it was the right time. It was when Andrew Murray and I had just got this single aliquot quartz dating working. We knew she had – that the site she wanted to work on and which she had been excavating at had sand units in it, so that would be a good place to go. She’d be able to go back and get material any time because she was South African. It was – you know, it was four hours’ drive from her home I think, it was pretty close. And Geoff had just developed the single grain system in collaboration with the people, Bøtter-Jensen, in Risø in Denmark. And so here was, you know, a good site for applying it. You know, we’d make sure the grains were absolutely relevant to the archaeological material. And there were all sorts of interesting things coming out
from the excavations. There were these pieces of ochre and people – on which were
scratched lines which appeared to representations of something that man was
obviously thinking about. These weren’t random scratches to get bits of ochre off,
they were clearly recording something or decorating something. And so there was a
real purpose there to work on it. And so this got us into a whole realm of, you know,
making the measurements on the single grains, realising that the single grains don’t –
of quartz from one site are not all the same in their behaviours, and then how to
handle the datasets that we were getting from that. And so that became something
like getting all together by the time she’d written it up. We ended up with something
like ten papers on it which were both archaeological and discussing single grain
behaviour and handling the large amounts of data that we got out. So it was very
good and in its – you know, that was a very big push and a very popular topic that was
picked up in the media as well.

*What was the cave that [inaud]?*

Ah, the cave was Blombos and the archaeologist who was excavating was Chris
Henshilwood. And interestingly Blombos Cave was actually on property that Chris
Henshilwood owned. It was a coastal site, his family had owned this land for a long
time and here he was able to excavate on his home territory, and it has been used as
training excavations and is still continuing to be excavated now some ten years later.
And there was this recent article where they were describing these shell pallets, where
they’d mixed the ochre, they found the ochre in with some kind of material but had
clearly been mixed into these shells. And the only reason you put ochre into
something like a shell would be to use it as a mix – or a mixing bowl or temporary
storage container for your art material, your coloured ochre pigment for doing
something with. And so this work is still being done and Chris uses it for training for
– he’s now moved to – part time to Norway, and so he’s teaching archaeology there,
and using again Blombos Cave as an excavation site for, you know, new generations
of archaeology students, still finding new things, going to greater depth – you know,
greater depths in the cave sediments. So it’s – yeah, it’s been a very important site
and it’s one of the sites – well, there was another site as well with another
archaeologist, Lyn Wadley from Wits and that – those two sites are what Zenobia
worked on for a good five or six years and we got all these papers from it.
And what was the luminescence dating able to show about this cave that couldn’t have been shown before?

Well, it was – there had been one or two radio carbon dates near the top of the section but clearly they were limiting ages and could be any age at all. So the chronology was really not at all known. These middle Stone Age deposits which were underneath the sand dune layer that extended into the cave, they contained all of these many, many stone and bone artefacts as well as shells. And, you know, this was all pre-radio carbon, so we don’t really know how old. All we really could say is I think there’s another sand dune further down, maybe that’s from, you know, the last – the previous glacial period. Maybe it’s about 130,000 but maybe it’s not. And suddenly we could – you know, we could firstly date the sand layer, the dune capping layer, so we could say all the material below is older than 70,000 years, and so that was pretty revolutionary to start with. And then by being able to take the single grains from the other layers we were able to say, well, you know, we can actually date the different layers, the layers that actually contain the ochre, the ones that contained the shells, and we could actually then get ages which were beautifully coherent down the section. They got older as you went down within the statistical areas on the ages, and that really gave a very, very strong chronology. So the luminescence – without the luminescence you wouldn’t know when this lot happened, you wouldn’t know how long the site had continued to be occupied for. And the earliest ages at the moment for occupation are 100,000 years, so one’s got a 30,000 period of occupation. People would have moved away and come back and, you know, you can’t work out the precise details but you can see that it appeared to – from the ages you got that showed systematic progression it didn’t look like there were any gaps in particular and looked like it had been used, you know, regularly by people. You know, maybe not all the year, we just don’t know.

