DR WILLIAM BROWNRIGG, F.R.S.:
PHYSICIAN, CHEMIST AND COUNTRY GENTLEMAN

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DR WILLIAM BROWNRIGG (1712–1800) of Ormathwaite Hall near Keswick in Cumberland, was the first scientist to undertake a systematic investigation of the poisonous gases in coal mines. As a result of his work he was elected a Fellow of the Royal Society in 1742 and awarded the Copley Medal in 1766. However, he never gained the reputation which seemed to be merited by the importance of his research, and contemporaries believed this to have been as a result of his refusal to leave his native Cumberland and live in London. Sir James Lowther of Whitehaven, his first patron, commented in 1750 that 'if he was in London he would probably get into better business', while his friend and biographer Joshua Dixon wrote of his having been 'repeatedly solicited' to move to the capital (1). Brownrigg himself commented that 'my situation here, at so great a distance from the capital . . . lies me under great disadvantages in communicating them [i.e. his experiments] to the public' (2). New evidence concerning Brownrigg has recently become available (3), from which it is clear that his preference for Cumberland was determined both by his scientific interests and also by his many other concerns. As a result it is now possible to attempt some re-assessment of his career, which may help to explain why he did not receive the acclaim he was thought to have deserved.

Brownrigg was born on 13 March 1711/12 at High Close Hall in Cumberland, and baptized a fortnight later at the parish church of Crosthwaite. His family were of petty gentry stock, having owned property at Millbeck, in the Vale of Keswick, since the sixteenth century. By a settlement made in 1676 on the marriage of George Brownrigg of Millbeck and Anne, the daughter of Gawen Williamson, the Brownriggs acquired property at Ormathwaite. George's grandson, also George, married in December 1706, Mary, the daughter of Henry Brownrigg of Armagh in county Wexford, and William was the eldest son of this marriage. There were also two other sons and four daughters (4).

Brownrigg's medical education apparently began in London early in the 1730s, and he later studied at Leyden where he obtained a doctorate in 1737 for a thesis entitled De Praxi Medica Incunda (5). He then returned to Whitehaven to practice as a physician and in August 1741 married Mary (b. 1721), the
daughter of John Spedding, who was chief estate steward to Sir James Lowther. She had a portion of £500 (6). The marriage was childless and Mary died in 1794. On the death of his father in 1760, Brownrigg succeeded to the family estate. His mental powers failed in his later years, and he lived quietly, under care, at Ormathwaite Hall. He was, as one obituarist put it, 'a monument to departed genius' in those last years, but he was not forgotten, and three local baronets were among the pall bearers at his funeral in January 1800 (7).

Two events took place shortly after Brownrigg’s return to Whitehaven in the summer of 1737 which were to have a considerable bearing on his career. The first was the death, in July, of Dr Richard Senhouse who, for many years, had been the most notable physician in the town. Brownrigg was able to take over his practice, and was soon being consulted by many of the local gentry. He acted as personal physician to Sir James Lowther (1673–1755) during his summer residence in the town, and also to his successor as owner of the family estates in West Cumberland, Sir James Lowther of Lowther (1736–1801). Brownrigg recorded some of the cases which particularly interested him, between 1737 and 1742, in a Case Book which has been preserved (8). The pages of the book are interleaved with letters to him and copies of his replies, thus revealing the identity of some of his patients. One commentator has taken this correspondence to be evidence that Brownrigg was typical of eighteenth-century physicians in relying upon written descriptions rather than personal examination (9). Whilst there is some truth in this suggestion—he offered a ‘friendly opinion’ of Sir James Lowther’s constitution to a London doctor treating him in London during a long and serious illness in 1750 (10)—it is not wholly correct. In November 1744 for example, he had ‘been this week at Millom and Unerigg, both the gentlemen being in a bad way’ (11). Since the two places were in diametrically opposed directions from Whitehaven, he must have spent a considerable amount of time travelling that week.

Brownrigg did not conserve his energies only for the local gentry. During an epidemic in Whitehaven, in April 1743, he attended anyone in need, and as a result ‘fatigued himself unreasonably’, and made himself so ill he was ‘like to have died’ (12). The experience he gained while treating people during the epidemic, plus his observations of a gaol fever which broke out in the town in 1757, led him to publish a paper in 1771 when plague broke out in Europe (13). His intention in publishing, was to facilitate treatment if the outbreak should reach England, but it never did. Brownrigg became a vice-president of the Whitehaven Dispensary from its inauguration in 1783, and contributed two guineas annually for the rest of his life (14). He continued to be consulted on medical matters even after his virtual retirement in 1780, but despite the esteem
in which he was held at Whitehaven, his reputation was not gained specifically for his work as a local physician.

