

Biographical Bits 1939 - 1970

Chris Anthony

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Biographical bits (1939-1970)

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INTRODUCTION

A few years ago I was asked to write a biographical memoir of a recently-deceased Fellow of The Royal Society - my hero Professor Rod Quayle. It was emphasised that I must produce a Memoir that would provide the authoritative account of his life and work in science. Working with his widow Yvonne, we had difficulty in getting the facts of his early life. My son Hugh pointed out that he knew very little of my early life and so I set out to write a brief account for him. Brevity has been abandoned but this does remain an account of facts rather than an elegant literary project. I self-indulgently expanded the original brief beyond early childhood as a reminder to myself as memory fades. Because of the origins of the project (a brief account of my early life) I have not included enough about John, Pam and Richard to whom I owe my happy childhood; my apologies. I should also like to thank them, my parents, my wife Liz, sons Clive and Hugh, and friends and colleagues in science, in music etc etc for contributing so much to my happy life.

The pages of illustrations are partly for my benefit, reminding me of events and especially of family and friends.

SUMMARY

I was born in the Peace Memorial Hospital 27th June 1939 in Watford, a town near London. My twin brother John was born first. Mum was only expecting one of us until about a week before. He was to have been John Christopher, so we took one name each, John arriving first. Our total weight was about 8.5lbs

My father (George) was a brewer's labourer; he married my mother (Hilda Hedges) in 1935, after they had saved for seven years to have a deposit to buy their house (for £500) in North Watford at 12 Eastfield Avenue; a new semi-detached house half way down a hill. I also had a younger sister (Pam, born 1942) and brother (Richard, born 1944). During my first 6 years Britain was at war with Germany so my father was absent as a soldier.

I went to Knutsford primary school and then Watford Grammar School for Boys. In 1957 I attended the University of Reading: BSc in microbiology (1960) and PhD In Microbial biochemistry (1963). I was later awarded a DSc (1984). I spent three years extending my PhD work with my Tutor and PhD supervisor Len Zatman in the same Microbiology Department (1963-1966), and one year's further post-doc work with John Guest in the Microbiology Department at the University of Sheffield. In 1967 I joined the Physiology and Biochemistry Department in the University of Southampton as a lecturer. I later became senior lecturer and Reader and then was given a Personal Chair in Biochemistry (1984). I retired in 2004, retaining my office for a time and having

the title of Emeritus Professor. I married Elizabeth Marian Elliott in 1970 and we have 2 sons Clive (born 24/02/1979) and Hugh (born 24/07/1981).

HISTORICAL CONTEXT

About two months after our birth war was declared against Hitler's Nazi Germany. He had taken over adjacent Austria (the Anschluss) and then invaded Czechoslovakia. The British government at last realised that people like Winston Churchill had been right in warning against Hitler's aggressive expansion plans so they told Hitler that if he invaded Poland, the next on his wish list, then we would be at war. He invaded and World War II started. He soon attacked Belgium, Holland and France; they surrendered, leaving Britain standing alone. Stalin's communist Soviet Union had made a non-aggression pact with Hitler, allowing him to attack Poland without Russian intervention. They then shared Poland. As soon as it was convenient Hitler broke the pact and attacked the USSR.

In 1940 the German Airforce (Luftwaffe) set out to prepare the way to invade Britain. Requiring air superiority they started bombing the airfields that would be used for defence, and then moved to bombing major cities. The relatively small British air force (RAF) defended vigorously in what became known as the Battle of Britain, Churchill (now Leader) coining his memorable phrase "Never in the field of human conflict was so much owed by so many to so few". The war against Germany continued until 1945, and against Japan until 1946.

In Britain the government prepared for a long war. As an island, provision of sufficient food would be a problem with imports threatened by the strong German navy. Food rationing was introduced. The army, navy and air force were strengthened by conscripting huge numbers of able-bodied men, excepting those involved in agriculture and some key industries. Women started to be employed in factories and on the land.

Dad was called up into the army soon after the start of the war, so mum had the sole responsibility for (eventually) four children during the next five years. We all had Ration books with stamps – to be redeemed for bread, butter, sugar, meat etc etc. This continued well after the end of the war. To cater for a growing family with rationed food and only a soldier's pay was a huge challenge. Of course there were no sweets and very little fruit. Vitamin C was provided as rather unpleasant orange juice in medicine bottles.

I wish I had paid more attention to my father's stories about his army experiences which were the most interesting of his life. He was always the lowest rank. I remember he did the following: drove a lorry, often with ammunition in France and Germany; worked on an anti-aircraft battery way up north in the Shetland Islands where there were important Naval bases, and also defending Bristol. We later found that he had worked on the guns at 'Battery Point' in Portishead near Bristol where my wife Liz grew up, and almost certainly lived in her house. Toward the end of the war he was involved in painting army trucks (the special regimental badges etc). We only saw him when he had short periods of leave such as the Christmas when, answering the knock on the door, I found a soldier in khaki carrying a gun. He later told how they were doing some army exercise in a wood and came out onto higher open ground and there before them was an "ancient city like magic with golden towers and steeples like nothing we had ever seen before". It was Oxford, impressing Dad so much that he talked about it with rare poetic enthusiasm. Another time he woke up alarmed in Holland to see a large ship coming through the field towards him – on a canal of course. His favourite stories were about how they hoodwinked despised officers, a

favourite being to prevent them borrowing his lorry to drive into town, by removing the rotor arm from the distributor.

At primary school one day we were all taken into the school hall to be told that if the war finished tomorrow (7th or 8th May, 1945) then we could have a day's holiday. So the war started two months after my birth and finished two months before my 6th birthday. At the war's end the country had street parties. I don't know if these were all on the same day or who organised them; ours was at the top of the hill as it was flat. I think I remember it but this may be because we still have a picture of it. It must have been soon after the war's end because there were very few men in the picture, and certainly dad was not home then. There was little change in life after the end of the war. Word soon got round if there was anything special in the shops. The most special piece of rapidly transmitted gossip had Pam and Richard piled into the pram and all of us trekking up to St Albans road to buy the first sweets – small bags of dolly mixtures – like tiny liquorice allsorts but without the liquorice.

Some children had chocolate that their soldier dads sent home to them in tins distributed to overseas soldiers by the Red Cross. We didn't get ours because dad was in Holland and was horrified by the half-starved little boys, so distributed his gift to them. I told this story at a science conference in Holland 30 years later and was thanked by a Dutchman who thought he might have been one of those boys.

Mum's only brother, uncle Edward was captured early in the war when fighting Italians. I think he was in a tank but he did not seem to want to talk about this, or his time in prison. I cannot remember there being a picture of dad on the wall at home but there was a picture of Edward in his army beret and shorts. It was sometime after the end of the war that he came home, welcomed to our house by big Union Jack flags hanging from the windows. I was always slightly nervous of him although he later became my favourite uncle. He was very angry if we were fussy about food, as when I complained that the marmalade was too thin on my toast. We got a speech about how unnecessary it is to have butter *and* marmalade. The result of his years on starvation rations I guess.

OUR PARENTS

Dad (George, born 7th July 1910) and Mum (Hilda Hedges, born 22nd February 1912) were both born in Watford. Both were slim and short (5' 2"). They left school by the age of 13 or 14. Dad had (I think this is correct) 11 brothers and sisters. I never met his father who drank too much and one Christmas day came home drunk to a family who had waited 3 hours for their Christmas dinner, only to see it thrown into the garden. Dad was very quiet and this is one of the only stories we ever heard about his early life; he never drank except Christmas sherry. He worked all his life in Benskin's Brewery, as did most of his brothers and sisters. His job was to test that the steam-cleaning process used for the beer barrels had been effective. This was done by smell – searching for alcohols, aldehydes, esters, acids etc, although I guess he did not know these details. I went to see him at work once. It was terrifying. The whole operation was in a vast covered area with a roof but no sides, so very cold. The huge barrels were rolled noisily across the floor and he had to catch them, sniff through a small hole in the side then plunge a flaming tar torch inside to read the barrel number, write it down in beautiful copper-plate script and roll the barrel on. I recently chatted with the first PhD student that I had examined (more than 50 years ago) who has become one of the top brewing scientists in the USA. He was thrilled to hear about this and now tells his students that the father of the author of *The Biochemistry of Methylophilos* (me) was a snifter, now replaced by gas liquid chromatography.

We regularly met some of dad's brothers and sisters. The ones I remember are aunty kitty who lived in the old family small terraced house whose most exciting feature was the small rear garden, backing onto the electric Bakerloo Line. Uncle John ran a nursery and so was not conscripted in the war. Uncle Earn (wife Esme) was a foreman in the brewery. They had no children and always made a fuss of us when we walked the long hot 2 miles to visit them. He had a bad leg and so was not conscripted. He was very entertaining for us, always complaining that he had a bone in his leg. Aunty Alice lived near Leavesden road Baptist church that we attended, initiated by unmarried auntie Rose. Aunty Beat was usually around with auntie Alice. Family parties were like films of Cockney parties with a lot of *Knees up Mother Brown* singing and dancing. The uncles played horrid games with us, like the pirate story where, blindfold, we removed the patch (real) from the pirates face and then had to put our fingers into the squelchy eye socket (half a lemon); I can still feel the horror.

Every year there was a Benskin's Brewery sports day with exciting and frightening battles between the Coopers, Transport, Bottlers etc. The ones I remember best were the tug-of-war which was very aggressive, and the 60 yard race, run carrying two full tuns - small wood or metal barrels. At the winning line the tuns were dropped, to career into the crowds if we were not first driven back. Of course there was a lot of beer, fuelling the athletic aggression. I can't remember dad taking any part and certainly not drinking. He smoked a pipe – one ounce of Erinmore mixture per week. He never swore. When I was in sixth form at school and a student I worked at the Brewery and was frightened by the constant effing all the time by even the women workers. Of course I became accustomed to it and learned the important lesson that swearing does not indicate a wicked or dangerous person. Dad died at the age of 55 (1966) of some unspecified lung/heart condition.

Mum was born as Hilda Hedges in 1912. She lived as a child in No. 11 Charles Street near the centre of town. She had an elder sister (Auntie Doris) and younger brother Edward. When she was six years old (old?) her mother died and Granddad married again, providing the traditional wicked stepmother for his first three children. From about the age of nine Mum had to take them in a pram to the town to do all the family shopping. She was always unclear when I asked about this time in her life. Grandad always cycled to visit us on Sunday mornings. When very young (13 or 14 I think) Mum left home to work in a big house as a maid. She made a great friend there who became our auntie Alice who lived with Auntie Annie in Wellington road. She had married young to someone who left her; she may have divorced him. They often came to tea, bringing 'shop cakes' and leaving 6p for each of us on the mantelpiece. Mum sometimes was slightly offended that we made a fuss of these little sponge cakes with pink icing when she was such a good cook.

She was a very good dressmaker, with her Singer sewing machine, kept in the cupboard under the stairs. She made a lot of our clothes and also clothes for other people. She went to clean other people's houses, the memorable one being in one of the rows of mock Tudor houses near us. I think the lady had no children and made a fuss of us when we were small and were taken there with mum. I don't remember this; what I remember is that she gave us expensive presents at Christmas, including the wooden machine guns that we used for shooting doodlebugs (German V1 flying bombs).

One job mum did to make ends meet, providing enough money to take us to the next Friday wage packet, was decorating Christmas crackers. Not as exciting as it seems. Horrible glue spread on crackers followed by sprinkling of shiny bits which scattered themselves everywhere.

To put it kindly, Mum was the dominant parent in our home. She was very intelligent and energetic and Dad was not, although he was kind and hardworking. And of course he was away from home in the war and so mum became accustomed to make all decisions and do most of the work. He was usually very quiet and when mum was in the kitchen in frequent ranting mode “I work my fingers to the bone with no help” etc, he would sit in the front room silently chewing on his empty pipe stem. I never once heard him arguing back. Mum would mock him about his lack of drive, coming back from the war and going straight into his old poorly-paid Benskin’s Brewery job. I guess he was delighted to have a job at all]. On demobilisation all soldiers were given a suit and shoes; his were odd sizes (one 6, one 7) and his failure to complain was a subject of mockery as was the fact that when the government informed past army personnel where they would serve if called up again he was listed as in ‘Intelligence’.

Mum blamed her short temper on her red hair, although it was auburn rather than a strict red. I don’t remember outbursts of sudden bad temper. What was more noticeable was her becoming upset about something and tenaciously going on and on about it, gradually expanding a specific annoyance into a prolonged generalised rant. I don’t recall this ever affecting our love for her.

One day when mum was working at the sink dad kept coming in, refilling a pail of water. Irritated, she asked what he thought he was doing getting in her way all the time. “Putting out the fire”; “where”; “it is only the shed”. It was completely burned out. Fortunately mum knew she could claim on insurance for the old bike, rubbish like punctured tires, broken chains, wrecked saddle etc. This provided enough to buy a new shed (asbestos) which I took over with curtains, an old chair and paraffin lamp to make my own private space. Mum had learned about the insurance one evening when the insurance man came to collect the weekly premium and found her in tears. She told him that she had been drying socks on the fireguard before the open fire and they had fallen in and burned. He invited himself in to hear all about it and to explain that she could still claim even though it was “all her own stupid fault”. He then got her to tell all the small home accidents that she had caused and so had not claimed for. He kindly fabricated an appropriate scenario and helped her claim for it all, explaining that for years she had paid promptly and had never once claimed.

OUR HOME

Upstairs our house had two bedrooms and a bathroom with sink and toilet. Before Pam (1942) and then Richard (1944) were born I shared a bed with John in the back bedroom with a view over the allotments and the backs of the houses in the distant notorious Devon Road. Allotments were small parcels of land ‘alloted’ to applicants to grow food. Dad had one after the war but it was not on our nearby patch. A favourite activity was to go to meet dad coming back from the allotment. We occasionally helped with digging potatoes, picking beans etc. I loved shelling peas, separating the smooth and wrinkled, not yet knowing their importance in developing Mendel’s inheritance theories. Runner beans always seemed a success and the excess was left, in bags on the front garden gate, for anyone to take.

Downstairs were the front room and kitchen. The front door from the porch opened onto a tiny ‘hall’ with a door to the right leading to the front room and the stairs in front. All our coats were hung on hooks to the left. I hated going up the stairs in the half dark, always apprehensive

about what might be hiding behind the coats, sometimes forcing myself not to run up. The front room had a low door leading to the stair cupboard which doubled as an air raid shelter occasionally. There was a large table, now in our kitchen, which also doubled as a play area and, again as an air raid shelter. There were upright chairs under the table and two armchairs and/or a small sofa. The most important feature of the room was the radio. We never did have television. At some stage we had a wind up gramophone, a gift from granddad, but very few records (78rpm); the only ones I remember are the laughing policeman and Susa's Washington Post March. When I was about 16 we were amazed when mum bought an electric Dansette record player, this being the first time that I remember any non-essential item being bought. Not long after this she met my primary school teacher (then Miss Riley) at the bus stop. This led to a gift of unwanted 78rpm records which was the music I got to know more than any before or since: Beethoven's 2nd symphony; Last movement of Tchaikovsky's 6th symphony; Sibelius's Swan of Tuonela; Stravinsky Firebird Suite; Mario Lanza opera arias. Of course there was a lot of surface noise on the old records; it was not until I played cello in the Stravinsky with the City of Southampton Orchestra that I discovered there were 20 missing pianissimo bars at the start, with hidden music also at the end of the Tchaikovsky. The Mario Lanza led to me liking opera. We could not afford new records so my only 33 long playing records were borrowed from a friend (Robert Thurlow), the most memorable being Beethoven's 5th and 8th symphonies, and Dvorak's New World Symphony. I borrowed the scores of the Beethoven 2nd symphony and the Stravinsky Firebird from the library and loved to think I understood it all; I now know better.

The kitchen, connected to the front room but with a separate back door, contained a gas cooker, a sink, and a wall-mounted gas Ascot to provide hot water although it was rarely lit. Of course, there was no central heating. There was a coke-burning stove which was used to start the morning fire in the sitting room, involving a slightly frantic carriage of burning coke between the rooms on a small shovel. An early memory is of John picking up a red-hot coal that had fallen out the front; I would not have remembered it except that the noisy fuss he made inspired me to do the same. This coal fire and the kitchen stove provided the only heating. If the coal fire threatened to go out it was revived by draping newspaper over the wire mesh fireguard to draw in a reviving flow of air beneath. This is only memorable because of the times that the paper (Daily Mail) went up in flames. We never had heating in the bedrooms. There was a larder, but a refrigerator and washing machine were only added after I left home for University in 1957. Monday washing was done by hand, then passed through the mangle before hanging on the washing line. Then all to be ironed. The back door led to a small area containing the coal bin, dustbin and shed. Coal was delivered by fearsome blackened men carrying bags of coal on their shoulders from the coal cart which used to be pulled by a horse - later from the coal lorry. Milk and bread were delivered from horse-drawn carts, also later replaced by small electric floats. At the sound of the horse's hooves we were dispatched with shovel and bucket to collect the valuable droppings for manuring the garden. I still love the smell of horse manure. The garden was small with a small lawn and flower bed, the further part being separated by a couple of rarely fruiting Cox's Orange Pippin apple trees and one fruitful cooking apple tree. We were encouraged to grow small crops of radishes and to plant seeds of necessarily hardy flowers, my favourite being Clarkia. Mum was expert at filling the garden with flowers which often started as clippings from friends' plants and once from cuttings surreptitiously scissored off plants in Kew Gardens.

The children's bath night was Saturday night. When smaller, John and I shared the bath, squabbling over who had to sit at the tap end, trying to avoid the uncomfortable plug. Later the squabbling was over who had the first clean hot bath and who had to wait until it was colder and

dirtier. Of course Mum always wanted it to be fair, so she arbitrated. We found this attitude irritating as we were older. When playing cricket we had to have equal times batting; even if we were not out we had to hand (or throw) the bat at a less competent player – usually Pam.

Before Pam was born we ('the twins') slept in the back bedroom with mum and dad in the front. My main memories of this bedroom was being comforted after a nightmare. I still remember the picture of a boy in the bed-time story who woke up smelling burning; I woke screaming – I was wading in a river with flames all around. My other memory is the promise of the wrapped Christmas presents that were stored temptingly on top of the wardrobe. Pam took over the backroom, and we took over the front, to be shared with Richard and his noisy hayfever later. Mum and Dad slept on a sofa bed in the downstairs front room. I am not sure when (probably about the time I went into the 6th form - 1955), but an extension was built onto the back of the house, just big enough to take the sofa bed. It had a flat roof accessed through the bathroom window on sunny afternoons when my school friends visited.

Our first attempt to have pets was due to the monthly rag-and-bone man with his horse-drawn trailer, banging metal pans to arouse us and giving small gifts for junk. One exciting time the gifts were yellow fluffy day-old chicks. We could not resist asking for some and mum could not resist us, although she made a fuss about where to keep them and what to feed them on. We put them under a soil sieve on the back lawn with a slice of bread. Of course, as guessed by mum, they died of cold overnight. The only successful attempt at pets for was our rabbits kept in hutches under the apple tree. We had two small rabbits which grew and grew to be the biggest possible rabbits; they were a cross between the Belgian Hare and Flemish Giant. When they escaped and ran down the road we had to catch them by riding them down on a bike and flinging an old mack over them. It was our responsibility to feed them and clean them. Their diet was mainly stale bread supplemented with plantain or dandelion leaves. When we neglected them in any way the fearsome threat was the rabbits must go – a threat used for other misbehaviour unrelated to rabbits. I can't remember how it was organised but we bred some pure white pink-eyed albino babies from them.

PRIMARY SCHOOL YEARS (AGE 4-11)

Knutsford Primary School

We (always referred to as the twins) first went to Knutsford Primary School (Headmaster, Mr Cook) in September 1943 soon after our fourth birthday. It was close to home so we could walk. One of my earliest memories was filing downstairs to the boiler rooms which functioned as an air raid shelter whenever the wail of the sirens interrupted lessons. I was much more nervous of all the strange hot water pipes than I was of bombs which we would not have heard above the sound of our organised singing; Raggle taggle gypsies Oh! After one year I skipped up a class and so was in a different class from John who was never academic. My school reports were positive, a memorable one saying that I was an asset to the class (I had to check if this was good or bad) but that I talked too much! I was given a shilling for my good report and John was given a shilling for trying (which he didn't). Mum was against competition, irritating us because we had to give up the bat to young Richard even if we had not been got out during French cricket. There was no school playing field, so we played football with a tennis ball in break times, although I cannot remember joining in much.

Because I had jumped a class I had to spend 2 years in the final year - class 6. In the second of these I was captain of Drake house but this involved very little except wearing the red shiny

enamel shield badge that I loved. I think I also chose the members of the netball team which I captained. Most memories relate to special classes of course. One day of the week we listened to a broadcast 'How things began', starting in the Precambrian and, too slowly, arriving at the exciting dinosaurs. An old man was lured in to show us his trilobite and ammonite fossils. In class 2 we had a red haired aggressive teacher who blighted my future life: throwing a cricket ball to us – arranged in a circle around him- seeing my mind was elsewhere he flung it too vigorously, briefly knocking me out. From then on he was slightly nervous of me (I realise in hindsight he worried that I might complain) and was never nasty to me in class; but the negative side was that I still get a shocking blast of adrenaline if I hear the sound of a cricket ball being struck. The cricket ground in Tirupati in India with its 8 simultaneous games brought it all back.

The school had a small garden and I volunteered to be garden monitor, mainly for the privilege of sitting alone reading in the tool shed when the weather was rough.

In class 6 we were taken on outings, the most memorable being to Dunstable Downs and Ivinghoe Beacon which involved quite a long walk up and down steep hills. I loved it and wanted to find real mountains, eventually satisfied by going on a Boys' Brigade camp at Chideock in Dorset with the high Golden Cap cliffs. We also went to the Elizabethan Hatfield house, the most memorable part being the first world war tank in the grounds.

In the last 2 years (class 6) we went camping in Cuffley camp, near Potter's Bar not far from Watford, sleeping on palliases which we first stuffed with straw. Some of the boys had big problems with the shared washing up, new to them but routine for those of us who did it daily. I loved living in a ridge tent, and the smell of canvas has remained attractive even though I now sleep in a camper van.

In class 6 I always came 2nd in the class to Joan Quick who looked like the young Princess Elizabeth. We had a lot of preparation for the 11 plus exam, for entrance to the Grammar School. I only remember the maths paper, which had 8 questions, the last being a complex question about areas of garden paths and ponds. When we came to the exam the structure had completely changed to an 'intelligence test' format. I guess it still had formal bits of English and maths but it had none of my area of expertise –calculating areas of garden paths. I passed and John didn't, as expected. Before and after the exam little fuss was made over it but I was given a present. Some of my friends had bikes but I had a penknife. Strangely I cannot remember feeling envious, we just knew that we were a bit different. The real disappointment was that I had great difficulty opening the blade but I dared not confess this – till now.

