

EDITED BY A. M. GLAZER & PATIENCE THOMSON



CRYSTAL CLEAR

THE AUTOBIOGRAPHIES OF
SIR LAWRENCE & LADY BRAGG



OXFORD



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and Lady Bragg

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A. M. Glazer and
Patience Thomson

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*Dedicated to the memories of
Stephen Lawrence Bragg (1923–2014) and
David William Bragg (1926–2005)*

Foreword

On 14 November 1915 in the midst of the carnage of the Great War, a young officer at the front in northern France received a telegram informing him that he had been awarded that year's Nobel Prize in Physics, to be shared with his father. The officer was the twenty-five-year old William Lawrence Bragg (WLB), and his father was William Henry Bragg (WHB). This made WLB the youngest Nobel laureate ever and, apart from the Peace Prize awarded in 2014, that remains true. Moreover, WHB and WLB are to date the only father and son team to be jointly awarded the Nobel Prize. Their discoveries made between 1912 and the outbreak of the war in 1914 can truly be said to have transformed all our lives, for they enabled us to understand and study for the first time the atomic structures of crystalline solids.

This has led to many of the most important scientific achievements of the last hundred years, continuing to the present day and no doubt beyond. WLB and WHB, in the late summer of 1912, were the first to show how to interpret the patterns of spots seen on a film or detector when X-rays are incident on a crystal. The spots arose from the scattering of the X-rays by the atoms in the crystal, a process known to physicists as diffraction. From the positions and intensities of these spots, WLB and WHB showed how to derive the arrangements of atoms in crystals. They thus jointly ushered in an entirely new scientific discipline, known as X-ray crystallography. It is a subject that has enabled scientists to determine the structures of thousands of crystals, starting from the very simple to the most complex materials. In molecular biology, the structures of proteins, viruses and, famously, DNA have been solved. One of the greatest triumphs of this kind was exemplified by the Nobel Award in 2009 to Venki Ramakrishnan, Thomas Steitz and Ada Yonath for the determination of the structure and function of the ribosome, the molecular machine in the cell that is responsible for the synthesis of proteins. This work over many years resulted in the location of some hundreds of thousands of atoms, a feat that the two Braggs could never have envisaged in their time. In addition, our knowledge of the atomic structures and properties of metals, electronic materials, pharmaceuticals and inorganic and organic materials, including polymers, comes directly from the

two Braggs' seminal research. More than twenty-six Nobel Prizes have been awarded since for research that has built upon the work of the two Braggs. Today crystallographic techniques are used throughout the world to study solid materials in universities, industries and research institutes worldwide. The World Directory of Crystallographers published by the International Union of Crystallography (IUCr) lists today 12,922 persons in 114 countries (2,119 in the USA, 865 in India, 824 in Germany, 730 in the UK, 718 in the Russian Federation, 574 in France, 573 in Japan, 493 in Italy, 369 in China. There are many more who use crystallographic techniques but whom are not listed, with a total estimated to be in excess of 30,000.

It all began with the discovery in Würzburg, Germany, of X-rays by Wilhelm Conrad Roentgen (1845–1923) in the late afternoon of 8 November 1895, for which he received the first Nobel Prize in Physics in 1901. Like most great scientific discoveries, this was made by accident, when Roentgen was experimenting with an electrical discharge tube covered with cardboard in a darkened room and happened to notice a shimmering glow from a fluorescent screen made from barium platinocyanide on a distant bench.¹ The rays were mysterious at the time, and hence the name given to them, at least outside Germany, was X-rays, signifying unknown rays. In the following years up to 1912, one of the burning questions in physics was whether these mysterious rays should be described in terms of waves or in terms of particles of some kind (the corpuscular theory). The world of physics was divided on this, with, it is true to say, the majority believing that X-rays were wave-like, as suggested by some experiments. However, WHB was one of those who argued in favour of the corpuscular theory, suggesting the X-rays could be described by the flow of neutral (uncharged) particles. WHB had begun his study of X-rays while in Adelaide, Australia, before coming to England to take up a professorial post in Leeds and could point to experiments that strongly suggested a corpuscular model (for instance, the observation of particle tracks seen in the cloud chamber invented by C. T. R. Wilson in Cambridge).

¹ There is a famous and pertinent quotation from the great French scientist, Louis Pasteur (1822–1895) who had observed many years earlier, '*Dans les champs de l'observation le hasard ne favorise que les esprits préparés,*' that is, 'In the fields of observation chance favours only the prepared mind!'

In the spring of 1912, according to the most widely accepted story, a *Privatdozent* in Arnold Sommerfeld's Institute of Theoretical Physics in Munich, Max Laue, was in conversation with a student of Sommerfeld, Paul Ewald, discussing the nature of crystals. The idea that crystals consisted of repeating groups of atoms, rather like the pattern in a wallpaper, had been a matter of conjecture for the previous two to three centuries. Laue asked Ewald that, if this was so, what would be the typical distances between the repeating units? When Ewald said that this would be very small, of the order of angstroms ($1 \text{ \AA} = 10^{-8} \text{ cm}$), Laue was said to have had a flash of inspiration. He thought that if X-rays were waves, they would have wavelengths of that order, and so in a stroke of genius he thought that it should be possible to use crystals to diffract X-rays, rather like the way in which visible light can be diffracted by a series of fine slits. He initially approached Sommerfeld for permission to use the institute's personnel to help to try out the experiment, but this was refused in the belief that they had more important things to do. However, not to be put off, Laue approached Paul Knipping (a student of Roentgen, who by this time had moved to Munich) and Walter Friedrich (an assistant of Sommerfeld) to try the experiment out. After several abortive attempts, one night in April 1912 (reputed to be 21 April) they obtained on a photographic film a pattern of spots, thus showing that the X-rays had been scattered by the crystal, consistent with diffraction. (Ewald once told me that in fact Friedrich and Knipping had secretly stolen Roentgen's apparatus in order to carry out the experiments!). The pattern of spots then strongly suggested that X-rays had wave-like properties. As Max von Laue (he acquired the 'von' in 1913 when his father was ennobled), he was awarded the 1914 Nobel Prize in Physics for this important discovery. However, in spite of producing the correct equations to explain the diffraction process, he made several incorrect assumptions and failed to understand fully the origin of the patterns of spots.

In the summer of 1912, WHB received a letter from a colleague telling him about Laue's work, but he was still convinced that X-rays were particle-like in nature. So, with his son WLB, he set about showing how Laue's patterns could be explained by particles travelling along 'avenues' within the crystals. Their experiments, however, were far from conclusive. Shortly after, WLB became convinced that X-rays in fact did consist of waves, and that Laue's experiment was indeed evidence of diffraction. It was on 11 November

1912 that WLB had his famous paper read to the Cambridge Philosophical Society in which he showed how to interpret Laue's diffraction patterns in terms of the positions of atoms in a crystal. He also gave a remarkably simple, yet brilliant, explanation by thinking of crystal diffraction as a kind of reflection of X-rays from parallel planes of atoms in the crystal. This was like the reflection of light from mirrors, except that the reflected waves, coming from different depths of the crystal, combined together, sometimes in phase and sometimes out of phase, thus creating the observed spots. To this day, these spots are called *reflections* by crystallographers. WLB had acquired a deep knowledge of optical physics while a student at Cambridge, and he applied this to the case of X-ray diffraction from a crystal. This led him to the very simple formula $\lambda = 2d \sin \theta$, which today is known to all scientists as Bragg's Law. The variable λ is the wavelength of the X-rays, d is the distance between successive planes of atoms and θ is the angle between the beam and the planes. This is one of the most important equations in all of science. With this, WLB had solved a problem that others had failed to do. Not bad for a mere twenty-two-year-old!