It was the second event at Whitehaven in the summer of 1737 which was to bear most responsibility for establishing Brownrigg’s importance as a scientist. On 5 August, twenty-two men were killed in an explosion at Corporal Pit, which was in Sir James Lowther’s Howgill colliery. This was the worst disaster to have befallen the town, and it formed the background to Brownrigg’s later research into the poisonous gases which, when ignited, caused such explosions. Inevitably in a town where coal mining was the major industry, many of Brownrigg’s patients were men affected by the fumes, and one of his earliest diagnoses was of Carlisle Spedding, Sir James’s colliery steward, and his wife’s uncle. Spedding’s constant exposure to the poisonous atmosphere—he was eventually to die in an explosion—made him a particularly interesting case (15). Brownrigg attempted to answer two questions; firstly, how could the periodic explosions be predicted and hopefully therefore prevented, and secondly how should those affected by the fumes be medically treated?

Brownrigg’s research was conducted in collaboration with Carlisle Spedding (16), and as a result he became intimately acquainted with the collieries and the mining processes. In 1772 he was able to take Benjamin Franklin and Sir John Pringle on a guided tour of the mines, during a visit they paid to him at Ormathwaite (17). Brownrigg quickly showed himself to be useful ‘in contriving things which are helpful to the workers employed in [the mines]’ (18), and with the backing of Carlisle Spedding, early in 1743 he proposed to Sir James Lowther that a laboratory should be built to facilitate his research. The plan was to build a small hut near to one of the pits and, using a scheme devised by Spedding, convey the ‘fire-damp’ (19) as it was known, through a series of pipes into the hut. Brownrigg could then continue his experiments hoping to ‘find out more of the nature of damps as well as pursue some chemical affairs at an easy expense’ (20). Lowther was always keen to encourage Brownrigg in his work and, far from raising any objections to the scheme, he gave him £10, half of the total cost of building the laboratory. The epidemic at Whitehaven and Brownrigg’s illness delayed construction, but it was completed and the pipes laid by July (21). A lease was then executed granting Brownrigg all the fire-damp from Peddlars Pit, for life, or for as long as he stayed in Whitehaven, at a peppercorn rent (22). There must have been problems in guaranteeing the supply of ‘fire-damp’ to the laboratory, but Brownrigg’s experiments went ahead, and it was here that he discovered that there was an increased production of fire-damp and consequently an increased risk of explosion, following a fall in barometric pressure (23).
Brownrigg’s work on damps became known through a series of papers he presented to the Royal Society in 1741 and 1742. Sir James Lowther had previously brought the Society’s attention to the problem of damps in 1733 and 1736 when he performed various experiments using bladders filled with the poisonous air, in the hope of eliciting suggestions for counteracting the problem. A paper written by Carlisle Spedding to accompany the 1733 experiment was published in the *Philosophical Transactions* (24). In January 1741, Lowther presented another paper written by Carlisle Spedding. This included some remarks by Brownrigg who also took the opportunity of sending Lowther a paper of his own on the subject (25), which the latter passed to his friend and physician, the then president of the Royal Society, Sir Hans Sloane. The paper, entitled ‘Some observations upon the several damps in the Coal Mines near Whitehaven’, was presented to the Royal Society in April, and was followed by three more, dealing respectively with the possible relations of these damps to epidemics, mineral waters and the nature of common air, over the next thirteen months (26). Brownrigg sent Lowther a further paper in December 1744, after he had learnt to predict explosions according to barometric pressure. Yet another of his papers was read in June 1749 (27).

Despite the importance of his findings Brownrigg did not immediately publish them. Although he told Sir Hans Sloane in November 1741 that ‘I have some thoughts of publishing them with the approbation of the Royal Society’, because he was then planning a larger work on the subject—he told Sloane in the same letter ‘I may probably sometime or other digest my observations into a History of Coal Mines’—he decided not to publish (28). He was still hoping to write such a ‘History’ in May 1754, and two years later an outline of it was read to the Royal Society by Dr Stephen Hales (29). But it was never completed, and indeed it was not until 1765 that any of his work on damps appeared in print, following a visit to Spa in Belgium the previous year (30).

During his visit Brownrigg conducted a number of experiments on the mineral waters there. He first established that no gases were evolved at 80 to 85 degrees Fahrenheit, and then heated samples of the water, in flasks, to about 110 degrees, collecting the ‘fixed air’ (carbon dioxide) in a bladder tied over the necks of the flasks. He observed that the water turned turbid, due to the precipitation of calcium and iron compounds. At the conclusion of the experiment, he tested the water and found that it contained no iron. He also measured the volume of gas evolved and found it to be incapable of supporting life. Finally, he concluded that fixed air was closely united to the ‘earthy and metalline’ ingredients of the water and was the means whereby they were kept in solution, and that at fairly high temperatures the gas was lost and the ‘metalline and
earthy particles' were precipitated, the amount of sediment depending on the volume of gas evolved. Since the third of his 1741/2 papers was an attempt to trace the relationship, if any, between fire-damp and the gases escaping from mineral waters, part of it was printed as an appendix to the Spa water paper. In 1774 he presented a further account of this work to the Royal Society in which he dealt in detail with the dependence of the solubility of calcareous earths (probably calcium carbonate) and iron salts on the dissolved gas (31).

