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BIOGRAPHICAL NOTES OF AUTHORS ON DERBYSHIRE

RICHARD WATSON, 1737-1816

by

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"I was born at Heversham, in Westmoreland, in August 1737. ... my ancestors, as far as I can trace them, have ... been ... tillers of their own ground, in the idiom of the country, Statesmen." So commences the autobiography of Richard Watson, later the Bishop of Llandaff, in the self-congratulatory style rarely absent in his life-story.

Third child of the local headmaster, he was sent in 1754 to Trinity College, Cambridge, with only a "slender portion" of £300 left him by his father. There he was "particularly noticed" by Dr Smith, then Master of the College, and appointed to a scholarship. By this time he had "acquired some knowledge of Hebrew; greatly improved himself in Greek and Latin; made considerable proficiency in mathematics and philosophy, and studied a number of works with much attention", until in 1759 he took his Bachelor of Arts degree.

In 1760 he was elected a fellow of Trinity College, gained his Master's degree in early 1762, was appointed Moderator of Trinity in October, and in 1764, of Christ's College. A year later he was "unanimously elected by the Senate" to be Professor of Chemistry. He did not forbear to mention that "An eminent physician in London" declined the contest on hearing Watson intended to read chemical lectures in the university.

At the time he knew nothing at all of chemistry, had never read a syllable on the subject, nor seen a single experiment in it, but was tired with mathematics and natural philosophy. The kindness of the university (it was always kind) animated him to extraordinary exertions, and he buried himself in his laboratory. Fourteen months after his election he read a course of chemical lectures to a very full audience. This was in 1765.

In 1768 he composed and printed his 'Institutiones Metallurgicae' (later he informs us it was not actually published) which indicates the direction of these early researches.

His first actual publication, "desired as such by the judge", was his 1769 Assize Sermon.

In 1771, the Regius Professor of Divinity died, and Watson had perforce to run around to obtain a Doctor's degree in Divinity, which he had neglected to obtain earlier, but by dint of hard travelling and some adroitness, he transacted the business and was (unanimously) elected Master of Trinity College - Professor of Divinity - the first office for honour in the university. He was then thirty four years of age.

His success in this office was such that during the next forty years he raised the value of the chair from not quite £330 to £1000 at the least. As Professor of Chemistry, he had had at first an unpaid post, but on hearing that professors of chemistry at Paris, Vienna, etc. were supported by their monarchs, he applied for and gained a £100 a year. His efforts of course were not conducted ever for his personal benefit, but only as befitted his position!

Watson applied himself to divinity in his accustomed manner, reducing its study into as narrow a compass as possible, using nothing but the Bible, and was much unconcerned about the opinions of councils, fathers, churches, bishops and other men, as little inspired as himself. This unfortunate trait possibly later cost him the loss of an archbishopric and other positions, and he had to content himself with, in 1782, the Bishopric of Llandaff, and the uplifting self assurance he had bent to none. This post as a sinecure which only required him to visit Llandaff on rare occasions! He was also for a time Rector of Knaptoft, a depopulated hamlet in Leicestershire, which apparently still provided a useful stipend!

His subsequent career appears to have been much involved in clerical and political dispute, acclaimed by some, decried by others, and except for his continuing interest in chemistry and metallurgy of no direct relevance to the present purpose.

Of Watson's personal life little is known. He married and had at least one child, for it was he, who, in 1817, a year after his father's death, who published Watson's autobiography. Though embittered by the failure of Crown and Government to properly reward his true merit, he was consoled by the obvious appreciation of his friend Mr Lutter, who left Watson an estate worth, and soon sold for, £23,500. Three years later, in 1789, he, as far as such a man as Watson was able, retired from public life and built a house on the banks of Windermere, which remained his home until his death.

The first of his 'Chemical Essays' made a limited appearance in 1771, just after he was raised to the mastership, but it soon appeared more widely. In his autobiography, for the years after 1771, Watson appears to have considered his studies in science of little importance, though he published further volumes of 'Chemical Essays' in 1778, 1781 and 1786, then burning a "great many chemical manuscripts .... which only wanted a careful revision to have been produced with credit to the world, such as those concerning Blood, Milk, Urine, Fermentation, Wine,

Ale, Vinegar, Putrefaction, Sugar, Balsams, Resins, Glass, Precious Stones, Metallic Substances," etc., in which he united natural and commercial history with chemical, and had introduced what the ancients knew on these subjects.