And how do you take a sample – take a single grain sample from a cave site?
The sampling is done as a bulk sample in that what you have is effectively a tube and you want to make it to go into the archaeological level that you can see. When you get to an archaeological section where somebody has excavated and they’ve cut down, you will see in front of you levels, sedimentary levels. Some will have more artefacts in or some will be darker or lighter. So you can see that there are periods of occupation that you can clearly see as level – visual levels, and so you want to sample those. So you’re using a sampling tube that is relatively small in diameter. It may be just a centimetre or two in diameter, which you can then insert into that visual level that you can see, and that’s the one you want to date. Unfortunately the nice sponge cake look that you get for loess deposits, which on the whole tend to be like sponge cake flat levels, is not the case in a cave. Sediments sort of get washed out at the back, so the next layer may be sloping, they – so when you’re putting something horizontal into the level you think it’s going in the collecting but in fact you may be cross cutting older or younger levels. So when you get the material back you don’t know, you can’t see this bit, all you can see is the, you know, the face of the section, you don’t know what goes on behind it. So this is where having single grains works because if you have cut through with your tube another layer that’s older – much older or much younger, or there might have been a more recent burial of somebody, you know, tens of thousands of years later than that material, you won’t see that, you won’t be able to know that. But if you can get the single grains out you – you’re getting all your quartz grains out of the sample in a regular way but instead of measuring them as, you know, a thousand grains in an aliquot, you now say, right, I’ll load them up onto these special discs one at a time. So you’ve got a disc with 100 grains on it and then you measure several thousand grains, then you can see, ooh, are they all the same population, do they have the same age or are some of them a bit younger, because there must have been some disturbance there. And so that is the – again, that’s the strong point of measuring sing – being able to measure single grains at archaeological sites because you just don’t know – you just can’t guarantee that you can sample really, really just that level. And so that’s why the single grain approach was perfect development time-wise for Zenobia’s project. It was – so Geoff was able to do – it would have the prototype of the single grain reader ’cause Geoff had built it. His software to control it, his software to analyse the data, perfect in application, and the single aliquot procedure which we could then apply and test out on single grains.
[End of Track 10]
Track 11

Could you say something now about the decision to retire from your position at Aberystwyth?

Yes. This decision came about when I was in Sweden for the six month period and I think it was because I’d enjoyed teaching the Masters students so much over there and then realised how much I really didn’t like teaching undergraduates, I didn’t find it fulfilling. So that was part of it. The other one was realising that my husband was, erm, getting older, though still sort of mobile and totally mentally active, but realised I actually wanted to spend time – more time with him, so I didn’t have to worry about going into the department or anything. And already Geoff Duller was on the faculty there so I knew that the luminescence lab would continue so it didn’t matter if I disappeared, and he’s perfectly capable of, you know, running the lab and developing the project. So I didn’t feel I was necessary there. So it just seemed a good time to quit. Unfortunately, because I was sort of very research active, didn’t want me to go, but because they were actually trying to lose geologists at that point, it was in one of our pre audit reshuffles, then there were financial incentives for people to leave. And I thought, well, if I can eventually manage to persuade them that I’m doing this not to go anywhere else, not to take my knowledge anywhere else, but just to, you know, be around. I wasn’t planning to leave Aberystwyth at that point, I was planning to stay there, but just go in – I went in most days but to be able to come and go as I wanted and just interact with the graduate students and any visiting post-docs. Financially we didn’t have – I didn’t have any children, Jack’s had been catered for before, so financially we didn’t need it. So it was, well, okay, let’s try and go now and just get our freedom and our life together. So very much a personal decision.

And what was the pattern of your life in those, I think, two years of retirement with Jack?

Oh, erm, well that was – it was very good. We still went into the department most days, Jack still had an office there, but it did mean that we could say, ‘Ooh, I think there’s a good weather forecast for next week, let’s go down to Cornwall and go and visit some friends there that we haven’t seen for a while,’ or let’s go across to
Cambridge and visit friends. And so we – it meant that we could just go away and visit places, stay places. I would still go to meetings and Jack would come too but we’d then go and treat it as a holiday, so it was very, very relaxed. So it was definitely the right thing to have done, yeah.

[03:19]

And what relations did you have with your parents at this time?

Hmm … my father had died, he passed away in 1990. And by then my mother was, erm, not particularly communicative. She still didn’t to know about Jack, so – but I did go over and, you know, we did take her out for meals, but it – you know, it was all a bit of a frosty relationship between them. So he would do his duty visit and she would put up with the duty visit of somebody who she still saw as the man in my life as against my husband, ’cause she didn’t know that I was married [laughs]. So, yeah, I would go over every – by then I was going over to see her about once every two months, usually on my own, spend a couple of days and it was quite time to go back again to Jack. So yeah.

How had that changed, ’cause I think last time you spoke about this Jack was sort of zipping off in the car to somewhere when your parents visited? How did it change from that situation to your mother meeting – you know, knowing him and meeting him but not …?

Well, she realised that when she phoned up she kept getting a man on the phone [laughs] so – and he clearly couldn’t be the plumber or the carpenter or whatever every time she phoned, so she realised there was a man living with me. And she just didn’t want to know so she – you know, if she didn’t want to know something she didn’t enquire and if I didn’t want her to know something I didn’t put it in front of her. So eventually I said, look, you know, my man is Jack and we’re coming – and we will come over and stay in a hotel and take you out for, you know, Christmas lunch. And, you know, she dealt with that in a – yeah, obviously a frosty was but at least she, you know, she was pleased I’d come over and … but, you know, just didn’t want to know any more, it was a non conversation piece, shall we say. Whereas she
was always interested to know what work I was doing when I was doing something related to archaeology, because she was keen on archaeology, so I would always try to have conversations with her about, you know, what I was doing. But she couldn’t work out why I was still doing what I said I’d been doing twenty years ago [laughs]. But, yeah, that was still never a close relationship.

Why was that her attitude towards Jack, why?