Brownrigg received two honours for his work on damps. In May 1742, following the five essays he had presented to the Society, he was elected a Fellow. On his behalf Sir James Lowther paid the twenty-two guineas fee which secured his life membership (32). The second honour followed the publication of his paper on Spa water. This was considered to be the best original publication of that year, and as a result Brownrigg was awarded the Society's Copley Medal in 1766.

Experimental investigation of the damps was not Brownrigg's only interest in the coal mines. In a paper presented to the Royal Society in 1755 he recorded his thoughts on Hales's new method of distillation by the combined operation of air and water. Hales had asked Brownrigg to consider whether his method of assisting distillation by passing a current of air through the distillation vessel, might be applied to the boilers of steam engines. There were five of these working in the Whitehaven collieries at that time and Brownrigg consulted Carlisle Spedding as to whether Hales's method could be used to improve their efficiency. Spedding was killed before a reply was sent, but Brownrigg recorded their joint observations, pointing out that the air would pass into the cylinder and prevent a good vacuum being formed when the steam was condensed. He suggested that mechanical agitation of the water might give more efficient steam production. He also suggested the use of superheated steam:

A much smaller quantity of steam [he wrote], heated and rarified, will work an engine than is now applied to cooler steam, which small quantity of steam may be raised in smaller vessels, and with smaller fires, than are now used in working those engines.

He may have been one of the first scientists to advocate the use of super-heated steam, but it was the latter part of the nineteenth century before the technical problems involved in its use were overcome (33).

Brownrigg had several other concerns apart from those connected with the coal mines. In 1748 he published *The Art of Making Common Salt*, a book in which he set out to show how salt could be made by processes which were better and cheaper than those hitherto known. His aim was partly to promote
the health of the nation, and partly to encourage an extension of the British fisheries thereby providing work for many of the seamen discharged after the War of the Austrian Succession. Salt manufactured in Britain was considered to be generally of a poorer quality than that made in other countries, and to be less suitable for preserving food. In the book Brownrigg surveyed salt-making in various parts of the world and made a number of suggestions regarding possible improvements of the British industry. One of his recommendations was that gentle heat should be used when concentrating the brine, and that its alkalinity should be neutralized with sour whey. If too fierce a heat was used Muriatic (hydrochloric) acid would be evolved by the reaction of magnesium chloride and water, and the basic residue would render the salt unfit for preserving. He also suggested, after studying the climate of various parts of Britain, that the action of the sun and wind could be used to concentrate brine, a practice common in warmer climes. Finally he made detailed suggestions for the construction of suitable equipment for making salt. William Watson presented an abridgement of the book to the Royal Society in the form of a paper, which was later published, and which one commentator has described as the most important paper in technical chemistry read to the Society between 1727 and 1774 (34). The impact of Brownrigg’s suggestions is difficult to gauge (35).

He was also involved in the first recorded introduction of platinum into Europe. Samples of ‘platina di pinto’, as it was known in the Spanish West Indies where it was found, were passed to him in 1741 by Charles Wood, who was later to marry his sister Jemima. In 1750 Brownrigg presented the samples to the Royal Society together with an account of their origin and properties, in which he related a number of experiments originally conducted by Wood. Brownrigg claimed that he had repeated some of the experiments to satisfy himself of the validity of Wood’s claims, but in any case his role in the introduction of platinum can hardly be regarded as having been a particularly important one (36).

Brownrigg was also interested in mineralogy and botany. In October 1741 he sent Sir Hans Sloane ‘some pebbles found on the shores near Whitehaven, the marks and characters of which are described in the catalogue herewith enclosed’ (37). When Mr Emanuel Mendez da Costa, librarian of the Royal Society, embarked upon a ‘Natural History of Fossils’ during the 1750s, he requested Brownrigg’s comments on Cumberland. Brownrigg agreed to help, and da Costa sent him a list of questions virtually asking for a complete history of Cumberland mineralogy. Although no reply of Brownrigg’s has survived, he is known to have sent da Costa a number of samples (38). He contributed a paper to the Royal Society in 1774 in which he described twenty specimens,
including Epsom salts and green vitriol, found in the Whitehaven collieries (39). Some of Brownrigg’s botanical interests are known from his correspondence with John Ellis (c. 1710–1776), the man described by Carl Linnaeus the eighteenth-century Swedish biologist as ‘the bright star of natural history’. Brownrigg sent Ellis samples of plants found in Cumberland, and offered him advice on his various experiments with plants (40).

The width of Brownrigg’s interests (41) and the importance of his publications earned him a considerable reputation. Dixon, an admittedly sympathetic biographer, described how ‘his attainments in every branch of science were acknowledged not only by the literati of this kingdom but by the most eminent professors on the continent; with many of whom he was either personally intimate or supported a regular correspondence’ (42). It was this reputation which led to the visit of Benjamin Franklin and the then President of the Royal Society, Sir John Pringle, to Ormathwaite in the summer of 1772. The three men conducted an experiment on Lake Derwentwater in an attempt to test Franklin’s hypothesis that waves could be stilled during a storm by pouring oil on them. This was one of several experiments of this nature carried out by Franklin, and recorded in a letter he wrote to Brownrigg the following year (43). There is no firm evidence as to what was achieved, but since Franklin never satisfied himself as to the validity of the experiment, the Derwentwater test was presumably inconclusive (44).