WHB modified his view of X-rays in the belief that they could be treated as *both* particles and waves, depending on the experiment employed and here he was well ahead of the then current thinking, as it was in the 1920s that wave-particle duality was indeed shown to be true.² WHB immediately realised the importance of WLB's insight, and WLB recognised the value of WHB's new X-ray spectrometer. This was a most important development, as this spectrometer can be regarded as the ancestor of the modern 'diffractometer' used by crystallographers throughout the world today.³ Father and son then collaborated to study the structures of several crystals. In 1913 WLB solved the structure of common salt (sodium chloride) and together with his father that of a crystal of diamond. The sodium chloride

² WHB said in his Robert Boyle lecture in Oxford in 1921: 'On Mondays, Wednesdays, and Fridays we use the wave theory; on Tuesdays, Thursdays, and Saturdays we think in terms of flying energy quanta or corpuscles.'

³ Incidentally, WLB had originally in 1912 written his law as $\lambda = 2d \cos \theta$, where the angle θ is the angle between the X-ray beam and the normal to the crystal planes being considered. I suggest that it was recast into its more familiar sine form in 1913 by changing the angle θ by 90° , as a result of using the spectrometer, where it is natural to measure angles from the direction of the incident X-ray beam.

structure was shown to consist of a chessboard-like pattern of alternating, equally spaced sodium and chlorine atoms. This structure was initially not accepted by many chemists who argued that the sodium and chlorine atoms should form molecules rather than equally spaced atoms. For instance, it is said that Professor Arthur Smithells begged WLB to ‘find that one sodium atom was just a tiny bit nearer to one chlorine than it was to the others’!⁴ Of course, WLB’s salt structure was finally accepted. It even appeared on a British postage stamp in 1977 (although I note that the artist actually made a tiny error in the drawing!).

At the time, WHB was a well-established scientist, while the young WLB was completely unknown. This meant that it was WHB who tended to receive the attention of the scientific community and that of the public. It was WHB who was invited to attend international meetings, such as the famous Solvay meeting in 1913. For a long time, WLB felt in his father’s shadow and this upset him. Despite this, WHB, a genial, kind, humble and shy man, always went out of his way to credit his son with the initial discovery wherever possible, even in his own publications (WHB must have explained to those attending the Solvay meeting that it was his son who had made the initial breakthrough, as all the attendees signed a postcard to send back to WLB—see Figure 17). In truth, both of them were very close and in constant contact, and they collaborated on many important contributions to the subject. One way in which the two Braggs later decided to alleviate the problem of overlapping research was for WHB to concentrate on organic crystals while WLB would work on metals and inorganic crystals.

Throughout 1913 and into 1914, father and son ‘plundered’ the field of crystallography, determining the structures of many crystals with no competition. WLB once said, ‘It was like discovering an alluvial gold field with nuggets lying all round waiting to be picked up’. Unfortunately, the two Braggs’ research was interrupted by the Great War of 1914–1918, during which time WLB served as an officer in a sound ranging unit in northern France, while WHB conducted studies of hydrophones to detect enemy submarines. WLB then went to Manchester and set up an important crystallography research group.

⁴ Arthur Smithells (1873–1960) was Professor of Chemistry in the University of Leeds and author of scientific papers on flame and spectrum analysis.

Many famous and important discoveries continued to be made. After working in Manchester, followed by a brief spell at the National Physical Laboratory (NPL), WLB was appointed Head of the world-famous Cavendish Laboratory in Cambridge, where he worked from 1938 until 1953. In this position, he stimulated the research of many great scientists, including the Nobel Prize winners Max Perutz, John Kendrew, Francis Crick and James Watson. In 1954 he was appointed to the Royal Institution of Great Britain, where he remained until his retirement in 1966. WLB died in 1971.

Another important aspect of the two Braggs is that they both, unusually for the period, strongly encouraged female students into crystallography. For instance, of eighteen of WHB's students, eleven were women! It is sometimes claimed that the large numbers of female scientists working in crystallography today owes its origin to the two Braggs.

If I may inject a personal note, I first encountered WLB while a teenager, when I had the good luck to attend his 'Schools Lectures' at the Royal Institution. I well remember his wonderful demonstrations: sometimes these were accompanied by loud whizzes and bangs followed by his boyish grin! He particularly liked teaching (or rather, in his own words, 'showing') science to children. It is believed that his Schools Lectures were attended by up to 20,000 school students per year over a ten-year period! Later, when I carried out my Ph.D. research in crystallography, I had the great pleasure to meet him in person, when he used to visit my supervisor Professor Dame Kathleen Lonsdale (who incidentally had been a student of WHB, thus making him my scientific grandfather!).

In later years, WLB came to be regarded as one of the great old men of science, much loved and respected, especially within the crystallographic community. I recall that many years ago our crystallography meetings in the UK used to take place at the Institute of Electrical Engineers in Savoy Place, London. I think by this time WLB had retired; but suddenly, during one such conference, attended by perhaps 300 to 400 people, he appeared at the back door of the auditorium. The whole audience rose en masse to its feet as he walked in.

Another example of the respect in which WLB was held is illustrated by the following note that I received in 2013 while I was planning, at the University of Warwick, an exhibition devoted to the work



Two screenshots taken from a film made of a Schools Lecture by WLB, probably in the late 1950s at the Royal Institution, in which he illustrates the principle of the Paget speech synthesiser—this uses compressed air, a tube and pieces of modelling clay to create human voices. He was in his element when demonstrating science to children. The top picture shows some of the audience of school children, and I am the teenager at the top left!

of the two Braggs; the note was from Michael Fuller, MBE, who had been a laboratory assistant at the Cavendish Laboratory under WLB:

One day, after school in Cambridge, I picked up a book in the library about the Cavendish Laboratory. An article about high voltage physics really excited me, so when I was due to leave school, a very naive 15 year old, without any qualifications, wrote direct to Sir Lawrence asking if I could come and work at the Cavendish Laboratory. Two days later, I received a very nice hand-written letter from him asking if I would like to come for an interview with a Dr Max Perutz, who was looking for an apprentice technician to work with Tony Broad on the development of a Rotating Anode X-ray set being set up in the basement of the Austin Wing.⁵ After a short interview, I was offered a post and started work on Jan 2nd 1952 in the MRC unit, learning all the techniques from glass-blowing to electronics and vacuum engineering.

As Sir Lawrence always left his bicycle in the basement corridor of the Austin Wing, where our x-ray generator set was being developed, he would often come and ask how I was getting on, and was the X-ray set working? Sometimes, after leaving his bicycle, he would call into the electrical maintenance workshop and have a chat with Bert [the electrician], and over a cup of tea catch up with all the gossip about what was happening in the lab.

Sir Lawrence was a classic English gentleman, who insisted on everybody being polite and well-dressed with lab coats buttoned up at all times, and tidy clean corridors etc. The only time I ever saw him cross and lose his temper was when a Dr Brandenberger, a nuclear physicist, came to work, one hot summer day in his 'Lederhosen' German outfit, walking along the corridor with his brown lab coat, his bare legs showing. Sir Lawrence, standing at the end of the ground floor corridor went very red faced and shouted to Dr Brandenberger to go home at once and come back to the lab properly dressed, stating that this is the Cavendish Laboratory and that certain standards of dress are expected.

He was a very talented painter, and presented two pen and ink sketches of Max Perutz and John Kendrew to the MRC unit. These hung in the corridor for many years, until a visit from an exhibition curator spotted them and pointed out that they were very valuable and should be kept under lock and key.

I have fond memories of Sir Lawrence, who helped me on my career, and would always find time to have a chat and provide advice.

⁵ The so-called Broad rotating-anode set was designed by the laboratory technician Tony Broad, a technician in the Cavendish Laboratory.

So how did this book come about? Several years ago I was invited to a conference in Madrid to talk about the two Braggs. I made contact with Lady Heath (Margaret), elder daughter of WLB. Amazingly, and rashly as I thought at the time, she let me take away the family photograph album (this is now in the Bragg archives at the Royal Institution). I also obtained from her a copy of WLB's autobiography, which had never been published.

