



James Jardine (1776-1858),

by unknown artist

Jardine, James (1776-1858), civil engineer, was born on 13 November 1776 at Applegarth, Dumfriesshire, the third child of James Jardine, farmer, and his wife, Elspeth Rodgeron. Having shown great ability in mathematics at Dumfries Academy, he went to Edinburgh with an introduction from his teacher to John Playfair, professor of mathematics at the university, where he attended classes but did not graduate. Playfair warmly befriended Jardine and obtained for him employment as a teacher of mathematics. His many pupils included Professor Dugald Stewart's son Matthew, Henry John Temple (afterwards Lord Palmerston), and Lord John Russell.

Before 1809 Jardine, on Playfair's advice, had begun to practise as a civil engineer and by 1811 had opened an office at 54 Princes Street, Edinburgh. In 1809 he observed levels in the Tay with reference to salmon stake nets. As a consequence of this research Jardine was the first to determine, by observations of the tides over a great extent of coast, the mean level of the sea and to show the symmetry of the undisturbed tidal wave above and below that level and the effect of a river current in disturbing that symmetry. These were deemed to be 'discoveries of high importance, both scientific and practical' (Waller, 12.1042, notice by W. J. M. Rankine). In 1810 on the recommendation of Thomas Telford, with whom he was to become closely associated over three decades, Jardine accurately determined the levels and output of springs in the Pentland hills. This work eventually led, in consultation with Telford, to his greatest and best-known achievement, supplying Edinburgh with a plentiful supply of water from Crawley spring and a newly constructed reservoir at Glencorse, via an iron aqueduct. The Scotsman described these works in 1825 as some of the most extensive, perfect, and complete ever executed at that time. Jardine was engineer to the water company from 1819 to 1846, his last major improvement being Threipmuir Reservoir, near Balerno. Other water-supply schemes on which he was consulted included Perth, Dumfries, Glasgow, Cobbinshaw Reservoir, and Leslie. He was also employed on several important law cases involving hydraulics. In 1830 he was consulted on the River Leven improvement and safely lowered the level of the loch. From 1831 to 1849 he acted as the project's commissioner.

Jardine's other work in Edinburgh included road layout, retaining walls and foundations, often associated with the architectural projects of William Playfair and others, and major drainage of the remainder of the North Loch and the meadows. Jardine also had a considerable practice in the improvement of communications throughout Scotland, at first on canal work, followed by pre-steam locomotion road and railway projects. In 1813-14 he surveyed and estimated costs for the Annandale Canal and the continuation of John Rennie's high-level Union Canal line via the south and east of Edinburgh to Leith docks. Neither scheme was implemented. In 1818 he advised on a proposed deviation of the Union Canal line through Callendar Park near Falkirk. (He was not responsible for the construction of the Union Canal as suggested in his Dictionary of National Biography entry.) From 1825 to 1830 Jardine directed extensive surveys and prepared estimates for a railway between Edinburgh and Glasgow but his

proposals, although seriously considered, were not adopted.

In 1826 Jardine was appointed engineer for the Edinburgh and Dalkeith—or Innocent as it was later known—Railway and by 1831 he had designed and supervised the construction of the line. At its Edinburgh end this had an inclined plane operated by steam engine and the first public railway tunnel in Scotland and, near Dalkeith, Glenesk Bridge. The tunnel and bridge, both impressive structures, have survived. Although horse-operated, the line was commercially successful both as a mineral and passenger railway, and for a number of years prior to its adaptation for steam locomotion in the mid-1840s carried more passengers per mile than the Liverpool and Manchester Railway. In 1827 Jardine also became engineer for the Ardrossan and Johnstone Railway which, although underfunded, was opened from Ardrossan to Kilwinning in 1831. In 1835 he surveyed the Nith valley line. In autumn 1830, with the success of steam locomotion on the Liverpool and Manchester Railway, horse traction projects became outdated, which was unfortunate for Jardine, who had two lines nearing completion. He played little part in the subsequent development of railways, but continued to be employed on river navigation and harbour improvement work. This included projects at Saltcoats, the Tay, the Forth ferries, the Earl Grey and King William IV docks at Dundee in consultation with Telford, and with other improvements at Perth, Leith, and Eyemouth. In addition he undertook the evaluation of metal lighthouse proposals for Skerryvore.

At Telford's request Jardine furnished calculations for the pioneering Menai suspension bridge in 1821, and he was a leading bridge engineer in Scotland. In addition to railway structures in iron, timber, and stone, his work included masonry bridges at Threave, Almond (near Perth), at and south of Dalkeith, and over the realigned River Leven. Unexecuted masonry projects included a five-span design for Dean Bridge, Edinburgh and a 160 ft span at Coulternose over the Findhorn. Jardine's scientifically based designs were influenced by Telford's practice but were more refined in some respects. For masonry bridges he adopted exceptionally small arch-ring depths, which combined with the adoption of arch-rings which reduced in depth towards the crown, low rise arches, and longitudinal walls within hollow spandrels, economized on materials and minimized weight on the foundations. Rankine assessed Jardine's work as 'all models of skilful design and solid construction' and his masonry 'worthy of the study of every engineer' (Waller, 12.1042).

Jardine had a national reputation as a scientific engineer. He played an important part in determining the proportions of the old and diverse Scottish weights and measures to the imperial standards. In 1811 he determined the length of the ell as 37.0598 inches at 62 °F. In 1824, after the passing of the act for establishing the imperial standards weights and measures, he became a member of the commission which examined all the old weights and measures in use in Scotland and conducted his enquiries 'with extreme precision'. Jardine was elected to fellowship of the Royal Society of Edinburgh in 1812, the Geological Society in 1816, and to membership of the Institution of Civil Engineers and the Society of Civil Engineers in 1820 and 1827 respectively. He was a director of the Edinburgh Astronomical Institution and its astronomer from 1815 to 1825.

From 1826 Jardine operated his practice from his house at 18 Queen Street, Edinburgh, where he died from senile debility on 20 June 1858 following an attack of bronchitis. He had remained a bachelor, but had a daughter, Ann, from a relationship with Margaret McGee. Ann Jardine (*b.* 1825) married her cousin Alexander Jardine, who practised as a surveyor and civil engineer at 18 Queen Street from 1844 to 1858. Rankine commented from personal knowledge that although Jardine's manner 'was somewhat eccentric and cynical, he secured the warm regard of his intimate friends amongst whom were many of the highest eminence in science' (Waller, pt 12). Jardine was buried at Warriston cemetery, Edinburgh.

Roland Paxton

Sources

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Archives

NA Scot., register of house plans

Likenesses

P. Park, marble bust, 1842, Scot. NPG · etching (after G. Aikman), repro. in Colston, *Edinburgh and District water supply*, facing p. 38 · watercolour drawing, Scot. NPG [*see illus.*]

Wealth at death

approx. £400

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