Brownrigg’s work on gases paralleled that of Black, Priestley and Cavendish, with whom he should be placed in the direct line of British pneumatic chemists (45). It seems likely that he pre-empted them in appreciating, as early as 1742, that there were different types of gases and that they were not just forms of air (46). Certainly his paper on the Spa mineral waters stimulated Cavendish whose own contribution on the Rathbone place waters appeared two years later (47), but his work was of considerably less overall importance than that of Cavendish. Brownrigg’s experiments in other branches of science were of less immediate value. His ideas on the steam engine were in advance of what was technically possible, while the evidence regarding the importance of his work on salt is inconclusive. Whether or not his reputation would have been advanced had he moved to London is difficult to determine. There is evidence that he was in the capital in 1770, 1774, 1775, 1777 and 1779, which suggests that his visits were fairly regular (48). Brownrigg’s attachment to Cumberland was for two reasons. Firstly it was the source of his research and the location of his laboratory. ‘My situation here’, he wrote in 1741, ‘affords me extraordinary opportunities of examining the structure of the Earth in these parts in which I observe many things very remarkable’ (49). Secondly, with the death of his father in 1760,
Brownrigg became a landed gentleman in his own right. Unlike many of his contemporaries, he chose to take an active interest in expanding and improving his estate (50), and to participate in the activities expected of a person in his position.

Brownrigg already owned property in 1760. He inherited land from his grandfather in 1727, and bought a parcel of ground adjoining the family estate in 1758. Additionally, in 1750, he leased Skiddaw Forest from the Duke of Somerset with the expressed intention of improving it (51). In 1760 he inherited the property at Millbeck and Ormathwaite, just to the north of Keswick, part of which had been acquired as a result of his great-grandfather's marriage in 1676. Brownrigg bought a number of properties to consolidate the estate, including Millbeck Hall for which, with its seventy-six acres, he paid £2600 in 1774. He is known to have spent £4538 on property, although the evidence may not be complete. The value of the estate increased considerably as a result. In 1740 it was thought to be worth something over £70 a year, but by 1787 the Millbeck Hall property alone was leased out for rents totalling £323–11–5 d. Most of the Ormathwaite property was used from 1763 as a garden and home farm (52).

Estate affairs had been handled by Brownrigg for some years before his father died, while from 1787, probably owing to his failing mental capacities, the management was taken over by his heir John Benn, who placed its day-to-day running in the hands of a steward. From the time he leased Skiddaw Forest in 1750 Brownrigg set about improving it, and obtained the advice of Robert Maxwell, a Scottish agricultural adviser. After reading Brownrigg's account of the land, Maxwell made a personal inspection before compiling a list of recommendations (53). Brownrigg clearly regarded himself as a successful agriculturalist. He informed Sir James Lowther of Lowther, when a lease of some land near Whitehaven was due to expire in 1769, that 'there is one field that, when I took it, was valued at fifty shillings per annum on which I, that first year, laid out more than would have purchased the inheritance of it. This has been amply repaid me and is now let very cheap at the yearly rent of £17!' (54).

The efficient estate manager of the 1750s found himself in considerable financial difficulties during the 1780s, and in 1787 a formal agreement was drawn up whereby Brownrigg, in effect, sold the estate to John Benn, his niece Elizabeth's husband. In return Benn, who, as it transpired had always been Brownrigg's choice as his successor, agreed to guarantee his debts which by then amounted to £8000. Brownrigg's troubles had begun in 1780 when he mortgaged the Ormathwaite property to Rowland Stephenson of London for £3200. Five years later he borrowed a further £1400 on the mortgage. He had
also borrowed various sums of money—amounting to £3200—from John Benn, and since he failed to pay any interest on the mortgage, by 1787 his debts stood at approximately £8000. By then Benn had taken an assignment of Stephenson’s mortgage, and consequently was Brownrigg’s sole creditor. The 1787 agreement guaranteed Brownrigg’s financial position for the rest of his life. No interest was to be paid on the £8000, and Benn, in addition to allowing Brownrigg and his wife the estate income during the rest of their lives, set aside a further £4000, also interest free, to meet any extraordinary expenditure. After Brownrigg and his wife died Benn was to deduct interest on the whole sum of £12000 at the rate of 5% a year from 1787 and, if anything remained of the £4000 guarantee, to pay various legacies with it. Brownrigg confirmed the agreement in his will which was executed shortly afterwards (55).

Unfortunately it is not clear what caused Brownrigg’s financial troubles. He first overstretch his resources in 1774 when he was only able to pay £600 down for the purchase of Millbeck Hall. The other £2000 was not paid until ten years later, and within a year of clearing the debt he borrowed a further £1400 from Stephenson. He was already borrowing from Benn, and accumulating a number of bond debts which Benn discharged at intervals during the 1790s (56). Whether it was debt which brought about his mental decline, or conversely the loss of his mental faculties which led to the overspending, will never be known, but the settlement of 1787 was clearly aimed at preventing further wasting of the estate.