The winter of 1946/1947

This was a famously terrible winter – one of the worst on record. We were under snow for weeks after the middle of January. The river Colne had earlier flooded its valley near us. The area near the river was one of our playgrounds, becoming more so after the flood became frozen and it was possible to walk a long way on fields of ice. Of course we were warned of stories of people falling through thin ice and we had our techniques for checking. The places we preferred had no water beneath the ice, just frozen earth. When the thaw set in there were floods all over England. The main thing I remember about this period was the need to avoid a boot-full by going in water above the top of our wellington boots. It was our (the twins) responsibility to make sure Pam and Richard did not come home with a boot-full. Mum used to get so angry if we failed, as the boots had to be dried out and socks changed etc. She would nag for hours on end, sometimes only stopping at bed time when the ritual was for us to say sorry, although that had already been done,

and this led to forgiveness and a cuddle, an early example of not allowing the sun go down on her wrath. On one occasion I came home soaked and mum did her usual thing of slapping us but finding that too tiring she grabbed a toy cricket stump which snapped when she hit me with it; a story used against her for years.

Life outside school

One of my earliest memories is of walking home with John when we were only about 5 years old from the group of shops where Knutsford Avenue met Bushey Mill Lane. As we came around the last bend in Westfield Avenue the air was filled with a terrifying wailing as of a dragon coming after us (John more realistically suggested a tank or lorry). We ran the last part home to find all mothers standing in their front gardens, worried about the approaching air raid. The single pitch of the all-clear was always a relief to hear. It was about this time that the doodle-bugs ('flying bombs') were released on London and sometimes came our way. We had a gun emplacement made of the large curved fireguard and armed with some wooden guns, a Christmas present from the kind lady whose house mum cleaned. We screamed with delight when we scored a hit and saw flames coming out of the back of our target (the ramjet engine). Mum ran out of the house and identified it as a doodle bug; we later learned it hit a school in nearby Harrow, killing 110 children.

We children did not interact much with neighbours. I cannot remember much about up the hill. Next to us downhill were Mr and Mrs Lee who were elderly with no children. We only saw them when we had to go and ask for our ball or other stuff dropped over the fence. We only saw Mrs Lee who was fierce. The antagonism might be related to the fact that all camping trips had involved singing, a favourite song, mainly performed on our return while washing up was 'I'll tell you a tale of old mother Lee (unrelated), down by the sea' - etc. Our main friends were directly opposite; auntie Marion and uncle George Moran with brain-damaged Robert (a little older than we twins) and nice Mark who was mainly friends with Richard. We have met up recently and I have visited them near Honiton where Mark repairs violins and does other woodwork things. I was a bit frightened of Robert who chattered meaninglessly most of the time but this was balanced by his mum who teased him and laughed at him, making everything friendly.

Until the age of 9 we attended St Alban's church Sunday school on Sunday mornings (or afternoons?). I remember it as being dull but not much else. The feeling of release on coming out of the church has remained with me, whatever the church. The church was on Westfield Avenue so near enough to walk. On Thursday evenings 'aunty' Alice collected us to walk us to an evening children's thing in her Plymouth Brethren hall at the corner of the notorious Queens road and Loates lane. The walk started at the end of our road on a track that led up past the gravel pits (used for target practice in war), past Reed's School (an orphanage) then down two tunnels under the main LMS rail line into Queens road. The distance was about one and a half miles. Alice came to collect us, took us there and back and then walked home. We sang choruses and listened to speakers who told stories illustrated with flannelgraphs. We had to memorise a Bible verse every week and there were quizzes which I loved as I usually won them. The hall was always full of children who came from the rough local area and were very smelly, especially on wet nights. We won lots of prizes – mainly bibles every year. The walk was exciting as it was almost all in the dark; torches were some of our most prized possessions, with the thrill of new batteries a regular joy.

The whole area around the gravel pits was known as 'the rocks' as in 'going up the rocks' etc. Now it is an industrial estate.

When we were about 8 years old aunty Rose (Dad's unmarried sister) encouraged us to go to the Sunday school at Leavesden Road Baptist church. This involved a walk up Balmoral road to St Albans road then up Regent street to the church at the end of the road. It was less formal than St Albans church and was the home of the Boys Brigade and its junior partner, The Life Boys, which we joined at age 9. The uniform was our own short grey trousers and special blue jersey with a big brass badge and a sailor hat. The couple of weeks waiting for my uniform were two of the longest of my life. Its most enticing feature was the pocket inside the hat. We met Tuesday nights. I remember little about what we did except that we lined up in some sort of groups opposite each other and I nervously waited to see if Richard Tilling, a beautiful fair haired boy in the facing group would be there. The Life boys went for an annual camp (in huts) which I remember little about except that one was at Kessingland on the North Norfolk coast. We slept on bunks in huts. Sea swimming was the most attractive activity although my main memory of this is the fear of the cold aggressive waves and struggling to get ashore on the steep pebbly beach.

SECONDARY SCHOOL YEARS (AGE 11-18)

Church and Boys Brigade

After 3 years in the Life Boys we moved to the older Boys' Brigade which met on Friday nights. I remained a member until leaving for University. A key activity was 'Drill'. Marching in twos and fours in complex patterns. I enjoyed this, especially when we had competitions with other Companies and in the Albert Hall. In my second year I joined the band on 3rd cornet. My first evening we played the Intermezzo from Mascagni's Cavalleria Rusticana. Rests were played as sniffs. Mr Cater ran the band, his two sons playing tuba and euphonium. 'Monkey' Wright played tenor horn. When valves got stuck Mr Cater unscrewed them and gobbled all over them. I did not like this so I provided my own gob; he was later diagnosed with tuberculosis. John also played cornet in the band and became a better player than me. Perhaps that is why I jumped at the chance to change over to trombone, always referred to as the slush pump, because of the copious spit produced during play and released by a small valve, infuriating mum when it formed a pool on the bedroom floor. We often played together at home, not thinking of the possibility of suffering neighbours. Mum, chatting with a stranger at the bus stop, mentioned that her sons played cornet and trombone to be told that her new acquaintance, who lived in Devon road on the other side of the allotment, always opened her windows to listen to us playing. The band played in competitions and in our Annual Display, held with other BB Companies in Watford Town Hall. The competitions were fun but a bit stressful. One time the euphonium player was ill so I tried to double up on euphonium and trombone parts; at the end we had to endure the judge commenting on our performances. On that occasion we were not placed but had a special mention – for 'the valiant efforts of the trombone player who thought he could fool us into thinking we were listening to a complete band'.

About once a month there was a Sunday parade led by the band, with me on trombone at the front behind the boy with the mace. We started at Harebreaks corner at the end of Balmoral road or up by the North Watford Odeon, marching along empty roads to the church at Leavesden

Road. The flag was always marched to the front by our 'colour march' – the March from Handel's Scipio. We took part in massed bands of the Boys Brigade in a 'Festival of Britain' (?) in Wembley stadium where in a rehearsal interval we were allowed to play football – so I have played at Wembley. I was in the front row of the band with another 15 trombones. We often performed in the Albert Hall in the Annual Display of the London Battalion (District), both in drill demonstrations and performances of the massed bands. My one brush with royalty: I was right marker of the massed bands when The Duke of Edinburgh inspected us. He paused to chat "why did you join the Boys' Brigade?" "to play cornet sir". "I see you succeeded". "No sir, this is a trombone". I later played for him in a small jazz band marching in front of the University cars carrying him from the University up to Wantage Hall for dinner.

Although the band did not officially take our instruments to annual camp, five of us took ours one year, in the back of the canvas-topped truck with tents etc. We were going early to set up the camp. We circled the monument outside Buckingham Palace playing Sousa's march El Capitan. For boys not going into further education or apprentice jobs (like John) there was the promise or threat of National Service and competence in playing in the brass band was a possible ticket into the relatively gentle life of a bandsman. At the age of 18 boys would disappear from BB and youth club for three months basic training in Catterick, returning with horrible short hair, smelling of army soap, sometimes dropping in with their instruments to show off their improved playing.

When at University, in vacations, I joined the Watford Silver Prize and Ex-servicemen's band. They were good fun, playing transcriptions of Beethoven's 5th Symphony and William Tell Overture. Whenever there was a stretch of rest bars for the tubas the music was accompanied by noisy slurping of the pints of Guinness that lurked under the chairs of the players.

Every year we went to the Boys' Brigade camp, sleeping in bell tents and eating in marquees. The latrines were dug the weekend before by some of the older boys; they were just big holes with a wooden contraption having a row of seating planks. We had to pay for the camp from our small pocket money and later from our paper rounds and Saturday jobs.

Band practice was on Tuesday nights, a tradition that has continued for 60 years – in Reading youth orchestra then a group in Sheffield then the City of Southampton Orchestra.

I cannot remember the reason, but when I was at Grammar School every Tuesday I went to auntie Alice for tea before going to band practice. The house was packed with heavy Victorian furniture with a coal burning range that heated the small sitting room and was also used for the huge tea kettle. There was a budgerigar called Joey. A picture of the battle of Waterloo dominated the room. I can't remember what I had for tea; the most memorable item was marrow jam with ginger. I have never since tasted anything with that label that was anywhere near as good. Alice was a Plymouth Brethren devotee and every week I had lectures on the second coming. She had huge impressive time charts of the bible, starting about 4000 years ago in Genesis and extending from Revelation to beyond the present time. I teased her with talk of evolution which she countered with chapter and verse from Genesis.

Saturday night was youth club in the church hall. I spent most of the time playing table tennis but also tried boxing. Once a year the BB ran a November jumble sale, the jumble, collected from surrounding houses and church members, usually carried on old prams through the damp foggy evenings. The event itself was always fun, my main memory being of old ladies competitively sifting through rather smelly heaps of old clothes. Once or twice a year we had a talent night

where I played a transcription for trombone of Handel's aria *Where'ere you walk* or his famous *Largo* accompanied by the church organist Mrs Willis. I was usually congratulated for my beautiful tone but I worried that this was because nothing else good could be said of the performance. I think Mrs Willis was especially kind to me because after services in the church I usually went and sat in the balcony where I could watch her playing the organ. We were often the only two left in the church by the end.

The minister in the church while we were there was the Rev. Lewis Misselbrook. He was a small gentle man, surprising us when we learned that he flew night fighter Mosquitoes in the war. He made the idea of a good kind brave Jesus believable. I turned up at his house one night when I was about 16 and said that I wanted to be baptised as I had loved Jesus for some years. After some interrogation he accepted that I was genuine and arranged for me to attend appropriate classes. These covered topics I felt I had absorbed unconsciously for many years, first at Auntie Alice's Thursday night meetings, then in BB and also a couple of Billy Graham meetings at Wembley, urged along by Blessed Assurance (Jesus is mine), How great Thou art, etc. At the baptismal service I climbed up into the pulpit with my carefully prepared notes to give my testimony but found I was holding them upside down. I was too nervous or embarrassed to correct this so spoke without them for which I was later gushingly commended, mainly by sentimental old ladies. Misselbrook set the church evangelising, going out to the surrounding streets (our parish) 'Visiting'. This was done in pairs, usually one older one younger. I was involved in this for some time but my only use was as recruiting officer for the BB and Saturday youth club.

Saturday morning pictures and library

Every Saturday morning we (John and me) went to Saturday morning pictures, usually at North Watford Odeon. We went downstairs at 6p, and upstairs (9p) only on birthdays when it was free. Before the films there was a session of singing, with words on the screen: *When April showers do come your way they bring the flowers that bloom in May; You are my sunshine, my only sunshine, you make me happy when skies are grey; Clementine*; there was usually a cartoon and a serial and a cowboy film or Mounties.

The public library was important for us, setting off on most Saturday afternoons on the long uphill cycle ride of Bushey Mill lane, turning right at the North Watford Odeon. On a lucky day the level crossing near North Watford Station was closed to allow passage of the Abbey Flyer to St. Albans, a small steam train. Books: Biggles and even to my embarrassment his female equivalent Worrals of the WAAF. Neville Shute (for mum). Les Miserables (abridged I guess as I have recently found it desperately long), Count of Monte Cristo. Biographies of Nelson, Drake etc; this naval interest was started by a school prize of a Book of famous pirates. When I was about 15 Auntie Alice gave me a small bookcase which I loved. The first book on it was an earlier prize from our Thursday evening club – A Book of Youthful Martyrs with illustrations of beautiful boys and girls going to horrific deaths. One of the few books in the house was Arthur Mee's 10 volume Childrens Encyclopedia. My favourite volume was volume 10 with rare colour pictures – of national flags. There was a 'favourite' picture of execution of an Indian peasant by an elephant stepping onto his head.

Bikes; a separate section as so many important memories are related to this

From as early as I can remember all suggestions to make a wish or to pray or ask Father Christmas for presents always provoked the same hopeful desperate, response – please let me have a bicycle. Our finances made this impossible until we were about age 14. We learned to ride at Auntie Doris's house about 6 miles away in the country at Buck's Hill. The older sister Cathleen, and Jean, who was our age, both had bikes and we shamelessly said how much we liked our cousins when I think their bikes were somewhat relevant. The country lanes were very hilly and poor brakes and early incompetence meant many grazes on knees and elbows. There were very few cars so the narrow lanes were fairly safe. Uncle Fred was a farm worker and so had not been called up during the war and I sensed some mild envy from mum about this and about the ease with which they could supplement their diet with the local rabbits. I got to love rabbit stew. The cornfields near their house at Bucks Hill were worked by Italian prisoners of war who were treated sympathetically by most people. It might have been different if they were Germans. I cannot remember much about childhood illnesses except the time I had mumps or measles when at my cousins' house and I could hear the others playing in the distant meadow. We spent a lot of time bird-nesting along the hedgerows and down the spinney. There were strict rules about only taking one egg. I got good at finding the nests, mainly of thrushes with their mud linings, blackbird and chaffinches. Whippendell woods provided our main venue for picnics and were great for bike rides later. I first saw a green woodpecker there – they called it the laughing woodpecker.

When we were 14 mum bought us (the twins) bikes. They were second hand, old-fashioned with rod brakes and had been reconditioned by painting the chrome wheel rims with silver paint. The excitement was so strong as we went to the shop to collect them. With my money earned by paper rounds etc I later bought a second hand bike with 3 hub gears and dropped (so-called racing) handlebars. I used this until going to university. A favourite ride was over to visit the cousins, now moved to another country place where uncle Fred worked in the greenhouses next to their wooden bungalow. We often went the six miles on Wednesday nights to the dance in the village hall where there was a mix of trad jazz – jiving, waltzes and foxtrots, country dancing (square dancing) and sentimental pop songs, Frankie Lane and so on. I rarely did anything except attempting waltzes and country dancing. Cycling home in the dark along country lanes was usually safe as there were so few cars but one night I was bumped in the back by a car, destroying my rear light. John had the wits to get the driver's address so mum wrote to him to ask if he had notified the police and what he intended to do about the smashed light. He posted about £5 (enormous amount) saying that he hoped this was more sensible than notifying the police; it was.

Trying to select bike-related things is difficult as thinking about it has produced so many memories. I used mine for school and for paper rounds. About the time I got the bike I became interested in birds, so after my paper round on dry days I often went to the local woods where I took my first bird picture. I tracked down a willow warbler by following its song then found its nest at the base of a hedge. Lying in the adjacent ditch concealed me enough for it to come and feed its young. The camera was a box Brownie. Those woods disappeared when, in 1957, the M1 motorway was built –starting at my birdwatching site, seen as a sodium orange glow from my bedroom window on my first visit home from university. Other favourite sites were Elstree reservoir where I first saw, calmly watching me from about 15 feet out from my hiding place in the bushes on the bank, a Great crested grebe. I don't think I have ever been so near one since. Stockers lake on the Uxbridge road past Rickmansworth was another favourite, where I got to recognise the sedge warbler's song. My bird book was the Observers book of birds by S Vere Benson with illustrations by Thorburn. I recently bought a 2nd hand copy for old time's sake on

Amazon for about £5. Later I used the Collins guide. I used some old 3x magnification field glasses bought from a second hand shop in the Queens Road, later replaced by an 8x24 pair, a gift from the father of a sort of girlfriend from church youth club. One of my strongest memories was of a perfect day: I cycled some way to a slightly hilly common land area (I cannot remember where) and spent the day alone, alternately reading and birdwatching, still a favourite activity when I remember to do it.

At weekends I often cycled to school friends' homes (Moore, Eric Johnson, Fitt, Charlie Wymer, Chris Smith). Now, whenever I open my car door I am reminded of when someone opened theirs just as I was overtaking, sending me sprawling in the road, cancelling my visit - so losing the friend; no phones in those days.

A more significant accident was as I cycled home from my morning paper round; hurtling out of the tunnel where Radlett Road goes under the main rail line my tennis racket clip slipped into the front wheel. I woke up in hospital with a cracked elbow bone. The neighbour who found me went to our house to tell mum "you know how you sometimes see a squashed squirrel in the road - well I saw this boy lying in the road like that and realised it was your son Chris – such a nice boy".

My longest ride ever was with John to the Farnborough Air Show about 38 miles away. I think this was the year we went the day after the De Havilland 110 exploded over the crowd while diving to break the sound barrier. The ride home seemed never ending, debating whose bike was best, then testing by swapping to find that both were uncomfortable after that sort of distance. I used to get a back ache behind my shoulder blade which I assumed was because I did not have the handlebars set properly so I was always altering them but with no good result. I later found that I was suffering from regular small pneumothoraxes.

John hated homework, causing noisy battles with Mum goading him to attempt impossible tasks. He left school as soon as he could, starting as an apprentice with Scammels, the local truck manufacturer which was later part of British Leyland before being sold off many years later to India as Ashok Leyland. John continued to work for them until made redundant in 1984. Immediately after starting as an apprentice John annoyed Mum by buying a new bike on the never-never (hire purchase).

Holidays

Family holidays were rare. I do remember going to Jaywick near Clacton, where we stayed in a small single story house/hut. We were driven by a local man who was a friend of one of Mum's 'shopping friends'. These were the irritating people who we met when shopping and kept us hanging about while mum had almost her only relaxation in the day. Oddly, I don't remember the beach with its anti-invasion stuff; my best memories are playing in the adjacent fields with the hot sun bringing out the scent of the rabbit droppings. I still love this.

When we were about 15 we were telling mum that we wanted to go on holiday to Romney Marsh, with the nearby Dungeness and its birds being a main attraction. She said we could do this if we would arrange it, thinking that would be the end of the matter. I wrote to the mayor of Romney and asked what we could do as we had very little money. He arranged for us to stay cheaply in his sister's caravan. John and I wanted to take our bikes which we arranged to do – by rail. We could just about afford this and were later horrified to find that our tickets were only for the journey there. I can't remember how we solved the problem which we only discovered when our tickets were taken from us on arrival.

Special treats These are mainly special memories from first 14 years.

Picnic by the river Colne. There was a small weir in the river as it flowed through the fields near the road. This is where I thought I learned to swim. We dived over the weir into the deeper water below it and were washed, threshing about until we grounded 20 metres downstream. It was a disappointing shock to find I could hardly get back to the side after diving into a swimming pool.

Picnic in Cassiobury park. This was good but it involved a long walk to get there (more than 2 miles). A further long walk down through the park took us to Whippendell woods.

Visits to some relation or friend of Mum's on a farm near Aston Clinton in the Chiltern hills. I loved the smell of the farmyard where I was once taken for an accidental ride on the back of a pig.

A major treat was to visit London Zoo in Regents Park, always preceded by debates on the best underground station to visit (Chalk Farm etc), all requiring a long walk to get to the zoo itself.

The extended Anthony family once filled three charabancs to go on a day's outing to Southend. Ours broke down in the Old Kent Road causing the longest wait in my life – for the replacement charabanc. It is now all I remember of the trip. Almost as soon as it was permitted after the war we went down to Brighton where the lack of sand was disappointing but the remaining beach defences compensated.

Exploration on the Bakerloo Line, without parents, when our cousins visited. We walked to Watford Junction and caught the train. The first time we went only as far as the first stop, Watford High Street, alighting to explore. Then one stop further each time: Bushey and Oxhey, Carpenders Park, Hatch End (for Pinner), Headstone Lane, Harrow and Wealdstone, North Wembley.

Elstree airport (near Radlett) was a small airfield I often cycled to. I was allowed to help push out the small overwing Auster aircraft, later claiming the one flying over us was 'mine'.

Ruislip Lido is a feeder reservoir for the Grand Junction Canal. It has a large sandy beach and surrounding woods. We went there with Auntie Marion and family. My only memory is being rowed by Dad and uncle George, both nervously incompetent, made more so by mum's negative comments (euphemism) when we became stuck in the reed bed.

One of the influential young men who helped run the youth club, also an officer in the BB was Taffy who lived near the church with his super-Welsh mother. He introduced me to opera by playing opera highlights at me. Most importantly he organised a youth club trip to see Verdi's *Rigoletto* at Sadlers Wells Opera in London. We went by hired coach and arrived late, causing me much embarrassment as we crept into our seats just at the beginning of one of the quartets (sextets?). I was immediately hooked and had to suffer sniggers on the coach home as I had been seen struggling with tears during *Rigoletto*'s discovery of his dead daughter.

WATFORD GRAMMAR SCHOOL FOR BOYS (WGBS) (1950 – 1957, AGE 11 – 18)

At age 11, John went with most of our friends to the Secondary Modern School, leaving me to go alone as a *Grammar Grub* to Watford Boys' Grammar School in Rickmansworth road, two and a half miles away. Mum was kindly quiet about the financial stress this imposed. We had lists of what I had to buy to attend the school. A suitable satchel for books; plimsolls and shorts for gym; rugby boots, shorts and shirt, cricket boots and whites. School cap with its badge was the only acceptable headwear, obligatory on the way to and from school. We could wear a suit or grey

flannels and black blazer with the school badge. I had no choice; I would wear the short-trouser grey suit that I had for Life Boys. In my third year I was still wearing short trousers. I was the last boy of my year in the school to wear long trousers, because I would then have to wear a blazer, as they were more expensive. In my first year we had a list of classroom kit including the 'Oxford Pocket Dictionary' and Oxford mathematics set (ruler compasses etc) in a small blue and brass tin, my most prized possession for years. We were recommended to buy everything from WH Smith's in town so off we went to get kitted out. My mother, never easily accepting authority, pointed out that they must have it wrong as the Pocket Oxford Dictionary would not fit in any pocket so she insisted on the 'Little Oxford Dictionary'. Many years later she discovered that grants had been available to help with such things but, typical of that period, those who needed help were not well-informed.

