3.3.7 My Time at Cambridge

Back to my first arrival at Cambridge in October 1953.

(i) The Cavendish Laboratory

As stated above, I had arrived at Cambridge on a Viscount Rhondda Research Studentship given by Gonville and Caius College. It paid a handsome scholarship of £325 a year (quite generous for those times) – with no fees to pay. The money was to cover food and living

expenses. (A three-course dinner those days cost only 3/6 (three shillings and sixpence), i.e. about one-sixth of a pound. Nowadays that type of dinner could cost around £7.50 – i.e. 45 times. So £325 of those days was equivalent to £14,600 at today's prices.) A few days after arrival, I made an appointment to see the Master, Sir James Chadwick – a Nobel Laureate in Physics (and the discoverer of the neutron) – at the Master's Lodge. Sir James was most gracious to me – and enquired after Professor Rafi Mohammad Chaudhri – who had sent me from GCL (the Government College, Lahore). I conveyed Professor R. M. C's greetings – and then said I would like to present a small gift from my Father to him. (For I thought it was perhaps inappropriate for me to present to him a gift of my own – having seen my Father's strict code of gift-giving and receiving (see later).) It was, I think, a 2-part gift. One was a cigar box made of walnut wood, in dark varnish and with surface carvings; the second was a lacquered wood, slender, faluting-necked flower vase, also hand-made: in black lacquer, with a red and yellow flower painted on its belly. Sir James asked me to thank my Father on his behalf for these lovely gifts.

I forgot to mention above that I was given one of the best set of rooms in college because of my Rhondda Studentship. These were C-2 in Gonville Court, and consisted of a large sitting room – with heavy brown leather sofas, some chairs, a desk, etc. At the back was a small bedroom – with a small iron-barred window giving on to the narrow Trinity Passage (?) separating Trinity and Caius colleges. Often one heard, of a morning, the familiar sound of dray-horses' hooves resonating on the cobbled street, as they drew a load of beer drums, etc. As mentioned earlier, an elderly 'bed-maker' lady made my bed, took away the white china piss-pot (or bed-chamber) to empty it, and probably also collected dirty laundry – which I stingily kept to a minimum. (I hand washed my socks once a fortnight or so, and even wore them in bed, I remember. They must have produced a rather pungent smell to others. I only felt their cloying gooiness; I think my shoes or slippers made a clip-clop sound as I walked. They nearly disintegrated when I washed them after a couple of weeks or so of day and night duty – and had to take them to the University Aunts in the area behind St. Mary's Church for repair.)

The next important scientist I met was Professor (Sir?) Otto Frisch, who was the Head of the Nuclear Physics Division at the Cavendish. The Cavendish Professor then was Sir Lawrence Bragg – another Nobel Laureate. Professor Frisch was a slight, rather small man, with a friendly face and rather penetrating eyes. I knew, of course, all about his explanation of the fission phenomenon, together with his aunt Lise Meitner, immediately after observations made by Hahn and Strassman in Berlin in 1938; and I think I made a reference to his being an Austrian during that interview, at which he smiled. He told me to visit the various groups of experimenters at the Cavendish and then decide which group I would like to work with. So I spent the next few days visiting the various groups and their laboratories. I

think I very much liked Denys Wilkinson's group, but for some reason finally opted for Dr A. D. French's group working on Low-energy Nuclear Physics using the cyclotron (a 3 MeV (?) Cockcroft-Walton generator (?).) This was possibly because, just before leaving Lahore, I had been helping Dr Chaudhri unload and install the 0.5 MeV (?) Cockcroft-Walton Generator at R. M. C.'s High-Tension Laboratory, a quarter of a mile away from his GCL Department of Physics.

In my group was a Ceylonese and a Portuguese (from Coimbra University) – both hard-working characters. (I became quite friendly with the Portuguese – possibly because he was always criticizing India for 'usurping' the Portuguese colony of Goa in South West India; and I, being a Pakistani, was quite happy to back his anti-India stance!) An important worker – and probably the senior-most under Dr French – was a research student called Geoff Dearnley, who later on, in the early 1960's, became famous for his pioneering work on semiconductor detectors, while at Harwell (Atomic Energy Research Establishment), and wrote one of the first books on that type of device. Another co-worker in that group was Ian Grant – who became a very good friend and was later on invited by me to the Atomic Energy Centre, Lahore, in 1964 – 1965, when I was the Director there. (His chief interest in coming to Lahore was to go mountain-climbing in the Himalayas. He contributed to my journal the NUCLEUS while there. Sadly, he died in 2002, while only 69; he was then a Reader in the University of Manchester.)