Certainly there is no evidence to suggest that the responsibility for Brownrigg’s financial position can be attributed to any one of his multifarious interests. It is appropriate to mention some of these as illustrations of just how varied they were. In a letter to Augustine Earle written in 1760, Brownrigg referred to his involvement in a lease of iron mines belonging to the Duke of Somerset. It can be established that this was a lease of October 1749 in which Brownrigg was a partner with Peter How, William Hicks, and Gabriel Griffiths—three of Whitehaven’s wealthiest merchants—and Joseph Bowes, of the Duke’s iron mines in the manor of Egremont. How, and Brownrigg’s brother-in-law Charles Wood, had also obtained a lease of coal mines in the same area, and in February 1750, together with Hicks and Griffiths, they formed the Low Mill Iron Company. Although the iron mines lease was clearly to supply the Company with ore, Brownrigg apparently had no direct connexion with it. The lease was for thirty years at a rent of £50 a year plus eighteen pence for every ton of marketable ore, but in 1760, according to Brownrigg, ‘after we had spent £1200 in searching for ore and opening those mines, and they were likely to become profitable, we were interrupted in working them by Mr John Gale who . . . set
up a claim to them' (57). Prior to that time 10,701 tons of ore had been raised, although no account survives of how much profit had been made. Mining ceased owing to the legal dispute, and the lease was terminated in 1766 (58). In 1765, however, Brownrigg had entered into partnership with Anthony Bacon to lease the Cyfarthfa iron furnace at Merthyr Tydfil in South Wales (59). He appears to have played the role of a sleeping partner in both of these concerns.

Brownrigg is also known to have had a number of other investments. With the death of his father-in-law John Spedding in 1758 he inherited, through his wife, a share in the Whitehaven Ropery Company. In 1765 this was bought up by Messrs Littledale and Company and Brownrigg used £750 of the £1,800 he received for his share, to purchase a one-eighth share in the new company. This was in turn taken over in 1788, at which time shares in ships and total stock in trade amounted to £5,650. Brownrigg's share was sold at this time. There is also evidence of his investing in government 3% long annuities, and lending money on the Keswick turnpike road scheme after 1762 (60).

After his father's death, Brownrigg was appointed to the commission of the peace, and he also held several positions which were usually reserved in Cumberland for the minor gentry. Two of these were quite lucrative. In 1760, as a result of Sir James Lowther of Lowther's influence, he obtained a sinecure customs position as Patent Searcher in the Port of Carlisle. The position was administered by deputy and Brownrigg retained it until his death. Although the salary was only £20 a year, the real benefit of the position was in the fees, which amounted to approximately £180 a year (61). Even after he had paid a deputy Brownrigg would have been left with a considerable profit. The second financially lucrative position was also obtained for him as a result of Sir James Lowther of Lowther's influence. This was the post of Receiver-General of Government Taxes in Cumberland and Westmorland, which he held from 1763 until 1778. In the latter year his appointment was, in the official Treasury language, 'postponed', because he was 'largely in arrears' (62). Officially he resigned in May 1778, but in reality he apparently sold the position to George and Matthew Atkinson, who were bankers, in return for an annuity of £150 (63). Quite a number of letters and accounts relating to Brownrigg's activities as Receiver-General have survived, and he evidently had considerable trouble persuading his deputies to collect, and then remit money to him, and that as a result he was in constant fear of Treasury process being issued against him (64). As Receiver he was allowed to deduct a fee of twopence in the pound on all money he received. In addition the Cumberland and Westmorland Receiver had a special allowance of a further threepence. Since the extra allowance yielded an average of more than £100 a year between 1768 and 1776 (65), and
in view of the size of the annuity allowed him by the Atkinsons, it is reasonable
to assume that Brownrigg received nearly £200 a year from the post. Out of
that he had to pay collection costs and premiums on bills of exchange (66).
However, it seems reasonable to assume that for many years after about 1760,
Brownrigg's positions yielded him anything up to about £300 a year, over and
above his estate income.

He is also likely to have received an income in his role as an agent for the
Lowther family. Apart from acting as medical adviser to the two Sir James's,
and using their mines for his research, Brownrigg apparently had a more direct
role to play. In 1745 a Cockermouth burgage was purchased for Sir James
Lowther of Whitehaven, in Brownrigg's name, although he was clearly acting
only as a trustee. He fulfilled a similar role in conjunction with Carlisle Spedding
in 1749, for a mortgage assignment (67). But the evidence is not clear as to
exactly what role he played for Sir James, although it appears to have been a
less positive one than for his successor. In 1767 he wrote to Sir James Lowther of
Lowther to remind him that in cultivating an electoral interest in Whitehaven
he should remember the needs of the poor, and in 1772 he wrote of having been
'engaged three or four days past in making a very good purchase for Sir James
Lowther near Maryport, which I have effected for £6450' (68). The following
year he specifically referred to himself in a letter as being 'an agent to Sir James
Lowther' (69), but just how much of his time was spent on Lowther business,
and how much he received for it, is unknown.