In August 2013, to celebrate the centenary of the Braggs' seminal work, I mounted an exhibition entitled 'The Two Braggs' and held at the University of Warwick (see <<http://www.amg122.com/twobraggs>>). In order to borrow the exhibits, much of them hitherto unseen in public, I contacted other members of the Bragg family. These included Stephen Bragg (WLB's son), Patience Thomson (younger daughter of WLB) and the Lady Adrian (Lucy, niece of WLB, and a member of the family who was particularly close to her grandfather WHB). I learnt that WHB, his wife Gwendoline, WLB and his sister Gwendy were all competent amateur artists, and so we had, in addition to the historic items of equipment and letters, a splendid display of their paintings and sketches. I think that it was this artistic tendency that enabled WLB, at such a young age, to see the solution to Laue's crystal diffraction problem, where the more formal approach of the German scientists struggled. Crystallography is by its nature both a highly mathematical and a visual subject!

I also was given a copy of a manuscript by Lady Bragg (née Hopkinson), WLB's wife, telling her side of the story. On reading through the manuscripts, I realised that these accounts may be of interest not just to crystallographers like me but perhaps to a more general audience. Publication of these accounts is especially apt, as 2015 is one hundred years since the two Braggs' Nobel Prize. WLB writes about his experience from his early childhood in Australia through to his work in England. His account of his work during the First World War is most interesting. It is not appreciated, I think, that he and his team of sound rangers actually were credited for significantly shortening the war. With current interest in this war, it seems to me that WLB's account is timely. Alice's account presents her life with WLB as seen from her point of view. Therefore, some anecdotes are repeated in both accounts, but there are also many other observations made about the many well-known people whom they both encountered. Alice admitted that she had no head for science, but she made her mark through public service. For example, she was the Mayor of Cambridge just after the Second World War and later served on government

commissions and as a magistrate. In spite of having a completely different personality and background from her husband, she was a great support to WLB throughout their lives together.

The Bragg family originated from the area around Wigton, in what was then known as Cumberland. They were mainly middle class, involved in areas such as shipping and farming. Alice's family, the Hopkinsons and Cunliffe-Owens, on the other hand, was very different, as it was well connected to the establishment, and even to royalty. It was a large family with many talented and distinguished members. Alice was a very outgoing person with strong opinions. On the other hand WLB was by nature, according to Alice in the 1965 BBC programme '50 Years a Winner', which celebrated the fiftieth anniversary of the Braggs' Nobel Prize, 'a shy, private, family man, whose mind was partly child-like in its ability to see behind the complex and to relate so well to children'. He never felt that he belonged to the establishment. He was an emotional man, but he kept his feelings under control. In fact, he was so private that he addressed almost everyone he talked to only by their surname, reserving first-name terms only for his closest friends and family. He also hated controversy, preferring to avoid it wherever possible. I can record here a story that was related to me many years ago when I worked at the Cavendish Laboratory. My chief technician in the Crystallography Laboratory, R. A. (Sam) Cole, had been a young technician there at the time that WLB was Cavendish Professor. The brilliant metallurgist–crystallographer A. J. Bradley was there too, having come from Manchester to Cambridge with WLB, but had developed a serious mental condition. Sam Cole was shocked when Bradley suddenly started to shout uncontrollably at WLB, with the result that WLB fled immediately from the scene!

I have attempted to edit with the lightest of touches, letting the Braggs speak for themselves in the language and style of their times. Apart from reorganising a few passages that had inadvertently been repeated, my main contribution to this work has been to supply brief explanatory footnotes. I assume that WLB had intended at some time to go back and flesh out and revise his manuscript but unfortunately he died in 1971 before doing it. That he never finished his account may be because he was so busy with organising the Royal Institution. He may also have become discouraged: a clue may be found in a letter to him in 1968 from C. P. Snow (in the Archive at the Royal Institution London), whom WLB had consulted about the manuscript. In it Snow says he is not egocentric enough and that 'nice men find it hard to write an

honest autobiography. . . The interest of Jim Watson's book [referring to the famous *The Double Helix*] lies very largely in the fact that he is not at all a nice man! The autobiography finishes before his move to the Royal Institution, although Lady Bragg's account does cover that period. I have removed some references to a very small number of people who are not relevant to the central story and whose present families might be disappointed to see what was said in private many years ago.

I have included some of WLB's fine sketches too and many other illustrations, some of which have never been seen in public before. It is fascinating to see how many famous people, including many Nobel Prize winners, were known personally to the Braggs, their names sprinkled casually throughout the manuscripts. As WLB's autobiography was an unfinished piece of work, it contains many names of people without explanation as to who they were. Some were obvious to me, but many others not. Thank goodness for the internet and Wikipedia for helping me to identify most of them!

In planning this book, I have worked closely with Patience Thomson, who has added her own account of her parents and their relationship to each other. This is told through a number of delightful anecdotes and vignettes which I think will give an additional, personal, insight into Sir Lawrence and Lady Bragg.

I am grateful to Professor Frank James and Charlotte New at the Royal Institution for permission and help to use the 'Braggiana' from the archives, and especially to members of the Bragg family, including Stephen,⁶ Patience, Margaret and Lucy. I am especially indebted also to John Jenkin, biographer of the two Braggs, for his comments and help with the manuscript, and Corinna Dahnke of the Clarendon Laboratory for initial typing. I thank also Ian Butson for help with identifying members of the Hopkinson and Cunliffe-Owen families. The following figures are shown by courtesy of the Royal Institution London: Figures 4, 5, 7–9, 13, 14, 16, 17, 20, 21, 25, 28, 29, 34–40, 41, 42, 46, 47, 58 and 69.

All royalties for this book will be donated to support the Royal Institution of Great Britain.

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⁶ Sadly, Stephen Bragg passed away in November 2014.

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1

Meet my Mother and Father (by Patience Thomson)

1.1 Introduction

My contribution to this book is, I feel, to bring alive my parents as real people and vibrant personalities. Because I am recording the memories of what I observed and what I was told as I grew up, my account is naturally weighted towards the years when I was living at home and seeing my parents on a daily basis. My late brothers Stephen and David and my sister Margaret would surely have had their own stories and their own perspectives on the Bragg family life, our upbringing and experiences. It is not for me to tell their story, but Margaret has been very helpful in reminding me of some of the classic Bragg anecdotes.

What I have written about my parents is intentionally not a chronological of their lives. Others have written biographies. My offering is a series of sketches illustrating different facets of their characters, their lifestyle, their attitudes and their feelings.

1.2 Personalities

A Double Act

My mother, my father and I are sitting in a café having tea and cake. My mother bends over to whisper something in my father's ear, which he then starts to rub ruefully.

'You're blowing cake crumbs into my ear,' my father complains, 'and I can't hear you.'

'Do you see that lady in the corner with the extraordinary purple hat?' asks my mother, a little louder.

My father rears back in his seat, looks all around and bellows, 'Lady in an extraordinary purple hat? Where?' and I nearly die of embarrassment.

Variants on this theme were not unusual. My parents played a double act, egging each other on and laughing together. They were a totally committed team, yet they had very little in common. 'Life is flavourless without you,' wrote my father to my mother in a letter from Canada in the war. Their marriage was a lifelong romance. They adored each other.

1.3 Meet my Mother

My mother was beautiful—not just pretty, but beautiful. Her only disadvantage was her prominent front teeth. She had thick dark hair, a lovely skin, a slim figure, boundless vivacity and a flirtatious nature. She was a people-person, happiest with a crowd around her. On her deathbed she unexpectedly made a statement that explained a lot to me. 'I have acted my way through life,' she said, 'and I have played many parts.' One might add that she had played them all with great confidence and skill.

Mother got away with being mildly eccentric and even outrageous. I remember her greeting my father on the doorstep. 'You have a letter from the War Office marked Strictly Private and Confidential, but it's very dull.' For a dare, she once ate an entire meal in a restaurant backwards. She started with coffee and ended with tomato soup.

Only my mother could write a poem to the porters at King's College, Cambridge, asking permission to wheel my pram through their grounds, as this would save her a long journey round to reach the centre of town. Alas, her poem does not survive, but the reply does.

Dear Madam,
 It has lately come to our knowledge,
 That you were not allowed to come through the College.
 We deeply regret we caused you pain,
 And hasten the veto to explain.
 We should never have thought your way home to dam,
 Had you not been accompanied by a pram.
 Our pathways were not made to cater
 For the wheels of a perambulator.
 If one came through the rest would follow,
 Marmot and Tansad, Dunkley and Swallow.