I was sent by mum on 3 separate explorations to find the best way to get to school. The main alternatives were the A385 bus from Radlett road which was a shorter walk at the home end and a longer walk at the other, or A321 from St Albans road which had a longer walk at the home end. I left home at 8.05 to get there by 9.0. In later years I cycled. On my first morning all 120 new boys lined up in front of the school to be told which forms (classes) we are in. Every boy was blazered except for me in my little grey suit. All boys had shiny leather satchels except for me as I had Dad's army haversack. Unlike those bought in army surplus stores nowadays, this one had seen service in Hitler's Germany. I was in class 3b. There was no class 1 or 2 as these had been part of the school when it had younger pupils.

On the first morning we had to display our books etc and of course I was the only one with a poky blue Little Oxford Dictionary. This was a good start; it meant that I never really expected to fit in – so all friends and successes in school were unexpected. I cannot remember any feeling of resentment or inferiority in any of this.

There were 30 boys per class and we stayed in the same formal class room, visited by different teachers who swept in, wearing dull black, chalk-dusted academic gowns. We were arranged in alphabetical order so I was always at the front near the door and had to leap up to open the door for teachers on their way in or out. This ruined the end of every class as I had to predict when the teacher was about to leave, while struggling to keep my mind off the problem so that I did not blush. We had homework most nights which I usually enjoyed. Mum occasionally helped but not always successfully. Her translation of Poissons d'Or swimming in the pond was Golden chickens (Poussons).

As we had no playground at primary school I had never played football so I was automatically put in the under-class touch-rugger squad with the fat boys, asthmatics and those with glasses. Games were played on the 'New Fields', reached by going down through Cassiobury Park and some way further; coming back involved a long slog uphill, often cold and muddy. After 2 years when I needed larger boots we were allowed to opt for running instead of rugger; I had to choose this as we had no money for boots. "Typical weedy choice" sneered Mr Thompson. I then prayed for rain on Wednesdays and Saturdays, which was half wasted on official school games. Although I liked my white cricket kit with its spiked boots I retained my fear of cricket balls so I usually swapped sides with a bored friend who was on the batting side, so spent the afternoon reading, chatting and making daisy chains. Of course we swapped again when it was his turn to bat. At the far end of the main school field we had an open air swimming pool which I enjoyed

although it was cold most of the time. I played informal tennis on the school courts but only at weekends or evenings.

I did have a brief period of sporting activity. At the start of the 6th form we all had to run a 1.5 mile relay race around the golf course, into Whippendell woods. One of the team leaders [Alan George], who attended the same church as me, kindly picked me for his team so that I would not be among the leftovers. In gratitude I ran as fast as I could, even in the gruelling uphill end to the course. I won my section and was immediately put in the school cross country team. In the evenings I went jogging (not then invented). After a few weeks I pulled a muscle and achieved my long-term goal of being excused games. When cured I started again with enthusiasm but had chest pains after a short time running. Thompson responded as might be expected [see below] and told me to stop fussing as it is only a stitch. I guess it was this period when I went to Boys Brigade camp at Chideock in Dorset and came second in a cross country race that involved running to the top of Golden Cap and back. I ran most of the way with John Batchelor but when we were approaching the field at the end of the run we had outrun the markers so did not know which way to go round the field – he chose the correct route.

After the 3rd year I gave up latin and history and in my 4th year I took O levels in English language and Maths. In the 5th year I took additional maths (including calculus), English literature (Chaucer, Shakespeare), Geography, French, Chemistry and Physics. In the 6th form I took 4 subjects at A and also S level (Scholarship level necessary to go to Oxford or Cambridge): Chemistry, Physics, Botany and Zoology. I also took a general paper that I remember included questions on Wagner and on how Science answers How but not Why.

Academic work in the 6th form

In the holiday period before entering the 6th form I changed my plans to study Maths, Physics and Chemistry in order to join the RAF, to study Biology in order to go to University (see below). At the start of the 6th form we were told that to get the good A levels required by universities we must do two and a half hours work every night. I believed this and did it. I immediately came near the top (1st or 2nd) in all subsequent exams [previously I had been less than average in the class]. There was a problem. We had only the kitchen table at home and nowhere else to work. Any work I did was sitting on the bend in the stairs using the top stair as a desk. I later made a desk by putting a plank of wood between two beds and sitting on the floor. Another problem was that I had too many other activities, related to the church [Baptist] and Boys' Brigade [BB]: Sunday - church stuff when I didn't work if possible; Monday – Cadet corps; Tuesday - band practice [I played trombone and helped with teaching new boys]; Wednesday –BB Gym; Thursday - midweek church meeting; Friday- main BB evening; Saturday – youth club. My work was done for one hour every lunch time in the library, facilitated by becoming library monitor, followed by work in the library from 4.10 to 5.40. I loved the library with its leather desk tops of olive and dulled flame colours. We did not do biology at O level (age 16) so we started from zero up to the scholarship papers [S level] in both botany and zoology in 2 years. So there was a lot to do in the library. Knight was a methodical teacher of chemistry but had insufficient time to teach one third of the course [inorganic chemistry] so that had to be self-taught. The books in the library were rather advanced but I did not know that until I found they were the basic texts (e.g. Finar Organic chemistry) for the chemistry component of my BSc at Reading University.

Starting Biology was a great experience. 'Willy' Wiles was our teacher, having learned the subject only a year or two previously – to help a student who wanted to study medicine. His most frequent comment was “It is so interesting”, applied to almost anything, and the way he approached it made it so. There were only 7 of us in this class including Me, Eric Johnson and Mike Fellowes, Robin Holloway (the fat farmer's son) and Graham Haines (the class joker who became a top sound engineer at the BBC). We were marked as biologists by the clinging aroma of dissected dogfish marinated in formalin. Not allowed nowadays was the dissection of hardly-anaesthetized frogs. I once managed a complete thorax dissection showing all the blood vessels linked to a still beating heart. The only time Willy routinely got angry was if he overheard negative comments about his other passion - hockey. We approached the end of the course without any teaching on mammals and our worry about this led to an expression of real anger. This was caused over the white mice which he forgot to feed over Christmas - so we came back to dead, part cannibalised corpses. We made it worse by expressing our worries: “are those white and red things called Mame-ells sir?”.

The physics practicals with Mr Hughes (good and kind) were a bit dry but I do still remember some of the stuff we did; proving the equations for acceleration of ball bearings down slopes, and the rules of electrical resistance using a beautiful wood and brass Wheatstone bridge. A powerful memory comes from the O level period; I misconnected a powerful Nife cell, giving me a nasty burn on my finger. This was dressed in an impressive bulging white bandage. As I was due to be called out of the class for my French oral exam I quickly learned the French for finger, burn, physics, etc; I later learned that I got very high marks.

My main memory of the chemistry practicals was the synthesis and purification of organic molecules (chloroform, ethyl acetate etc) which I kept in small bottles in my desk, surreptitiously sniffing them during classes.

Ree was very keen that those studying science should not be 'narrow minded scientists'. He instituted a system of education for us in the 6th form for which I continue to feel grateful. We had lectures on art history, literature [the war poets – as does every boy now], and music. I still surprise myself by my ability to distinguish Monet/Manet etc. In music we spent 4-6 lessons on a single piece of music – Nielsen's 5th symphony. I guess this was chosen because of the section where in the battle of Good and Evil the side drum is instructed to play *ad lib* as if trying to wreck everything the orchestra is doing. For many years on the CSO programme committee I tried to get the orchestra to play this very difficult work. When they finally agreed I found that it was almost too difficult for me but a great 'closing' experience.

One lesson on literature was taken by Ree in which he read us a short story for us to criticise. It concerned a boy in occupied France who wanted to see fireworks to celebrate something. A strange man, staying with the family, arranged to blow up an ammunition dump for the boy. We all said it was absurdly unlikely, only to be told it was true. Ree was the strange man, the story being told in full in the novel *Never say Goodbye* by Hilary Green in which Ree is Caesar the hero. The usual literary teacher was a new or temporary teacher [to whom I owe so much] who had us reading Aldous Huxley's *Brave New World* etc. He asked us to write an essay on something that was important to us. I wrote [badly I assume] a piece “Culture amongst the Morons”. I thought this cleverly related to Huxley's *Brave New World*'s Deltas, Epsilons etc. It was an appreciation of our culture course but responding to the implied insult to us ignorant science

pupils. I doubted that the teacher could change an electric plug or some similar childish thing. I outlined a course for the 'arts' students to learn a bit of elementary science. I assume I must have been childishly insulting because I was made by Ree to write an apology to the teacher.

My German visitor; Wolfgang Koch from Koln

In 1952, when I was 13, a scheme was announced that aimed to promote reconciliation between England and Germany. Poor boys from slums of German cities would come and live in English families for a month or so. I went home enthusiastic that we should invite a boy but my mother said we could not afford another mouth to feed. It was later announced that there was one boy with no available family. So Mum wrote a note to Ree to say that we could accommodate him if a small amount of money could be provided for food. He told her that the amount she suggested (10 shillings) was not nearly enough to feed a boy and that she could have 3 times as much. She then sent him her whole budget, proving that the amount he proposed for one boy would be enough to feed all her 4 children. He then sent an apologetic and very humble letter apologising for his lack of understanding. When the boy Wolfgang Koch arrived he was clearly undernourished and very nervous. My father did not help by demonstrating his few phrases of German, picked up while a lorry driver in the army in Germany (Hands Up!, Surrender! Etc). When given an orange he cried because he did not know how to peel it. With the aid of a dictionary, he explained he had only ever seen the orange peel previously, picked out of waste bins in the wreck of the city of Cologne, bombed to the ground in retribution for the destruction of our city of Coventry. In 1958, as a travelling student, I visited him in Koln. He had moved from the slums to a nicer area. He was tall and muscular from his hobby - kayaking *up* the Rhine. The whole family were clearly much better off than mine, the father driving me in his Volkswagen to show me where it was made in the factory where he worked.

It is only thinking back that I realise how remarkable my mother was in this. The Germans had damaged six of the early years of her marriage, bringing up 4 children, without enough food or money and in fear of losing Dad or being bombed to pieces. Yet 7 years later she welcomed this German boy into our home.

Dale Fort field course and my change in career plans

I think perhaps I owe my subsequent career to Headmaster Harry Ree's acquired appreciation of my family finances. In the upper remove [O level year, age 16] only two students from class A studied geography and so we joined Upper remove Geography for those lessons, taken by gentle old Merret, stooping under his chalky batwing academic gown, muttering quietly (said to be the result of WW1 shell shock). He was badly teased by the boys in the back row. Our more sophisticated teasing was developed by Eric Johnson (now a Church minister) who had entered the School aged about 15 when his family moved to Watford from Essex. As a sort of Christian duty I had said friendly things to him when he first started in our class and that developed into real friendship. Our teasing of Merrett involved sitting at the front of the class being absurdly enthusiastic about everything. One day we were told of "a wonderful opportunity for you boys" – to attend a week long field course in oceanography at the Dale Fort field centre in Wales. There were 2 places available for our school. Our hands shot up and we were praised as model students. I then found Eric was genuine, whereas I knew that I had no money for such

things and I was not really interested. A few days later my class teacher [J. B. Rigg] kept me back to tell me he'd had a discussion with Ree and they had somehow found some money to pay for me to go.

At Dale Fort I spent part of most days in a fishing boat learning to read a sextant while feeling sick from sea, diesel engines and dead fish. We shared the boat with marine biologists who went berserk as their dredge net was hauled aboard, diving excitedly into the smelly mud. I became friends with the biologists and was amazed at their enthusiasm. We all had small research projects which was an exciting prospect. Mine was to measure the variation in the salinity of the tidal estuary at one spot during the course of the day. I found a suitable sandbank that I had noted would not be completely immersed at high tide and set myself up there, watching the oystercatchers and ringed plover, while measuring and recording salinity with a hydrometer – like a fishing float in a measuring cylinder. Sadly, I fell asleep and the cylinder was pushed over by the incoming tide, the smashed hydrometer terminating the experiment. In my oral presentation of results I was (sarcastically?) congratulated on how my experiment was continued beyond the smash time, but only with notes on changes in the direction and numbers of oystercatchers with the moving tide.

From my room-mate I learned important facts not mentioned at school: Oxford and Cambridge are not the only universities; the state would pay poorer students to go to university on a full grant and it was not necessary to have a qualification in latin (although this was true for Oxbridge which is where the school was keen for students to apply). He was going to Reading University to study Zoology. On my return I horrified my form teacher (Inky Knight) when I told him I was changing plans and would do biology instead of maths. He said “The only careers in biology are in medicine or agriculture”. I explained to him that it was possible to study biology at university and that I would go to Reading and study zoology. Mum was then invited to visit the school to discuss my career with Inky Knight. He saw us in his smelly laboratory prep room where mum was perched nervously on a lab stool, her dangling feet not reaching the ground. She explained that I was keen to have a career in science research which he tried to talk down as being very boring and rarely of any use to anyone. Of course I was sure I would be the exception (partly true).

When I discussed at some point that I was applying to Reading university the response [I think it was from Ree] was: “a good idea as they don't do interviews where you would have nothing to say except about biology”. In one of the general classes in the 6th form we had to give brief chats about something we found interesting. I had found a book called Man, Microbe and Malady in the library so read up on this to give my short chat about microbes. This led me to apply to Reading to do a BSc in General Microbiology. They did not do interviews; instead I was offered a place, 2 days after applying, on a postcard. The school did not value anything that was done outside the school which is where most of my activities happened, but which was not noticed by the school.

The teachers

When I started at WBGs the Head was Mr Bolton. Assistant Head [or Deputy??] was Mr Merrett. In my 2nd year the new Head was Harry Ree DSO. He was a war hero, working in the SOE (special operations executive), working in Nazi-occupied France directing sabotage by resistance

groups. At the start of morning assembly the prefects marched up the side of the hall, stopping at the Head's door. This was flung open and Ree shot out into the hall in black gown and mortar board which he swept off as he trotted up the steps to reach the lectern. The invariable Bible readings of Mr Bolton were replaced by a wide range of readings from holy men, philosophers, poets, reformists etc. I was always impressed by the wide range of choices. I think I later discovered the source, when I was a paperboy for WH Smith, on finding Victor Gollancz's anthology 'From Darkness to Light'.

I enjoyed almost all lessons and every year was an improvement on the previous year. Especially good teachers were: Rigg [geography]; Budden [Maths]; Knight [chemistry]; Wiles [biology] a great teacher. When 30 years later I published my first book it was dedicated to Willy Wiles. Bad teachers included Chris Thomas [actually an excellent teacher of French but succeeding by our fear of his slimy sarcasm]. Sid Fettes [latin] who was terrified of us and everything else in life. Miller [maths], the bully.

The school bullies (only teachers)

Fanny Lister never taught me so I was relatively immune— except when he stopped us running or talking in corridors. He always wore metal-shod shoes, to be heard all around the school, marching down the corridors (especially on Mondays when he wore his RAF uniform for the evening cadets). The room in which we seven pupils enjoyed biology with Wiles was long and narrow and parallel with the corridor. When Wiles heard the approaching Lister he quickly moved to one end of the room and marched with swinging arms parallel to Lister in the corridor. He said nothing but it was a comfort to know that this bully did not have the support of the whole school staff.

Dusty Miller's Hitler moustache was appropriate. I cannot remember his maths teaching, only the fear. I owe him a useful insight, resulting from a memorable piece of bullying. A favourite target was Paul Moffat, the shy nervous son of parents who belonged to a strict religious group the Plymouth Brethren. To illustrate some aspect of friction Miller had him sat on the desk at the front and pulled him up and down by his feet. Probably every boy was [at least] uncomfortable with this. Eventually another quiet boy, Brewer, stood up and, out of control, screamed that Miller should stop. He did so and directed his attention to Brewer instead, pulling ear and hair etc. I still feel guilty that we allowed this bullying of Moffat to go on and that only Brewer had the courage to act. This suggests that I know the answer to the question "would I have had the courage to stand up to Hitler's treatment of Jews etc".

Thompson never taught me but his attitude to those who were poor at games was disgusting. He provides a nice example of Rée's positive attitude. In the sixth form we did not have to wear school caps. This was wonderful as mine was always being stolen and used for games by local boys who did not like Grammar Grubs like me. But if a hat was worn outside school it could only be a school cap. Every morning I got up at 6.20 am to do a paper round. I cycled to town [2 miles], prepared the papers, delivered them to all the roads around the school, including papers for my teachers Mr Merret and Mr Knight, then cycled home. I ate a quick breakfast then cycled to school. There was little time to dry out on wet mornings. One especially wet day I arrived at school, cycling in pouring rain wearing a flat cap instead of a school cap. Thompson saw me and reported me to Ree who called me in from class. He reminded me of the rule. "Sorry but I do not

have a cap any more, it would be a waste to buy one as I cannot afford it". "Well you could afford that other cap". "Yes sir it was 2 pence at the church jumble sale". "Well then please be sensible and remove it as you come down Rickmansworth Road". My hero.

School lunchtimes

The school appeared only to appreciate activities that were run by the school, so all they knew about me was that I worked boringly hard and was in the Cadet corps, so all my friends were made prefects but I was not. They invited me into the prefects' room until stopped by bully Thompson. Some lunch times were spent with a gang of enthusiasts in the music room in a hut in the grounds, listening to traditional jazz. I remained too self-conscious to even tap my feet. [I am reminded of that when I worked to ensure that no one tapped their feet in my cello section in City of Southampton Orchestra, when I was principal cello]. For about a year (in 4th year I guess) I played trombone with a small group in lunch times, attempting big band stuff – mainly Glenn Miller classics, with Graham Haines on saxophone. There was also a skiffle group, copying the now popular Lonnie Donegan with his Cumberland Gap and Rock Island line. He had played banjo (I think) with Chris Barber's band – our very own British trad jazz band. All this was shattered with the arrival of Bill Halley and the Comets with Rock around the Clock at the cinema, and then Elvis. Rock had started so trad jazz, skiffle groups and big bands were out. Eric Johnson took me to London to the very informal Mac's jazz club which was entered by following a sign outside that just pointed vertically downward. The descent led to a cave swirling with Gauloise tobacco smoke. We were there on the memorable occasion when Ken Colyer returned from the USA to take part in the Trad revival, and played with Chris Barber (the only occasion when they did this). Graham Haines, the class comedian, went on to become a senior sound engineer with the BBC, his name appearing in the credits after many great performances (eg Albert Hall Verdi Requiem).

The Cadet Corps

I joined the cadet corps as soon as I could (age 14 I think). We had to join the army corps first and then later move to air cadets. I wanted to join but many did not and some students tried to protest themselves out of it; 'RAT' Oldfield led this rebellion. The Head, Harry Ree was sympathetic to the idea that nothing should be obligatory but he had the school rules and tradition to maintain. Those who refused to join had to spend the same time (Monday evenings immediately after school) picking up stones from the school playing field. I was enthusiastic to join as my career plan was to join the RAF as an apprentice, a plan inspired by the writing of Group Captain WE Johns in his Biggles books about an ace pilot in the Battle of Britain. In the army cadets we had 'field days' in Whippendell woods. I remember little about these except that we were armed with blank ammunition for our Lee Enfield 0.303 rifles. These could cause damage if aimed close or if, as happened to me one was fired by the enemy (a very good friend of mine) who had failed to detect me, camouflaged in an adjacent ditch. The harm was purely psychological – I had not seen him either so we both nearly died of fright (a case of 'Best Friendly fire'). I enjoyed the rifle range where the first rule was to learn to cushion the 303's kick by padding the shoulder with the uniform beret. I lost a friend by showing him how to do this but forgetting to tell him to first remove the metal cap badge. He claimed for weeks that he was branded on the shoulder by the insignia. I was a marksman with the 303 and with the Bren gun which was a sort of repeating 303

on a tripod so no kick. Many years later at some youth club run by Richard Barnett the boys were shooting at targets with pistols. I was offered a go, much to the amusement of some of the boys who had only seen me acting the fool. All my methods and skill came back, driven by pride I nonchalantly lowered the pistol until properly sited and got 4/4 bullseyes. "You did not hold the gun stationary". Well you don't.

At last I was in the air cadets where I learned navigation and how jet engines work (I just now tried to remember but failed). The great experience was going to summer camps, sleeping in dormitories in Nissen huts, getting up early, fixing our beds in regulation mode, rushing out to do drill after bolting down a big breakfast. It all came flooding back when I read T.E. Lawrence's account of life as a lowly aircraftman in *The Mint*. I had no problem with early rising as reveille was a bugle blown at a time much later than my usual paper round times. The highlight of course was the opportunity to fly from our base at Watton in Norfolk; we flew in an old twin engine Vickers Varsity from one airfield to another, coming in to land and then flying off before actually landing. This was to test the talk-down approach system (pulling up at the last minute). On my first flight I lay on my belly in the bomb aimer's pod beneath the plane. We had not been told what we were doing so as we came in to 'land' I had the choice of trusting the pilot or of telling him that the wheels were not yet down. I trusted, but still feel a sense of relief when my Boeing makes the comforting noise of the landing gear coming into place as we arrive in Chennai etc. I also learned from this experience that I feel less airsick when lying down so I usually volunteered for the otherwise uncomfortable bomb aimer's pod. A special treat was our first flight in a two seater Chipmunk trainer, the trainee being in the front seat. I was asked if I wanted to take over: "of course". "Make a 90 degree turn, but take it slowly". I did this. "Ok you have done this before". No. "OK so you read Biggles?" Of course - that is how I know that a touch of the left foot on the rudder as you gently move the stick to the left, causes a slight bank and a smooth turn.

A second memorable camp was on Thorney Island, near Hayling Island East of Portsmouth. Most cadets went to the small pub nearby with a couple of airman who got their drinks for them. I did not drink and anyway how could I resist the mud of Thorney Island. Almost uninhabited it was an unofficial nature reserve. My first sight of redshank and dunlin and curlew and, almost as important, my first hearing of the wildness of shorebirds.

I might have gained more status in the eyes of the school if I had attended the gliding course in the summer holidays at Dunstable for which I had won a scholarship, but they forgot to tell me I had won it. Mr Thomas did have the decency to ask how it had gone at the start of next term – the first I had heard of it. It had been the best week for gliding for many years and 2 gliding records were recorded.