The surviving evidence shows that Brownrigg had a multitude of interests.
After his retirement to Ormathwaite round about 1780, he continued his scien-
tific researches in a laboratory he had built on to the Hall. Air pumps, micro-
scopes, telescopes, globes, a pantograph and a thermometer were found in it
after his death. He also read widely; apart from chemistry, his library included
books on a variety of subjects including religion, natural science, travel, poetry,
the classics, history, husbandry and Italian. In 1752 he was responsible for 'a new
paper about the woollen manufacture' (70), and he wrote a history of Cumber-
land which was never published (71). According to Dixon, Brownrigg was also
active in encouraging Thomas West to publish his Guide to the Lakes in the hope
that it would help, as indeed it did, to turn Keswick into a fashionable resort
(72).

In the light of this new evidence about Brownrigg how should his career be
viewed? Much of what has been written about him in the past has been based
on Dixon's very partial accounts (73), without the information which has been
advanced here as to the multiplicity of his interests. The picture which now
emerges contains a number of anomalies. Why, for example, did he take on the
time-consuming and frustrating job of Receiver-General for Taxes when there is no evidence that he was in need of additional income? How, also, are his debts to be explained unless they are attributable to his declining mental capacity? Anomalies apart, however, several points can be made about Brownrigg’s life and reputation.

Like some of his contemporaries (74), Brownrigg devoted only a part of his time to scientific enquiry. He was, first and foremost, a physician, and the risks he took during the Whitehaven epidemic of 1743 bear ample testimony to the devotion he showed to his chosen profession. But as a result his research into damps had to be fitted into the gaps in a crowded schedule, and, by the 1750s, to share his spare time with interests not only in other branches of science, but also agricultural improvement, industrial ventures and county affairs. After 1760 he was of sufficient means to have relinquished his Whitehaven practice, in order to have devoted himself more singlemindedly to scientific enquiry. He did not do so, nor did he sacrifice any of his various other scientific and non-scientific interests simply to further his reputation in chemistry.

Yet he deservedly gained a reputation for his experimental work with gases, and made interesting contributions to several other branches of science, despite being what might perhaps be called a dilettante scientist. Sir James Lowther had sought in vain in 1733 and 1736 for an explanation of the problematic damps, and this explains his encouragement of Brownrigg in what was, in effect, the first systematic investigation of gases in mines. Brownrigg’s work on gases paralleled that of Priestley, Black and Cavendish, and in certain respects even preceded theirs, but if he never enjoyed a similar reputation this may have been not so much because he refused to devote a greater proportion of his time to this work, as his failure to publish his findings. Although he intended to write a general history of damps, such a work was never published, and it is likely that it was never written (75). Despite seventeen years of experimenting, he despaired, in 1754, of completing an account of his results:

I now begin to doubt [he told John Ellis], whether I shall ever be able to publish the result of them as the repeating many of my observations and experiments, describing them exactly, arranging them in proper order, and reasoning upon them, will require more leisure than I shall probably ever be master of . . . (76).

But the consequence of his failure to write the general history was that, of the papers he presented to the Royal Society in 1741 and 1742, which were largely responsible for establishing his reputation in chemistry, only an extract of one of them appeared in print (77). Considering the impact of his 1765 paper,
the Royal Society's evident desire to publish his earlier work, it is perhaps not unreasonable to assume that Brownrigg had the potential to have become one of the most eminent of eighteenth-century scientists, but that he was not prepared to sacrifice his many other interests in the hope of attaining that reputation.

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EDITORIAL NOTE

William Brownrigg also corresponded with Benjamin Franklin, after the latter’s visit to Ormathwaite, on the effect of oil in damping waves on water. The evidence for Franklin’s experiment on the pond at Clapham Common (this Issue, p. 215) and for his thereafter carrying some oil in his hollow cane comes from the letter, Franklin to Brownrigg, published in *Philosophical Transactions* 64, 447–455, 1774.