Oh, because he was so much older than me and she didn’t reckon anybody – any girl should marry anybody who was more than five years older, ‘cause that’s what she’d done, married somebody who was only five years older and that she considered was the limit. So yeah, that’s – she just assumed that somebody who’d be marrying somebody who was a lot younger was clearly taking advantage of them. And that wasn’t the case at all but she wouldn’t understand that and that was always a problem that she had. My father had no problem at all, so …

[0:06:39]

Thank you. And then what happens next in terms of significant events?

Well, I suppose we kept – you know, kept on going into – department must have – let’s think, actually retired in – I’m just trying to think when I actually retired. Hmm … that was 2001, yeah. I guess and the next thing that happened was that Jack actually died in 2003, having had a heart attack in the department but none of us realised he was having a heart attack. But that was sort of a devastating sort of situation. Fortunately after he died then the people in the lab all sort of rallied around, so I was going in the office all the time and that worked extremely well. They were very supportive, gave me lots of things to do, colleagues were very good, people invited me to go like to Canada. And, you know, so this sort of whole community of luminescence people is very personally supportive as well, so that was good. So there were loads of new students coming in to work with Geoff and now Helen, who was on faculty as well by then, so there were lots of young minds to keep occupied and ask questions of.
I also found myself visiting China and spent time there with a guy called Wang Xulong, who I’m still in contact with, just about on a daily basis. I’ve already been Wang Xulonged this morning and we are – that’s with whom I spent most of my time Skypeing. We sit and discuss science and experiments and datasets, buzz backwards and forwards.

So I kept this up while I was in Aberystwyth and then I guess when I turned sixty in 2008 I was by then thinking, I’ve got to do something in my life, I can’t actually sit in Aberystwyth forever. You know, there are two perfectly competent people running a lab here but, you know, I will feel like the – you know, the sort of the ghost that creeps in front time to time and this isn’t right, they need to be – not have me anywhere in sight. But – and it was a case of where, where to go to. And I realised that, though I liked the area of the New Forest, I wouldn’t have known anybody there to go and – you know, or to be able to decide which village to go to, whereas Cambridge, I was visiting, I was passing through en route to a holiday through Stansted and my friend round the corner said, oh, why don’t you come back to Cambridge, there’s lots of people you still know and, you know, you moved away, they didn’t and, you know, this is the place to be. So that’s what I’ve done. I’ve made contact with both the McDonald Institute for Archaeology here and the geography department and have got honorary positions in each of them. But most of my academic functioning is with people at the end of an email and maybe people in Aberystwyth and then I can go visit as well. But also people like Wang Xulong or people in Poland. So yeah, I decided coming to Cambridge would be a good idea and just made the move. So still have the same interests but no sort of – nobody to go talk to every day, but when you can do it on Skype or on the phone or send emails it’s not a problem, I can still think and work and write, so that’s good.

Are you able to share data in that – over email?
Yes. I get files – they maybe files – Excel files or Word documents with graphs on or PDFs with graphs. So, yes, I mean, this is something one wouldn’t have been able to do, you know, twenty-odd years ago and, you know, I’m at the right place at the right time yet again, being able to take advantage of communications that enable me to do the things I want to do. You know, I can download from libraries, get documents. So it’s – you know, it’s all there to do it now, I don’t have to go into a library. I can go direct into Elsevier or through Aberystwyth I can get to other non Elsevier journals. And that means that, you know, all the information is still at your fingertips.

And you said, for example, you’d been Wang Xulonged this morning.

Yes.

What – could you give a sense of what – like what that might mean? What tends to be how it starts, how a conversation over Skype might start from someone, perhaps Wang or someone else abroad who wants to engage you in scientific thinking, how it sort of begins?

Yes. It starts with – can start in one of two ways. It can either be I’ve met the person at a meeting and – but I’ve only just sort of met them in passing and they’ve realised that I’m somebody who is, you know, approachable, that people will ask me things and I’ll freely give the information if I have it. Or it’ll be somebody emailing who hasn’t met me who says I’m so and so, I read your paper on something, so they’ve got the link that there is a particular paper that’s relevant and they think I might still be thinking about it. And they say, I’ve done these experiments that give me this and this and I don’t understand why they do that, so can you help me. So the next one is, yeah, I’ve, you know, got some time at the moment, I can help you, you know, can you send me the graph and send me the experimental sequence that you did to get the dataset for these graphs that you’re sending me. And so that arrives down the email. So it usually starts off as an email correspondence. And it’s only when you’re really – so email is the major way of doing it, because it gives you time to think. It’s only when you’re wanting to have a detailed discussion with somebody equivalent to having a discussion with them in the room that the Skype comes in and then you’re – you can do instant texting, you can almost write – you can almost type as fast as you
can talk. So you can just, you know, talk like we are now but you’re just doing it on a keyboard and that person is instantly there engaging with you. Whereas if it’s emails it might take a little bit and they may have wandered off somewhere, but in this case it’s absolutely instant. And then we send – we’re still sending emails with files on if we want to know – you know, say, well, what does that dataset look like and, ooh, go check your email box, I’ve just sent it to you. So you can get that and then you can look at it and then you can both talk about it. That’s how it works, it’s really – it’s great. I mean, it’s – you know, you’d – I can see why in the past some people might have either gone very solitary when they retired or they disengaged totally from their academic field because they didn’t have any interactions that – in this way because you didn’t have the communication. Now you’ve got the communication, you know, you can discuss things with anybody anywhere, so you’ve I think probably got more chance of staying involved with your research ideas. Though you don’t have the equipment to do it yourself you’ve still got the ideas and if you hit it right you can persuade somebody to do the experiment you would do if you were there, they think it’s their experiment but, you know, you know you’ve just pushed them in that little direction saying, ooh, I think I’d look at that, yeah. So that’s great fun. It also means they have to go off and spend physical time doing the experiments where you can go off and read a book [laughs].