Paid work while at school

As dad's wage was small and mum's work was limited by the need to look after the family we needed to earn cash, especially to pay for Boys Brigade camping holidays etc. As soon as it was legal (age 14) I got a Saturday job. This was in the general grocers (Charles I think) in the group of shops where Knutsford Avenue met Bushey Mill Lane. The most important shop was Jacks newspaper shop where we could buy buns whose insides were eaten then filled with Tizer (a fluorescent orange fizzy drink). I used to deliver groceries on a bike with a small rack on the front but mostly I stocked shelves. My main memory is undoing the big paper sacks containing 1lb and

2lb bags of sugar in the cellar and taking the bags upstairs; I disliked the sandpaper effect of sugar scratching on fingernails and especially loathed the cockroaches. I also worked in holidays in the corner hardware shop, coming home smelling of soap.

Paper rounds were the main daily work, continuing up until going to University. Eventually, when Richard was old enough all four of us were herded by Mum out of the house (before dawn in winter); she then cooked Dad's breakfast then welcomed us back for a quick breakfast and clothing change to get off to school on time. Weather was always a problem. We wore Sou'westers and heavy yellow cycling capes when really wet. Keeping warm was always a problem. Balaclavas were essential and gloves, although this made handling of papers difficult. I still remember the joy of a Christmas present of new lambs' skin gloves with wool inside and soft velvety fawn outside. Nothing prevented us suffering from chilblains on knuckles and toes – so itchy and painful. My first round was at Jacks, my round being mainly in the long mock Tudor avenues near the shop. At one time I delivered to the roads around our Leavesden Road Baptist church which were mainly back-to-back terraced houses, mainly taking the Mirror etc which was good as the letter boxes were always meanly small. I later found that I had delivered papers to the family of Mary, wife of Liz's brother Hugh.

My most memorable period was working for WH Smith in the town centre, two miles away, while in the 6th form at school. They provided red bikes with huge paniers for the papers. They had no cross bar so were easy to leap on and off during deliveries. I secured my place at the end of a 2 week trial because I had mended my own puncture. My round took me to the 'rich' Cassiobury park roads around my Grammar School and included my teachers Mr Merrett and Mr Knight. One road was a short gravel-surfaced 'unadopted' cul-de-sac and I wondered what sort of lucky people would live in such a road; I now know. That reminds me of creepy Mr Chris Thomas who wanted us to translate cul-de-sac literally as arse of a sack; I refused and nervously suggested that we should translate into ordinary English and no one I knew except him would search the arse of his shopping bag for something he had misplaced. He peevishly agreed but insisted I was a cissy. A unique feature of paper rounds at WH Smith was that we sorted our own papers in a cold hut. We were given the heap of the papers and magazines that we needed for that day to sort them into an appropriate sequence of customers using a book, listing their orders. As my round was mainly to the posh houses I had the biggest load, mainly comprising The Times, Manchester Guardian etc. Most magazines, weighing down my load were published on Fridays so that day I used to have to get up at 6.05. On easier days I enjoyed this sorting job as I read a lot of the front pages and was impressed at how sensible the Manchester Guardian was compared with our home papers – Daily Mail and The People. Morning paper deliveries meant that I came to know when different bird species began to sing during the year, the first time of hearing thrushes, blackbirds, dunnoek etc being recorded when I got home. I still love the sound of a flock of marauding jackdaws swooping between the houses in the early morning light in February. One of the least pleasant aspects of the job was collecting so-called Christmas boxes (tips) from customers on Saturday mornings just before Christmas. Those in poorer areas were willing but gave little while those in richer areas were divided – some being very generous and others turning me away. I wonder if they related this lack of generosity with their torn Times the next week.

A new paperboy, aged about 14, always took up his place beside me during paper sorting because I did not tease him like some of the frightening uncouth paperboys. He told me his name

was Alan Hedges; this was mum's maiden name so I asked if he lived at No. 11 Charles St. (my Mum's home when little). Amazed, he asked how I knew. He was the son of my Grandfather with his second wife (Mum's wicked stepmother), making him my uncle! We become friends, going for bike rides and swimming in the Bushey open air pool, but mum was never happy for me to invite him home.

I also worked on Saturdays from a grocer's shop near Watford High Street. I had a bike with an enormous cage on the front, weighing down the tiny front wheel. This made manoeuvring hazardous and difficult to pedal - especially up the steep hill into Bushey. The relief of safe arrival was followed by the fear of cracked eggs discovered and the hope of a generous tip. I became obsessed with accumulation of tips that I spent on mini-Dinky toy cars.

From the age of sixteen I was able to work in the holidays. When at school this was usually at Benskins' Brewery where dad worked. My first job was loading wooden beer crates, usually in a line of workers just lifting the crate off a pair of crates that made a small platform onto a second platform until they reached their destination lorry. I was at a phase when I was keen to be strong and fit so I walked or ran to work and chose to be the person at the end of the line, throwing the crates up onto the stacks on the lorry. This was one of the rare times I registered Dad looking proud of me. Enthusiastic workers were occasionally selected and sent 'off to the Dutch barn'. I eventually attracted enough attention to be chosen, to discover that the barn was stacked high with empty crates and climbing up through a 3D maze of these we reached a hidden area to sit together on crates with other crates providing tables, one of which had beer bottles. This was the only source of drink all day, also provided in more regular rendezvous, as we were allowed 3 pints per day. We worked so hard that I never needed a toilet the whole time I was there.

One winter time I was allocated to the accounts section, working with eight others at a large table covered in green cloth, ruled by a snobbish office head who tried to impress me by telling about his opera-singing wife. We started by transferring data from a pile of individual sheets for each pub delivery to a huge daily summary sheet for adding up. This provided information on how many India pale ale or brandy or Guinness etc were delivered to each pub, the large sheet summarising all this with the costs. To avoid boredom I aimed to achieve completion as fast as I could. Accuracy was assured on the summary sheet by totalling costs horizontally and then vertically, the whole coming together from two directions with the same sum. I got quite good at doing these long sums in my head; I can still do this quite rapidly, but it would be easier now as we no longer have pounds shillings and pence. After a few days I was taken aside by the boss and told to go slower so that I would fit in with the timing of the older regular staff. I achieved this by reading about the 1951 expedition to Everest written by the leader John Hunt. The book had to be in the drawer which opened onto my lap so that it could be quickly closed away if the super-boss came in. I achieved an undeserved reputation when the snobbish boss pointed out my dad down below, sitting on a wall eating a banana: "look, one of the monkeys Benskins insists on employing"; "Oh that's my Dad". Great laughs for my wit.

One Easter time I was asked by my friend Eric Johnson to work for a few days (and nights) before Easter in his father's bakery. My main task was to help make Hot Cross Buns. Trays of weighed-out blobs of dough were presented to me for conversion to perfect spheres for baking. Done by dusting with flour then placing my hands over them and rolling clockwise with left hand and anti-clockwise with the right. I was occasionally given the privilege of placing the strips of

pastry on them to make the crosses. It was more than fifteen years later before I could tolerate the smell of Hot cross buns. I now love them.

Music matters

In the 6th form I was asked by Frank Thomas, the brother of creepy Chris Thomas who had taught us French, to join the school orchestra which he conducted. My first experience was Schubert's unfinished 8th symphony. Chris Thomas had recently started to learn the clarinet and joined in with enthusiasm, sniffing the rests and squirting squeals into appropriate places. There was a problem. I had learned trombone in a brass band and so everything was played in the treble clef but the orchestral music was in tenor clef. An expert was brought in to teach me to transpose but he had to accept that my trick was better than a serious approach; I pretended the tenor clef was my old treble clef and I just added a couple of sharps. We needed a second trombone and so a girl was imported from the Girl's Grammar School that Pam attended. She was a beautiful American marching band blond. I was the envy of everyone. We were invited to a party at RAT Oldfields home in richest Loudwater at which I learned a few lessons. A novice at everything; I tried to smoke and drink and put my arm tentatively around my partners shoulders while sitting on a bench in the garden only to be overwhelmed by all three, falling backwards dizzy into the trench behind us. At subsequent rare parties I attended over the years I always helped at the bar so avoiding real social contact and misdemeanors.

The school seemed to have no real music teachers. In the first couple of years we had music lessons with Madam de Guise, a very short French red-haired lady with too much garish makeup who had to stand on a box to teach us. The first half of the lesson was spent trying to learn the words of the psalm that was sung on Thursdays in Assembly; the second half was spent trying to learn the music for it. Frank Thomas (not a music teacher) ran the orchestra and Mr Budden (maths) ran the choir which was involved in early recordings of Britten's Spring Symphony. In my first University vacation he asked me to join in his performance of Haydn's Creation, imitating the lion's roar and supporting the base line in the great choruses. The female parts were sung by small groups of boys. Wonderful – a desert island piece.

Just before I was due to start University I was in church, upstairs in the balcony with Terry Fox when during a hymn I started to get severe chest pains. I went out and was followed by nice Mr Frobisher who called an ambulance which took me to hospital with its alarm bell clanging out of time with the Brahms Symphony (3rd movement) that was pounding in my head. I was taken straight up to a ward and told it was a heart condition - pericarditis caused by a virus very similar to the cold virus. I was told to give up running, swimming etc. Although I explained many times that I always got the pains immediately after playing my trombone intensively they said it was nothing to do with that and that I could continue to play. I was 10 days in the hospital during which I received a letter from the University of Reading telling me all about Fresher's week which I missed as I was still in hospital. I was also informed that my tutor had changed from Dr Brown to Dr L.J. Zatman, so exotic that I felt I was becoming a scientist already. He became my PhD supervisor, Post doc colleague and a great friend.

READING UNIVERSITY UNDERGRADUATE YEARS 1957-1960

I worked for three years for my BSc then three years for PhD and then three years as a post doctoral research assistant. Although I have tried to keep in some sort of chronological order many subjects will expand across time periods.

Academic matters

The BSc course at the University of Reading involved working for a General Honours degree in three equal subjects which might then be followed by a further year of a Special Honours Degree in a single subject. The general degree might take two or three years – usually done in two years. There was a qualifying exam at the end of year One and a final exam at the end of year Two. My three subjects were Microbiology, Zoology and Chemistry. Each had three lectures plus 6 hours practical per week. The most memorable (being the most stressful) was a Saturday morning physical chemistry lecture at 9.0 followed by a practical. Besides writing up practicals, we had very little set work and very few, if any, tutorials. There were about 30-40 students in each class.

Microbiology: Although I had enrolled to do the Special Honours in Microbiology I found this subject the least interesting in the first two years, except for the biochemistry which was taught by my tutor Len Zatman. Classification (Ron. M. Keddie and Muriel Rhodes) was grim, as was immunology (Shattock). Later staff included Tom Heydemann and Eve Billing. The head of department was Prof B.C.J. Gabriel Knight; he gave muddled lectures on the history of microbiology. H.P. Charles came in our 2nd year and gave lectures/tutorials on microbial genetics in our final year. I disliked the practicals for which we had to wear hot white coats in a Bunsen-heated lab. Looking back I can see the teaching was excellent. I loved microscopes when I was a young teenager, going regularly to an opticians on the Queens Road who sold them and allowed me to sit for the odd hour looking at his slides. But when it came to staining microbes and peering down at the grubby little spots on the slides in my practical classes I lost all interest. The best part of the traditional microbiology course was the 3 week project in the 2nd year. Muriel Rhodes gave me 3 test tubes containing different bacterial cultures that I had to identify, by staining, microscopy and growth characteristics on various media to see if they produced acid etc. The easy part was to work out that they were all *Pseudomonas* species. To find out which species was a problem. We used Bergey's manual of determinative bacteriology (*Bergey*). Absurdly, so it seemed to me, I needed to know where the bugs came from in order to distinguish one species from another. So my conclusion included 'if they come from water then this is the answer but if from soil then this is the answer', ending with what was probably an immature rant about the stupidity of such a system. Rhodes was delighted as this was the subject, and conclusion, of her enormous 2-volume PhD thesis on *Pseudomonas*. This gave me some confidence that perhaps I could do research.

Zoology: The Zoology department was run by Alistair Graham and his long-time colleague Dr Vera Fretter, both internationally-known experts on Mollusca. Fretter gave a memorable demonstration of the process of 'torsion' during which the bilaterally symmetrical larva twists into the convoluted adult; her demonstration involved getting both her arms up one sleeve of her grubby labcoat. The course was very traditional, plodding through the Phyla. There was almost no physiology and little ecology. I enjoyed it and spent happy Wednesday or Saturday afternoons in the Zoology museum. We had formal practical exams in all subjects. One memorable Saturday

morning we trooped down to our exam discussing what we might have to dissect. We were certain it could not be the fiendish Whelk as this required very expensive bone cutters to access their insides. Peering through the windows led to massed heart-sink at the sight of 40 whelks on dissection slabs, each placed neatly between a pair of house bricks. Our ecology was picked up on a field course at Flatford mill where I slept in Willy Lott's cottage shown in the famous Constable painting. I remember little of it except for using a quadrant for estimating numbers of grasshoppers. Throw a one metre wire square onto the ground; catch the insects, paint their heads with little blobs of intense yellow paint, liberate them and then later use the square again and count the proportion of painted to unpainted insects. Good fun when done with a bunch of casual witty layabouts on a sunny afternoon.

Our Friday afternoon lectures on migration were delivered by gentle Dr Creighton who leaned on the end of the bench like a bit of river flotsam on an overhanging branch. I never remained awake to the end of any of his lectures, his sleepy stories being excellent lullabies. I later learned that his interest in migration had been stimulated by his wartime experience. He had been an RAF navigator and was interned as a POW after being shot down. He became an expert at carving the rubber heels of shoes into stamps for forged papers. As the allies advanced on Germany he spent 6 months being marched around the country, a practice that killed a very high proportion of the POWs. He later was the PhD supervisor of Tony Gower, working on caddis fly larvae in the watercress beds near Watership Down.

Chemistry: This was the most difficult of my three subjects and so I spent more than half my time doing this. The head of department was Edward Guggenheim FRS. I enjoyed it, having done much of the first year work at school, using the same books; Finar, Organic chemistry, Prutton & Maron, Physical and ...Inorganic.

I preferred organic chemistry, especially the lectures of Derek Bryce-Smith on chemical mechanisms. Saturday morning physical chemistry lectures were usually by J.E. Prue who was always sarcastic about female students but then became the subject of much mocking when he announced that he rejected all his previous negative comments as he was about to get married. He had written a standard work on Physico-chemical calculations with Guggenheim (the famous authority on chemical thermodynamics).

I always enjoyed the practical chemistry and was quite good at it, especially synthetic organic chemistry and qualitative inorganic analysis with its lovely coloured precipitates. I don't think I had much imagination (or perhaps courage) as most of my work in chemistry in the library involved a lot of plodding learning, especially of the physical chemistry, but I enjoyed the imagination required when working out ways of synthesising and analysing organic molecules.

At the end of the 2nd general BSc year exams, I came 2nd, my old room-mate David Smith coming first. We then had to discuss our plans for the Special Honours BSc with Prof Knight. He told me I had got very high marks in Chemistry, very good marks in Zoology and poor marks in Microbiology – so why did I want to specialise in microbiology? Prof Guggenheim wanted me to do chemistry and even offered a research studentship when I had finished. I explained that I did not really understand the subject but had memorised it. Graham had offered a place on the Zoology course as I clearly had an enthusiasm for it. I told Knight that I had come to Reading to do Microbiology as it was the only place in UK that did General microbiology as opposed to more medical stuff. I explained that I really liked the biochemistry and that I hoped to do research in

microbial biochemistry. He accepted this eventually so I was able to start the next year the Special Honours BSc in Microbiology, together with 3 other students (David Smith, Judy Shuttleworth, & Paul Gibbs).

This course was remarkable in that we had 11 staff and 4 students. The practical included a long project which always had the same title: "Isolate and characterise microbes able to grow on X as sole source of carbon and energy". X could be anything. Some students might isolate many bacteria and then concentrate on taxonomy while others like me might isolate a single organism and study its biochemistry. The compound X for me was aspirin (acetyl salicylic acid). I quickly showed that this was rapidly hydrolysed to salicylic acid and acetic acid which supported rapid growth of many well-known microbes and was not interesting; so I changed to salicylic acid (an aromatic hydroxyl benzoic acid). Being a ring structure its metabolism had to involve breaking the benzene ring. I showed that catechol was an intermediate. I worked late into the night most nights. After I finished my PhD I went to the International Congress of Biochemistry in New York, flying in a Boeing, chartered by The Biochemical Society to get us all there. When airborne I asked the distinguished looking biochemist in the adjacent seat, later identified as the famous Prof. Dagley from Leeds, what his subject was; "I am interested in the degradation by soil bacteria of aromatic compounds and at present I am interested in the pathway for degradation of salicylic acid". Clever clogs me said that I thought it would involve catechol as an intermediate and I asked where he had isolated it. "It was a gift from a biochemist in Reading called Zatman". He was using 'my isolate! Len thought this was wonderful – as did I.

Every Tuesday we gave presentations on our research projects that all staff were expected to attend. In my first talk I was saying all the clever biochemical things I would do as soon as the bug was isolated and Knight blared out from the back "first cut your hair". I did have long hair but did not see the relevance. It transpired that he was quoting Mrs Beaton's cookbook with its famous instruction – First catch your hare.

I was dreading the Easter holiday before finals because of the intense revision. The first day I started my grim plan to work long hours by cycling to the central town library. As the morning struggled on the reading room slowly filled up with school friends I had not seen since leaving school and we had regular coffee and lunch breaks together, often feeling sophisticated in a typical '50s coffee bar with rubber plants and transparent plastic cups.

Judy got her expected First Class and went off to be a farmer. Paul Gibbs used his Upper Second to work in microbial industries including Boroughs Wellcome. David's Upper Second gained him a Research Studentship while my Lower Second left me swinging in the breeze with my hopes of doing research somewhat damaged.

Student life

In my three undergraduate years at Reading University I lived in St Patrick's Hall, a fast 15 minute walk up hill from the London Road site where most of the University was situated. Whiteknights Park was very near with its lake and the new Letters Faculty. It had recently been opened by the Queen, accompanied by the Vice Chancellor Sir John (Jack) Wolfenden. As they drove up to the entrance the students unfurled a banner from the roof "The House that Jack Built". In my first year I shared a large room with David Smith who was doing the same course as me. We were in the large Northcourt house, an annexe a few hundred yards down the road from

the main hall. Our room was adjacent to that of my tutor Len Zatman. I met him soon after I arrived. The loaf of bread that I threw at David shot past him into Dr Zatman's room as he opened the door to complain about the noise. He invited me in, where I had to chat while nervously fending off his golden Labrador. David was a relatively formal quiet student who became a great friend. When I said I was surprised that he had brought his old school cap with him to University he explained he used it to catch the huge flying May (or June?) Bugs. Because of my hospitalisation (with erroneously diagnosed heart problems) I had arrived about a week late so there was some curiosity which helped me make many friends. David Smith was rather shy and it was more than ten days before he corrected me when I always introduced him as David King. He was pleased when I told him I usually went to bed about ten O'clock but he later pointed out that I rarely came in until one in the morning. My 'ten o'clock' was of course because of my very early paper round mornings. We irritated some friends because we were sufficiently interested in our subjects to talk about them while walking back up the hill at the end of each afternoon. We shared an interest in reading long depressing novels by Dostoevsky, finding a lot of humour where none was intended. His tolerance, kindness and interest in academic work were all important in getting me through my first wonderful year at Reading.

The ivy-covered main hall was built around a quadrangle entered by way of an arch by the porter's lodge ruled by Mac, the Scottish porter. One side of the quadrangle was taken up by the common room and the library and the opposite side by the bar (I never entered it) and on the first floor the dining hall. Breakfast and lunch were self-service and evening dinner was formal, served at 7.0, to starving students in black gowns after noisily queuing on the stairs, the many agriculture students rushing up on Wednesdays in gowns and wellie boots after their 'farm walks'. We were served by ancient Austrians and Poles, leftovers from wartime I guess.

Friends

The Christian Union was very active in Pats. Before I went to Reading a member of the CU who was at WBGs came to visit (Brian Woolnough) – they must have had some system for looking out for new members. When I arrived he immediately invited me to coffee and that started a flood of coffee nights and lots of new friends. I attended the CU meetings, but always half on the outside. I disliked the suggestion of some members that members should make friends who were not Christian as if this were a dangerous activity. A good friend in this first term and for many years subsequently was Brian Skinner, a first year agriculture student. He lived on the top floor of a neighbouring annexe house which had a challenging fire escape system. This was rope with a chest harness having a controlled speed of descent. Brian tolerated me bursting into his room when he had visitors, leaping out of the window. Other friends: Derek Bailey, a 2nd year student with whom I travelled 4000 miles in 4 weeks on his motor scooter, visiting Rome by way of Innsbruck etc. On the ground floor of Northcourt house lived a 4th year student doing fine art. To amuse himself he used to visit and give me lectures on whatever he was then obsessed with. As a result of these I dutifully bought my second LP record – the Budapest quartet playing Beethoven Op 127 and other late quartets including the Grosse Fuge. One day he announced that he had had a successful day betting on horses – one of his other obsessions. To celebrate he had bought a new record – the whole of Wagner's Ring cycle.

In my first year, through the Christian Union, I got to know a second year agriculture student Derek Bailey. In the summer term he invited me to go on a trip to Europe with him on his Lambretta motorscooter (150cc two stroke engine). We covered 4000 miles in 28 days starting with a visit to the family of my German friend in Cologne then down the Rhine. We lived entirely on bread and cheese or ham or salami with milk [often stale] and very cheap wine. No hot meals for 4 weeks except in a campsite in Frejus after we were rescued by kind French couple after a puncture. We had a tiny tent. The original aim was to go to Vienna. We had an accident near Innsbruck, knocked into the road by a small car. We camped in the garden of the policeman who had to arrange for a court hearing in Innsbruck to determine blame for insurance purposes. Although we watched the car driver going for a drink with the judge he still favoured us. We had to take the scooter to Italy [Bressanone] to get it repaired. So we gave up on Vienna and went to Rome instead where we saw a performance of Verdi's Aida in the outside arena of the Caracalla baths. Our last meal in France was in a very wet tent in a thunderstorm: I had to break open a tin of sardines with my sheath knife eating the oily mess with dried bread rolls taken from the 'pour les chiens' basket outside a bakery in Geneva. We had to leave Derek's watch with a garage in London to buy fuel. Seeing we were going down the road where auntie Marion lived in North London we stopped to beg a drink. My mother opened the door and asked could she help. "Yes mum please". She could be forgiven not recognising her son as I was extremely sunburned and had a black beard with broad streaks of red.