Any assessment of the importance of Watson's work in science is difficult to make. He was working at the period in which the modern scientific method was just appearing - at least he was free of the restraining influence of alchemy, and was a very acute observer and recorder. Though little original thought is evident, he had an ability to translocate ideas from one activity to another, eg. in his suggestion to condense lead fume in flues similar to those used in arsenic manufacture in Saxony. He offered very many practical suggestions for the improvement of manufacturing processes, though these were often at the time impractical for technological reasons. His most successful suggestion was for an improved method of preparing charcoal for gunpowder, which he suggests saved the country at least £100,000 a year. Other suggestions later taken up include the black bulb thermometer, and the conversion of coke ovens into retorts for the manufacture of coal gas. His contemporaries valued his contribution to the extent of making him a Fellow of the Royal Society [1769] and in 1788, of the American Academy of Arts and Sciences. His position as Professor of Chemistry is important as the first scientific chair in this country, whilst his occupation of it is no less notable in that he did not regard it as a sinecure.

Watson wrote two essays particularly concerning Derbyshire, whilst several others have slight references usually easily available from other sources. The first essay, 'Of Derbyshire Lead Ore' first appeared in 1778. He described the ore, and a number of simple experiments. These involved weighing of samples, and distillation in a retort, with or without air, and with various substances such as iron filings and charcoal. A long discussion about the weight of a cubic foot of ore showed that volume as a measurement, ie. the dish, was a mode "liable to some exception". The other experiments confirmed little except that ore could be smelted successfully using the prevailing methods. Little help for smelters there. But he made one valuable suggestion; to use water, or the vapour of water, or long winding tunnels, to condense the lead fume which then escaped via the flue, to fall to the ground "poisoning the water or herbiage on which it settles".

The second essay was written about three years later. In it he tells a conventional history of lead smelting up to the introduction of the cupola furnace, though incidentally throwing doubt on the fable that it was invented by a "physician named Wright". (Of the London Lead Company). He account of the operation of the furnace is an example par excellance of his power of observation, and this, together with the accounts of Schluter, Farey, and Percy, are the main sources for research into cupola operation and development.

The charge of ore at this date was about one ton, or a little more if the quality was poor, and three charges were worked in twenty four hours.

After about six hours the ore was as fluid as milk, with the slag, or scoria, floating on top of the lead, whilst a considerable portion of its weight had already been carried off through the chimney. Quicklime was thrown over the slag so as to thicken it. The slag was then raked towards the sides of the furnace, leaving the pure lead to be tapped off. Then the slag was redistributed, the heat raised so as to liquify it, and the process of thickening and separation repeated. The slag was finally raked out. (Drawn slag). In some recent furnaces the amount of quicklime necessary had been reduced in the final operation by the adoption of a higher and second tap hole, by which the bulk of the slag was run off before thickening was carried out. This was known as 'Maccaroni', to which it has a superficial resemblance.

Thousands of tons of slag, with up to 10% or 12% of lead could be found near every smelting house, but it seemed so unprofitable that few smelters bothered with resmelting at the slag hearth "such an unwholesome business". Watson suggested that stamping in a mill, or grinding beneath carts on the road may serve to powder the stony and metallic parts of the slag, after which they could be separated by washing, reducing the amount to be resmelted. Later accounts suggest this was done, though earlier account suggest it was not entirely a new idea.

Since 1778, Watson had conversed with some of the principal lead smelters, who agreed his suggestion of flues was very rational. One such flue had been erected in Middleton Dale (the Upper Cupola), though regrettably for an entirely different reason. (It was actually constructed to deflect fume from a slag mill from falling on the adjacent pasture). It had been very successful on both counts, and the fume was sold to painters at ten or twelve pounds a ton. Watson obviously, and justifiably felt very proud of his suggestion, though as he remarked about the chance of the flue's introduction, "so difficult it is to wean artists from their ancient ways", that twenty years later the flue was disconnected, to the misfortune of the horses, and their owner, of the next pasture. His further suggestion, to absorb the fumes of sulphur dioxide in water, was neglected until after the mid-nineteenth century, and even then, the resultant sulphurous acid was dumped, or absorbed in lime. So much for science.

REFERENCES

Smith, G., 1906, Concise Dictionary of National Biography, 2nd Edit. Vol. 1, p.1373-4.

Singer, Charles; Holmyard, E.J; Hall, A.R; Williams, Trevor I; 1958. History of Technology, Vol. 4, p.260-63.

Watson, Richard, 1817. Anecdotes of the Life of Richard Watson, Bishop of Llandaff, (Edited). Published by his son Richard Watson. London, 551pp.

Watson, Richard, 1793. Chemical Essays, 6th Edit. Volume III. Essay VII of Derbyshire Lead Ore (1778) p.207-250. Essay VIII of the smelting of Lead Ore, as practised in Derbyshire. (c.1781) p.251-300. London.

Sheffield City Libraries, Bagshawe Collection, Bag. 587/68 - the Sheldon - Storrs Lawsuit, concerning bellanding at Upper Cupola.

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