You just wait for them to …

Come back with a …

For the next email.

Exactly.

It’s sort of like – because I remember you saying that at Aberystwyth you tended not to use the machines anymore and that you were sort of supervising at a distance, the distance being from your office to where the machines were and the students came.

Yes, yes.
And it seems to be just like – just increasing the distance a bit but still sort of controlling at a distance.

Yes, yes.

To what extent is it difficult to ensure that procedures are followed in the way that you would follow them if, as you say, you were going to do the experiment yourself? How do you manage to sort of control at a distance what people are doing, how they’re using the machines, how they’re …?

I think you keep asking – you keep asking the questions, you try to get them to write like a mini report. And so you say, well, you know, what measurement sequence did you do to do that, and now because you can actually do a complete – like what the instrument is doing, what the measurements – you know, heat to here at this temperature, hold for this length of time, you know, radiate here, you know, measure this, you know, whatever it is you’re asking it to do, they can send you that sequence. So you can just look down it and say, right, they did that and that, oh, they changed that there. And so you know what’s been changed and you can say, oh, but you asked the machine to do that, why did you do that there, what justification have you got for changing it. And so you can go in and check that way, exactly how they’re measuring something and whether that’s the most sensible way. Usually it is, it’s not usually a problem, but occasionally somebody does something slightly different but you don’t quite know why and then you have to try and find out. So, yes, you need to have faith in what the people – I think the question is do you have faith in what the people are doing and I think the answer is yes you do by asking lots of questions and assessing the answers that come back. It’s like if you ask – if somebody says, ooh, here are these graphs, and then you say, well, actually what did you do behind that, and they don’t come up with exactly what they did because they’ve lost it in their notebook or they’ve lost the programme that they – where they’ve entered the data. You go, hmm, yeah, this is a bit worrying, I don’t think I want to go further with this one. And if you’re at a distance you can easily back off from that and sort of hint they might like to keep slightly better records of precise experimental procedure, or anything in how they prepare the samples, for example. So it’s not quite as direct as sort of taking it yourself or not as direct as standing there behind the person saying, well, let me just
peer into your notebook a minute and, you know, did you enter that column of numbers in the software or did you enter that column of numbers. So you have to – you have an inkling, if somebody sends you a graph you have an inkling of what they’ve done and then you just, you know, get them to confirm what they’ve done. So I – but it means I ask an awful lot of questions and they sometimes say, oh, why do you want to know that, and I say, I just do, just humour me, you know. It’s just me, I just always like to ask a question. And then they just accept that and tell you the answer and we move on. So it’s – I feel confident when I know the person well as well, that if I ask the question what they did they will tell me exactly what they did.

Are there – how do you make a decision about who to help and who not to of those who contact you?

Hmm … I think I tend to want to help people who are from overseas and therefore whose native language is not English, so they get stuck with the subtleties of what they read, they get overloaded in what they read, and obviously in some ways English can be written in a very convoluted way and you can’t always interpret what the person’s meaning. But if you’re an English language native speaker then sometimes you can see, oh, they actually meant that, hmm, they were a bit suspicious about that, hmm, you know, and you can – and then you think, well, the other person probably doesn’t see the subtlety there. So foreign nationals, those who are working isolated in their own country, like for example this Romanian that I’ve just been to visit, you know, she’s done all the work herself. She has interacted with people in Belgium but now she’s back in Romania, you know, she’s trying to set – get this lab running and supervise students and got some mature – some quartz that shows slightly unusable behaviour from her lower section so, you know, just – so when she wrote I was sort of happy to get involved. And the same with the Chinese – couple of Chinese guys. It also works that if you visit them or you see them and you interact for a bit and then you don’t get anything back for a while, this natural attrition occurs, so it depends on the ongoing enthusiasm coming from their end. I’m not going to chase them. For me it’s not – you know, I don’t need publications. But for them if it’s important to them
to develop their careers they will come up with – they will chase me up and then I’ll respond. So I tend to work when prodded [laughs].

And how do you make a decision about whether your name goes on a publication that you’ve helped with?