Another memorable friend was Graham R. Bunting who lived in the same annexe as Brian. He was studying Zoology etc but failed some early exams so changed to do psychology where he was successful. He became the Student President of St Patrick's Hall and engineered a remarkable coup based on his thorough reading of the students union constitution. He announced a general meeting at one minute to midnight on a Saturday and held the meeting early on the Sunday morning, attended only of course by Pats members. The Reading University Students Union voted unanimously to change the name to St Patricks University Students Union. On the Monday afternoon there was a parade on the main campus with Graham taking the salute on a raised platform with agriculture students and their farmer friends parading with sheep and pigs and a couple of cows. A pig escaped into the Zoology lecture theatre during the afternoon lecture.

Graham carried on his 'political' career in the student section of the United Nations in Brussels [In 1964 he published a history of the United Nations – see Google]. When I was a research student at this time I was pleased to receive an invitation to go and visit him there, his motive being that I would track down a painting belonging to him. It was a portrait of him as the President of Hall painted by Colin Frodsham, a fine art student friend of John Nankivell. The deal was that he would pay my fare to visit even if I failed to find the picture - which I did. He was surprised when I phoned from Brussels train station as his whole scheme was that I would go on my motorbike so that could get a free lift home. To dampen his annoyance I said I would pay for dinner at a good hotel; he chose the most famous hotel in Brussels and the bill was more than the cost of my travel. The last I heard of him was a story of a friend who was approached on Southend pier by a tall handsome blond lady in red high heels who said "good evening, I guess you won't remember me as I used to be Graham Bunting". A pity that he did not have the presence of mind to get contact details.

In my second year I moved into a single room on the 1st floor of F block, invited by members of the trad jazz band because of my assumed tolerance to noise with my trombone. The gates of hall were closed for the night at 11.00, the only entrance then being by the tiny window in the first floor kitchen in one of the corner blocks. A good friend during 2nd year was Tony Gower who was a first year Zoology student. At some point he broke off relations and spent a lot of time devising clever stunts to annoy me. The best was to remove the central stem of my door handle making the door useless. I left my room by climbing down the drainpipe (overlooked by the Warden's garden) and back in through the ground floor kitchen window. I entered my room by climbing down the drainpipe from the floor above. I visited him in Briton Ferry near Swansea and amazed them all by being able to ride a bike. I then amazed myself by being stupid enough to be nearly caught by the rapidly advancing tide on Jersey marine beach.

The warden of the St Patricks hall (Pats) was Mr T.R.M. Creighton, an expert on African moves towards independence (from a review of his book *The anatomy of Partnership*: "temperamentally liberal and democratically inclined"). He told a story of how he was chased by a rhino while driving his Landrover towing his grand piano in a trailer. After a complaint about my noisy trombone I was 'invited' to the Warden's lodge for sherry, Mac the porter obviously enjoying my fear when delivering the invitation. It was a good experience, being praised for my enthusiasm and gently advised on how to be more considerate. He had really invited me, he explained, to ask me to be on a committee he was setting up to establish a programme of concerts to be performed in the junior common room. Our first concert was by the unknown but later famous Osian Ellis on harp.

Rag day was a big event in the University and town, raising loads of money for charities. One year in February I camped out in a tiny tent on the high street and also raised money busking with a Sri Lankan friend on accordion playing transcriptions for trombone of operatic tenor arias, sobbing my way through an aria from Pagliacci.

There was a strong rivalry with nearby Wantage Hall, with Sheep Night annually celebrating the night when the agriculture students from Pats filled up the Wantage quad with a huge flock of sheep. When the Duke of Edinburgh, Prince Phillip, visited the University his dinner was arranged to be in Wantage Hall. In protest he was met outside the Vice Chancellors lodge by most of the Pats students, parading in front of his car on its way up Redlands road to dinner led from the front by a small marching (trad jazz) band with me on trombone. On arrival, alighting from his car he was welcomed by me playing the bugle call 'Come to the cookhouse door boys'.

In my final year I had a sad experience when a good friend of David and myself (Alan Lillingstone) was killed in a motorcycle accident when riding pillion on the back of a 'friend' from his home. He had told me that he did not like this boy but their parents were friends so he felt obliged to invite him. This happened just at the start of the summer term when finals exams were held. The elderly deputy warden invited David Smith and myself to see him to commiserate and kindly to suggest that we sorted out his room and made sure there was nothing his parents might find and disapprove of – but there was nothing. Inappropriately, he was buried in a grave side by side with his unwanted friend.

At about this time I had problems with my friend Ray Felton who I came to know through Derek Bailey. Ray was a 1st year research student in Physics who was a model of the strong silent type. He was large and heavy and was important in the rowing team. Just before starting an

important race he told David Smith, a fellow rower, "I got a pain but I should reach the end". He did so and promptly collapsed with a burst appendix rolling out of the boat into the Thames whence he was dragged ashore, being unable to swim and only half conscious anyway. About the time of my finals exams he became enthusiastic to emulate the 'Jackson Pollock painters' and took to painting in oils on large sheets of hardboard. Our microbiology practical exam was spread over 3 days – to allow bugs to grow. I returned home at midnight in the middle of these exams to find he had emptied my wardrobe, placed it face down and was standing on my desk throwing paint at the excellent plywood back. I could not have slept in the oil-smelling room so moved to a friend's floor to get up early next morning to carry on with my practical exam. Graham Bunting had the wardrobe-back painting framed and presented it to the Hall Warden as a parting gift, confessing its origins three years later.

In the summer of 1960 I graduated and Ray finished his first year of research and he started to suffer from depression and was drinking a lot. One day he was seen standing on the physics department roof after throwing a whiskey bottle down at the chief technician. He was lured down and the head of department told him he should take 3 months off his research "don't worry about money we will find an extra 3 months".

He then proposed that we spend this money on a trip to Greece and perhaps Israel. The plan was to hitch hike down through Germany etc to the East coast of Italy and get the ferry at Brindisi. We hitched successfully to Koln where the rain storms inhibited hitching, so we got the train to Interlaken in Switzerland. After a whole day failing to get a lift we stocked up on good mountain maps and lots of food, and spent 8 days walking to Italy, mainly on footpaths but often on or around the high mountain pass roads. After a day on the beach at Rimini, Ray went to the bank, collected all the money, divided it into 2 and caught the train home. I then hitched home by way Lake Como (one lift). After a couple of days there I set out for home. I soon had a lift but was deposited at a small village only 3 km away. After 2 hours a Danish driver asked where I was heading "North"? "Where"? Anywhere North". After a few hours he told me he owned a furniture factory in Copenhagen and I could go with him all the way there; after a week he would take me to Paris so I could get a train home in time for John's wedding to Grace. Good plan. After a wonderful drive over the Alps all the way to Copenhagen he dropped me at a campsite about 6km out of town. When I later phoned the company to arrange my lift to Paris I was told that he had the same name as the owner but was a mere salesman and had already left. I had to get back in time for John's wedding to Grace (24th September 1960) so I had to book the ferry home to Harwich, leaving a tiny amount of money to survive for the week before departure. The crazy Australian friends in the next tent were leaving next day and, pitying me, bequeathed me 4 boxes containing tinned meat, potatoes etc. Next morning I walked to the English church of St Albans in Copenhagen. On the way out I was welcomed by an English man who listened sympathetically to my story before telling his. He and his wife were planning to go to South Africa on some sort of mission work. She was due to give birth to their first child in a week's time but having no money were selling her jewellery to buy food. So I was 'an answer to prayer' and moved in with them, providing enough food to last till we all left Copenhagen. They later thanked me for my help by asking me to be a Godfather to their boy. I lost touch after a few years.

Brian Skinner and family

Sometime in my first year I was invited to stay with Brian Skinner for the weekend at his home near Stoke Poges just outside Slough. The house, called Broomfield, became very important in the next few years. Brian's father was recently retired from his job of supply manager to ICI paint division; he spent most of his time in the study. Mrs Skinner became converted to Christianity after they were married and remained amazed that her husband was never attracted to the gospel, whereas her five children all became ardent Christians. These were John, Brian, Ruth, Clive and Hazel. The house was enormous with five or six bedrooms, two huge rooms downstairs and the large kitchen / breakfast room where most of life was lived. The garden had a tennis court lawn and beautiful flowerbeds and an orchard. Brian had established a small business of free range chickens – sold to local hotels. Brian's older brother John was studying to be a farmer (which he became); the others still at School were Ruth, Clive and Hazel. Within ten minutes of arriving I heard the sound of the trumpet in the distance; I chased it to its source to find Clive (age 14/15) playing. He became a very good friend as indicated by our naming Clive after him so many years later. I often visited Broomfield over the years. Special memories: building a chicken plucking shed with concrete slabs rescued from an old air raid shelter. I learned to do wiring and rewired the garage, extending the supply to the shed to drive the chicken plucking machine. This was a rotating drum with Bunsen tubing flails, glued in with special glue provided by Richard from his work on aircraft. I once helped out at Christmas by catching the birds then killing them by breaking their necks, hanging them in W-shaped hangers on the wall and, when inert, immersing them in water for exactly two minutes at 180 deg F to loosen the feathers which were rapidly removed by the flails of the machine. I then helped out in the evening de-gutting them. An important influence of the Skinners was their demonstration that I was able to do many things which previously had no confidence I could do. This attitude had been assumed because dad tended to sneer at my booklearning so I had accepted that I could not do practical things.

Broomfield remained for years an important place for me. I always felt so welcome. The days leading up to Christmas were spent there, tramping round the parish playing carols on trombone, with Clive on trumpet. I spent my 21st birthday there, starting with 21 bumps tied by hands and feet and lowered and raised out the window against the pebble-dash wall onto the rockery below. While the boys did this the girls erected a small tent, my birthday present, on the lawn. One summer I was doing some work there and Brian said I was needed on a sort of Christian camping Outward-Bound course for older teenage apprentices. Clive was enthusiastic for me to go so of course off I went. It was on the Arthog promontory on the South side of the Barmouth Estuary. We taught rock climbing, orienteering in the mountains and Kayaking with evening bible studies. Much of it I had to learn the evening before teaching. I disliked rock climbing; I hated looking up from a precarious perch but was ok looking down so I specialised in abseiling. I led a group in kayaks out beyond the rail bridge across to Barmouth and had a worrying time working out how to get the boys safely turned around to head for home in the increasing swell. It was on this trip that I ran with Clive up Snowdon and discovered the thrill of scree jumping down the mountain, later passed on to Clive Junior. After camping the night 20 miles from home we sent the boys off in small groups to navigate back home. We instructors, drew a straight line on the map and followed as best we could. The last part involved fording a river with me carrying someone carrying rucksacks, alternating between an almost submerged step forward and a jump up to grab

a lungful of air. We expected a triumphal entry but we were first back so we entered wet and bedraggled into an empty campsite.

A night exercise had the boys tramping over Cader Idris, replenished by hot chocolate, delivered by me and Brian from the back of his Douglas Dragonfly motorbike; this had the useful feature of opposing twin cylinders that provided a low centre of gravity, important on mountain sheep tracks. [Many years later we camped at Arthog on our honeymoon).

The strict evangelical tradition at Broomfield meant that it was assumed that paperback books and the cinema were not appropriate. I managed to educate them with my paperback Steinbeck novels and took Clive to London to the cinema to see Ben Hur which led to the whole family recanting and going to the cinema. It was often emphasised that we should not be 'judging' of others and this seemed to be a long-running joke. I only ever felt judged when a fuss was made of anything good that I did sensing (probably incorrectly) that there must be negative judgements that were repressed.

Paid work while a University student

When I was a student I mainly worked for the Watford Parks Department. At the start of the holiday I turned up at 7.0 am at the office and joined the queue of scruffy hopefuls, made up of a few students and others who were at the lower end of any social/education spectrum. The person in charge was youngish, slim and looked like Tom Courtenay, always wearing a grey suit with a buttonhole of a dandelion or other weed. He had a degree in horticulture. One time as we assembled in our nervous line he called out "any science students? I confessed and was told "follow him - you are on grass mowers". Mine was petrol powered with very aggressive reciprocating blades in front for carving through rough weeds, small trees etc. I was driven out to an allotment to cut down the undergrowth of brambles and thistles that was threatening to attack the edges of the allotment. It was hard work but I enjoyed the destructive element. One day I was working on a downward slope at the edge and I lost control. We lumbered downhill as I struggled to turn it off. I failed, the engine finally stalling as it tried to chew its way through the penfold wire boundary fence at the moment that the boss arrived in his little van. He strolled over lighting a cigarette and choosing a fresh dandelion. "Leave that mess, I will get an engineer out to unscramble it all, and come with me". I got in beside him and had a brief interview "I am bored so am driving around on a general inspection, first tell me if you have heard of Shostakovich". I told him that I had just bought the first recording of his cello concerto performed by Rostropovich. "OK off we go". This became a regular thing as he used to get bored reviewing his slaves as he called us.

One year I was paired with a history student to clear scrub and prepare an area for planting in the small woodland that stretched from the bottom of Radlett Road toward the by-pass (A41). Our only tools were forks and spades. My student co-worker loved his history and spent a week explaining the causes of the 1st World War. I later had a more public workplace with the same student, tending the flowerbed at the junction of Balmoral Road and Knutsford Avenue, a very short walk from home. We devised a game of synchronised fork throwing in which the forks were thrown up to loop back and arrive together about three yards ahead of us.

My hardest period was the summer when I was involved with a team renovating the children's play areas in Watford parks. The first part required us to dig out the foundations of the

swings which were blocks of concrete embedding the metal support struts. The concrete had to be smashed by hand with pickaxes and sledgehammers. One person held a metal wedge for breaking the concrete with a metre long set of tongs while trusting another to smash at the head with a heavy swung sledgehammer. I soon realised that I preferred the relatively safe hard work of the hammer to living with the fear and reasonable expectation of the hammerer mis-hitting the wedge and painfully smashing the tongs out of my grip. The smashed lumps of concrete were heaved out of the holes and carted away. After this we installed the new ones in fresh concrete, all mixed by hand which was of course tiring but mainly enjoyable and I did become very strong. It was at this time that I was taught by Brian Skinner to break 6 inch nails by hand. They had to be wrapped in a handkerchief to avoid damage. The 'trick' was to concentrate every bit of strength and will to the first bending of the nail; after that it was a long determined slog of bending and straightening the nail till it broke. One time I dropped it at the finish and picked it up, so getting a nasty burn from the forged nail.

Music at Reading

As I was forbidden sport I devoted my spare time at university playing trombone in three orchestras (Reading Youth Orchestra, University Orchestra and Reading Symphony Orchestra) and a traditional jazz band. I used to practice in the St Patrick's Hall tiny music room, off the corridor leading up to the dining hall, serenading the queues up the stairs to formal dinner which was served by ageing Polish and Austrian servants every night.

During all this time I experienced chest pains, especially after concerts. In the 2nd term of my 2nd year, I had severe pains during a Saturday morning physical chemistry practical. Dr Prue assumed it was a heart attack and took me to the adjacent Royal Berkshire Hospital on the London Road. I was seen by a West Indian doctor who sneered at me being such a weed complaining about the pain. I told him about previous Watford hospitalisation and diagnosis of a heart problem; he sneered at that also and correctly diagnosed a pneumothorax (blown lung). This last extreme episode was the result of using my standard tenor trombone to learn the high alto trombone part of Brahms 4th symphony; the previous heart diagnosis had been wrong. I was told there is no treatment except to lie in bed for ten days and that I must give up the trombone. After a short time weeping under the bedclothes I emerged with plans to give up the trombone and to take up the cello which I continue to play. This same hospital had treated the famous trumpeter Harry James by spraying inside his thorax with talcum powder provoking growth of impermeable scar tissue. But I was not as important as him. I later learned that an operation has been developed after RAF pilots near the end of expensive training developed the problem as a result of massive G forces in their fighter aircraft.

My artist friend John Nankivell painted a picture on the crudely plastered wall in the outer corridor opposite the music department: On the left a grim dark scene announcing 'Death of the trombone virtuoso Chris Anthony (For sale Boosey and Hawkes trombone, £26); on the right a glorious golden picture (like John Martin) announcing the birth of the Cello Virtuoso Chris Anthony (wanted one Cello approx. £26). Soon after leaving hospital I went to the afternoon rehearsal of my Reading Symphony Orchestra in the Town Hall. An elderly man was helping them out by playing through the Saint Saens Cello concerto. I rather self-consciously sat next to the only other audience member in the middle of the hall. When I said how wonderful the player is my new

companion told me it was her husband Ernst Slaney. When I told my sad tale to her (Grace Slaney) she invited me home for coffee to meet her husband who sold me my first cello for £20. It was a mid-1800s German instrument. We became friends and years later I bought my William Forster cello from Grace when Ernst died.

I was later able to play at the back of the cellos in the Reading Symphony Orchestra, my friend (and trumpet pupil Nigel Chandler playing in the brass section). Being close to London we were able to hire musicians relatively easily. Sometimes I was the only trombone so I had the pleasure of playing with music students from London. While backstage in a visiting concert in a school theatre I found myself with 3 students who insisted on playing catch with an enormous medicine ball during a piece where we were not needed. The trombone student was Nicolas Braithwaite, now a serious conductor. I took part in a memorable concert of Verdi's Requiem with the great tenor Richard Lewis. My main memory is of my nervousness about Nigel playing one of the off-stage trumpets. In the Youth Orchestra I mainly remember playing Tchaikovsky's great music for Swan Lake.

My recorded music was mainly from borrowed LPs – from the lending section of a music shop. I mainly remember lots of Bruckner and Mahler. Most Saturday afternoons were spent writing up practicals and cleaning up notes while in the record room of the music department where Prof Woodham allowed me to go. So that I did not have to spend a lot of time choosing I played long pieces and became very familiar with Haydn's Creation, The Bach Passions, Dream of Gerontius and especially Beethoven's Missa Solemnis. Very many years later I met Professor Woodham in the Mayflower theatre at a Welsh National Opera performance. He was very old, decrepit and short-sighted. He confirmed that he was Prof Woodham from Reading and then burst into slightly mad laughter as he remembered me as "that student who started learning the cello by learning the first Bach cello suite a bar at a time (I still find it very difficult).

READING UNIVERSITY YEARS; POSTGRADUATE AND POST DOCTORAL PERIOD

The science content of my PhD and post-doctoral work are described in a later section.

I 'achieved' a Lower Second class honours in my final BSc exam. Everyone was rather surprised which was gratifying but not much else. I guess the reason was my arrogant dismissal of ecology, fungi and taxonomy as uninteresting compared with biochemistry and genetics that took up most of my time and interest. I needed an Upper Second to be given a Research Council Studentship. Before the exam results I had attended an interview to try to get an Agricultural Research Council studentship. I sat on one side of a table, the other sides being occupied by senior serious scientists. I was asked, among a lot of other stuff, if there was any topic I would like to investigate in future years. I said that I would like to study the growth of mixed bacterial cultures in a continuous culture chemostat. They enjoyed a joint sneer at the blasphemy of using mixed cultures. I failed. This topic did become of interest many years later and I chaired a Research Council committee that awarded a big grant to study this.

Fortunately I had also applied for a University studentship before the exam results were available. Only one of the panel was a scientist - 65 year old Prof Harris whose interest was fossil plants. He only asked one question: 'what is the colour of ATP?' White. Why? It does not have a sufficient number of alternating single and double bonds to absorb light at wavelengths we can detect. He wrote this down. I had asked if it would be discourteous to assume they were not

science experts. They encouraged me to talk at a nice low level as if I was telling mum about science stuff. I later learnt that I was put on the short list because I was the only candidate that the Prof of mediaeval church history could understand. I was not awarded a studentship but after the exam results one of the successful candidates rejected his studentship as it paid less than the national Research Councils (£300 instead of £350). I was awarded the liberated studentship. I heard about this when I was at home looking for a job so I phoned the Department. Knight then offered me a job with his old friend (Dr Standfast) at the Lister Institute at Elstree, near Watford. He reminded me that I would be paid well etc. I rejected this as it was medical microbiology and accepted the low paid studentship to work with Len Zatman, my hero. He was a short man with dark swept-back hair who seemed to find everything in life interesting. He was by nature informal and when he saw everyone wearing ties and jackets he responded by always wearing a bow tie. He started his first undergraduate biochemistry lecture to us with his definition of Biochemistry, written in huge letters across the blackboard: Meat → Zatman.

Probably the majority of research students have some bad experiences with their PhD supervisors. I was very fortunate, I can remember none. When I wrote *The Biochemistry of Methylobacteria* I dedicated it to Willy Wiles (my Biology teacher), J. Rod Quayle (the 'godfather' of my subject) and Len Zatman (an opportunity belatedly to express gratitude). He came down for a celebratory dinner and to receive his copy of the book. He phoned the next morning to say how much he had enjoyed reading it. He had stayed up till four in the morning reading it from beginning to end.

The other research student starting in October 1960 was my old room-mate David Smith, working with the rather fearsome Dr P M Francis Shattock on the D antigen of *Streptococci*. His neat organised approach to the lab contrasted a little with my slightly more slapdash approach but I am glad to say that he influenced me more than I influenced him. He worked in a lab adjacent to Shattock's inner office so casual visits were a risky business. I worked initially in a single person lab opposite Len's office on the first floor. One advantage of this was the echoing acoustic of the stairwell where I played cello in the evenings. I later moved to a large lab in a wooden hut on the ground floor. This was next to the office/lab of Dr H.P. Charles (Charlie) who became a life-long friend. I stayed in this lab until 1966, sharing it later with an obsessively tidy Tony. It was roomy enough for cello practice, tolerated by Charlie. Under the window at the end of the room there was a long bench beneath which built cages for gerbils one of which I donated to Bristol zoo when they opened their first nocturnal animal house.

The Department tradition was for morning coffee and afternoon tea to be served in a small space, beside our centrifuge outside Prof Knight's office. Shattock's influence meant that it was all rather formal with willow-pattern cups. David and I often found the conversation of little interest as we had no house with leaking gutter or lawns to mow etc. Len would always lighten everything with stories of what had recently read in science or anything, anywhere. The staff were Knight, Len Zatman, Ron Keddie (a dour Scot), P.M. Frances Shattock, Charlie, Muriel Rhodes and Eve Billing. At some stage new staff arrived: Bob Park, Ian Tiffen, Tom Heydemann. A typical Len Zatman story: He said he had a vague memory that a dehydrogenase enzyme could be made to work slightly differently if acetyl-NAD was used instead of the usual NAD. He struggled but could not remember who had used this compound or where it was published. I looked it up in my textbook Fruton and Simmonds and there it was in the footnotes 'Zatman, Colwick and Kaplan'.