And after the prams the bikes would race
Raleigh and Humber and Hercules.
You understand we are not to blame!
If only you could establish a claim . . .
You are not one of our corporate life
In as much as you are not a Fellow's wife.
Our ruling cannot be any other
Because you are not a Fellow's mother.
We cannot presume the rule to alter
Since you say you are not a Fellow's daughter.
We could settle at once this unfortunate bother,
If you could claim a Fellow as brother.
You could sail triumphantly through the College
Wheeling your pram over sacred grass
Through Jumbo's arch, to the best of my knowledge
And no one could say 'You may not pass'.
But as you affirm you are none of these things,
. . . I remain, yours sincerely
(Not) the Porter of King's

My Mother's Roots

My mother's father, Dr Albert Hopkinson, was a saintly man; unfortunately, saintliness is a quality which children do not always appreciate. My cousin, Margaret Barton, wrote of Albert's parents in her book *John and Alice Hopkinson* that they 'could have come out of no other environment than the protestant north in the great days of individualism'.

Albert was the fifth son and tenth child in a family of thirteen. There was no money left in the kitty for him to train as a consultant, so he became a general practitioner in Manchester and practised there for many years while my mother was growing up. He was deeply committed to helping the poor and often did not send in a bill. My children and grandchildren have played endlessly with a huge box of wooden bricks which had been presented by a carpenter whose large family had been successfully attended by my grandfather during a scarlet fever epidemic.

His work took its toll and he moved to Cambridge, where he became a demonstrator in anatomy. I used to look on with fascination as he carved the Sunday joint with impeccable precision.

However, Albert Hopkinson was no pushover. Once when travelling with his family, he was informed by a station master that the children's perambulator must go in the luggage van. He picked up the offending article and whirled it round his head. 'Hand luggage,' he said triumphantly.

Incidentally, Albert's father, John Hopkinson, was illegitimate. In spite of this disadvantage in Victorian Britain, he made good and became Lord Mayor of Manchester. All letters and references concerning his illegitimacy were destroyed by his daughter, Mary.

Albert Hopkinson, my mother's father, married Olga Cunliffe-Owen. Her family were spirited, talented and eccentric. Sir Philip Cunliffe-Owen spent some years in the navy but left on account of ill health. There followed several years of idleness, travelling abroad with his father. I find it extraordinary that Sir Philip Cunliffe-Owen ended up as the second-ever Director of the South Kensington Museum, later the Victoria and Albert, from 1874 to 1893. One cannot but question his credentials for the job. He was a navy man and a traveller. However, he was a close friend of the Royal Family and this might be part of the explanation. He lived in the residence within the grounds of the museum and brought up his nine children there. They played in the galleries on Sunday, when the museum was closed. Olga's account of her girlhood is beautifully written and gives fascinating insight into upper-class life in the nineteenth century. My grandmother was often at court and had an idyllic existence with continental travel, pleasure and parties. I still have and wear her mother's deep blue velvet ball dress, made in Paris.

In 1853, while staying in Vevey, Philip met Baroness Jenny von Reitzenstein, his future wife. According to family tradition, he courted her barefoot in the snow, singing under her window. Jenny brought a strong German influence into the family. She was certainly an aristocrat. Her father, Baron von Reitzenstein, commanded the Prussian Garde du Corps and she was brought up at court with the future Kaiser. She wrote two diaries covering the period from 1849 to 1853. There is no mention in them of the political upheavals of the time. It is Jenny's romantic story. She fell in love with a French officer of no

means. They were discovered and separated and Jenny was married off to Sir Philip.

In the diaries I found a cartoon, drawn in pencil but signed in ink. The signature was that of Crown Prince Friedrich Wilhelm. Years later, on visits to London, he would send his bandsmen to play outside the residence in the museum.

When I was sixteen, my mother took me to stay with a certain Princess Wittenstein in Westphalia. We were introduced all round in the drawing room and my mother was immediately forthcoming on her German relatives, all 'von' or 'zu' something. Someone whipped the *Almanach de Gotha* out of his pocket to test her authenticity. She passed with flying colours.

Mother was much influenced by her German heritage. On Christmas Eve, celebrated in Germanic style, she always sang 'Stille Nacht, heilige Nacht'. She had a sentimental and emotional streak and a passionate and intensely loyal love of family. 'Patience is perfect,' she wrote on my holiday report for school. 'And even if she isn't, I wouldn't tell you.'

Delving a little further back in the Cunliffe-Owen history I discovered a strain of derring-do that was obviously a dominant trait in the family. A slim green volume, with no print on the cover or spine, fell out of a suitcase. On opening it, I discovered the title *The Descendants of the Elder Branch of the Cunliffes of Wycoller*. The Cunliffes, it transpired, from whom my grandmother, Olga, descended, had been lords of the manor in the small village of Wycoller, in Lancashire, for many hundreds of years. The manor, now a ruin, was finally lost to them through the extravagance of the last family owner. Incidentally, it was his son, Charles, who added 'Owen' to his surname.

I knew from my mother that Wycoller Hall was frequently visited by the Brontës, who lived nearby, and that, damp and dismal, it was reckoned by some to be the model for Ferndean Manor in *Jane Eyre*. What I did not know, until I visited Wikipedia, was that the Cunliffe forebears were a racy lot.

One of the Cunliffe squires was hunting during the reign of Charles II. The fox that he was pursuing ran into the manor, up the stairs and into the women's chamber, hotly followed by the hounds and my Cunliffe ancestor, who did not bother to dismount from his horse. Arriving with raised hunting whip, he startled his wife to such an extent that she died from fright.

Once a year he returns, in the hours of darkness, to haunt the manor, dressed in a costume of the Stuart era. His visit is proclaimed by the clattering of his horse's hooves. His wife's ghost put a curse on the Cunliffes, predicting their downfall and the ruin of the manor.

Another Cunliffe is said to have married a West Indian woman. Realising on his way back to England that he had made a huge mistake, he threw her overboard. She drowned. Her ghost also haunts the manor.

Obviously these two stories must be taken with a pinch of salt but do reflect the Cunliffes' reputation, which was not the image of the usual English country gentleman. There was definitely dramatic blood in their veins, a trait which I think my mother inherited.

Mother's Upbringing and Education

My mother was an accomplished writer; here is a typical example taken from an undated draft for *The Manchester Guardian* or *The Times*. It was entitled 'Memories of Mancunians'.

My grandparents lived at Grove house, Rusholme, where the Whitworth Gallery now stands. There they had their thirteen children and an Alderney cow in the paddock towards their support. Those who survived childhood spent most of their lives in Manchester so that it was natural that we knew some of the city's 'characters'.

One of my earliest memories is that of Dendy (Miss Mary Dendy),¹ a prim figure in a jet-trimmed bonnet, and cloak, pioneer in mental deficiency work. She was indeed runner up for the place of first woman Commissioner in Lunacy when Dame Ellen Pinsent was appointed.² Dendy founded the Sandlebridge Homes for the feeble-minded in Cheshire, and we had a curious rake-off from this venture. She bought the children large spotted handkerchiefs wholesale, and included our needs in this purchase. Except for parties the five of us always had 'feeble-minded' hankies as we called them. My sister and I had tea with her occasionally, (gentlemen's relish and meringues) and were allowed to use her typewriter for our stories, as long as they had moral endings. Had we but known it, I am sure now that she was studying us as a control group for her mental health activities.

¹ Mary Dendy (1859–1933) was the secretary (and later president) of the Mary Dendy Society, which was involved in agitation for the reform of provision for the 'mentally subnormal'.

² Ellen Frances Pinsent, née Parker (1866–1949), was a British mental health worker.