They usually – they usually put – in most of the countries they add you – I think they’ve now learnt they add you in the author list as to, you know, contribution. Fortunately mine’s usually a smaller contribution, which is – you know, it’s not involved with the whole project right the way through, it’s coming in at a later bit when they’ve got a problem. And then also being Wintle it means you’re at the end of the alphabet so you naturally get tacked on at the end if they think alphabetical, so that’s okay too. But I’ll only go on it if I’ve been through all the data and am happy to support all the statements there. And often I’ll have had quite a large impact on writing it and turning things around and saying, this is an irrelevant part, you’ve put it in but it’s totally irrelevant to your main argument, take it out, or conversely, you really haven’t developed this bit enough, I’ll sit and write this bit so this bit is the stronger part now ‘cause I think that’s what’s most important to the wider audience that you’re trying to attract to your paper. So that sort of thing I’ll do. Or have you got the dataset which will support this, if not go off and make the measurement so and so and then see if that supports what you’ve been doing and come back with a dataset and then we’ll incorporate that in the original plan. So papers don’t just go linearly in the direction you think they are when you start, they often – there are often places where you can strengthen by doing a slightly different experiment. So I try and sort of push them into doing those. So yeah, I’m happily usually the end author [laughs].

Are you able to – would you be happy putting your name on a paper if you hadn’t seen the material in the field?

Hmm … yes, because usually the papers – usually those papers are using that material for more luminescence experimental work and it’s very much exploring the luminescence characteristics of the quartz and feldspars. And so it doesn’t really matter where it comes from. If it’s a paper where the dating is important, like the – the Chinese loess or Blombos or the Californian dune sands where now the date – you
know, it’s more dating, you know, you’ve already sat and looked how material worked and you say, ah, I can date this, this isn’t going to be a problem material, go ahead and date it, then those are usually sites where I will almost certainly have been and looked and taken the samples and been there. I may not have done the work in the lab myself, I may have been one of the students or research technicians who’d be in the lab doing hands on, that doesn’t worry me. But usually I like to go and see. It’s not just ‘cause I like going to exciting places, which some people seem to think it’s just because I like going to, you know, somewhere like Alaska or the US Mid West or China or South Africa. It’s just that I want to know what the issues are, I want to talk to the archaeologists and see what their thinking about it is, how the dating can help and then also how they can help me by saying how they thought the sediment grains got there, you know, did they blow in, did they get carried in in water, you know, how did they get there. So that I think is important, to go in the field and – it’s why it will not be like radiocarbon where somebody sends in a bit of charcoal or twig and that then gets dated in a lab. This – it is – you really do want to see how the sediment’s got there. It’s part of – it’s part of the – understanding the zeroing mechanism, understanding whether there’s any possible radioactivity problems because of water going through the sediments. Whatever it is, it’s good to go and just see it. And then you also use that opportunity to interact, get to know, understand the problems of the person who’s interpreting the site, the archaeologist or the climatologist or the, you know, magnetic susceptibility person, whoever it is. You’re there with them in the field. That also is a much better relationship than going through finally to the final discussions, implications and writing the paper. So it’s good from that point of view too.

[0:27:18]

When you said that perhaps someone you were helping over Skype might send you an outline of the procedures they followed, so that you can see what they’ve done in order to get the data they’re showing you, to what extent does the Risø machine and the computer that controls it provide that for you? Does it produce a sort of printout of what it’s done so that it keeps its own record?
It keeps its own record but it keeps it stored in the machine. It – the software that runs the Risø equipment is developed by them but you – it’s very easy to see that you tell it to – you can tell it in words to heat to here, cool to here and it will keep that – you store that programme and say this is the run that I used on this sample, or this is the run that I used on that sample. So there is a run that specifically – a file that’s specifically for that sample that goes – that sits there together with the data it produces. So you can see those and people can just copy it and send it over.

[0:28:32]

Thank you. And while in Cambridge, when not using Skype to continue researching luminescence, what have you tended to spend your time on?

Well, having been here in Cambridge now, I guess it’s probably two and a half years, I – I particularly go walking once a week, so I’ve joined the local rambling club. So we go off and do twelve mile hikes every Wednesday and sometimes on Sundays. So outdoors when it’s not chucking it down with rain and it’s not – it has to be fun, if it’s raining to start with I don’t want to know and I just hunker down and stay in the house. Other things I do is I have – I go to theatre, concerts with various friends who – the ones I picked up again with here and some new ones. I have signed up for U3A courses, University of Third Age courses on crime fiction, so going back to early interests and detective stories, now having a reason for doing it because I actually have to discuss it with people in meetings once a fortnight. So that’s every first half of the year after January. So I still enjoy doing that. And I have a friend who actually runs the courses here in Cambridge and we go and do things like go on holidays to Sweden to go and see where they made the Wallander films that have been on the television, that’s Henning Mankell’s detective character. And I suddenly realised that walking round the countryside here I was looking at churches and then realised I actually knew nothing about churches so I’ve been doing some – took a course in development of church architecture, so I can actually appreciate far more. And found another – one of my other friends who also likes looking at churches and so if it’s a nice day we just phone up and jump in the car and go off to look at a little group of churches somewhere. So enjoy doing that. Going on – and going on walking holidays abroad, so, you know, still doing the walking but also doing some travelling
in Europe, but getting to places like also as far as Northern Morocco but I’ve been to Spain or Italy and walking through the countryside there but, you know, seeing different things. So combining, you know, architectural things with the walking and enjoying, you know, eating and drinking local food and wine and beer. So, yeah, really enjoying doing that. So fine, I never have a moment where I just sit in the house and think, oh, what shall I do today, there’s always something there on the agenda, the calendar is forever full with something. Or it might be, you know, travel off to Aberystwyth or go on the luminescence – join a luminescence person somewhere for a few days. So all of these things seem to go out. I used to think, oh, I’ve got an empty calendar and then you realise it’s only empty from two months ahead of where you are, next two months are absolutely stuffed with things to do. And being in Cambridge, there’s just – you know, there are just so many more things to do than there were in Aberystwyth, for examples. More concerts, more choral music to go and listen to, more lectures on various things, some might be archaeological or – you know, it’s a very varied life here.