Tom Heydemann arrived in our 2nd year, appointed before finishing his PhD thesis at Cambridge University. While David and I were writing the many drafts of our theses in 1963 we often came stressed into coffee discussing some problem with writing. Tom was scornful of the

fuss we were making while he was typing direct his four required copies. He failed. We achieved what we set out to do and finished our research and thesis writing within three years. David won by a few weeks; I finished in May 1963, giving 4 months to write up proper papers. In my 2nd year I had done a series of difficult experiments to show that 'my enzyme' is unique in being activated by ammonia free base, not the more common ammonium ion. Tom sneered at my conclusion saying that this is not unusual. Len spent time confirming my conclusion about uniqueness then furiously banned Tom from ever discussing research with me again. But this did not stop me liking him.

I worked most evenings and also on Saturday mornings. I had lunch in the students' Union canteen and I guess I much of the time I relied on this and just snacked in the evening. This was often with David, the corner shop providing bananas, peanuts and pork pie; any mould was excised before eating, a free replacement being provided on production of the evidence. I think we once resorted to making soup from the bacterial nutrient broth – what's good for the workers should be good enough for the bosses.

Accommodation

During my undergraduate time I had always lived in St Patricks hall with all meals provided. As a postgraduate I had to fend for myself. My first flat was shared with Ray Felton at the top of an old house in King's Road near Cemetery Junction. We overlooked the gas works and the Kennet Canal. On the day I moved in I had three lots of visitors, bringing a few extra bits and pieces and some food. When the third lot arrived the old landlady shuffled down the hall and shouted "this is the third lot of visitors you have had – you'll be bringing women and jazz bands next". The next morning I had a letter waiting on the stairs giving me a week's notice. I told her that I had paid for 4 weeks so I needed 4 weeks' notice. For six months every Monday morning there was a stamped mailed letter waiting for me at the bottom of the stairs giving me notice. After a couple of weeks I ignored these and they were removed by the evening. We shared our flat with a few families of mice who appeared when I put a record on Ray's Phillips' Black Box. I used to practice cello in the flat and later discovered that the landlady used to stand on a kitchen chair better to hear me through the ceiling. In theory we catered individually; in practice I would often find my food missing as Ray assumed it was ok to help himself. I cannot remember this being a real problem.

All places I lived in were rooms in the homes of lonely elderly ladies who also lived there. In one of these I returned one day to find her waiting for me at the front gate, trembling with fear because my friend "has gone mad and has wrecked the kitchen". The friend (the other tenant) was a French Canadian who spent hours extolling the glorious tradition of French song. He was rather fastidious and, after a week sharing a kitchen that had last been properly cleaned many years before, took action by removing all furniture including electric cooker, fridge onto the back lawn and scrubbing down the walls. I checked with him that he expected to be finished within the hour so I entertained the landlady in my room, explaining the he was so so grateful for his lovely accommodation that he wanted to say thank you to her by cleaning her kitchen. I think this was the flat I later shared with Roger Wales, a psychology postgrad who was at some time President of the Christian Union. He started every day peering dejectedly out of his bedroom window muttering "oh another day". Since then I have been grateful that I usually wake cheerful and optimistic. He researched aspects of Perception, the main topic of the Professor of Psychology. I spent many boring hours as his guinea pig recording my perception of weight using many many pairs of weighted plastic film canisters. Another tenant was an Irish postgraduate who was researching de Quincey, writer of *Confessions of an opium eater*. I heard many hours of Irish blarney about it but could never get any sense out of him relating to the purpose or content of his

research. When I asked where he went to school he put on a modest sincere look and said “Haileybury actually”, effectively apologising for going to a better school than me. I had never heard of it of course – I have since learned it was the school established to educate the servants of our empire.

My best accommodation was in Green road which I shared some of the time with Tony Gower. It was remarkable in being clean and warm. The landlady had come to England at the time of the Russian revolution, from Georgia. The only problem was that her daughter aged about 40 was a little crazy. She worked at the BBC Listening Centre in Caversham, monitoring Russian broadcasts. She resented us and found ways of being awkward. I used to have some of the teenage boys from the Baptist Church (David Meads, Brian Mosely, Chris Warman) to tea on Sundays. As soon as she heard them arriving she would lock herself in the bathroom which had the only loo. She had not realised that a kitchen sink makes an adequate pee place for boys. She once punched me in the face when I complained to her mother about her behaviour; I collapsed onto the open piano keyboard and produced a wonderful backing chord to her shrieking that I was trying to wreck the piano. There was no heat in the kitchen and occasionally when really cold we would cook on top of the stove with our feet in the oven. After Tony once made an impressive macaroni pie our landlady took it up the road to show to all her neighbours.

Elizabeth Marian Elliott

Most Saturdays I attended the main Christian Union meeting and at one of these in my first year as a postgraduate I was introduced by a plotting gaggle of girls to Elizabeth Elliott, then in her second year undergraduate course in the microbiology department. I quickly latched onto the fact that she lived in St. Andrews Hall at the bottom of Redlands Road, 200 metres from my lab, so quickly invited myself for tea. I think it was the autumn term because we went together to the Christmas show in the Great Hall – Jantaculum. One thing led very slowly to another and we were married August 1st 1970.

One of our first outings together was supposed to be a gentle potter on a sunny afternoon in my big open canoe near the University boat club. The outing was dampened by the sky turning grey and by a request from the students to help them look for the body of a friend who had fallen from his boat and was presumed drowned. We pottered about as planned but not looking too hard. My first visit to her home at 43 Beach Road West in Portishead was of course memorable. Her older brother Graham was very formal, planning to be an engineer of some sort; Her younger brother Ben was quiet but when I shared a bedroom with him he told me all his plans for a future in pig farming; her other brothers were Andy (also called Pug), aiming to be a scientist and the youngest Hugh who was more interested in visual arts. I got to know Andy best as I helped him with his chemistry and also playing cello duets with him. I first got to know him well when he stayed with me for a few days in Watford after his father died. We lay awake half the night while he gave me a long discourse on the character and political rise of Bismark as he unified many separate states into the country of Germany.

They have all been successful in their aims although Andy became a professional cellist after graduating in Biochemistry at Leicester University (his tutor was Hans Kornberg). Liz’s mother was always busy looking after the family – usually very calmly and always very welcoming to me. I did not start well with Mr Elliott, the Head teacher of Gordano School – the first secondary modern to become a comprehensive school. He mocked me because I refused to drink more than one glass of wine while he worked through the bottle. He was a good pianist and played to us after dinner, apologising for some fumbled notes. My suggestion that this was due to drinking too much

did not go down well. Sadly he died within a couple of years. As I became one of the family I got to like them all very much, spending camping holidays with them (mainly in Northumberland and Scotland) and also of course many many weekends, with memorable trips to The Quantocks, Mendips, Black Mountains and Brecon Beacons.

One of my first real outings with Liz was to see Britten's Billy Budd at Covent Garden, conducted by Georg Solti. Tickets were so expensive we economised on everything else, especially our dinner which was baked beans on toast in a workers café in the vegetable market part of Coven Garden. Wonderful music with the bonus of watching Solti swinging over the conductor's rail towards the trombones to encourage them to produce a typical rich Britten brass blast. I have later learned that such choreography is not essential as the Brass players know what the notes are and what the fff means, but the 'screaming skull' was a memorable part of the experience.

Church, Christian Union etc

My main church was Carey Baptist church near Tilehurst; the minister was Mr Owens. As I was one of the last to leave one Sunday morning he said I did not seem to be in a hurry to get home for lunch. "You would be in no hurry if you had to make your own omelette". He was shocked and got a church member Mr Mosely to invite me for lunch the following week - a very important lunch, repeated for years. Mrs Mosely was large in body and in spirit whereas Mr Mosely was physically small but so kind and caring. He worked as the manager of a 'Gentleman's outfitters'. They were always worried that I would be bored there so asked me to bring a friend which I did. Many years later I met someone who had been a student years after me at Reading who said this tradition of generous hospitality had continued long after I had moved away. Michael was a very affectionate 14 year old, his sister being younger and relatively invisible. Michael was in the Boys' Brigade at the church which was a small affair compared with my Watford BB company. I gradually got to know a lot of Brian's friends and they would come to tea with me on Sunday afternoons. They included a neighbour David Meads (who I met up with more than 50 years later) and Michael's cousin. I was asked to go to their summer camp to help and had a great time. While there I met a cheeky boy called Chris Warman who I got to know well. He lived with his mother near the church and she was always wanting me to visit so I could be a good influence. He liked me because of my motorbike. We met up again 50 years later when he reminded me that I had later given him my discarded moped. This was the start of a life of motorcycling. Sadly many years later he had a very serious accident on his big bike, breaking arms and leg. When we met he walked with a stick and offered his reconstituted hand in a purple velvet glove. Not all influences are good; he maintained I was a good influence. He reminded me that I had written a reference for him for a job with the GPO and that I had gone with him to his interview and chatted with the future boss. He worked happily with them all his life.

In my undergraduate time I was lured up to a week's bible teaching course at a country house at Swanwick in Derbyshire. I remember little about it except the celebrated John Stott was a main teacher, helped by David Slack an eminent academic ornithologist well-known for his monograph on the life of the robin. They invited students to join them on a birdwatching walk which I bravely did, being the only student to take up the offer. I was very excited to see a ring ousel and was surprised that David Lack could recognise only robins, so the 'little brown birds' had to be identified for him by Stott as meadow pipits. Since then I have confidently identified all confusing little brown birds as meadow pipits – sometimes correctly.

Nigel Chandler

One spring time Liz and I went with David Ingleby to Bach's St Mathew Passion in the University concert hall. Liz lived in St Andrews Hall next to the campus so arranged an interval tea. She invited David and his young friend Nigel Chandler (from Argyll Brethren church). Although sitting quietly in a corner he was unusual in bravely taking two cakes when I offered him the plate. After a couple of minutes chatting he told me that he played trumpet and needed a teacher. The following Monday I went to see him in his house next to Prospect Park and gave him a lesson in the flattering acoustic of their large garage. I went there every Monday for the next two years. He was planning to take grade 5 but we got up to grade 8 in six months. He became a good friend and remains so. At this time I had a large 2-person canoe which I kept at the University boathouse. One Whitsun we went on a paddle up the Thames in a gentle Wind in the Willows way, sleeping in a small tent on the river bank which was overrun by cows who ate one of my socks. Nigel worried his mother because he had no plans for his future so she pleaded with me to advise him. I asked him what he would most like to achieve and he said "design St. Paul's cathedral but Wren got there first". He had assumed that his purely artistic approach with no maths etc would exclude him from doing architecture at university. He showed me an architecture book he liked written by a member of staff at Newcastle University. So I wrote telling about Nigel and asking if there was any hope of a place at Newcastle. I said that I was at Reading University and was responsible for advising him, signing off as Dr C. Anthony, using this useful title for the first time. We received an instant reply and an invitation for Nigel to go there for interview which he passed so I helped send my friend away to the other end of the country. He remains an architect living in Northumberland.

David Ingleby

In the summer of 1961 Just after I bought my motorbike a friend, David Ingleby (also in Christian Union), asked if I could do him a favour by driving to visit his mother before she had to go into hospital for an operation. Knowing his family lived in Cornwall I immediately agreed only to be told we had to go the following week and that she lived in Porto in Portugal. We did Reading to Porto in 5 days (4 nights). Wonderful drive down through Les Landes, past St. Sebastien and across Spain (400 miles in one day) on rather rough roads. The bike went well but before we reached Portugal the spring in the gear return spring lever [right foot] broke and so had to be manipulated with an elastic cord and complicated footwork for the rest of the journey. Usual running speed was 55 - 65mph. The weather was hot and dry on the way there. On the way home within 20 minutes of crossing the Pyrenees into France the rain started and continued all the way home. I learned half a century later that David was slightly embarrassed by my usual driving clothes - only crash helmet, shorts and shoes. The best way to ride on a motorbike chugging at 20 mph with the warm Eucalyptus air in our faces or the smell of winnowing wheat drifting across us. After Porto we went South to Lisbon and nearby Cascais, Estoril and Sintra. We flew in a Bristol freighter from Lydd to North France. The front of the aircraft had 'clam doors'. After we disembarked onto the runway the clam opened its shell and the bike was rolled out with three waving 'porters' balanced on it. We slept in a tiny tent always in wild places. I learned that the best way to travel fast and safely through France on simple roads was to follow a Dutch car towing a small trailer; they loved fast safe driving. We got there in time. Then a more leisurely trip back. As soon as we Crossed the Pyrenees into France the rain started and stayed with us the whole way home.

Bikes and cars

When I was an undergraduate I might have had a bike but cannot remember. When starting as a postgraduate I had a bank statement that erroneously suggested I had £30 in my account which I then spent on an old NSU Quickly moped (50cc). The day I passed my test I bought an old (1956) BSA – 350 cc single cylinder motorbike. I learned a lot about mechanics with this, rebuilding big ends and putting in a complete new wiring loom. When I started my post doc period I bought a 1939 6 cylinder Vauxhall with leather seats and gangster running board. I drove thousands of miles in this, learning to drive. My driving test ended when, braking hard to avoid hitting a lorry driver jumping out of his cab, the car took us onto the opposite pavement because of the uneven pull of the cable brakes. I passed, with a generous comment on my important emergency stop. The big ends went at 74 mph going downhill with Liz on the A4 on the way back to Reading from her home in Portishead. John Bowen, the husband of Beryl, Liz's landlady, was a professional car mechanic (retired) and happened to have a spare engine for this car in his garage but we decided it had really had its day and I dumped it on a bit of spare land belonging to the University. A friend was planning to dump his car so I bought it from him: a 1947 Rover 14 saloon (2 litre straight 6 cylinder), with leather seats, running board, windscreen that could be wound up fully to create a sports car, and a neat little wooden dashboard wheel that put us dangerously into free wheel mode. When I moved up to Sheffield for a second post doc I needed a more reliable car and bought a Rover 90.

MY SCIENCE: MY PhD PROJECT AND POST-DOCTORAL WORK

Summary

I had a choice of two PhD projects. The first was a continuation of work by his Len Zatman's previous student on the bacterial biosynthesis of NAD (a coenzyme derived in humans from the vitamin niacin). I chose the second topic which had arisen from a conversation between Len and Muriel Rhodes who had heard of a *Pseudomonas* species that would grow on methanol (methyl alcohol), which like methane has only a single carbon atom in the molecule. So every carbon atom in the bugs must be derived from this or from carbon dioxide in the air. All their energy must be obtained by oxidising the methanol. This aroused Len's interest for a rather special reason. He had worked on methanol toxicity in humans. Low doses cause blindness, heavier exposure causing death. The toxicity was most likely due to toxic formaldehyde, the product of oxidation of methanol. Len tried to confirm that the methanol would be oxidised by a typical alcohol dehydrogenase of the sort found in almost all living things. But remarkably, none of the very large number of such enzymes is able to oxidise methanol, although able to oxidise almost any other alcohol. So, he concluded that if bacteria grow on methanol they must have an enzyme which is truly unique in being able to oxidise methanol.

Because of Len's final year lectures I had become interested in the newly-discovered complex biochemical pathways responsible for the assimilation into cell material of compounds containing only two carbon atoms (ethanol, acetic acid). So I wanted to study how the bacteria growing on methanol assimilated their single carbon atom growth substrate. The department was not equipped to study this subject, requiring complex experiments using radioactive tracer compounds. So, disappointingly, my project was to discover how such bacteria oxidised methanol to formaldehyde, and how they coupled this energy-yielding reaction to produce ATP, the energy currency of all living cells. I assumed that the process would involve a typical enzyme with perhaps

the only unusual property being its ability to use methanol as its substrate. I was completely wrong and Len was completely right. We solved the problem and it kept me occupied for more than 40 years; my first paper (1964) described the bacterial species I had isolated that grew on methanol; the second, published adjacent to the first, described the methanol dehydrogenase responsible for catalysing methanol oxidation. My last paper, published in 2006 described the 3 dimensional structure of this enzyme at atomic resolution. 'My' methanol dehydrogenase is a completely novel type of enzyme, the first to be described of a large class of novel enzymes, the quinoproteins which later became the subject of an extensive series of international symposia. I think it reasonable to conclude that I was very lucky but I strongly disagree if anyone else suggests this.

I finished my practical work in January and started to write my thesis. By contrast with some students my experience was positive. After I had finished a section I would sit in Len's office slogging through my clumsy writing. Whenever he needed time to understand something or was struggling to find a better way of describing it he would clean up his pipe, refill and light it, offering me a peppermint as antidote. I was working at the desk in the library in the evenings giving me opportunity to write and rewrite and rewrite and to become friends with the Chief librarian's secretary who then typed the thesis. My copy had to be perfect as mistakes meant a complete retype of the page with its 3 carbon copies. It was submitted May 10th, David Smith's being submitted ten days earlier. So we both finished in a little over two and a half years, achieving one of our aims – to break the Departmental record (four and a half years). I would not have done this without Len's constant encouragement and David's example and company.

My grant paid me up to October so I spent the next few months writing up my thesis as two Biochemical Journal papers and looking for a post-doctoral position. After the possibility of going to work with Quayle fell through Len told me that he had got a grant for three years postdoc from the Agricultural Research council and I could have this. This was ideal because I had shown that we had a very unusual enzyme and it was at a stage when I could investigate it further. This proved to be important in directing all my future research as our 'classic Anthony/Zatman enzyme' proved to be the first of a whole new category of enzymes that have a completely novel prosthetic group called PQQ. I discovered this but its structure was determined thirteen years later to be an orthoquinone by the Cambridge X-ray structure group. Many other enzymes were later shown to be similar and became known as quinoproteins, becoming the subject of a whole series of international symposia. Although I researched many related and unrelated topics this enzyme was the subject of both my first papers (1964) and my last (in 2006).

POST-DOC RESEARCH WITH JOHN GUEST AT SHEFFIELD

After three years post-doc in Reading I spent a year (1966/1967) in Sheffield working as a post-doc with John Guest. This was the result of 'social engineering' that could not happen now. I had applied for an advertised job with Hans Kornberg, Prof of Biochemistry at Leicester but he said it was already taken. I asked if he had any other positions as I had been first attracted, as an undergraduate to biochemical research by reading his papers on the discovery of the glyoxylate cycle. He wrote back to say he was very touched but that there was no room in his lab. Two days later he phoned to say he realised that I might feel this was some sort of excuse so could I come up to give a seminar the next day and see for myself. Although it was late afternoon, allowing no

time to prepare slides etc, I said yes. He told me on arrival that this was his standard filter – to remove unworthy candidates who would decline a seminar at such short notice. There *was* no room so he used his influence with the Research Council to get me a year of post doc money to go to Quayle's lab at Sheffield. This was an obvious proposal as Rod Quayle was the top man in the study of bacteria that grow on methanol. Quayle generously said I should not work with him as it would later be assumed that I was one of his students and therefore not respected as a 'competitor'. My project with John Guest was on the regulation of synthesis of enzymes involved in biochemical pathways used for the production of small co-enzymes. He chose coenzyme B₁₂ (cyanocobalamin) which he thought would only be used during growth on glutamate not glucose. Within two weeks we found there was no regulation of its synthesis – it was always needed. So I shifted to a study of regulation of the metabolic pathways for growth on glutamate and glucose. The year's work led to a paper on this – introducing the concept of catabolic inhibition. John always claimed that I spent the first 3 months writing up my Reading work, the next three on the project, the next on job applications and the last cleaning up my messy lab. We remain good friends.

1964 NEW YORK INTERNATIONAL CONGRESS OF BIOCHEMISTRY

As soon as I agreed to do the three year post doc with Len Zatman he told me I should attend the 9th International Congress of Biochemistry, to be held in New York in August 1964, kindly helping to get necessary grants to pay for it, based on the fact that I was planning to present a poster of our work. The Biochemical Society chartered a Boeing 707 to transport a large cross section of European Biochemists who met and mingled in a sort of glass cage assembly area in Heathrow. I was probably the youngest there (25 yrs). Hans Kornberg kindly came up for a chat which was interrupted when he pointed out that I was wanted: outside the glass cage were mum and Auntie Alice banging on the glass walls and waving and blowing kisses. I guess it was the first time that anyone in the family had flown such a distance before. As mentioned previously, I sat next to Dagley, Professor at Leeds University. While struggling to take a picture of Greenland out the window I met a teenage boy who was travelling with his father from Switzerland. We all crossed paths occasionally during the Congress and again on the flight home. As soon as we had arrived in New York the organisers had given UK visitors \$200 spending money. I had told this to my Swiss friends who suggested I should spend it by visiting them in Lausanne/Geneva after we got home. I did this and learned a lot of the French language necessary to spend 4 days with a crowd of teenagers, being towed on a bike by them on their mopeds about Geneva and playing card games. On the flight to New York we passed through a thunderstorm which was announced by the pilot, telling us that to slow the plane the wheels would be lowered. This was accompanied by loud banging and lurching. The Italian lady next to me clung to me tightly while I tried to translate and mime the wheel message, leading her to think we were about to turn over.

I was advised that the YMCA would provide safe and inexpensive accommodation and, influenced by the recent West Side Story film, I booked the West Side YMCA, up near Columbus Circle and the Rockefeller Centre, not far from Harlem. The Harlem riots had recently occurred (between July 16 and 22) after a black teenager was shot and killed by police. Related to this, I guess, was my first shocking experience of the City on the way from the airport when the cab driver pointed out the gun in his lap. Every day I walked down 7th Avenue to the Congress, held in

two hotels - The Americana and New York Hilton. Walking back in the evening or night was a challenge. The second night I was approached by a large black man asking for a dollar for his friend, sitting on a nearby bench. I ran until out of breath and staggered into a bar which had a chalked board announcing Red Allen would be playing. He was a famed New Orleans' trad jazz trumpeter who had played with my heroes King Oliver, Louis Armstrong and the great Kid Ory. Down in a corner of the bar an elderly black man was quietly doodling on a trumpet. I asked "are you THE Red Allen"; "Yep". I cannot remember anything more so perhaps I should pretend that I bought him a beer when I got mine but I doubt it. Every subsequent night I trotted up 7th Avenue with one stop for beer and one for coffee. My room in the YMCA had no curtains to protect me from the flashing red YMCA sign outside. I mentioned this to a man in the lift one evening and he creepily invited me to move in with him. I declined.

