

Ernest at War, 1917

“May, come and read this list” Ernest called out to May, who was playing the piano. Ernest and May, well, had different musical tastes. For May, classical music was her love and relaxation. For Ernest, a rousing chorus of “Onward Christian Soldiers” suited his musical tastes, especially when he was in a good mood. The song was one he had learnt in Sunday school days back in New Zealand; however the singing was not of a quality that would get invites to any choir.

The list detailed where all his personal letters, financial and life insurance papers and will were to be found. Ernest told May of additions to his will so that if he died his medals would be left to May who would pass them onto Eileen, now just 16 years old. The reason for all this was that the world was at war and the United States had recently joined the British and France to fight Germany and Turkey. Ernest was being sent across the vast Atlantic Ocean on a 10 day voyage to the United States with news of his research about submarines. If the U-boats didn't get him first! May would not even know where he was going to, it was a secret destination. In times of war security was of first importance. A saying had developed, “loose lips sink ships”.

The U-boats were both deadly and frightening. On 7 May 1915, *U-20* sank the liner RMS *Lusitania* with a single torpedo hit. The sinking claimed 1,198 lives. As well they were sinking ships carrying much needed supplies for Britain. They were hard to detect when on the ocean surface let alone when they were submerged. Have you ever tried to see those eels and trout hiding in rivers and lakes? That's where Ernest came in.

Ernest did not like the war. He had come out to visit Australia and New Zealand in 1914. He travelled on the S.S. *Euripedes* with 300 scientists to Australia to attend a large science conference. Some of them were Germans and when the war broke out they were 3 days from Adelaide. Ernest still regarded the German scientists as friends but those who made the rules had different ideas. The Germans were confined when they returned to Britain in “internment camps”. One of his young scientists, James Chadwick was interned in Germany. He was unlucky to have been studying in Berlin when war broke out. Ernest returned to a different Britain. The science laboratory at Manchester had emptied out as men went off to fight. Some of his former students ended up fighting on the opposite side. Then there was Gallipoli.

Discussion questions

- 1) What is involved in putting your affairs in order? What can happen if you die and haven't put your affairs in order?
- 2) Why might “loose lips sink ships”?
- 3) Why could U-boats threaten Britain's survival?

Each year on 25 April – Anzac Day – New Zealanders and Australians mark the anniversary of the Gallipoli landings of 1915. On that day, thousands of young men, far from their homes, stormed the beaches on the Gallipoli Peninsula in what is now modern Turkey. For nine long months New Zealanders, Australians and allies from France and the British Isles battled harsh conditions and Turkish opponents who were desperately fighting to protect their homeland. By the time the campaign ended, over 120,000 men had died: more than 80,000 Turkish soldiers and 44,000 British and

French soldiers, including over 8500 Australians. Among the dead were 2721 young New Zealanders, about a quarter of those who had landed on the peninsula. For Ernest it was personal, his cousin William Rutherford had died. And, young Harry Moseley, his brilliant research scientist who seemed destined to win a Nobel Prize, died after being shot in the head by a Turkish sniper.

As much as Ernest thought war a terrible waste he was not happy to sit by and watch these U-boats take life and threaten Britain's survival. He was appointed to a board of scientists investigating how submarines could be detected. If you could find a submarine, you could attack it and protect your ships.

Discussion questions

- 4) What did Ernest think about war?
- 5) How did war affect Ernest?

The first thing Ernest discovered was that little research had been done and there were some weird ideas out there. Some people thought that sea lions could be used to hunt submarines. Others thought that sacks could be placed over the submarine periscope when it rose out of the water. The confused U-boat commander would then raise his reserve periscope and the Royal Navy sailors would then smash both periscopes with hammers! Ernest's approach was to build a water tank at Manchester and carry out experiments on how sound travelled underwater.

Ernest would then travel from his Manchester Laboratory to the British Navy research station at Hawkcraig in the Firth of Forth in Scotland to carry out trials with submarines. The weather there was not tropical, and rain could be expected at any time. Sometimes a dense, chilly fog called the 'haar' blew in from the North Sea. It did not do the rheumatism in Ernest's knee any good. In some trials a small boat was sent out and a scientist had to put his head underwater and work out the musical note the submarine was making. He had a sailor sitting on his legs so he didn't fall out.

One idea was that of using echo-location to detect objects under water, like dolphins and whales use to detect food. Today we are likely to meet this when passing a speed camera and if we are travelling too fast we may become poorer. Back in 1917 the technology wasn't good enough and Ernest recommended directional hydrophones, two tubes that could rotate and act like underwater ears picking up sound from a moving submarine. This was the information he was to take over to the Americans.

Discussion questions

- 6) What were some silly ideas about finding submarines? Why were they silly?
- 7) What was the downside of working at Hawkcraig?
- 8) How do we detect submarines and other underwater objects today?

Ernest did one thing during this time that later embarrassed him. In 1916 he and another scientist, Professor Bragg, took out Patent 125,446 entitled 'Improvements in Apparatus for detecting the Direction of sound in Water'. A patent gives an inventor exclusive rights to use the invention for a period of time and they may be able to make lots of money. This was the only patent Ernest ever held. Thomas Edison, the inventor of the electric light bulb used research as a way to get rich and held 1093

patents in his name in the US alone. Ernest was not very interested in patents, preferring research to add to the world's knowledge and freely published his research. During his life he was well off, but not super rich, money didn't mean that much to him.

Ernest off course could never spend too much time away from his research into the nucleus of an atom. When he returned from America he would fire alpha particles at nitrogen atoms and oxygen would be produced. He had succeeded in changing one type of atom into another. Ernest preferred to call it transmutation. The New York Times newspaper headlined it as 'Dream of Scientists for a Thousand Years Achieved by Dr. Rutherford'. They were talking about alchemy, in which people tried to change common metals like lead into something valuable like gold. They had never succeeded.

Ernest never became rich because of this experiment, but he did achieve immortality in science and history by it. His fame still lives on.

Discussion questions

- 9) How was Ernest Rutherford different to Thomas Edison?
- 10) Did Ernest achieve something greater than wealth?