[0:32:41]

Could you tell me about the sculpture that you bought from a lady in the – who I think is in the same village.

Oh yes.

Which has – aspects of it sort of remind you of parts of your life or people that you’ve met.

Yes.

Perhaps you’d like to describe it first and then say why you bought it.

Well, the sculpture is, er – it’s about a foot high and it’s in two parts. And what it is, it’s made of wood, and it’s not any old wood, the wood is bog oak. It’s the wood – the oaks that were found in the drained land of East Anglia. And I came across these bog oaks from this part of the UK when I first came to the Godwin Lab and they were
being used for calibrating radiocarbon. And so they are something that I – always makes me think about the Godwin Lab here in Cambridge. The – but also this wood, it opens up like a – the piece opens up like big doors open up and – it was called Gateway to the Past and I just see it as the Godwin Lab epitomised because also in it are some pieces of bronze, which have been also sculpted but in the form of shells. There’s about five of them. And they fit inside the sculpture. You just get a hint of one of them from the outside. But they are shells and again one of the people who was in the Godwin Lab when I was first there was working on oxygen isotopes of shells from archaeological sites. She was doing this together with Nick Shackleton, who was interested also in archaeology. And so it reminds me both of Nick and also of Margaret Deith. And so again part of my life then. And there are other shells in there which remind me of another colleague who interpreted, or interprets still, land shells, Richard Preece. And so for me that piece of sculpture has a very special meaning. I was quite surprised to find this elderly lady in the village is making – she makes big sculptures but this small one with bog oak and bronze just had so much meaning for me. So it’s something I enjoy looking at every day.

What’s her name, the sculptor?

Christine Fox. She’s a delightful lady who has a large number of sculptures in and around Cambridge but also, I believe, beyond.

And have you collected any other art or viewed any other art that has some sort of link with or echo with your work?

Hmm … more places than work. Erm, for example, I was in Alaska and I got taken by a print of the sun going down over the trees in Alaska, so that for me was – it’s upstairs in my bedroom and it – I always think about the fieldwork in Alaska. And that was together with somebody who worked on fission track dating of the ash layers that are found there. So that speaks to me of – that picture speaks to me of Alaska. I’ve got a reproduction of a – just a cheap reproduction of a Georgia O’Keeffe landscape from South West United States and that reminds me of doing fieldwork in California. So again it’s a landscape thing. The – and again there’s another piece of ceramics which reminds me of dunes in Namibia, where I’ve also worked, and that –
though I bought it from somebody who made it locally, it’s again very evocative of that region. And other things, like I’ve a bit tapestry from Zambia where I went and worked and that’s hanging up in the hallway, so there are – and then there are little porcelain plates by – with sayings by Piet Hein, the Dane, and this reminds me of the time I spent in Denmark. So almost everything that is surrounding me here is reminiscent of places that I have been or things that I have done, including a rather large Cyril Power reproduction print of an eight, which reminds me of days when I started rowing in Oxford. So they’re all – everything that’s scattered around has got a significance of a place, though not necessarily directly related to work.

[0:38:39]

Thank you. And I wondered whether, over the course of your adult life, your views on religion have altered?

Hmm … well, I – I’m not sure that religion per se has possibly altered. I usually go into Cambridge once a week and go to something in one of the college chapels, Evensong or just a recital, but it’s purely for the musical content. I suppose I get moved by choral music, early choral music, and just enjoy it in the settings where it was designed to be heard. But I do not take part in any sense in any of the proceedings. So – I can’t sing in tune so there’s no point in me opening my mouth and singing anything, you know, I sort of stand there and try not to look out of place but I’m really there for the music and for the architecture. So I don’t think that my religious views have changed, in that I – and also I become – recently went to Korea and I found I did not approve, for example, of the results of sort of, you know, 100 years of missionary activity in a country where the culture – I don’t think it fits in. And so I have a problem with things like that. But, yeah, I can go in and I can appreciate beauty around me in the landscape but I don’t feel that I have to go to that through any kind of religion per se, but can be moved by music or landscape or art. And so I might say I’ve become more spiritually aware over the last forty years, I would think, but I don’t see that as becoming more religious in a formal sense anyway.

