

Alexander Craig Aitken - world class mathematician from Blueskin



Edward Aitken (1882-1959) married Ellen Eason Dick(1883-1949)¹. His nephew by his brother, William Aitken and Elizabeth Towers, was Professor Alexander Craig Aitken (1895-1967), a famous mathematician² –

Alec Aitken's family was Scottish on his father's side and English on

his mother's. Alec's mother, Elizabeth Towers, emigrated with her family to New Zealand from Wolverhampton, England, when she was eight years old. Alexander Aitken, Alec's grandfather on his father's side, had emigrated from Lanarkshire



in Scotland to Otago in New Zealand in 1868, and began farming near Dunedin. Alec's father, William Aitken, was one of his fourteen children and William began his working life on his father's farm. Later, he became a grocer in Dunedin. William and Elizabeth had seven children, Alec being the eldest.

Alec attended the Otago Boys' High School in Dunedin, where he was head boy in 1912, winning a scholarship to Otago University which he entered in 1913. Surprisingly, although he had amazed his school friends and teachers with his incredible memory, he had shown no special mathematical abilities at school. He began to study languages and mathematics at university with the intention of becoming a school teacher but his university career was interrupted by World War I.

¹ She was a first cousin, 2X removed, of the Sargison brothers.

² <http://www-history.mcs.st-andrews.ac.uk/Biographies/Aitken.html>

In 1915, he enlisted in the New Zealand Expeditionary Force and served in Gallipoli, Egypt, and France, being wounded at the battle of the Somme. To the soldiers on the shores of Gallipoli, he was known for his violin.

Alec was gifted the violin by a friend who had won it in a raffle on board the ship to Egypt. He played it almost every night in the trenches, bringing the power of music to the soldiers who were surrounded by the sadness of war. When his E string broke, he made a new string out of field telephone wire. When Christmas came along, his concerts included 'The First Noel' - accompanied by a choir of soldiers.

It was hard work for Alec trudging through mud, carrying his heavy soldiers' pack as well as his violin case. Luckily, he had friends who loved the music so much that they took turns with the violin, making sure it was always safe.

One night during combat, Alec was injured and sent to hospital. When he recovered and was sent back home to New Zealand, he thought the violin was lost forever, but it followed him home. The violin is still on display at Otago Boys' High School, a reminder that the even smallest things, like a silent concert, can make the biggest difference.³ Aitken continued to play the violin all his life and composed music to a very high standard. A professional musician noted: *Aitken is the most accomplished amateur musician I have ever known.*

The Somme – through Alexander Aitken's eyes



Badly wounded on the Somme during the Battle of Morval (25-27 September 1916), Alexander Aitken managed to drag himself back through no-man's-land to safety:

Bullets still hissed above my shell-hole, a raised hand would have been perforated at once; it was out of the question to think of crawling back. I saw the head and shoulders, and once or twice the hands also, of a field telephonist running forward from shell-hole to shell-hole and unrolling his wire; he

³ <https://www.walkingwithananzac.co.nz/alexander-craig-aitken>

was still unwounded as he drew level with my crater and passed behind me towards the front, but I fear he could not long have remained so.

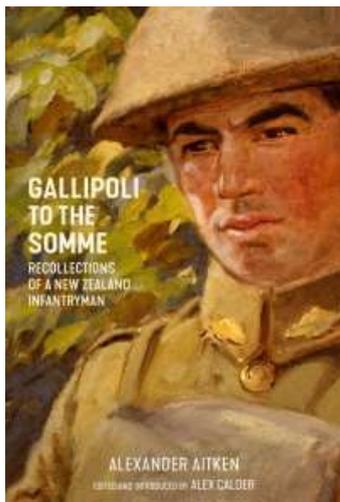
Soon afterwards I was myself forced to move, by noticing amid the uproar a regularity, a periodicity, in a particular type of explosion. I watched carefully, and saw that shells from a 5.9 or 4.1 howitzer were coming closer every two minutes, apparently in a straight line. When first seen, their burst seemed close to the part of Goose Alley, perhaps 500 yards back, where we had emerged and strung out. I visualized the German gunners lowering their howitzers by a fraction of angle each time; I reckoned that in about ten minutes one of these shells would fall near my crater, possibly on it. Being blown to pieces or killed by blast seemed worse than the machine-guns. Using what cover I could, I crawled from my shell-hole over to our original right, now my left, out of line of fire. This brought me in a few minutes to the Factory Corner road again, at a point some 200 yards to the original right of Goose Alley, which I could trace by its thrown-up earth at that distance down the road.... The road here and the ground to either side were strewn with bodies, some motionless, some not. Cries and groans, prayers, imprecations, reached me.... Yet there is something to be confessed. Under the strictest eye of truth, my sympathy for these men at that moment was abstract almost to vanishing point. I deduced their pain, I know I should feel it as grievous beyond measure; but I was still wholly mathematical, absorbed in the one problem, whether pairs of consecutive explosions of those howitzer shells showed the slightest difference in direction. It seemed to me that they did. Soon two successive bursts straddled the road. I could not raise my head to look, but judged that the later one must have landed very close to the shell-hole I had first occupied....