Ian Grant and I were given a room to share on the first floor of the Cavendish Laboratory (then next to the Black (or Old?) Friar's Street, with Downing Street (or Place) on the other perimeter. This was a large room – a great part of which was occupied by a large red-and-white plastic model – which I later learnt was the original double-helix constructed by Crick and Watson. (I used to see Francis Crick at the tea-time break, often emitting a long and loud laughter. He was a tall, slim man, which reminded me of a Sherlock Holmes character. People said he was a no-good, noise maker (but then he won a Nobel Prize around 1966 as the co-discoverer of the structure of the DNA molecule).)

I must now describe my quite stupid approach as a research student. It must be remembered that, before coming to Cambridge, I had always been considered – and possibly was – a brilliant student all the way from Primary and Secondary school and through my college days up to my MSc exam. I had, almost without fail, stood first in the class in my school days, taken the top 1st to 5th position in the University exams throughout my college career; and had been sent to Cambridge with a shining certificate by Dr Chaudhri – himself one of the most hard-working students of his day at Cambridge. And here, I found myself amongst perhaps the most brilliant physics students in the <u>world</u>. Instead, then, of throwing myself into the arena to work as hard as I could to learn new techniques and new science – I, most stupidly, tried to give the impression that I already knew those machines and that most

advanced, world-class equipment. For instance, I remember a large piece of equipment called a 'kicksorter' (actually invented by Denys Wilkinson a couple of years earlier) – which sorted out the energy pulses from a detector (i.e. it was a sequential voltage discriminator). Instead of simply admitting that I had never seen one before, I pretended that I was quite familiar with it and had worked with a similar instrument in Lahore. I wonder now how one could be so idiotic. The more senior students would have gladly explained to me how it worked. I did get some training in the use of a lathe and a milling and turning machine – but did not spend as much time at it as my Ceylonese counter-part seemed to be doing. Also, although in my experimental work I was not likely to make much use of it, I started reading books on advanced mathematics: tensor algebra, imaginary numbers ($\sqrt{i}$), quantum mechanics, matrices, etc., etc. – often studying them until 3am – with the gas-fire in full blaze in the cold nights of England – and then waking up at 11 or 11.30am; missing the breakfast, turning up in the laboratory at 3pm, and start reading research papers in Physics journals, instead of doing actual experimental work.

But perhaps I am exaggerating a bit. I did, of course, do some experimental work and did learn some new techniques. Thus, I remember learning a technique of making thin beryllium films from a technician called Lamb. (He had a very East Anglian (?) accent. He said: "Get a rait-tyled file…" I said what is rite-tyled – how do you spell it? He said: are, aye (eye), tee; tee, eye, eye elle…(rat-tailed). Another time he said: To-die is Fry-dye; it is the pie-dye. Again it was spelt Tee –o-dee-eye-vie… I knew nothing about the principles of English crosswords. During a tea-break, he said: I am stuck on this clue: A small island for hire. I said, how about Islet (as I knew it meant a small island. Lamb had to explain about the "is let". He was most impressed by my knowledge of English). Anyway, one had to evaporate or sublimate a small lump of beryllium metal placed inside a small cage of tantalum or whatever, coated with a paste of aluminium oxide or something, on to a glass slide coated with salt solution; then cleverly dip the glass slide at an angle into a trough of water, which would dissolve the salt (common salt, NaCl) and off would float a very thin film of beryllium. This film would then be bombarded by a beam of cyclotron protons to lead to the emission of neutrons (i.e. ${}^{9}_{4}\mathrm{Be}$ (p, n) ${}^{9}_{5}\mathrm{B}$). I cannot remember what we did with those neutrons – or did we just calculate the cross section for that reaction? Anyway, Lamb had told me that powdered beryllium was a very hazardous material – as it produced Beryllicosis (something like silicosis), which could lead to something like lung cancer or tumours. (He said he himself had become immune to this after years of use – so that he sometimes did not wear the mask over his nose, that I always had to – or was supposed to – wear.) When I was hospitalized for bovine tuberculosis of the kidneys in early 1955 (January), one school of thought opined that I had had beryllium poisoning of my kidneys.

I was always a bit clumsy with my experimental procedures. Thus Ian Grant once gleefully narrated to all those present in the AECL how, when I had constructed some electronic device during my first year at Cavendish – which had taken a long time to complete – it all went hay-wire with a loud bang: sparks jumping about. I had no clear memory of this. However, what I do have a clear memory of was an incident with the Cockcroft-Walton generator or the cyclotron. During an experimental run, the cyclotron had been kept in my care for 2 or 3 hours. I was supposed to keep filling a funnel with liquid nitrogen so as to maintain the high vacuum produced by a diffusion pump. For some reason, at one stage during that run, I failed to put in enough liquid nitrogen. The result was that the cyclotron broke down – or some pump oil got into the system. Geoff or some technician questioned me about it. I was honest enough to admit my oversight. No-one admonished me – and it took them nearly a day and a half to clear the system of the oil – but I felt quite embarrassed and ashamed.

So much for my experimental prowess. Next, some other adventures.