Then there were the 'Manchester Guardian families', the Scotts and the Montagues. Mr C. P. Scott was a legend to me, but later, as a bride, my husband and I had dinner with him in Fallowfield, and had to return his hospitality.³ The prospect of this alarmed me and I rang up his doctor for advice. 'Get on to Lloyd George with the soup,' he said. I did, and we hardly left the subject till the famous editor left for his office at 9.30 in a hansom cab. His grandchildren were all at school with us, and the Montagues, though young devils, were a fascinating crowd. They were fond of pouring small bags of sand from behind their wall on people they did not like; and selling their grandfather's soft fruit in grubby handfuls at his gate. C. E. Montague, their father, was on the literary side of *The Guardian*.⁴ With his rugged red face and bristling white hair, he was athletic, and always won the fathers' race at our school, though as he was the official starter, he had the advantage of gym shoes. In the first war, he served in the Sportsman's Battalion, which in fact was raised by my Aunt Emma.⁵ Emma Cunliffe-Owen had decided that in the hunting, shooting and fishing, but over-age male, there was an untapped source of recruitment for the army. She put this personally to Lord Kitchener at the war office.⁶ Everything would be done by Aunt Emma if she could have a suite at the Hotel Cecil. Kitchener finally said that she could have what she wanted as long as he need never see her again. C. E. Montague reported that my Aunt weighed and measured her recruits herself, and equipped them economically and thoroughly. He said the toothbrushes especially were the best in the army. When the battalion was finally disbanded, my aunt took the salute from a bath-chair, in Hyde Park, the drum on her lap, her decoration round her neck, wearing ospreys and an ermine tippet. Had Mr Montague not told us this, even knowing my Aunt Emma, I should hardly have believed it.

The University personalities were of course generally only Manchester's by adoption, but many stayed for years. Any south-going tram would have a selection. Mrs Perkins, for instance, wife of the Professor of

³ Charles Prestwich Scott (1846–1932) was a British journalist, publisher and politician. He was editor of *The Manchester Guardian* (now *The Guardian*) from 1872 until 1929 and its owner from 1907 onwards.

⁴ Charles Edward Montague (1867–1928) was an English journalist, known also as a writer of novels and essays.

⁵ Emma Paulina Cunliffe-Owen (b. 1863).

⁶ Horatio Herbert Kitchener (1850–1916), the first Earl Kitchener, was a senior British Army officer and colonial administrator who won fame for his imperial campaigns and later played a central role in the early part of the First World War.

Chemistry, would sit, supporting on her tray-like bosom a spray of carnations weirdly coloured by her husband's latest discovery in aniline dye.⁷ Professor Herford might be there, having corrected exam papers placed on top of the pillar box at his stop.⁸ Professor Alexander always bicycled.⁹ A curious figure, a cross between Jehovah and Father Christmas, with his great beard, and twinkling eyes, he generally dismounted and walked with us to school, he was very fond of children. Rutherford was a bit frightening, he had such a loud, gruff voice, and was so large.¹⁰ I remember going to a fancy dress party at his house in Withington. We were playing hide and seek, but told that there was one room into which we must not go. I suppose I forgot which it was, as I crept into an empty room and was just going behind a curtain, when Rutherford loomed up from his desk, and shouted 'Who are you?' 'A violet,' I said, and added quickly, 'A modest violet.' 'Ho! Ho! Ho!' he roared, 'you can hide here with me.' Alas! None of course dared look for me there, and I nearly missed tea.

One of the most colourful of all was Miss Anna Phillips of Prestwick Park, a loud-spoken cheerful woman in elastic-sided boots and tweeds. Soon after I was married, I had to second a vote of thanks in the Town Hall, and simple though this should have been, I was very bad. I had never seen Miss Phillips before, but at the end she bustled up and shouted, 'Take the advice of an old woman, my dear, and never speak in public. It's clearly painful to you and much more painful for everyone else.' I went home in tears, and my father-in-law urged me to speak again next day, but there was no opportunity. Miss Phillips was really the soul of kindness. She had lunch parties for new arrivals to Manchester, and especially young clergy. On one such occasion, I remember her nephew G. M. Trevelyan was staying with her just after he had been awarded the Order of Merit.¹¹ 'George,' said his

⁷ William Henry Perkin, Jr (1860–1929) was an English organic chemist who was primarily known for his groundbreaking research work on the degradation of naturally occurring organic compounds. He was the son of Sir William Henry Perkin (1838–1907), who founded the aniline dye industry.

⁸ Charles Harold Herford (1853–1931) was an English literary scholar and critic.

⁹ Samuel Alexander (1859–1938) was an Australian-born British philosopher. He was the first Jewish Fellow of an Oxbridge college.

¹⁰ Ernest Rutherford (1871–1937), born in New Zealand, has been called the father of nuclear physics and was awarded the Nobel Prize in Chemistry in 1908, primarily for his research into radioactivity. He also proved that atoms had most of their mass concentrated within a very small nucleus and that alpha particles were helium atoms.

¹¹ George Macaulay Trevelyan (1876–1962) was a British historian. He was Master of Trinity College, Cambridge, from 1940 to 1951.

aunt, after lunch, 'run up and fetch your nice medal. We should all like to see it.' The modest Trevelyan demurred, but he was no match for his aunt. He returned and gave it to her. She clapped her hands, 'No, no, George, put it on and walk round slowly.' I shall never forget that Gandhi-like figure, in acute embarrassment, walking round in a circle.

These are pictures of just a few of the great figures. My cousin, Katherine Chorley, wrote an admirable book, 'Manchester made them'. If I ever wrote down my memories, I would call the book 'They made Manchester'.

The decision was taken to send my mother to boarding school. St Leonard's School in St Andrews was a highly traditional establishment. Mother was there during the First World War, which was a tragic time. Girls lost fathers and brothers. Mother was a rebel. When she was a fag, which entailed running errands and doing useful small jobs for a senior girl, she was so bad at it that she was made to continue for a second year. She played atrocious cricket—an obligatory exercise—and actually managed to bowl backwards over her shoulder.

Tragedy erupted into her life when her beloved brother was killed near Ypres in June 1915. His letters to her from the front survive. In these letters to his sister, he tries to reassure her and writes about life on the front as if it were some kind of adventure. He stresses anything positive he can invent to allay anxieties.

19 April 1915

I have just finished my second four days in the trenches and am still safe and sound. I move off in about an hour with dugouts. You must understand that all our movements here are nocturnal. It is never safe to go about behind the line in daylight as snipers are always on the lookout!

1st June 1915

Meanwhile we are very comfortable. At one end of the trench is a farm not inhabited now by anything but rats. It is surrounded by a moat of black inky water which, sad to say, is full of weeds. We found an old sort of make-shift punt on it and have made various perilous journeys. I have also shot at the rats with my revolver but with very little success.

I must close now with much love from Eric

He went missing a couple of days later. His body was never found. Eric's great friends were Bob Bragg and Cecil Hopkinson.^{12, 13} When Cecil died of his wounds, back in England, the last of the three to go, my Hopkinson grandfather said sadly, 'Tonight Cecil will be with Bob and Eric in Paradise.'

Mother studied history at Newnham College in Cambridge, where I followed her many years later. Cambridge after the First World War was full of gaiety, parties, tea dances, trips to point-to-points and, of course, balls. There were so few female undergraduates, with only Newnham and Girton to supply them, that the girls were much in demand. The men were, of course, older and more mature, having returned from war, and such qualities added to their attraction. It is surprising that my mother managed to do any work at all; but my grandfather arranged coaching for her and she came out with a respectable second-class degree. Incidentally, she and her great friend Cecily Carter scandalised their fellow undergraduates by wearing low-cut black satin nightdresses.

Mum had always told us that she had had thirteen proposals of marriage before she took her degree. My father always countered that these had constituted quantity, not quality. One proposal from a Wills cousin took place in a summerhouse. My aunt Enid sneaked up and lay on the roof taking notes, which she entitled 'Through the eyes of a neutral'.

Mother was having too good a time to tie herself down. Even my father was rejected first time round and told to go on his glorious way alone. It was two years later that they finally got engaged.

Mother and our Education

There was never a teaching element in my mother's involvement in our education. She never helped with history projects or with our homework in other subjects. What she did give us was a command of

¹² Robert Charles Bragg, born in 1892, sadly was killed in 1915 at Gallipoli during the Great War.