About 4 p.m. the sky clouded over and drizzle fell. I angled for a German waterproof sheet a yard away, and this, though riddled with bullet-holes, gave me some shelter.... There was nothing for it but to wait until dark, when, if machine-gun fire should die down, I might hope to crawl back overland to somewhere near the starting-point of our attack, where the trench would be occupied by the 10th Company and would be in better repair. The distance would be about 500 yards...

About 8 p.m. the rain had stopped, the sky had cleared; in the dusk I could just distinguish our observation-balloons. The stars shone in a moonless night, the Great

Bear swinging low with the Pole Star above. I turned my back on them, fixed south by other constellations and began the long crawl, leaving behind the water-bottle but hanging Fitt's binoculars (which I later returned to him in 1st London General Hospital, Camberwell) round my neck.

It was thus that I ended my active service, so slight, unimportant, and uneventful compared with that of hundreds of thousands of others who went through such things over and over again, who saw three or four years where I had seen less than one. From



shell-hole to shell-hole I side-crawled on left elbow and knee; perhaps taking three to four hours – though I had ceased to consult the luminous wrist-watch, now daubed with mud. Many times I was tempted to curl up and wait for the stretcher-bearers, but I crawled the few yards farther, rested, and crawled again. The accurate memory that I have retained of my active service flags and blurs a little here, but at length I saw outlined, in black against the rain-washed night sky, the figures of two men on a

mound, digging. I recognized them, Alf Ellis of my old section and Lou Mylchreest, a Manxman, also of the 10th Company, which had evidently come up from supplies to hold the line....

An indefinite time later, after midnight, I came to and found myself propped up on a ledge cut in the side of the trench, no longer troubling to identify the constellations above; they had served their turn. My mind was at rest; the long responsibility had ended⁴.

Post War

His war experiences were to haunt him for the rest of his life. After three months in hospital in Chelsea, London, he was invalided back to New Zealand in 1917. The following year, he returned to his university studies, graduating in 1920 with First Class Honours

⁴ Alexander Aitken, *Gallipoli to the Somme*, 1963, pp. 170-3 available as ebook edited by Alex Calder. Also see <https://nzhistory.govt.nz/media/video/alexander-aitken-great-war-story>

in French and Latin but only Second-Class Honours in mathematics, in which he had no proper instruction. In the year he graduated, Aitken married Mary Winifred Betts who was a botany lecturer at Otago University. They had two children, a girl and a boy.

Aitken followed his original intention and became a schoolteacher at his old school, Otago Boys' High School. His mathematical genius bubbled under the surface and, encouraged by R J T Bell, the new professor of mathematics at Otago University, Aitken won a scholarship to study for a Ph.D in Scotland in 1923 under Whittaker. His doctoral studies focused on an actuarially motivated problem of fitting a curve to data which was subject to statistical error. His Ph.D. thesis was considered so outstanding that he was awarded a D.Sc. for it in 1926. Aitken had already been elected a fellow of the Royal Society of Edinburgh in 1925.

He was also appointed to the staff of Edinburgh University in 1925 where he spent the rest of his life. After holding lecturing posts in actuarial mathematics, then in statistics, then mathematical economics, he became a Reader in statistics in 1936, the year he was elected a Fellow of the Royal Society. Ten years later, he was appointed to Whittaker's chair.

Aitken's mathematical work was in statistics, numerical analysis, and algebra. In numerical analysis he introduced the idea of accelerating the convergence of a numerical method. He also introduced a method of progressive linear interpolation. In algebra he made contributions to the theory of determinants. He also saw clearly how invariant theory fitted into the theory of groups but wrote that he had never followed through his ideas because of:-

... various circumstances of anxiety, or duty, or bad health ... I have observed my talented younger contemporary Dudley Littlewood's assault and capture most of this terrain.

