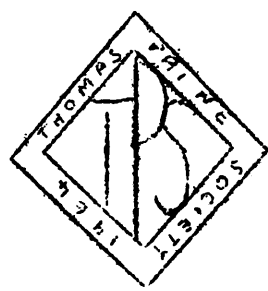


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THE SECOND IRON  
BRIDGEby  
S.T. Miller

THE RAPIDLY GROWING importance of the town of Sunderland, by the end of the 18th. century, is reflected above all in the coal export figures recorded in the Order Books of the River Wear Commission. The decade 1749-1758 saw the export via the Wear of 1,500,000 chaldrons (Newcastle chaldrons), but by the decade 1789-1798 this total had risen to 2,900,000 chaldrons, i.e. doubling.

However the further development of the town was hampered by the absence of a bridge across the river at that point. Sunderland was, in fact, divided into the "barbary coast" of Monkwearmouth on the northern side and Bishopwearmouth and Sunderland on the southern side. It was more usual in the late 18th. century indeed to talk of "Sunderland and the Wearmouths". The river could only be crossed by ferries (there were two ferries, the Panns Ferry and the very ancient Sunderland ferry which did not end until 1957, and whose establishment may have been coeval with that of the celebrated Monastery of Monkwearmouth. It may well be that the only serious mishap ever recorded as befalling the Sunderland ferry may have added impetus to the drive towards a bridge - for in the late 18th. century, on a Sunday evening, the ferry overturned in id-stream and 22 people were drowned), fords higher up the river and the medieval Chester bridge. Nor was there a decent through road to Newcastle - Sunderland was unkindly regarded as being on "the road to no place".

The problem was obvious enough as were the advantages to be gained by local business from a bridge. In 1790 a committee had been set up to look at the problem of the local ferry and arrived at the conclusion that a stone bridge should be set up. Yet this could be no solution since it would require supporting piers, and this would obstruct the considerable river traffic in coal which underpinned the prosperity of the town.

An answer to this was offered by Rowland Burdon. Born in 1756, he was the tenth in descent from Thomas Burdon of Stockton who had flourished in the reign of Edward IV. His father prospered as a member of the Company of Merchant Adventised of Newcastle and purchased the manor of Castle Eden. Rowland junior succeeded his father in 1786, and was also returned as member for the County in 1790 in an election fought against Sir John Eden and Ralph Milbanke (the father of Lady Byron). Indeed he represented the County as a moderate Tory in three successive Parliaments between 1790 and 1806 and only retired in the latter year owing to "circumstances over which he could exercise no control" which made him "the victim of misplaced confidence" (in fact all of his assets were lost in the crash of the bank of Messrs. Surtees and Co. which came in 1803). But Burdon was no "mere country gentleman". As well as being an accomplished scholar and modern linguist he had also studied architecture under Sir John Soane. He was also directly concerned in the problem of bridging the river because this would continue his Stockton-Sunderland Turnpike and an extension to Newcastle and South Shields would follow. In general there is every reason to believe that he was a leading figure in local commercial circles ("He did not cut a shining figure as an orator, but as a practical man of business he stood second to none, and as a commercial man he was known and respected by the wealthier merchants of Tyne, Wear and Tees...").

Burdon proposed that an iron bridge should be constructed in a single span, and his proposal was accepted. The foundation stone was laid on the north side on September 24th., 1793 (an inscription on the foundation stone began: "At the time when the mad impetuosity of the French nation eager for what was wrong disturbed the nations of Europe with iron war, Rowland

Burdon Esq., desirous of better things, determined to join together with an iron bridge the rocky and steep banks of the Wear...." The work was also dedicated with the motto "Nil Desperandum Auspice Deo", and it is recorded that many years after the completion of the bridge a non latinist clergyman was asked to explain it, and knowing the Paine claim to the design, confidently translated it as "This desperate job was the work of a Deist"! and Thomas Wilson ("an ingenious native") was appointed to construct it. "It was opened for the accomodation of the public" on August 9th., 1796 by Prince William of Gloucester escorted by a procession of local masons (as a precaution 1,000 locally stationed soldiers marched across it first) the "splendid shew...afforded the highest gratification to....50000 persons". "The 'brass' then retired to the Phoenix Lodge to regale themselves with an excellent cold collation" while "apposite toasts were drunk, several excellent songs were sung and the day was concluded with true hilarity and genuine mirth.

The occasion was marked by the usual flurry of broadsheets and ballards, of which one may be singled out for its topicality if nothing else -

Ye sons of Sunderland with shouts  
That rival Oceans War,  
Hail Burdon in his Iron Boots  
Who strides from shore to shore.

Oh may he firm support each leg  
Oh much, oh much, we fear  
Poor Rowland may outstretch himself  
In striding across the Wear.

A Patent quickly issue ou  
Lest some more bold than he  
Should put on larger Iron Boots  
And stride across the sea.

And let us pray for speedy peace  
Lest Frenchmen should come over  
And following Burdon's iron plan  
From Calais strike to Dover.

The bridge consisted of six ribs of 5' distance apart. There was a superstructure of planking to provide the base for a McAdam type road. The whole width was 32' with a paved footway on each side, an iron palisadre and lamp posts at intervals. The bridge weighed 900 tons (the Iron Bridge weighed only 378 tons) of which 260 tons were iron (only 46 tons of which were wrought). The span was 236' (an immense advance on the 100' of the first Iron Bridge) and it was a segment of a circle about 440' in diameter. The whole thing cost £32,414 19s 7d., of which Burdon subscribed £30,000 (the Iron Bridge cost a mere £6,000).