¹³ Rudolf Cecil Hopkinson (1891–1917) became a close friend of WLB. He died from wounds during the First World War. A full account of his life can be downloaded from the 1918 book *Rudolph Cecil Hopkinson, Memoirs and Letters* (available at <<https://archive.org/details/memoirletters00hopkiala>>), in which, on pages 21–24, WLB has written about him.

language, written and spoken, and a love of words. I remember her reading me *The Mill on the Floss* in the garden one hot summer. At one level, it was totally unsuitable for a seven-year-old child but I have remembered the content to this day. She brought things alive.

I always felt it was weird that my mother made all the decisions on our education in a rather haphazard way, when it was my dad who was the born teacher. My mother believed in education for girls but marriage was the ultimate aim for us. She called the shots on how and where we were educated. I never quite forgave her for sending me protesting to boarding school when she wanted to go to the USA for a semester with my father.

In our gap year before university, Margaret and I were both, in our turn, presented to the Queen and went to some of the parties of the debutante season. My father was more interested in the architecture of Buckingham Palace, and the question of whether the pillars were made of fake or genuine marble.

When my mother visited me at Newnham, she never asked about my work but quizzed me on my social life. My supervisor had been a contemporary of my mother and invited us both to tea. 'You are working Patience too hard,' said Mum. 'She needs to get out and enjoy herself more.'

'But you want her to do better than you did,' was the immediate sharp response.

Incidentally, in contrast to Mum, my father had read most of the French works on my list but dismissed Racine and Corneille as 'tripe', and much of the work of modern French writers as 'sordid'. Dad told me that, sometime after his marriage, he had been extremely upset and had fallen out badly with his parents on the issue of whether his sister, Gwendy, should go to Cambridge. He was violently in favour—'Look at Alice,' he said. His parents looked at my mother, who had quite a reputation, and shook their heads.

My Mother in Public

Mum was an accomplished amateur actress on stage from the days when she played the lead role in *Pinafore* at St Leonard's School. She acted out her many roles in real life too. She spoke well in public, with a delightfully dry sense of humour.

In the First World War my mother and her younger sister Enid entertained the wounded soldiers in the local hospital in Manchester.

Both had good voices and my mother was an accomplished pianist. She used to play songs like 'There's a long, long road a-winding' and 'Keep the home fires burning'. Her favourite was the music hall hit 'Which switch is the switch miss for Ipswich'. She still sang this for her grandchildren at top speed and word perfect in her eighties. Alas, Dad was tone deaf and appreciated none of this. He only recognised the national anthem when everyone stood up.

Once Mum came to my school, the Perse Girls in Cambridge, and gave out the prizes. My father fell into one of his rare rages when I pointed out after we returned that her petticoat had been showing one inch below her skirt.

As Mayor of Cambridge, she reviewed the Cambridge Regiment on their return after the war. In her heavy robes, standing on the balcony of the town hall above the teeming town square, she whispered urgently to her army minder, 'I'm going to faint.' Without turning his head he whispered back, 'Keep wiggling your toes.' Incidentally, my father did not wish to play the part of Lady Mayoress, so my sister and I shared it between us when appropriate. I was twelve, and the gold chain banged against my knees as I opened the Midsummer Fair.

When I went to observe her as Chairman of the Magistrates Court in Cambridge, I saw the clerk unobtrusively creep up to the table and tactfully reverse the vital map which explained the cause of the accident. Mum could not read maps. She could and did frequently get lost in her car during the war, when all the signposts had been removed.

Mother's Hobbies and Interests

Her great strength was her social confidence and personality. She was the life and soul of parties, people fell for her and she made deep and enduring friendships.

She did not share in my father's hobbies except for walking, travelling and perhaps tennis. She found birdwatching chilly and boring and she could not distinguish between a whimbrel and a curlew. Ostensibly, she loved wild flowers but could not remember their names. This applied to the butterflies and shells which my father collected and preserved. WLB loved to paint on holiday, while Mum lay on the beach and read *Vogue*. When uncommitted elsewhere, I was taken along to keep her company. I would much rather have painted with

Dad. But when my father died, a curious thing happened. My mother took herself off to painting classes. Instead of the soft and gentle water-colours my father loved, she produced portraits, sometimes copied, in the style of Matisse, a painter my father particularly disliked.

WLB's love of sailing was not shared by my mother. She used to strap a hot-water bottle to her stomach if it was the least bit chilly. Oddly enough, she never worked a rope or took the tiller, even though her childhood holidays, often spent in the Lake District, had been full of adventurous climbing and sailing opportunities.

Both parents loved the garden, but mother only tended a narrow strip outside the drawing-room window, where she grew *Iris stylosa* and other favourites. She did not plant, weed, dig or sow but she appreciated the results of my father's labour and loved visiting other people's gardens.

Dad was very keen on photography. However, mother never took photos or carried a camera. She herself was very photogenic and loved to pose.



Figure 1 Painting by Lady Bragg after the death of WLB. (Courtesy: Patience Thomson)

So what were my mother's hobbies? She read a lot and wrote a lot: informal letters, and articles for magazines and newspapers. She produced long letters, she collected friends and she knitted. While fire-watching in the war, she hand-stitched me exquisite doll's clothes from scraps of silk. She kept diaries. She had a flair for decorating and designing the interior of her various homes, with the help of her great friend Joan Worthington,¹⁴ and she loved clothes. However, because she did so much voluntary work and entertained for my father, she had little spare time.

Opinions and Values

Alice Bragg's broadcast for 8 February 1961:

What I feel strongly

What a chance you are giving me, a chance to let a stream of bees out of my bonnet, ride hobby horses out of my stable, yes, and probably let cats out of my personal bag. Strong feelings can be roused against things and for things—I think I will let a few of the anti-bees out first, and in any old order—I worry that we can't prevent so many women doing too much and getting overtired, especially young women with small children, and we let them get lonely and house-bound, too.

I am against so many people taking so many pills for anything and everything which might in time change us out of all recognition. I'm roused by people who drink and then drive vehicles, by over dramatized society divorces and the sex life of film stars recorded in newspapers. I get fierce about things that won't work properly in the home unless you remember to put your foot against something and one finger on another thing and untie a bit of string first. For me, at least, they must be fool-proof. I dislike intensely the expressions 'couldn't care less', 'can't be bothered', 'and 'it'll have to do', any kind of slap-dashery in fact. I get hot about people who insist on forcing food down small children against their will. The average child is much too sensible to starve.

Now you'll be getting a rough idea of the inside of my bonnet with these few examples. But one must have strong feelings the other way, of pleasure and satisfaction. Well here come some of mine—of course I have them about art, travel, music and books and all that, but my odd

¹⁴ Probably Sophie Joan Worthington, née Banham (b. 1905); English draughtswoman and architect.

ones are more amusing for you. I've got very warm feelings for taxi-drivers. When I push my grandchildren across Piccadilly (and by the way those curbs are far too high for prams) it's they who always stop for me, under any conditions, and bless the ones who shouted 'Stick to it, Grandma.' I'll throw in lorry drivers who unfailingly give the right signals when I'm driving. I am thrilled when I've made something. Oh! The sight of a perfect cake when I open the oven door (that happens infrequently alas!). I love very old possessions, for instance, my pre-war bicycle. When it was stolen, borrowed I mean, for a day, on its return I literally took it to my bedroom with me. I get a tremendous kick, if, and when, my married children say, as to a trusty dog, 'Good old Mother, what should we do without you'. I love hearing the younger generation talking, especially if it's about ours. Altogether I've a strong feeling that there's a lot of fun about in life.

Now, please, look at my Queen Bee, and here I get on to my big hobby horse. That's family life in all its aspects, and how to preserve it.

My mother goes on to talk about the role of the Marriage Guidance Council (she was their president) and ends with the following conclusive paragraph:

And so to sum up—what I feel deeply is that we should all matter more to each other, find out how to love more, if you like. In my mind I see that young man in the dock, convicted of larceny, that lonely deserted wife, that rejected adolescent girl, that fumbly, neglected old man, and I want conditions changed so that we do not hear that sad cry from them—nobody really cares.