Aitken wrote several books, one of the most famous being *The theory of canonical matrices* (1932) which was written jointly with Turnbull. With Ernest Rutherford he was editor of a series of the University Mathematical Texts and he himself wrote for the series *Determinants and matrices* (1939) and *Statistical Mathematics* (1939). In 1962, he published an article very dear to his heart, namely *The case against decimalisation*.

In describing his period of recovery from a small operation in 1934, Aitken wrote:-

The nights were bad, in the daytime colleagues and other friends visited me, and I tried to think about abstract things, such as the theory of probability and the theory of groups - and I did begin to see more deeply into these rather abstruse disciplines. Indeed I date a change in my interests and an increase in competence, from these weeks of enforced physical inactivity.

Aitken describes the reaction of other mathematicians to his work:-
... the papers on numerical analysis, statistical mathematics and the theory of the symmetric group continued to write themselves in steady succession, with other small notes on odds and ends. Those that I valued most, the algebraic ones, seemed to attract hardly any notice, others, which I regarded as mere application of the highly compressed and powerful notation and algebra of matrices to standard problems in statistics or computation found great publicity in America...

Colin M Campbell, a colleague of the authors of this archive at the University of St Andrews, was a student in Edinburgh in the early 1960's. He writes:-

Professor Aitken's first year mathematics lectures were rather unusual. The fifty minutes were composed of forty minutes of clear mathematics, five minutes of jokes and stories and five minutes of 'tricks'. For the latter Professor Aitken would ask for members of the class to give him numbers for which he would then write down the reciprocal, the square root, the cube root or other appropriate expression. From the five minutes of 'stories' one also recalls as part of his lectures on probability a rather stern warning about the evils and foolishness of gambling!

In fact, Aitken's memory proved a major problem for him throughout his life. For most people memories fade in time which is particularly fortunate for the unpleasant things which happen. However, for Aitken memories did not fade and, for example, his horrific memories of the battle of the Somme lived with him as real as the day he lived them. He

wrote of them in [2] near the end of his life. These memories must have contributed, or perhaps were the entire cause, of the recurrent ill health he suffered.

Unfortunately, this was all too typical of the situation many veterans found themselves in – and doubtless still do – with no support.

Collar writes:-

These black periods must have been harrowing in the extreme, but were borne with great fortitude and courage.

The illness eventually led to his death. The book, which he wrote to try to put the memories of the Somme behind him, may not have had the desired effect but the book did lead to Aitken being elected to the Royal Society of Literature in 1964.

. **Article by:** *J J O'Connor* and *E F Robertson*⁵

⁵ <http://www-groups.dcs.st-and.ac.uk/history/Biographies/Aitken.html>

Winnie Betts

Aitken's wife was perhaps even more interesting than he was himself. She was the first woman botany lecturer at the University of Otago. Winnie Betts was just 25 years old when she commenced her new position at the beginning of 1920. Born in Moteuka, she was educated at Nelson College for Girls, receiving a University National Scholarship in 1911. She then came to Otago, graduating BSc in 1916 and MSc in 1917. She was clearly one of the more capable students of her era, and by 1915, her tutor Professor William Benham had selected her as a demonstrator in biology. On completing her MSc, she received a National Research Scholarship; one was awarded at each university each year. This provided her with an income of £100 a year along with lab expenses so she could carry out independent research. In 1919, at a lecture to an admittedly partisan audience in Nelson, distinguished botanist Leonard Cockayne described Betts as "the most brilliant woman scientist in New Zealand."⁶



Figure 1 Winnie Betts

In December 1920, Winnie Betts married another brilliant Otago graduate, the mathematician, Alexander Aitken.⁷ They had two children together, but Winnie did not stop working, continuing to teach and research in the botany department until 1923, when her husband won a scholarship to undertake mathematical studies in Edinburgh. Sadly, her own career was brought to a full stop by the move to Scotland, where the couple remained for the rest of their lives. Such was the fate of all too many highly intelligent and capable women in the early 20th century around the world!

⁶ This section comes from <https://blogs.otago.ac.nz/thehockenblog/2014/09/08/winifred-betts-botany-pioneer/>