LECTURE

The Dating Game

Summary of lecture presented to the Society on Saturday 5th March 2005 by Dr Cherry Lewis.

This is the story of how Arthur Holmes (1890-1965) learned to tell geological time. It combines the fascinating story of his life and his development of a geological time scale, with the history of geology and radioactivity until the 1950s. Despite a struggle against poverty, scientific hostility, ill health and personal tragedy, it was Arthur Holmes' vision of bringing chronological order into geological chaos that finally led to an accurate date for the Age of the Earth.

At the end of the 19th century, geologists, biologists, physicists and astronomers were looking for a clock that would provide an answer to one of the greatest time problems of all: how old is the Earth? Ingenious methods for measuring it were proposed, but few came close to the truth because no scale had been developed to quantify geological time. At that time, understanding geology was like understanding history, but without any dates.

From a good understanding of rocks and fossils, geologists such as Darwin thought that millions of years had passed between formation of the Earth, the start of Life, and the birth of Man, but they had no way of proving it and confounding those who believed in the short time scale implied by a literal interpretation of the Bible. Although geologists understood the order in which events had occurred, because there was no geological time scale, they had little idea of how old anything was geologically. Today we know that the Earth is 4.5 billion years old, and we can say with great confidence that an enormous meteorite collided with the Earth 65 million years ago, and wiped out most of life. But how do we know those dates?

Geologists have now developed their own clock with which to tell geological time. It is made of uranium and has been ticking away ever since the Earth was formed in a nebulous cloud of dust. In order to find out how long ago that was, all we had to do was learn how to tell the time using this special clock.

From a modest family background, Arthur Holmes went to school in Gateshead where he became fascinated by one of the fiercest scientific debates of all time: the Age of the Earth. An extremely bright boy, he won a scholarship to study physics at the Royal College of Science in London, where he worked on the new science of radioactivity which promised to shed light on problems of dating the Earth.

Undaunted by criticism of his work from established geologists (who were appalled by the results he obtained and by an Earth older than a billion years), his main opponent was poverty. Continually struggling against financial hardship he first took a job looking for minerals in Mozambique, and later on prospecting for oil in Burma, in an attempt to provide for his family. The extraordinary tales of life in these countries in the 1910s and early 1920s are recorded by him in diaries and letters sent home; he nearly died of malaria in Mozambique, and soon after the Burma company collapsed, his young and adored son tragically died of dysentery.

Back in Gateshead, desolate at the death of his son, with no money and no job prospects, life was very grim. He opened a shop selling Far Eastern trinkets in a business venture with his wife's cousin. But in 1924 Durham University decided to enlarge its science facilities, which included a new geology department. Arthur Holmes was chosen to set it up. A period of tremendous activity ensued, as decay rates of uranium isotopes were recognised and measured, so that the age of the Earth was pushed back first to 2 billion and then to 3.4 billion years, whereupon for a short while it was older than the age of the Universe as predicted by physicists. Arthur published his first real attempt at a geological time scale in 1927.

Then in 1931 on a geological excursion to Scotland, Arthur Holmes met Doris Reynolds. A brilliant geologist in her own right, it was a meeting of minds and they fell deeply in love. They married in 1938, soon after Arthur's first wife died of cancer.

As technology caught up with Arthur's ideas for a geological time scale, rocks could at last be accurately dated without using the laborious chemical methods that had previously hampered progress. By 1943, the true value of Arthur's work was finally recognised in his appointment to the position of Regius Professor of Geology at Edinburgh University, but he never lost sight of his vision. In 1953, the age of the Earth was finally established at 4550 million years. Give or take a few million, that number has not changed since.