Len had worked in the US at the Johns Hopkins Institute with Sydney Colowick and Nathan Kaplan, two of the best known biochemists in the world because they edited the ubiquitous *Methods in Enzymology*. Of course, being Len Zatman he had made many friends in the USA and these formed the basis of a postcard of contact names for me - in three categories: friends who would be nice to chat with, those who would be excited to meet me, and the top category of those who would do anything for a friend of Len Zatman. I attended a special honorary lecture by Colowick and found myself caught up with a gang surrounding him as we got into a huge lift. I asked one of the groupies to tell him that Len Zatman's student was hoping to meet him. I was squashed by his bear hug and swept off to their celebration lunch. The lectures and poster sessions were held in the large ballrooms with gilt chairs, mirrors and chandeliers. At the designated time I nervously stood by my poster awaiting the expected queue of Nobel Laureates. Only one person even glanced at it – the elderly black waiter in crisp white uniform, straight out of *Gone with the Wind*, who came up with sympathy and wonderful black coffee. Perhaps this is why subsequently I have been very conscientious in chatting with young scientists nervously manning their posters at conferences. I remember little about the conference itself and have stupidly thrown away the hardback published plenary lectures (now available for \$48 from Amazon).

Tom Heydemann also attended the Congress. He was always chatty and appeared to be an outgoing man of the world so he surprised me by wanting to do things with me rather than making new friends at the Congress. He insisted on taking me for a bus drive up through Harlem, something we had been warned to avoid because of the recent 6 days of rioting. He was very embarrassing, noisily pointing out cute black kids on their bikes, fights on street corners etc. I was so relieved to be safely let off back at Columbus Circle. A highlight for me was a special performance for us at the Lincoln Centre by the Boston Symphony Orchestra of Tchaikovsky's 6th symphony.

INTERNATIONAL CONGRESS OF MICROBIOLOGY, MOSCOW 1966

From my experience of the New York Congress I knew that these meetings always welcomed younger scientists and I confirmed this with the Society for General Microbiology who were offering grants for young researchers. I energetically encouraged the research students to apply and we all got grants, including Liz Elliott who was to become my wife, Gillian Roberts, John Grainger (a lecturer who later married Gillian). This rather irritated Ron Keddie (Liz's dour supervisor) who did not go.

The Society recommended the cheapest travel to Moscow which we all accepted, setting off from Tilbury in a Russian ship to sail through the Baltic Sea, stopping at Helsinki and Stockholm to Leningrad. Down in the bar we did not notice that the progress of the ship into the North Sea force 8 gale was the cause of our unsteadiness. Lurching up steep stairs I just made the rail before being seasick for the only time in my life. Liz helped clean me a bit, making me think for the first time that this must be what marriage is for and that Liz was an appropriate candidate. I spent the rest of the voyage sitting on deck, lining up rail and horizon to comfort me that all was now safe. The food was unremittingly soured with cream.

After staying for one night in Leningrad we flew to Moscow where we stayed in Moscow State University, one of the largest construction projects in the post-WWII Soviet Union. We soon learned that queuing was a favourite Russian occupation. On the boat we had been irritated by the very loud bearded David Cove who always accompanied Noel Carr walking with crutches; David constantly bleating 'When I was in Cambridge'. Our feelings about him changed completely when queuing to register in our hotel in Leningrad when he marched to the front and got them to form four lines and he helped with all their bureaucracy. At the conference we queued for hours to get registered by InTourist, because our names were in Cyrillic script, arranged in order of our initial registration, not alphabetically. I shared a washroom with David - set between our two bedrooms. Every night he lectured me on some aspect of his work, struggling to prove that his system for studying regulation of gene expression (using the fungus *Aspergillus* and the protein nitrate reductase) was superior to the Pasteur Institute's operon model with *E. coli*.

The organisation of the Congress was very poor. The lectures had simultaneous translation which was usually out of phase. I soon realised that having a too well-defined an aim would lead to disappointment with randomly rearranged lecture theatres, topics and speakers. I saw a lot of Moscow. The huge open spaces within the University were filled with small kiosks for collecting meal tickets etc where David Smith and I would stand long before they opened, competing to get the longest queue of hopeful punters which we then deserted. It was the hours spent in queues that gave us the opportunity of distinguishing the national characters of the Eastern Block. The Russians were on their best behaviour, trying to be good hosts but with threats against them if they were too friendly (no home visits allowed). The East Germans were unfriendly and aggressive, followed by Romanians, Bulgarians and lastly the friendly joking Czechoslovaks who loved to mock the Soviets.

In the university accommodation every landing on every corridor had seated old ladies muttering at us as we went by, but we never understood their function. Of course it is the chaos and disasters that have remained in the memory. There was a boat trip with food and drink. They must have expected only four boatloads as the six extra ones at the back of the flotilla had nothing provided during our six hour trip, half of which was in the dark. When I returned to my room at midnight I found they had taken the opportunity to varnish the floor and the woodwork. I made a walkway of that day's programmes across the wet varnish to open the window and jump into the bed. Breakfast was usually taken at little stalls in the huge concourse, the toast and red caviar being my favourite start to the day. The end of the Congress was celebrated appropriately by a banquet (standing I think) on 30th July (1966) in the Palace of Congresses in the Kremlin. News was fed up to the main hall from downstairs where a few were watching England beating Germany in the football World Cup on the only available TV. As the news was noisily relayed upstairs to the

banqueteers the place went crazy, the post-war feelings of the Russians against the Germans still very strong. Armenian brandy was forced down the throats of any English captured by the drunken Russians.

I loved Moscow and was sorry to leave. Later I learned that John Guest with whom I was soon to be working in Sheffield had disliked the whole experience as he persevered with the academic parts and struggled as a speaker suffering the non-simultaneous translations. I must have met him there but he says I do not feature in his written record of the Congress.

MY FIRST AND LAST JOB - IN THE UNIVERSITY OF SOUTHAMPTON

During my year at Sheffield I applied for four jobs. The first was with Ian Scott in the University of Sussex (failed) and the second was successful – a lectureship in the Physiology and Biochemistry Department in the University of Southampton where I remain. My main research has included work on metabolic pathways in methylotrophs (bacteria growing on methane, methanol etc) and on the way in which energy is obtained by way of ‘my’ enzyme, using the techniques of continuous culture, microbial genetics, spectrophotometry, molecular biology, site-directed mutagenesis, X-ray crystallography. I published about 100 research papers and a similar number of reviews and book chapters. In 1980 I accepted an invitation by Academic Press to write a book. This took 16 obsessive months of work to produce a 400 page monograph: *The Biochemistry of Methylotrophs*. This probably was what led the University to give me a Personal Chair in Biochemistry in 1986. Soon after its publication there was one of the series of Symposia on Microbial Growth on C1-Compounds. Rod Quayle gave an introductory lecture in which he summarised the main published developments from the previous three years. He concluded with “perhaps the most important development: at last someone has had the courage to write the long-overdue account of our subject and here is the first sentence”. Then on the huge wide screen the sentence I had struggled with to start the book: *Once upon a time there was a lonely methylotroph...* I felt very honoured.

In the closing lecture, by Len Zatman, the crazy inebriated Russian contingent launched a squadron of paper aircraft down onto the speakers platform – made from flyers advertising my book. Picking one up from beneath his feet, Len saw what it was and concluded his talk “I might have guessed”.

In 2018, nearly 60 years after getting my lower second BSc in microbiology *Marinibacterium anthonyii* was named in honour of the British microbiologist Professor Chris Anthony (!!!!)

APPENDIX: Summary of my research

This is an account of my earlier research.

How do bacteria oxidise methanol?

My first task was to isolate bacteria able to grow on methanol using the elective culture technique. This depends on the fact that soil will contain, among many millions of bugs per gram, some that will grow on any natural substrate. Some are able to grow on many compounds while others are more fussy. A small amount of soil is put into a growth medium at neutral pH containing a source of nitrogen and phosphate and metal ions and a single carbon source –

methanol. The only bacteria that grow are those able to grow on methanol; after incubation the cloudy medium indicates that bacteria have grown on the methanol and these are selected by plating onto agar containing methanol in a Petri dish. Single colonies, arising from single bacteria are picked off and purified. In retrospect I was much too thorough, isolating many pure cultures of bacteria able to grow on this special substrate. All the best-growing bacteria were a delicate pink colour (red on rich solid growth media). I selected one for all our further work and called it *Pseudomonas* species M27. I chose it because it had the deepest pretty colour. Years later I regretted this choice as the colour made studies of its respiratory pigments (cytochromes) more difficult.

The obvious next move was to measure its ability to oxidise methanol and potential metabolites (formaldehyde, formate) and succinate, lactate etc. This was done by growing the bacteria in large numbers of growth flasks, harvesting them using a centrifuge, washing them and making a dense suspension of them for study using Warburg manometry. They were placed in a small conical vessel with a side arm containing the substrate of interest (methanol etc). The vessel was then attached to a manometer and changes in pressure recorded after adding substrate. The vessel itself was in a water bath with the manometer clipped on the outside; one water bath contained seven vessels per side, all shaking noisily. Every few minutes it was stopped while I frantically recorded the pressures that changed as oxygen was consumed. These values could be manipulated to give a measure of rates of respiration with various substrates, the effects of inhibitors of respiration etc. After the experiment the vessels had to be washed in a boiling vat then dried. During this process I calculated the results and planned the next run. I did a huge number of these, challenging myself to do more of them every time. Looking back I should have stopped all this long before I did, but I did learn a lot about experimental variation etc. I was told at this time that my frequent headaches were probably due to eye strain caused by the Warburg manometer, so started to wear spectacles for reading etc.

My first 'discovery' - sadly an artefact. There were no unexpected results except that, surprisingly, some respiratory inhibitors had no effect on methanol oxidation, explicable some years later when we uncovered the very unusual nature of this process. There had been a few 'slight' papers on this topic published in the Canadian Journal of Microbiology. One showed that the metal-chelating agent EDTA specifically inhibited methanol oxidation, this inhibition being cancelled by addition of ferrous sulphate. They concluded that this must be because the reaction is catalysed by catalase, an iron-containing enzyme (the EDTA removing the essential iron). My first research success was to show that the relief of EDTA inhibition was an artefact; what was being seen was the inorganic oxidation of ferrous to ferric sulphate, a process greatly stimulated by EDTA which prefers the oxidised ferric form, thus removing it from the equation and speeding up the oxidative process.

After one year of research a paper was published from the University of Oxford by David Peel and Rod Quayle which described exactly what I had been doing – except for the EDTA work. It was 30 years before Claude Chan showed how EDTA inhibits methanol oxidation – oddly enough this does not involve its chelating character. [EDTA competes with the necessary electron acceptor from the dehydrogenase, cytochrome cL]. Quayle was already an important biochemist having made essential contributions to the understanding of the process of carbon dioxide fixation during photosynthesis with the great team of Melvin Calvin, being the first to demonstrate the presence

of the most common enzyme on earth – catalysing the fixation of carbon dioxide in photosynthesis. So we had a competitor. A friend of Knight (Luria, a Nobel Laureate) visited our department and I told him what we were doing, and this was passed on to Quayle when Luria visited Oxford the next week. Like the three kings Luria returned by a different route so we did not learn of the competition. Quayle told me this years later. After working in Oxford Quayle became head of Microbiology at Sheffield University and later he was the Vice Chancellor at the University of Bath. After he died I wrote the Biographical Memoir published by The Royal Society.

Methanol dehydrogenase. The next challenge was to try to identify the enzyme responsible for catalysing the oxidation of methanol to formaldehyde. The obvious type of enzyme would be an alcohol dehydrogenase which would remove two hydrogen atoms from methanol and add them to the coenzyme NAD. Such enzymes are easily measured in bacterial extracts, produced by their exposure to sonic oscillation. But there was no such reaction catalysed by our extracts. The only alternative was that the mysterious enzyme might be a flavoprotein as is involved in the oxidation of succinate to fumarate in the Krebs cycle. This contains derivatives of the vitamin riboflavin and is assayed by measuring the transfer of hydrogen atoms from succinate to a dye which changes colour when reduced by this hydrogen transfer. But this could not be seen with extracts of our bacteria using methanol. So I read up the earlier work on such enzymes to find another approach. This involved using a 'Thunberg tube', containing whole cells, methanol and dye, and evacuating the air from the tube so preventing any re-oxidation by air of any reduced dye which would mask any positive results. A control was always used which had no methanol; we hoped to observe a reduction of the dye (indicated by colour change) in the presence of methanol but not without. I did so many of these experiments with different dyes and a huge range of conditions but always after 30 minutes incubation there was never any positive result.

About this time the department had a visitor from the USA called F.R. Whatley who had worked with Daniel Arnon on the revolutionary 'Arnon/Whatley' cyclic photophosphorylation process in plants. In his description of this system he often referred to a compound PMS that seemed to solve their problems during the study of electron transfer (equivalent to our struggle to find an acceptor for electrons/hydrogen during methanol oxidation). I conjured up the courage blushing to ask about 'your magic compound PMS'. He agreed it was magic and explained that this is a sort of dye that has a relatively low redox potential, so that it can mediate oxidation/reduction reactions that other known dyes cannot do. I bought some and using Thunberg tubes (above) I tested it with whole cells with and without methanol. To avoid curtailing the experiment I took the two tubes in the top pocket of my lab coat into an obligatory seminar by Roy Markham, an eminent visiting virologist. To show his slides the room was almost completely dark, but the lighter slides allowed me to check my experiment. Sure enough the dye became completely reduced (discoloured) when methanol was present but not in its absence. I had to mask my tearful gurgles of delight by pretending a fit of coughing. Of course it required a few weeks of experiments with sonic extracts of my bugs to be certain, but these showed that our extracts contained an enzyme able to transfer electrons from methanol to the artificial dye PMS, producing formaldehyde. This formed the basis of an assay that allowed us to purify what became known as methanol dehydrogenase, and to characterise the enzyme. This took up to December 1962. We wrote an abstract of a paper on this to be presented at the January meeting of the Society of General Microbiology in ice-bound Sheffield. I met Peter Large, Rod Quayle's research

student and he introduced me to my hero who encouraged me to apply to work with him in Oxford. I learnt later that this was rejected by his boss Sir Hans Krebs (my poor Reading BSc did not make me attractive). The winter of 1962/1963 was famously cold, with snow much of the time, requiring careful riding of my big BSA motorbike through icy roads to work.

A little later I was invited to Oxford to advise Quayle on the assay of this enzyme as they had problems. I arrived on my motorbike in boots and gloves in light snow. I had the odd experience of walking between labs to go to their special spectrophotometer in a different building, accompanied by Rod Quayle, Hans Kornberg (later to become Sir Hans Kornberg, Head of Biochemistry at Cambridge, and President of the International Union of Biochemistry), and June Lascelles (a famous Australian cytochrome expert). Their very sophisticated recording spectrophotometer automatically washed out their samples at the end of the experiment; this meant they did not see that the reaction had in fact occurred but had not been observed because of an oddity in the nature of the reaction. My childish comment that if they did their own washing up they would not have been confused was accepted kindly. Quayle then generously showed me the first chapters of three of his students' PhD theses where they described their failure to discover the enzyme before setting off to do the sort of work I had really wanted to do on the metabolic path of carbon during assimilation of methanol. The properties of the enzyme suggested it was a new type of dehydrogenase, which Quayle generously referred to in his publications as the Anthony/Zatman enzyme. Not long after a full description was published the Japanese used my system to show that there is a similar enzyme in those bacteria that make vinegar from ethanol (the acetic acid bacteria), oxidising the alcohol in the first reaction of its metabolism. How this was done had remained a mystery for very many years so they were delighted, leading to happy friendships and wonderful trips to Japan many years later.

P1 Our Family History Mum's side



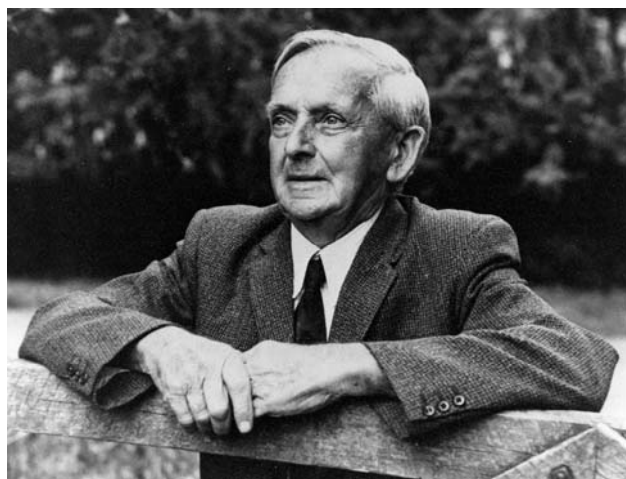
Mum's family. Perhaps her father is seated 2nd or 3rd from left



Mum (left) and Doris with parents



Sister Doris and Mum (seated)



Grand dad as I remember him



Dad



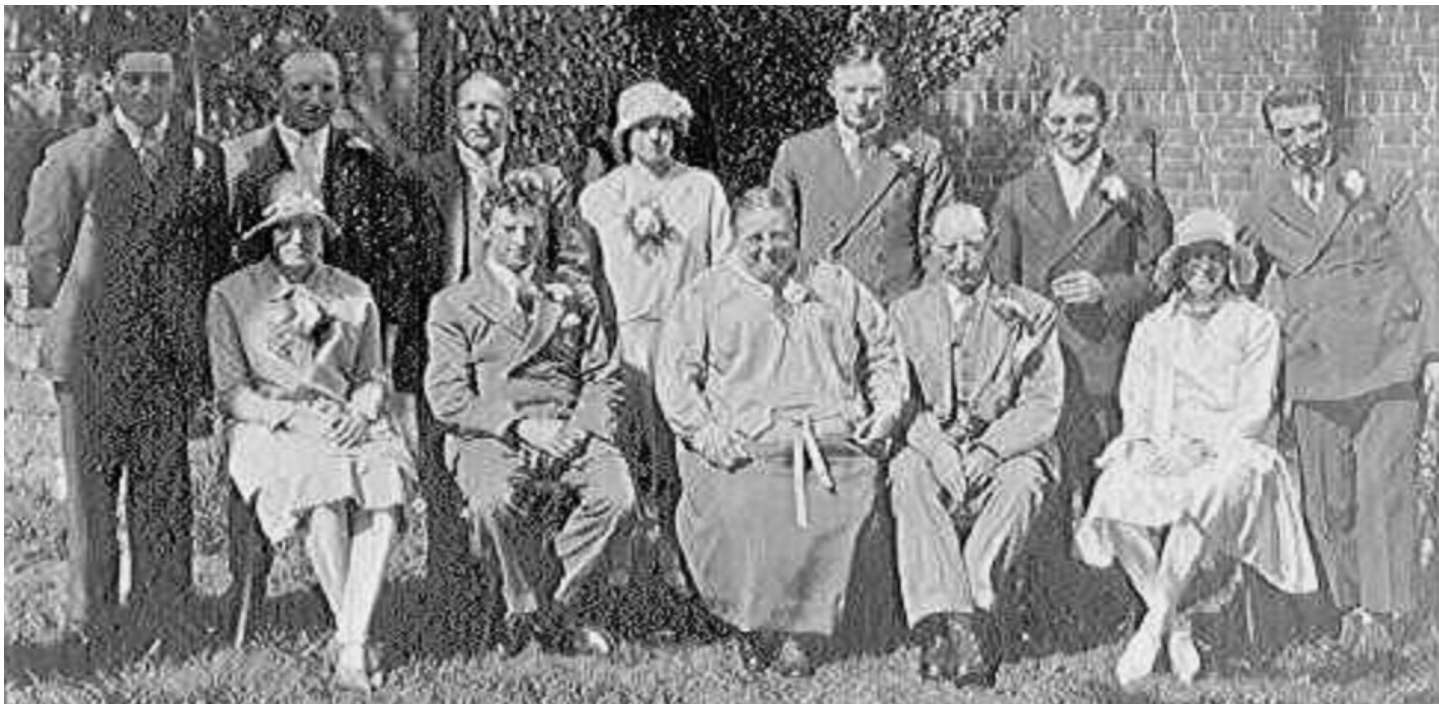
Mum without glasses



Dad and Mum with next generation

P2 Our Family History Dad's side

These are the only pictures I have been able to find; all provided by John's daughter Pauline



Grand Dad (Henry George Anthony) with his wife (Rose) and others in the family



Grand Dad and Grand Ma and their gravestone



My uncle Charles Edward
and his wife Winnifred Froud



Dad (George Anthony)

His brothers included John who was a nurseryman, Ted (wife Esme) who was a foreman in Benskin's Brewery, Charles.

Sisters were Rose , Alice, Beat

P3 Our Young Family



Uncle John is holding John



Chris & John; June 1939

Chris is fair, John dark

Pam; January 1941

Richard: February 1943



P4 Family with Aunties Alice and Annie



Auntie Alice



P5 Victory in Europe (VE) Celebration



From left: Pam, John, Chris. Auntie Marion with Mark and Mum with Richard



Above at Ruislip Lido

Left with Auntie Alice (left) and Annie

P6 Family growing up



Chris, 7



Chris, 10



Chris, 11, Drake Captain



Chris urchin



John, 10



Pam



Richard



Pam



Chris age about 14



Chris and John



Richard with giant rabbit

P7 Chris as late teenager



WBGS 5th year:

Roy Owens, David Cleever,
Brian Bunce, Fred Chedgley,
Peter Hodgson, Me,
Chris Daniels, Gerald Jones,
Bob Thurlow, Garbutt

Below: my hospital
ward the week before
leaving for Reading
University



Using sextant on Oceanography course at
Dale Fort, age 16

Jazz band in BB display with John (cornet),
Monkey Wright (tenor) and John Atchelor
(Tuba). Right: age 16 at BB camp.