Where Christian belief was concerned, my mother was a devoted member of the Anglican High Church community and deeply religious. She took us to church every Sunday, where the incense made us feel sick. My father was a 'blue sky worshipper', which meant that he stayed at home and worked in the garden on Sundays. However, he sometimes went to the early morning communion with my mother. Interestingly, when I asked him about the afterlife, he told me in a very relaxed voice that the only certainty he had was that any arrangements made by God would prove to be satisfactory. He wrote the following to my mother when he was in Canada:

June 2nd 1941

I went to early morning church which I always feel is a way of communing with you because it brings back so many memories—going with you

in Didsbury and on those lovely sunny mornings in Alderley Edge, and at Kingston and bicycling along to St Benets in Cambridge and countless holidays before breakfast walks to unknown little churches. It is something I always associate particularly with you.

1.4 Meet my Father

My Father's Roots

My father's forebears were very different from my mother's. Some were farmers and sailors in the north of England. Apart from his father, Sir William Bragg, the most famous was the entrepreneur and explorer, Sir Charles Todd, who set up the Overland Telegraph link between Adelaide and Darwin.

My father spent a lot of time with Grandfather Todd at the Adelaide Observatory. He was not only Postmaster General but Astronomer Royal for South Australia. For many years, we had a large black umbrella in our hall. When opened, it revealed all the stars in the night sky of the Southern Hemisphere.

I do not think it is fanciful to suggest that there was a family gene that led to thinking in a visuospatial manner, in three dimensions, in fact, and which encouraged lateral thinking.

My Mother's View

I have my mother's preparatory notes on how she wished to present WLB in her autobiography; the notes are scrappy but worth recording and a good starting point.

Great shyness, did not know ordinary things.

Hated Senate and Committees unless he was chairman.

Disconcerted people by not listening. Faraway look came over him. Sometimes had been listening, something said to him triggered off train of thought—his own—sometimes not interested . . .

Often missed things because he had not been attending.

Used often to drop off at the Whitworth [PT: Art Gallery] on the way home.

Always tore up first letter. [PT: This would have been an angry response to some 'trigger'. He would write a second more moderate one after.]

Not a club man. Did not like Conferences, e.g. the Brit. Ass [PT: British Association]

Always had blind dog, Nuttall,¹⁵ Scott Dickson,¹⁶ James¹⁷ [PT: someone to lead him and guide him]

Blessed secretaries Mair Jones, Brenda Smith

Always someone like Bell—disloyal, critical [PT: who was a target for his annoyance]

Our trips to the RI [PT: Royal Institution]

Mind on agenda. Things worked v. slowly—he ‘had not put his case well.’ Certain people very fond of him and helped him through. . .

‘Mortified’ a great word. [PT: He used it a lot about his own feelings]

Great friend GPT [PT: George Paget Thomson¹⁸]

Both overshadowed by famous fathers in same line.

Anxious at Trinity—so many College things he did not know—often queried their importance.

Alarmed by Blackett and Fowler,^{19, 20} tho’ both fond of him—always pleased to see Bernal.²¹

Passion for books—reread them, really knew them.

Happiness in old age. Loved parties.

A natural worrier (Brushed off on me).

My father changed character during his lifetime. His childhood and adolescence were not always easy. He faced the trauma of the First

¹⁵ John Mitchell Nuttall (1890–1958); famous for the Geiger–Nuttall rule showing that short-lived isotopes emit more energetic alpha particles than long-lived ones.

¹⁶ Ernest Scott Dickson was Senior Lecturer at the University of Manchester. He died in 1944.

¹⁷ Reginald William James (1891–1964) was a crystallographer and became Professor of Physics at Cape Town University.

¹⁸ George Paget Thomson (1892–1975), son of J. J. Thomson, shared the 1937 Nobel Prize in Physics with Clinton Davisson for the discovery of electron diffraction. He remained a close friend of WLB.

¹⁹ Patrick Maynard Stuart Blackett (1897–1974) was a British physicist known for work on cloud chambers, cosmic rays and palaeomagnetism. He was awarded the 1948 Nobel Prize in Physics.

²⁰ Ralph Howard Fowler (1889–1944) was known for his work on statistical physics and for the study of aerodynamics of aircraft spins during the First World War.

²¹ John Desmond Bernal (1901–1971), known as ‘Sage’, had been a student of WHB and built up a formidable team of crystallographers while at Cambridge in the 1930s. He was a controversial figure because of his political views and sympathy for the Soviet Union. One of his students, Dorothy Hodgkin, née Crowfoot (1910–1994), went on to win the Nobel Prize in Chemistry in 1964 for the study of the structures of penicillin and vitamin B₁₂.

World War. His great friend Cecil Hopkinson died of his wounds, and his brother Bob was killed at Gallipoli. Afterwards he had the problem of being such a young Professor at Manchester University. He had little experience of lecturing, and none of running a department. There was the awkward element of rivalry between father and son. At one stage he had a breakdown while in Manchester and had to take time off. He was often overstretched and unprepared. But all this happened before I was born. I appeared on the scene in 1935 and by the time I can remember him, much of this early angst and underconfidence had waned. He had a firm grip on his priorities in life.

The self-effacement that had characterised him as a young man vanished with time and was replaced by his pleasure at the recognition he was receiving. At Cambridge and the Royal Institution he had very specific jobs to do and was doing them well. After the war ended he had time to travel, to pursue his hobbies and to enjoy his family. Alice was almost always by his side. These were golden years and

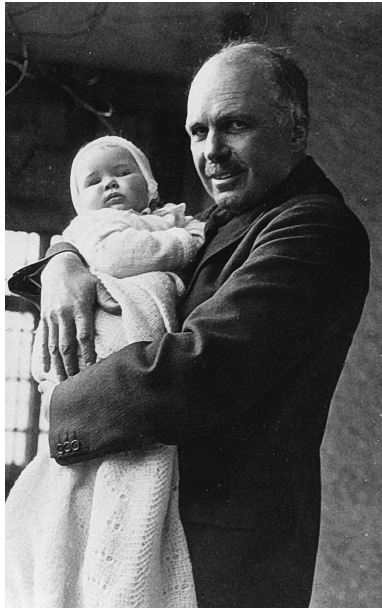


Figure 2 WLB with Patience in 1936. (Courtesy: Patience Thomson)

even the life-threatening cancer, from which he only just recovered, did not dent his enthusiasm or zest for life. The father I knew was a man who had come to terms with the world around him, basically a happy man, fulfilled. He would read us Browning's poem 'How good is man's life, the mere living'.

I have given my mother priority in this introduction, because people know far less about her. She has had no biography, no lengthy obituaries and no lectures in her name. However there are a few points I would like to make about my father.

Physically a very fit man, Dad had excelled at school in the 100 yards in athletics and still played a threatening role at net in tennis. He loved skiing and walking. I used to ride on his shoulders on family picnic expeditions. He enjoyed physical activities and had a very healthy appetite.

Dad was not part of the Establishment. He had not been to public or grammar school and so had no English friends from school days and did not automatically fall into a category; he was a colonial from Australia. He had two invitations to be Master of a College, at Cambridge and at Oxford, respectively, and accepted neither invitation. He delegated administration whenever he could. He was not clubbable and did not particularly relish dinners at the High Table in Trinity. My mother would pointedly put out the dyspepsia tablets on a tray in the hall and go to bed.

Modest and self-deprecating, my father was quick to acknowledge mistakes and quick to apologise, but he could still get very angry, so much so that he would go red in the face and start to stammer. His family, and especially his father, seldom expressed their personal inner feelings, either to each other within the family, or to the outside world. My mother thawed WLB out emotionally.

My father adored children. He was very unusual for his time and generation in that he loved them even when their heads were still wobbly. He could and did change nappies.

A walk with him on summer Sundays often involved the identification of birds, butterflies and wild flowers. Where I could not follow was in his vast knowledge about insects, as most of them seemed to me either dull or threatening. He would point out a praying mantis in Corfu or explain the singular behaviour of the cuckoo bee.

Mutual Attraction

So what did my parents have in common? First, a sense of humour. Then, a sense of proportion in identifying what was important to them in life. Complete loyalty and fidelity. Then, there was their driving energy and enthusiasm. They grasped opportunities—they had a sense of commitment. With their mutual admiration, support and encouragement they increased each other's confidence. But they still gave each other space to go off and do their own thing. Finally they were deeply, passionately in love.

