James Ferguson – public educator, writer on mechanics and astronomy, horologist

The life and achievements of James Ferguson FRS (1710-1776) continue to fascinate people. How did an almost completely self-taught son of a tenant farmer in rural Banffshire rise to become an influential communicator of science in the 18th century, Fellow of the Royal Society, recipient of a royal pension and designer of some very fine astronomical clocks that within their scope have not been bettered? Ferguson has been the subject of two biographies\(^1\)\(^2\) and the inspiration for a 19th century historical novel\(^3\). The likeness here is from a little-known 1756 portrait in possession of the University of Aberdeen.

The fact is that James Ferguson had talent: a steady hand, a good eye, an enquiring mind, an ingenious creativity, a willingness to seize the moment and, in addition, particularly in his early years, some luck. Ferguson was born about 4 km NE of Milltown of Rothiemay where today there is a splendid monument to him in the village. It is 4 m tall, made of Aberdeen granite and first erected in 1907. His father was tenant of ‘a few acres of land’ but he could read and write which, I suspect, is more than could be said for crofters in many parts of Britain in the early 18th century. He taught his children. In his youth Ferguson made models of things with such raw materials as he could find, as many boys do, and tried to understand how things worked, as many boys do. Put out to a neighbouring farm as a youngster to look after sheep, he became fascinated with the night sky and worked out how to chart the stars with a contrivance of his own made of beads and string. In retrospect, the ingredients were forming for his career but he needed to earn a better living than as shepherd boy. Various chance encounters and jobs led to him moving to Edinburgh as a young man and learning the art of making Indian ink portraits. This was the professional skill that gave him entry into circles that would otherwise have been closed to him.

In his late 20s he married and took a more serious interest in Astronomy, to the extent that he made models illustrating such topics as the Moon’s path, the origin of eclipses and more than one orrery. In Edinburgh he gained an introduction to publishing and to patrons, those essential accompaniments to a successful 18th century life. Among his patrons was the gifted mathematician Colin Maclaurin, who introduced him to lecturing. Edinburgh led to London, where Ferguson moved in 1743 and where he made a name for himself as a public lecturer on Natural Philosophy and author of works that explained his subjects, particularly astronomy, in the simplest language that would not compromise rigor. His public lectures were popular and well illustrated by models and demonstrations. Among his books are “The Use of a New Orrery”; “Astronomy Explained upon Sir Isaac Newton's Principles”; “Lectures on Select Subjects”; “Tables and Tracts”; “The Young Gentleman and Lady's Astronomy”; “Select
The Scientific Tourist: Aberdeen

Mechanical Exercises” and, returning to his artistic skills, “The Art of Drawing in Perspective”. His books ran to several editions and a number of them remained in print and were even re-issued in the 19th century.

In Ferguson’s time, astronomy was mainly about the solar system, about eclipses, about tides and about the Moon’s motion. Telescopes hadn’t the aperture for deep space work. Even by the end of his life, a 4 inch aperture refractor was pushing the limits of the glass technology of the day. Spectroscopy was nowhere to be seen. The ‘fixed stars’ seemed to carry little information. Nonetheless, astronomy was evolving into a technical subject, technical enough to need a sympathetic expositor to keep the public informed. James Ferguson was the Patrick Moore of his day in this respect. He played a significant rôle as an interpreter of science in the public forum. This is an important rôle today but it was even more important in the 18th century when schooling for many people was minimal by today’s standard and what there was tended to be based on catechism and rote learning. University education was an even rarer luxury, particularly in England, and there was almost no formal academic education for half the population – women.

Ferguson’s interest in stars and their motion naturally lead him to an interest in ‘time’. Indeed, accurate time was defined by stellar motion in the 18th century. An orrery, showing the motion of planets around the Sun, was a clock in all but name and detailed appearance. Ferguson in his books gave designs for a number of astronomical clocks that not only showed the time of day but the day of the month, the phase of the Moon, the position of the stars in the sky and in, in some clocks, the state of the tide, for that was determined by the relative positions of Sun and Moon. To get the timing close to correct Ferguson had to be particularly ingenious in choosing the gear ratios of his meshing teeth within the clock. He proved very adept at this. He made some prototypes in wood but once his designs were published then skilled clockmakers were able to execute some very fine pieces that did all they were supposed to.

The University has a splendid James Ferguson clock made ‘in-house’ by Patrick Copland and his assistant John King in the 1780s. It is shown in the accompanying picture. Ferguson’s youngest son John attended Copland’s first year of Natural Philosophy lectures at Marischal College in 1775/76 on the way to his AM degree but Ferguson himself had only 3 months schooling in his life and of course no University education. Nevertheless he was highly respected for his achievements both in his day and by posterity.

John S. Reid