P8 Church and Boys' Brigade From the age of about 9 we joined the Life Boys, moving to the Boys' Brigade a couple of years later. From then on until I went to University I attended BB bible class then morning service then evening



Leavesden Road Baptist Church

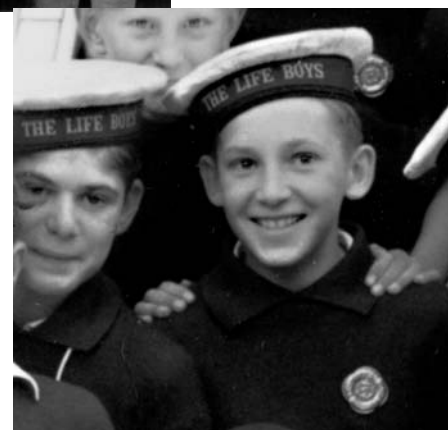


The Life Boys with Mr Willis and Mrs Willis
who was also the Church organist



Our Minister, Rev Lewis Misselbrook

John and Chris



P9 Boys' Brigade members



A serious member but lacks focus

Corporal Richard with
his armful of badges



Lance corporal John (cornet)



Private Richard (baritone horn)



Lance Corporal Chris (trombone)



Terry Fox (standing) outside a typical bell tent at BB camp



Terry Fox (euphonium) and Monkey Wright (Tenor horn)

P10 The Boys' Brigade Company with the band



P11 Watford Grammar School for Boys



The Head Teacher
Harry Ree DSO



'Willy' Wiles The best



Fifth year: Owens, Ralph Bousefield, Brian Bunce, Hodgson, Fred Chedgey, Me, Chris Daniels, Jones, Rob Thurlow, Garbutt

P12 WBGS Masters [1951 or 1954]



Chris Thomas; Frank Thomas; ? Admisistrator;?; Classics; Dusty Miller



? ? Merrett; Bolton (Head);



Stevenson; Rigg; Classics; Inky knight; Openshaw



Fannie Lister; Thomas; Wiles; Thompson ; Sid Fettes

P13 WBGS The boys



1951 x;x;Moffat; x; Graham Haines; tubby Holloway. Derbyshire, Daniels;x ; Bousefield; x; Me



1954 Garbutt; Tonkin; x;x;RAT Oldfield; Holden; Charlie Wymer



1954 Me; ?; Riley; Mike Fellowes; Waters; ?; Moffat



1954 Bousefield; Chris Smith; Harris; Eric Johnson; Fred Chedgely; Rob Thurlow?

P14 Air Cadet Corps



ATC at Watton in front of Vickers Varsity. I am 7th from left. Inset is our cap badge



Vickers Varsity showing
'my' bomb-aimers pod

The Chipmunk trainer
I flew from front seat



P15 Farnborough Air Show in the 1950s



DH 110



Hawker Hunter



Gloster Javelin Fighter Bomber



Hawker P1127 jump jet, predecessor of Harrier, below which proved its worth in the Falklands in 1982



The Saunders-Roe Princess Flying Boat, the largest ever. Built at Calshot but never to go into service. One returned on its last flight to be beached at Calshot Spit where Clive and I found it to explore when he was about 12.



P16 Important Aircraft

The commercial planes were favourites on my cycle rides to Heathrow.



Boeing Stratocruiser at Heathrow in 1950s



Lockheed Constellation



The great Handley Page Victor; flight tested over our house



Boeing 707; I flew on this to USA in 1964



The Vickers Valiant



Avro Vulcan on its first outing at Farnborough
In the presence of John and Chris Anthony

P17 Our home: 12 Eastfield Avenue, Watford



Eastfield Avenue showing allotments at the rear. No. 12 is marked (A).



Home. Ours is the house on the right. It has had an extension built on its left. The house on the far left of ours looks like ours used to be, retaining the old porch.



The beach houses at Jawick (near Clacton Essex) where we had a rare family holiday

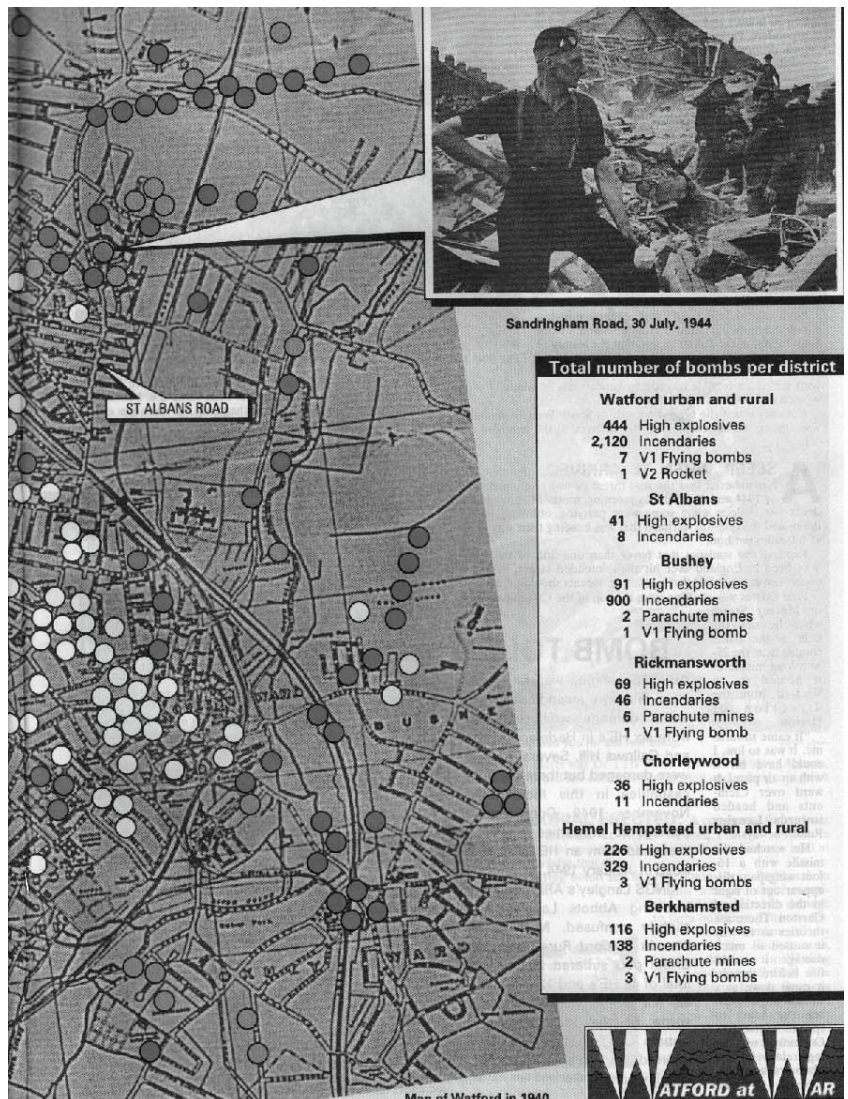
P18 Watford in wartime



Anderson shelter in our garden. We very rarely used it. We usually sat under the kitchen table



The flying bomb or V1 or Doodlebug



Map of Watford bomb sites



The result of a doodlebug in Sandringham road less than half a mile from us



P19 Watford in the 1950s



The Pond. With The Odeon and on the right of that there is a Gentlemen's Outfitters where I had a holiday job outfitting gentlemen.



Watford town hall. We had Boys Brigade displays here



Watford Peace Memorial Hospital where I was misdiagnosed with a heart disease the week before going to university



The Abbey Flyer between North Watford and St. Albans



An Auster at Elstree aerodrome here I was allowed to help push planes out of the hanger



The entrance to Cassiobury park

P20 Watford Map 1 around 1940, showing key childhood locations.



A, 12 Eastfield Ave

B, Rough woodland with path leading to Watford Bypass (1st Munden) and over to 2nd woodland path (2nd Munden). Named after Munden House near end of 2nd Munden. Further along Bushey Mill Lane was a bridge over River Colne and access to river where we swam and caught crayfish.

C, Rough wild land surrounding river. Completely flooded, then frozen in 1946.

D. Leavesden Road Baptist Church (just off map to the left).

E. Berry Grove woods where I did much early birdwatching. Destroyed when M1 was built in 1957.

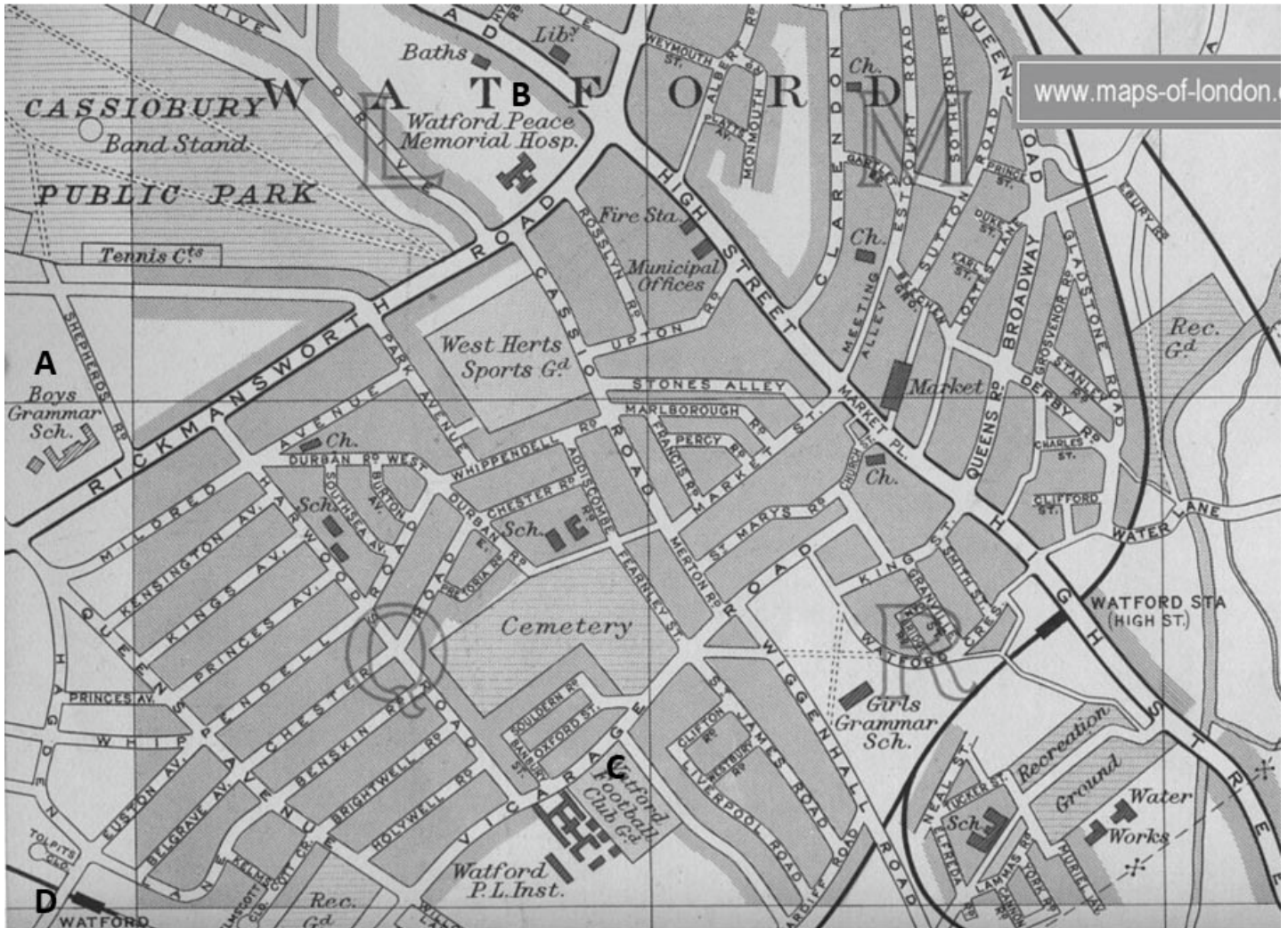
F. 'The Rocks' Rough area with gravel pits used during war as shooting range. A path led from our roads past the orphanage (Reeds' School. G. Knutsford Road primary School.

P21 Watford map 2 (around 1940)



- A. Footpath over the rocks to the tunnel under the LMS rail line Where we used to climb the bank to watch the trains.
- B. Ebury road where Dad was brought up and where auntie kitty lived.
- C. Charles street where mum lived as a child.
- D. The Brethren hall in Loates Lane where we walked with Auntie Alice on Thursday evenings.

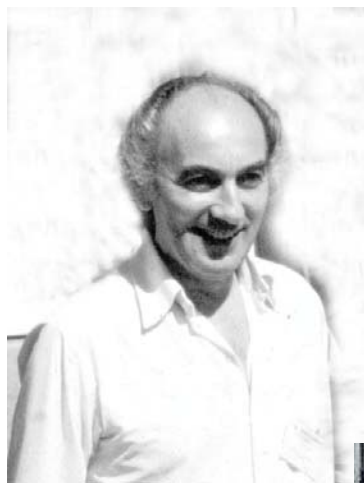
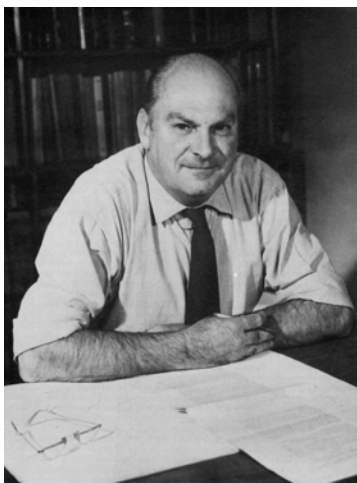
P22 Watford South West Map 3 (around 1940)



- A. Watford Grammar School for Boys (WBGS).
- B. Peace Memorial Hospital, Swimming baths, Cassiobury Park.
- C. Watford Football Club, Vicarage Road (partly financed by Benskins Brewery).
- D. Start of Tolpits Lane where Scammells Lorry works was (where John worked from age 15).

Benskin's Brewery is located in the right hand corner next to the water works. Dad walked here from home every day of his working life.

P23 Reading University 1957—1963

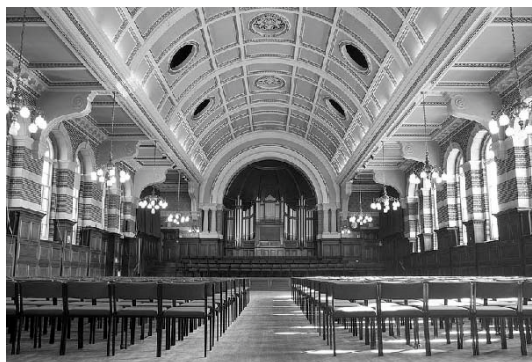


In 2nd and 3rd years I lived here in St Patrick's Hall.
Clock seen from the library where I worked

Head; BCJG Knight and Len Zatman, my tutor, PhD supervisor, friend and hero



Prue (physical chem), Deputy warden and Tom Creighton, Warden of St. Patrick's Hall



The Great Hall, for concerts, Jantaculum, examinations and graduation



Clock tower with Great Hall on the right and the covered cloisters



In my 2nd year my trombone playing induced a pneumothorax. I gave up trombone and bought a cello from Ernst Slaney and 11 years later after he died his widow Grace sold me his Forster cello, pictured many years later.



BSc graduation (1960)



PhD graduation (1963)

P24 Reading University Friends (A)



1st year. In St Pats annex—Northourt Hall. David Smith on left —my room mate, and friend for life



Some of the Christian Union. David Ingleby, X, Me, Ray Felton, David Smith



David Smith, Brian Skinner and friend



Jazz band escorting Prince Philip to dinner



Derek Bailey, Me, David Smith, friend, Ray Felton



Thai friend, Graham Bunting, Tony Gower, Me

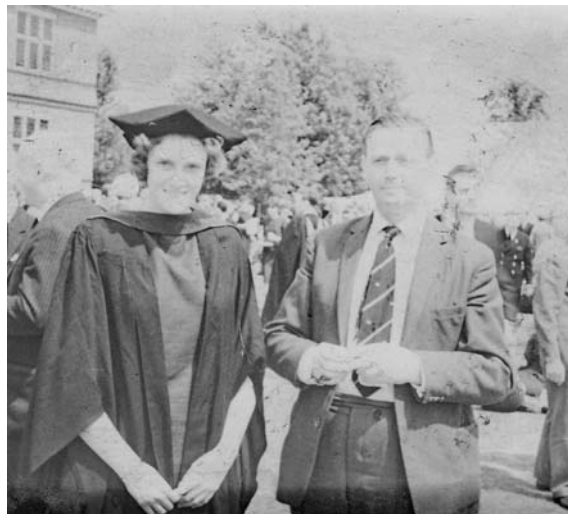
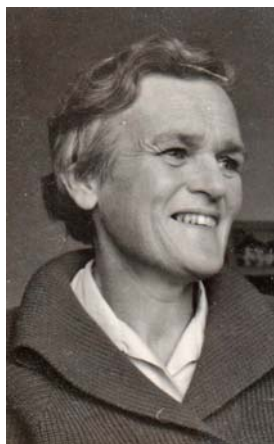


With Derek Bailey in Europe



Derek Hanson, who used my recording of Beethoven's 9th symphony as a plate for his toast, John Nankivell, a good friend and now successful artist, and Graham Bunting

P25 Reading University Friends (B)



Libby's parents and Libby on graduation day with father



Camping with Libby's family including Andy and Hugh



Nigel Chandler ; one of the best ever—now a successful architect



Me terrorising Alan Lillingstone in our second year

P26 Moscow 1966 International Congress of Microbiology



All meetings and accommodation were here



Opening ceremony was held here which included a ballet concert



Commemorative stamp



Opening ceremony. David listening, me asleep and Liz hiding from the camera



With Liz at the closing Banquet in the Kremlin Palace during England beating Germany in the world cup

P27 Our Weddings



John and Grace 1960. Front row: Dad, Mum, John and Grace. Back row : Charlie Sumpter, Derek (later to be Pam's husband), unknown, and Keith (Grace's brother)



Pam with dad on wedding day



Richard and Pat 1979



Chris and Libby (1970), starting my (our) wonderful future



P28 Reading University Science Pictures 1960—1968



Len Zatman

During my PhD I discovered the bacterial enzyme that oxidises methanol to formaldehyde in bacteria growing on methanol. In my post-doctoral time I showed its active site had a novel prosthetic group – the first new one to be described for more than 50 years. It was later shown, by X-ray crystallographers at Cambridge, to be PQQ. After moving to Southampton I continued to work on aspects of the enzyme and with my collaborator in Oxford published its 3D structure. PQQ was then shown to be important in many other enzymes which came to be called quinoproteins. International Symposia on these were held for many years and I organised the last in 2002.

My papers 1964 -1969 The first 5 were published with my PhD supervisor, collaborator and great friend Len Zatman

Anthony, C. and Zatman, L.J. (1964). The methanol-oxidizing enzyme of *Pseudomonas* sp. M27. *Biochemical Journal* 92, 614-621.

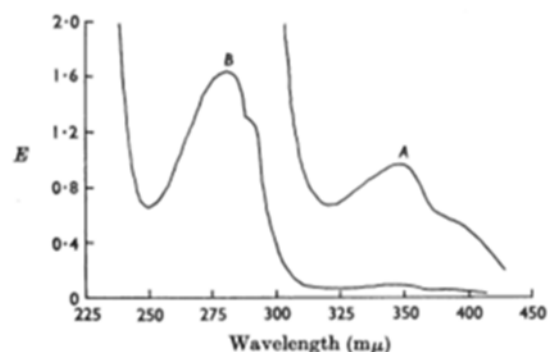
Anthony, C. and Zatman, L.J. (1964). Isolation and properties of *Pseudomonas* sp. M27. *Biochemical Journal* 92, 609-614.

Anthony, C. and Zatman, L.J. (1965). The alcohol dehydrogenase of *Pseudomonas* sp. M27. *Biochemical Journal* 96, 808-812.

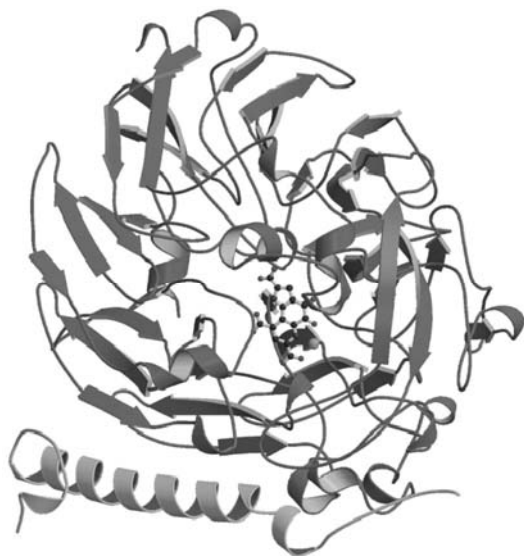
Anthony, C. and Zatman, L.J. (1967). The microbial oxidation of methanol: purification and properties of the alcohol dehydrogenase of *Pseudomonas* sp. M27. *Biochemical Journal* 104, 953-959.

Anthony, C. and Zatman, L.J. (1967). The microbial oxidation of methanol: The prosthetic group of alcohol dehydrogenase of *Pseudomonas* sp. M27; A new oxidoreductase prosthetic group. *Biochemical Journal* 104, 960-969.

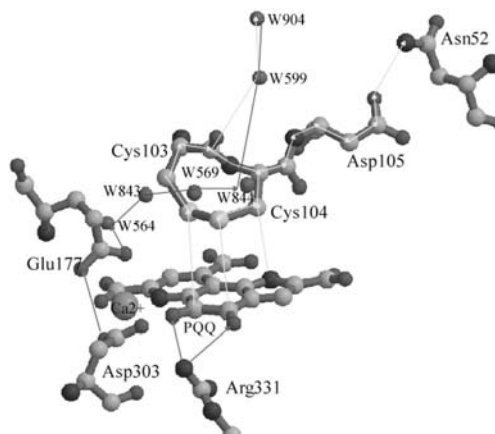
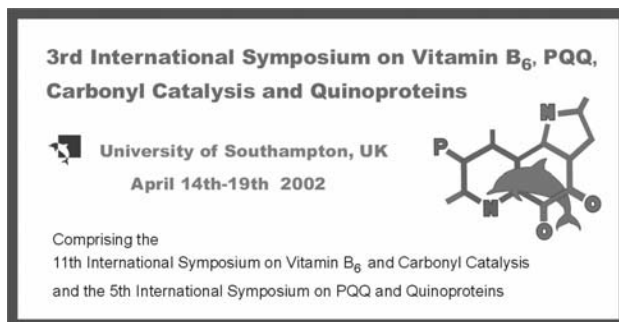
Anthony, C. and Guest, J.R. (1969). Deferred metabolism of glucose by *Clostridium tetanomorphum*. *Journal of General Microbiology* 54, 277-286.



Absorption spectrum of methanol dehydrogenase (MDH); the peak marked A is due to the PQQ prosthetic group



The 'propeller' structure of MDH from my last paper on 'my enzyme'.



The active site of the MDH enzyme showing PQQ

From my last research paper on the same subject 40 years after the first: Williams, PA, Coates, L, Mohammed, F, Gill, R, Erskine, PT, Coker, A, Wood, SP, Anthony, C & Cooper, JB 2005, 'The atomic resolution structure of methanol dehydrogenase from *Methylobacterium extorquens*' *Acta Crystallographica Section D Biological Crystallography*, vol. 61, no. 1, pp. 75-79.

A nice present in a paper published in 2018, suggests I have at last become a real microbiologist. "We propose that the strain La6 represents a novel species of the genus *Marinibacterium*. We propose the name *Marinibacterium anthonyi* (in honor of the British microbiologist Professor Christopher Anthony)."