They needed each other. By the end of his life, my father relished being lionised at parties. Mother helped him to enjoy the social scene by letting him be a guest at his own parties and briefing him with lists of those attending and their interests. She attended his lectures, even though she could not understand the scientific principles involved, and encouraged him to enjoy public speaking and acclaim. In turn, he would say how happy he was to move in the kind of prestigious circles, both national and international, that my mother so loved.

He orchestrated a popular TV series where he demonstrated dramatic experiments. People accosted him in shops and in the street to tell him how much they were appreciating his programmes. By the sixties he had become a 'grand old man of science' and loved it. In return, he gave my mother a solid and serious grip on life and encouraged her to take on major public roles.

WLB backed my mother up wholeheartedly in all her enterprises. They were, in a positive sense, a mutual admiration society. She distracted my father and calmed him down when he was angry. Dad cherished my mother.

Family

They had four children: Stephen (b. 1923), David (b. 1926), Margaret (b. 1931) and me (b. 1935). We were widely spaced and so only shared a limited amount of time in our childhood. They shared the pleasure of having children around them, and both were excellent grandparents.

My brother Stephen became an engineer, chief scientist of Rolls Royce and later Vice-Chancellor of Brunel University.

I need to say more about Dave because his problems affected my parents so acutely. David was a sensitive and gentle soul. He was for



Figure 3 Patience in 1951, finishing a thriller. (Sketch by WLB; Courtesy: Patience Thomson)

many years a gardener for Caius College, Cambridge. He was musical and artistic, but alas also schizophrenic. He spent considerable periods in hospital. Before his death, he gave me, for safe keeping, the despairing notes he made about his shock treatment in the fifties, and his feelings of inferiority, frustration and uncertainty. His treatment was scandalous. He had unsuitable boyfriends. One took his savings, stole his clothes and embarked on a tour of the country borrowing money from our parents' friends. This caused my parents great distress. He was treated in the fifties at a time when consultants insisted that they must treat their patient in confidence and in isolation and that the family should not be informed or become involved in any way. It was a cruel concept which thoroughly upset my parents. My mother felt responsible for Dave's condition and used to agonise trying to work out what she had done wrong. My father tried to convince her that it was all in the chemistry of the brain. Mental health was ill understood. There would be angry scenes when my brother was late for lunch or left his new raincoat on the train. He

was a constant worry to my parents, and all solutions seemed only to be temporary. Mother said that this misfortune was the worst experience of her life.

My sister Margaret went to Oxford, married into the Foreign Office and spent much of her time abroad. She was my teacher and mentor throughout my childhood, and I owe her a great debt of gratitude.

I myself went to Cambridge. Subsequently, I worked on the translation and publication of the Nazi party papers, which the allies had confiscated after the war. The Foreign Office had undertaken to edit and publish a selection. My father was very interested in this work and I would discuss it with him at dinner.

After the birth of my four children, I trained as a special-needs teacher, working in St Bartholomew's Hospital Psychology Department, in a young offenders' unit and in various schools. I was Principal of Fairley House School in London for eight years and subsequently helped to co-found a publishing house, Barrington Stoke, which produces books for individuals, juvenile and adult, with reading difficulties. Both my parents had instilled in me a love and understanding of language that stood me in good stead.

Learning from daughters—BY ALICE BRAGG

June 8th 1966

'Nothing comes up to mother's gingerbread'—that's what husbands used to say to young wives. Times change; now mothers say: 'No one makes pâté like my daughters.' The young marrieds seem to me a complete women's magazine of tips for middle-aged mums. That is if one can take it. Either one preserves the 'I have forgotten more than you are ever likely to know attitude,' or one learns from married daughters.

They don't worry, as we used to do, at any rate not about the same things. This is not a matter of temperament; it's the difference in generation. They are quite happy to show the works. When people drop in, if they are in the kitchen they stay there, if dressing they continue to dress. If they aren't dressed it doesn't matter. I'm picking this up fast, and have been able to receive the postman without my shoes and stockings, and shout over the banisters to the plumber, in my vest. They are not too upset if they break, lose or burn things. We were trained to keep possessions (I've had my work basket all my life), with the view to passing them on to the children. But most of the things the children aren't going to want. They have not the room and they have different taste. They use what they have thoroughly, and lend freely. I

am a bit slow in saying, as they do, 'have my flat, take my car, borrow my outfit for the party,' without adding 'You will be careful won't you?'

My generation were accustomed to order and method, so that it was not so easy to deal with the unexpected. It threw us out. But the daughters and their friends like it that way. If they have something better to do on Monday they don't wash; anyway of course they have washing machines and spin-driers, but they will wash at night, or any old time. If friends stay on, they feed them, any number, and when there's no bread (metaphorically speaking) they make it or do without. I still have to have the right tools and equipment, but I remember when one daughter's stove was temperamental she wrapped a presentation salmon in her trousseau nightdress and cooked it thus.

Out-of-date conventions

That brings me to the whole question of food. First lesson, why have a joint and apple pie on Sunday? Why cold supper on Sunday night? These are conventions all geared to having help, and as they have no help they've ditched them, and I'm going along with them here. The husbands can cook of course, and mine is learning, though he is best and safest with a frying pan. I notice they don't bother much about puddings, except for parties, that's all right for me, it is an insurance against middle-aged spread. They fancy French, Hungarian, Chinese dishes. British food has somewhat low priority. Well, I can just manage to make pizza, piperade and the like, but really only to be 'with it.'

As for the children, it is really too late to learn here for one's own benefit. One can only take an academic interest, but since at any moment a granny may have to function it is as well to watch the form. Basically, I note that children have not to be forced to eat what they don't like, or indeed to eat at all. Incidentally they exhibit surprising tastes, wanting pickles, chutney, pepper, and strong cheese. The same latitude goes for bed-time. If they are not tired, they stay up, watch something on television, or do a little gentle milling round till ready for sleep. It is a shock to realise that while still quite young they can cook breakfast for themselves, answer the telephone, and fly all over the world, carefully labelled. Even when these children are really small the daughters take them anywhere and everywhere, with little bags crammed with plastic feeders and pants, and plastic sheets. I thank God that they do, for I shall never be good at coping with wet mattresses, however hard I tell myself it's only nature.

Thus, I try and learn not to worry about appearances, to do a whole lot of things at once, to seize opportunities that may not be offered again, and never (hardly ever) say no to any new experience. Of course I shall

not catch up, and sometimes my daughters' efficiency depresses me. But then I play my trump card. I tell myself that it could be just possible that they have inherited some of their qualities from me.

Down the other end of West Road lived old Lady Thomson and her daughter, who were sort of extended family. She was the widow of J. J. Thomson and mother of Dad's greatest friend, Sir George Thomson.²² My father kept an eye on her and did odd jobs for her (how did he find the time?). In particular, he mowed her lawn. There was no petrol for the motor mower, so it was pulled by a pony wearing leather booties, so as not to make holes in the lawn.

Lady Thomson's eleven-year-old grandson, David, came to live with her during the war after his mother had died. He used to come to tea with us. Fifteen years later, I married him. When I announced our engagement to my parents, my father picked up the telephone to ring his friend George Thomson who had already received the news.

'Herumph, Willie'

'Herumph, George'

'Are you going to the Royal Society on Wednesday?'

And so it was settled.

1.5 Family Homes

Before my memories start, my parents had lived in Didsbury, Manchester, in Alderley Edge, Cheshire, and at Bushy House, the NPL (National Physical Laboratory) in Teddington outside London. I was three when we moved to Cambridge, and 3 West Road is the home of my childhood. It is there that I shall start this part of my Bragg story.

Life at 3 West Road, Cambridge

It was a great place to bring up a family. It was the first home that I can remember. The previous owner had been shot dead by one of his students, and his children left us a scary treasure hunt in the extensive cellars to welcome us in.

²² John Joseph Thomson (1856–1940), discoverer of the electron, was awarded the Nobel Prize in Physics in 1906 for his research on the conductivity of electricity in gases.