What does being moved consist of for you, what does that mean?
Hmm, just becoming detached from all the other things around you, being swept up in the piece of music. Er, just thinking, wow, how wonderful it is to stand around and look at this – look at the landscape, look at the ocean crashing down. And so I think increased appreciation of natural beauty.

[0:41:43]

And the same question for politics, whether your political outlook or views or voting habits have altered throughout life and say why.

Again, no, not really, they’re – they tend to be slightly right of centre but only slightly. I wouldn’t want to be a politician so I don’t want to spend time blaming one side or the other. I find it amazing – well, I don’t know why I should be amazed because in science we never have an ultimate solution to anything, we never have an ultimate proof, so why should we expect to have an ultimate political system that functions at all levels. We certainly don’t have. And, you know, external things have impact on a country or countries, like we’re going through at the moment, and you think, well, what could people have done, you know, would it have – would we have a Euro crisis right now anyway. And so, you know, everything is an – there is a living in the present feel and thinking, well, you can’t actually ever get an ultimate paradise where everything works for everybody, this is not achievable. So a slight bit of frustration but I’m not going to lose sleep over it.

[0:43:12]

Thank you. And you mentioned in the first session that your father – when you were a child your father used to give you detective stories to read. And I wondered whether you could say something of your – the development of your interest in detective fiction as time’s gone on.

Oh, I’ve read detective fiction on and off – I’ve read some other things but I’ve come back to detective fiction now I have a sort of reason for reading it, like this course I’m doing. And funnily enough, exactly right now I’m re-reading a book that I probably
haven’t looked at for forty-five years that was one my father gave me, because it’s one of the ones that’s listed on this course. And I just still enjoy some of the older detective stories but also appreciate how newer ones will deal with contemporary issues. The ones in the past tended to be rather esoteric, written in ivory towers for people in ivory towers. Nowadays they’re much more dealing with problems in society and, you know, whether somebody’s ripping somebody off on a building project and that’s the cause of the murder that occurs. But – so I think, you know, there has been a change in how we look at it. There’s also the international aspect. I think my father would have really enjoyed sort of the wider range of crime fiction that’s now available, because it takes you to other countries and other views, particularly when it’s written by a person who is a native of that country and then you’re reading it in translation. I’ve just read in translation one – a Catalan detective story, much to my surprise, and again it just gives you insight also into those countries. They don’t write about the crime per se, they write about the crime in the context and in the context of life, living in those countries. And I think he would have enjoyed that as much as I do.

What’s the book that you’re reading after forty-five years?

It’s by Michael Innes, Death at the President’s Lodging. And Michael Innes was somebody who I actually met when I was at Linacre College in Oxford. Erm, I knew he was in Oxford and I managed to get somebody to invite him for dinner. And it was just interesting meeting the person who’d written all the stories that I’d read. I’d read everything he’d written. I look back now and think, yeah, they’re rather pretentious, and I even knew then they were pretentious ‘cause I had to keep looking up words in the dictionary. And I have been reading this one and I was reading it on a train yesterday and I thought, I wish I had my pen with me, I could have written down all those words I didn’t know. And I think, yeah, but I’d never use them so there’d be no point in doing that, whereas when I was younger I’d write them up and look at them and think I really ought to know what that word means and use it, but I’ve forgotten them all [laughs].

And who are your sort of favourite contemporary crime writers?
Hmm … oh, I think I like Kate Atkinson, who’s written one about Cambridge and some more about Edinburgh. I like the way she constructs stories within stories. They’re – it’s written in a very different way. I like Graham Hurley’s down to earth bird watching detective set in Portsmouth because it’s sort of like home area. But again it’s set in Portsmouth and seeing Portsmouth as a – the haves and the have nots, again it’s a contemporary society with comment on them. I don’t go for historical crime fiction, I prefer sort of contemporary ones. And Ian Rankin is always good for really tightly crafted story and, you know, not too violent but with believable people. And Colin Dexter’s more – you know, even though one obviously is influenced by the TV adaptation with John Thaw, it’s still – you know, I read them originally first but still enjoy those very much. I think it’s places that I know and I think that is actually – yeah, it’s a mixture of places that I know but also places I don’t know and would like to learn about. Like I don’t know Edinburgh but, you know, it would be fun to go there to Edinburgh. And like going to – to Sweden having read the Henning Mankell books of Wallander, then you can – to go there and see it, see the landscape. So I enjoy those right now. But things change, you read new ones and forget some of the older ones.

And aside from the geography, what’s the appeal of detective fiction?

Ooh, it’s – it’s something that is light. I find I fall asleep too easily if I read something that’s rather serious. I like trying to work out what’s gone on and try and solve it, but I never do [laughs]. And I guess that’s – it’s something that links across to my work in the sense that I feel all the time I’m trying to solve a murder after it’s taken place. So there’s a – it’s a mystery, it’s something that you – something has happened, you don’t know why it’s happened or how it’s happened. Well, but you know how but not why or by whom. And I think it’s just trying to put – just seeing other people put logical arguments together and then trying to follow them yourself. I think that’s why I enjoy crime fiction.

