Aubrey Russak-Pribble

Period 4

Sir Edward Victor Appleton

Sir Edward Victor Appleton, who received the Nobel Prize in Physics in 1947, was born September sixth, 1892, in Bradford England, which was previously known as the most polluted town in England due to its smoke stacks from the textile mills which arrived with the Industrial Revolution. Growing up, Edward Victor Appleton, born to Peter and Mary Appleton, attended Hanson Grammar School in the town of Bradford, part of Yorkshire. As a child, he was mainly interested in music and cricket, which soon changed after he won a scholarship to St. John's College, part of Cambridge University, where teaching has occurred since 1096. At Cambridge, eighteen year old Edward Appleton was fortunate to be taught by Lord Rutherford and Sir J.J. Thomson, both infamous scientists who contributed greatly to the foundations of modern science. He attained a first class degree in Natural Sciences and then joined the armed forces during World War One for first the West Riding Regiment and then the Royal Engineers, where he worked with radios, or wirelesses. After the war, Appleton was inspired to learn more about the new technology of radio waves which he encountered during the war and returned to Cambridge to research them.

Appleton worked at the Cavendish Laboratory from 1920, until being appointed as Professor of Physics at King's College of London University, which he held for twelve years. During these years, Appleton worked on what was known as the Kennelly-Heaviside layer of the atmosphere

at their campus on the Strand in London. He was eventually transferred to another campus in Hampstead in the suburbs of London because his experiments on the layer, which reflects radio signals, often interfered with other radio users in London. By reflecting the radio signals to this layer of the atmosphere, signals were able to be heard over greater distances. He was able to measure the distance to the Kennelly-Heaviside layer by having British Broadcasting Corporation transmit waves and measuring the time it took for them to return, attaining the result of sixty miles above the ground. These techniques would later be called frequency-modulation radar, and he continued them to discover a layer in the atmosphere even higher than the Kennelly-Heaviside layer, which is at an altitude between two hundred and fifty and three hundred and fifty kilometers and is called the Appleton layer. This layer reflects shorter waves across the Earth and is a dependable reflector (unlike many of the other layers, which reflect radio waves differently depending on the temperature and time of day), which makes it useful in communication. Edward Victor Appleton's experiments made the ionosphere the first object detected by radiolocation.

Appleton continued his research with the ionosphere, developing the Appleton-Hartree equation to explain that free electrons cause the charges that caused the reflections in the atmosphere. By studying the fluctuations in the layers of the atmosphere during an eclipse, he discovered that the Sun had a direct effect on the layer and that its radiation is required to ionize the upper atmosphere. He also discovered the height of the layers of the ionosphere are affected by the Moon and influenced by the magnetic field of the Earth. Further, he discovered

that polar blackouts are caused by magnetic storms. Later, he discovered the number of sunspots on the Sun influences the condition of the ionosphere.

Appleton was greatly affected by the two world wars that occurred during his career. If not for the first World War, he wouldn't have become interested in radio waves, so the War spurred his scientific curiosity. In the second World War, his work was used to create the radar, which was a necessary new technology in the war, and which helped in the Battle of Britain, not to mention helped change the way wars were fought. The radar was first used to locate targets in air, ground, and sea, which later evolved into applications for ships, roads, and aircrafts, changing from a military to a civilian application. Radars are used in aircraft to detect obstacles and give accurate altitude readings, which makes aviation more precise and safe. Radars are also used in ships to measure distances and prevent the collision of ships, along with navigation by fixing position onto fixed references on land. Police use radar guns to monitor the speed of cars on the road. Radar is also used to monitor weather patterns and is a tool for short-term weather forecasting, as well as mapping the composition of Earth's crust by sending specialized radars into the ground. None of these advancements would have occurred so rapidly had Edward Appleton not researched the properties of waves.

Because of his work, Appleton was knighted in 191. He served many important positions, such as the Scientific Advisor Committee and was awarded the Medal of Merit, the Norwegian Cross of Freedom, and an officer in the French Legion of Honor, not to mention being appointed by the Pope into the Pontificial Academy of Science, the Secretary of the Department of Scientific

and Industrial Research, and the Vice- President of the American Institute of Radio Engineers. He also helped in the making of the atomic bomb. His final office was the Principal and Vice-Chancellor of the University of Edinburgh. Sir Edward Victor Appleton was awarded the Nobel Prize in Physics for his immense contributions in the knowledge of the upper atmosphere in 1947.

Sources:

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