NOTES

(2) The Linnean Society of London, Ellis Correspondence [hereafter Ellis Corresp.] William Brownrigg to John Ellis, 17 February 1755.
(3) These are the papers of Lord Ormathwaite which have been deposited in C.R.O. under reference DX/448. I have also been able to draw upon the Lonsdale MSS. in C.R.O. (D/Lons/W) in which there are many references to Brownrigg which have not previously been used.
(4) DX/448/12–14, 17.
(5) (Lugden Batavorum, 1737); Dixon, p. 3.
(6) DX/448/12; D/Lons/W, John Spedding to Sir James Lowther [hereafter Spedding to Lowther and bi-seversa], 28 December 1740.
(8) Tullie House Library, Carlisle. The Case Book is a bound volume of 240 pages, written mostly in Latin and including, apart from medical cases, discourses on other subjects, including two pages on the weather at Whitehaven.
(10) D/Lons/W, John Stevenson to Spedding, 2 August 1750.
11) Ibid., Spedding to Lowther, 16 November 1744.
12) Ibid., Spedding to Lowther, 1 May 1743.
15) Tullie House Library, Carlisle, Case Book, pp. 30, 32.
16) In November 1744 for example, the two men were ‘daily consulting about managing the air’, D/Lons/W Spedding to Lowther, 27 November 1744. Further evidence of their joint work is given in Spedding’s letters of 24 August 1743 and 28 December 1744.
17) E. H. Davidson, ‘Franklin and Brownrigg’, American Literature, 23 (1951–52), p. 44. Brownrigg’s knowledge of the mines is also revealed in a letter of his to Sir James Lowther of Lowther, written on 29 August 1765 (D/Lons/W, Misc. Letters, Bundle 47) in which he gave a detailed scheme for managing the coal trade, and in his footnotes to Dr John Dalton’s A Descriptive Poem Addressed to Two Ladies at their Return from Viewing the Mines near Whitehaven (London, 1755); Ellis Corresp., Brownrigg to Ellis, 4 December 1754.
18) Ibid., Spedding to Lowther, 7 January 1743.
19) Ibid., Spedding to Lowther, 18 July 1743; Lowther to Spedding, 18 August 1743. According to J. Dixon, A General State of the Whitehaven Dispensary (Whitehaven, 1800), p. 9, Brownrigg published ‘An Account of the Laboratory erected near Whitehaven in 1746 for the purpose of accurately investigating the properties of inflammable Air: and for the Performance of various operations in Chemistry’. I have not been able to locate a copy of any such account, or any collaborative evidence that it was published.
20) Ibid., Lowther to Spedding, 20 December 1744; Dixon, p. 10. The importance of barometric pressure as a guide to the relative level of choke-damp was already known on the Scottish coalfield where fire-damp was almost unknown. It is possible that Brownrigg may have been introduced to the importance of barometric pressure by a Scottish coal-owner, Sir John Clerk of Penicuik, who visited Whitehaven in 1739. See W. A. J. Prevost, ‘A trip to Whitehaven to visit the coal works there in 1739’ by Sir John Clerk’, Trans. Cumberland & Westmorland Antiq. & Archeol. Soc., Second series, 65, 305–310 (1965); B. F. Duckham, A History of the Scottish Coal Industry Vol. I. 1700–1815 (Newton Abbot, 1970), pp. 89–90. How widely Brownrigg’s discovery was used is not, unfortunately, known.
21) Ibid., Lowther to Spedding, 8 & 10 February 1733, 15 & 22 April 1736; Spedding to Lowther, 28 April 1736; Phil. Trans., 38, 109–113 (1733–34).
22) Ibid., Lowther to Spedding, 13 November 1740, 17 January 1741.
23) The MSS. are in the Royal Society’s library under reference L&P.I, 79–82. Brownrigg delivered the papers on 16 April 1741, 11 March 1742, 8 April 1742 and 13 May 1742.
24) Ibid., Lowther to Spedding, 20 December 1744, 16 May and 13 June 1749.
26) Ellis Corresp., Brownrigg to Ellis, 1 March 1754, 18 May 1756.
(30) Phil. Trans., 55, 218–243 (1765); Brownrigg was invited to go to Spa by Sir James Lowther of Lowther in June 1764, but he turned down the offer, D/Lons/W Misc. Letters, Bundle 47, Brownrigg to Lowther, 9 June 1764. He must subsequently have changed his mind.

(31) Phil. Trans., 64, 357–371 (1774). By that time papers on the solubility of these earths and salts had been given by Cavendish (Phil. Trans., 57, 92 (1767)) and Lane (Phil. Trans., 59, 216 (1769)), respectively, which Brownrigg acknowledged. Dixon maintained that Brownrigg’s 1774 paper had been written about 1765 (p. 30). The appendix to Brownrigg’s 1765 paper was taken from the paper he read to the Royal Society in April 1742, and not, as he stated twice (Phil. Trans., 55, 218, 236 (1765)), April 1741.

(32) D/Lons/W, Spedding to Lowther, 5 May 1742; Lowther to Spedding, 20 & 29 May 1742.


(35) In 1801 Dixon (p. 50) wrote, ‘His improvements... have been adopted in the Cheshire and Droitwich salterns’, but E. Hughes, Studies in Administration and Finance 1558–1825 (Manchester, 1934), p. 109, says—despite being aware of Brownrigg’s book—‘there were no striking developments in the Cheshire industry at this time’, referring to the second half of the eighteenth century.


(37) B.L. Sloane MSS. 4057, fo. 78, Brownrigg to Sir Hans Sloane, 8 October 1741.

(38) B.L. Additional MSS. 28335, fos. 196–207, correspondence of Brownrigg and da Costa; Ellis Corresp., Brownrigg to Ellis, 17 February 1755.

(39) Phil. Trans., 64, 481–491 (1774).


(41) Dixon, p. 85; The Royal Society’s library contains two further papers by Brownrigg which were presented in 1754 and 1755. One on congelation was read on 24 January 1754 (L&P. II, 470), and the other ‘Of de Mairan’s Book’, on 9 January 1755 (L&P. II, 554). Brownrigg was disappointed that the Society did not publish his paper on congelation; Ellis Corresp., Brownrigg to Ellis, 18 May 1756.