What are the key mysteries in luminescence dating, is it the – you talked about the – not knowing precisely where a grain – where a – you know, where a piece of quartz has been, the sort of life history of the piece of quartz, how it’s ended up being where it is.
Yep.

*And how that relates to what – the signal that you’re getting from it.*

That’s exactly – that’s one strand of it is, you know, you get a signal, you measure the signal coming out of it and you know that it – that within that somewhere is certainly something telling you the amount of time that’s taken place since it was deposited. So you want to know how to get that time as accurately and precisely as possible. The other questions are trying to work out what happens to your signal if you do this, this and this to it, heat it, irradiate it, bleach it with light, and then you should be able to understand the system well enough to know exactly what it’s going to look like – the signal will look like at the end of that point. And it doesn’t always come out looking like that and so that is intriguing and so why and then trying to – you know, basically you’re interrogating your suspect, you’re trying to get – you know, trying to get your grains to tell you how they behave, and they’re like completely reluctant suspects, they don’t want to tell you what they’ve done. They may or may not be good witnesses. So that’s there, and also just seeing – yeah, basically seeing how reliable the grain behaviour is. So that again is always – you know, and is it the same for all grains or, you know, you get quartz from different places and it behaves slightly differently. And it’s, you know, it’s just like human beings, they’re all variable.

[0:51:38]

*Is there not a way of looking into the crystal structure and trying to anticipate how it will behave by – I mean, are these traps visible at any level of magnification or …?*

No. They’re only available to find out what they are by looking and seeing whether – for example, does your signal go up if you made artificial quartz and you put in certain elements to dope it to disturb the crystal structure. So if you start off with a pure laboratory grown quartz and then – I don’t have the facility to do that but you can go to labs where they can grow really pure quartz crystal for experimental purposes. And there’s no luminescent signal coming out of that material at all. But then people will have wanted to dope it with different atoms to go into the lattice to
alter it. And so if you put in manganese then it’ll alter the luminescence efficiency, so ions or any of these things. We know it changes it but nobody’s ever done a – can make a one to one linkage, you know. The luminescent signal will go up as you put in more of this particular element but then suddenly you put in more and nothing else happens, so what was that about. And so it’s – I tried to bring this all together with colleagues in Switzerland and also in Italy and – who – these colleagues have looked at it for a whole – you know, they’re a mixture of physicists, geologists and physical geographers. And we all sat there with the literature trying to answer these questions, what is the cause of this, what do we know, and it was really quite illuminating that we really realised that we didn’t know an awful lot. The luminescence signals we measure are very sensitive monitors of something in those crystals. People look at trapped electrons using a technique called electron spin resonance, and so they irradiate and their signal goes up, but we don’t know which of those signals or which of their many signals that they can see correspond to the many signals that we see in the luminescence. And trying to get a one to one saying this really is this, we can measure it also with ESR and we know that’s due to that doping; we’re not there. I mean, it would be nice to spend a lot of time doing that but when most of the pressure comes on the research for you to actually get a dating technique coming up, you know, what – you know, there’s so much of blue sky research you can do but when it comes to trying to – at the end to have a deliverable, the instant deliverable is an age and so you – we just tend to do it empirically. And this is – this is frustrating but in the end you have to accept that as what your research involves.

Just in that, what’s ESR?

ESR? Electron spin resonance.

Ah sorry, thank you, yeah.

And finally, could you say something about the experience of being interviewed for National Life Stories, including the process of thinking about your life and writing notes on it in preparation.
Yeah. I found it an interesting experience because I’ve never kept – I’ve never kept diaries and never actually had to think about why I’ve done things in life or what influences. I’ve been aware, for example, of perhaps when somebody has said, ooh, you’ve got this award, and you think, well gosh, I actually would have liked to thanked – would have liked to have thanked so and so and so and so and so, because I’ve realised that they were influential on my life and why I seem to have been, you know, reasonably successful at what I’ve done. But I think these interviews have made me think far more about the influence of people. I’ve always been aware of serendipity playing a role, seeing an opportunity and seizing it, and I think I’ve just seen that reinforced during the course of putting these – putting some notes together for the interview. And also being aware of – by all the people that I’ve mentioned, being aware of how much impact I’ve probably had on people by things like, you know, I went and looked at my publication list and realised they were almost all co-authored papers, particularly as the years have gone by, but that’s because I find it more exciting, I’ve had less time. But it’s brought me into contact with lots of people, so I’ve found that, yeah, it’s made me think about the roles all these people have played in my life but also thinking, oh, I’ve probably played some sort of role in their life as well. So I’ve – I think I’ve come away with the impression of a – sort of positive from having done this. I haven’t unearthed any skeletons that I think, oh gosh, I should have done that differently. I haven’t had any problems like that. It’s actually been a positive reinforcing thing to have done.

[End of Track 11]