(42) Dixon, p. 82. In November 1741 when he was only just beginning to make his mark Brownrigg already held ‘a correspondence with several learn’d men in England and Holland’, D/Lons/W, Spedding to Lowther, 29 November 1741.

(43) Phil. Trans., 64, 445–460 (1774).

(44) Dixon, p. 73, claimed that it was a success. See also E. H. Davidson, ‘Franklin and Brownrigg’, American Literature, 23, 38–56 (1951–52).


(47) Phil. Trans., 57 (1967); see Dixon, pp. 25–26.
(48) Ellis Corresp., Brownrigg to Ellis, 12 May 1770; Kendal R.O. WD/RGL, letters of Brownrigg to John Moore, 30 April 1774, 20 April 1775, 11 July 1777 and 13 July 1779. He was in London from February to July in 1779, DX/448/14, Millbeck Estate Accounts. Cf. Joseph Priestley who spent one month a year in London, D.N.B., xvi, 357ff.

(49) B.L. Sloane MSS., 4057, fo. 92, Brownrigg to Sir Hans Sloane, 25 November 1741.

(50) Ellis Corresp., Brownrigg to Ellis, 27 June 1766.

(51) DX/448/7, 13; C.R.O. D/Lec, Box 16A. The lease is dated 28 April 1750. After a legal dispute it was confirmed in March 1753, and was for a term of thirty years, D/Lec/16/102.

(52) DX/448/3, 7, 14; D/Lons/W, Spedding to Lowther, 28 December 1740. In 1752 Brownrigg set out a flower garden on land adjoining his Whitehaven house, Ellis Corresp., Brownrigg to Ellis, 20 October 1752.

(53) The recommendations were later published in R. Maxwell, The Practical Husbandman (Edinburgh, 1757), pp. 268–271.

(54) D/Lons/W, Misc. Letters, Bundle 47, Brownrigg to Sir James Lowther, 30 January 1760.

(55) DX/448/4, 17, 19.

(56) DX/448/14 (letter of Brownrigg to Mr Anthony Bacon, 7 February 1774), 15, 23.

(57) Brownrigg to Augustine Earle, 14 April 1760. The letter has been affixed inside the front cover of Brownrigg’s Case Book in Tullie House Library, Carlisle.

(58) C.R.O. D/Lec, Box 16A, Box 240 Peter How’s Accounts.


(60) DX/448/14, Millbeck Estate Accounts.

(61) Ibid., fo. 16; Public R.O. T/11/26, fo. 138; T/11/40, fo. 295; C.R.O. CQJ/1/10–12.


(63) Matthew Atkinson claimed in 1787 that a change in Treasury regulations meant he was not making £100 a year from the post, and was therefore making a considerable loss by the time he had paid Brownrigg, DX/448/14, Atkinson to Brownrigg, 17 July 1787.

(64) The letters and accounts are in C.R.O. D/Hud/A7 and Kendal R.O. WD/RGL.

(65) Public R.O. T/22/6, fos. 369, 416, 448, 449; T/22/7, fos. 14, 90.

(66) These costs could be quite substantial, DX/448/14, documents relating to land tax administration. The extra allowance was partly to offset the cost of obtaining bills of exchange. Brownrigg had particular difficulty with the 1773 collection—which was not finally completed until March 1776—owing to the collapse of the Scottish bank of Douglas, Heron and Co. through which he had remitted money to London. See H. Hamilton, ‘The Failure of the Ayr Bank, 1772’, Econ. Hist. Rev., Second series, 8, 405–417 (1955–56).

(67) D/Lons/W, Spedding to Lowther, 10 February 1745; Lowther to Spedding, 17 January 1749.

(68) Ibid., Misc. Letters, Bundle 47, Brownrigg to Sir James Lowther, 14 February 1767; Kendal R.O. WD/RGL, Brownrigg to John Moore, 1 November 1772.

(69) Kendal R.O. WD/RGL, Brownrigg to Moore, 10 August 1773.

(70) D/Lons/W, Spedding to Lowther, 27 June 1752.

(71) Brownrigg’s books, pictures and scientific instruments were auctioned after his death and the manuscript of his Cumberland history is noted in the catalogue, A Catalogue of the
Paintings, Drawings &c... For Sale by Auction at Ormathwaite, 8 May 1804 (Carlisle, 1804).

(72) Gent's Mag., 70, 387 (1800); T. West, Guide to the Lakes (Kendal, 1778). It ran to eleven editions by 1821.


(74) Cf. for example Henry Cavendish, D.N.B., iii, pp. 1257–1262, and Joseph Priestley, D.N.B., xvii, pp. 357–376.

(75) There is no mention of any work on damps in the sale catalogue of Brownrigg’s effects. Since it mentions the manuscript history of Cumberland it would presumably have mentioned any other manuscript had it been there.

(76) Ellis Corresp., Brownrigg to Ellis, 1 March 1754.

(77) See page 259.