The expense of the bridge was broken down for 1792-7 in a parliamentary return obtained at the time by Mr. Warn, M.P. as follows:

	£	s	d
Expense of obtaining Act of Parliament.....	687	2	5
Consulting Architects.....	695	15	10
Incidental expenses.....	192	8	10
Purchase of ground on North side.....	529	0	6
Purchase of Houses.....	202	5	5
Cost of stones and lime.....	5450	11	1
Cost of timber.....	1966	8	8
Wrought Iron.....	2112	0	11
Cast and wrought iron for arch.....	4018	3	5
Surveyors salary.....	1000	0	0
Assistant surverors salary.....	192	18	0
Clerk and Treasurer.....	150	0	0
Wages to Masons and Laborers.....	10735	11	5

	£	s	d
Cost of Floats, Boats and Ropes, etc .....	1375	1	0
Incidental expenses .....	407	13	4
Interest paid to subscribers .....	2699	18	9
Cost of bridge .....	£32,414	19	7
Purchase of Panns Ferry .....	1600	0	0
Low expenses .....	622	19	4
Purchase of the Ferry .....	6300	0	0
Low expenses .....	362	1	1
cost of bridge and ferries .....	£41,300 0 0		

The bridge was the subject of considerable praise at the time because of the novelty of its method and material of construction, its elegance and its scale (indeed it would seem that it was the biggest single arch bridge of its day). In 1818 Sir J. Brunel, in a report to the Bridge Commission, said 'At the first sight of this extraordinary fabric I could not withhold the tribute of praise which the projectors and promoters of the scheme are so justly entitled to, for the boldness of the designs, for the magnitude of the enterprise, considering the time it was suggested.'

Sir Robert Stephenson described it as 'a noble and splendid structure which has no parallel in this or any other country.'

A complication must now be introduced to a hitherto straight forward story. In 1785 Thomas Paine had designed an iron bridge to span the Schuylkill river near Philadelphia without piers because 'The vast quantities of Ice and melted snow at the breaking up of the frost in that part of America render it unpractical to erect a Bridge on Piers.' He intended the bridge to be of 520 tons of iron '....to be distributed into thirteen Ribs, in commemoration of the thirteen United States, each Rib to contain forty tons...'

In June 1786 he sent Benjamin Franklin a model bridge made of cast iron bars, and produced later an elaborate model that would bear the weight of three men. The State Authorities of Pennsylvania, however, were not interested - nor were the French forthcoming with any practical support although the French Academy of Science (to whom he submitted his scheme in 1787, sending at the same time a copy of the plan to Sir Joseph Banks to be shown at the Royal Society).

In 1788 Paine patented his design in London (Specification of Patents No.1667) and decided to go ahead with production himself. He had, in fact, to be satisfied with a sample rib of 88' (moderating his ambition with 'a little common sense') by the brothers Walker of Rotherham (the very same firm which had manufactured Burdors bridge). He tested this section for both strain (it withstood a weight of 6 tons of pig iron - twice its own weight) and for the stresses of changes of temperature. In pieces it was as portable as bars of iron, and when it was dismantled was 'stowed away in a corner of a workshop where it occupied so small a compass as to be hid away among the shavings.'

In June 1789 Paine prevailed on the Walkers to produce a bridge of 110' span with five ribs to be erected across the Thames, then sold. By May 1790 the parts were cast and shipped, however, Paine's backer, the American Peter Whiteside went bankrupt and the bridge was constructed as an exhibition work on Leasing Green, Paddington, with a shilling per head charged to view it. Paine recorded in a letter to Sir George Stainton 'that it is so much visited and exceedingly admired by the ladies, who, tho' they may not be so much acquainted with mathematical principles are certainly Judges of Taste'!

In Britain the reaction to his inflammatory rejoinders to Burke's Reflections, and the attractions of France, led to Paine's flight and

the bridge was left in the hands of his creditors.

The two tales now become extricated. According to Michael M. Rix who follows the normal line of development, Rowland Burdon knowing that they 'were going begging purchased the posts of Paine's bridge and in 1793 set about adapting them to their new site'. The argument in favour of Paine is continued very recently by Mr. Tom Corfe, the latest historian of Sunderland ('...they made use of plans....devised by the famous radical Thomas Paine...'), and the latest biographer of Paine ('...the materials of Paine's bridge and most of its principle were used to erect a bridge over the River Wear near Sunderland'). No one has ever argued that Paine came to Sunderland and constructed a bridge, but it is usually claimed that he designed the bridge, or at least his design and the pieces of his bridge were pirated by Rowland Burdon. These claims, however, were opposed, especially by Burdon's son. In the 19th century and to this day there is a strong tradition in Sunderland that Burdon was the victim, that he designed and constructed the bridge and that the credit was stolen by Paine, or stolen for him.

It does not appear that the evidence for either of these claims has ever been seriously examined. This evidence can be usefully examined in three parts. There is largely hearsay evidence of observers, and there is the evidence of the initial specifications of patents.

Indeed there was considerable contemporary belief that Burdon was the designer as well as the constructor. The Encyclopedia Britannica Supplement of 1803 concluded its entry under 'Arch' by commenting on the Wearmouth Bridge, 'The inventor and architect is Rowland Burdon Esq., one of the representative of that county in the present Parliament.' Mr. Thomas Bowdler, in a paper read before the Royal Society in 1797 remarked:

'Iron bridges ah indeed been built in Coalbrookdale and in other places, but they were on the system of wooden arches rather than of stone. A plan for an iron bridge on a new principle was also invented by Mr. Thomas Paine, and exhibited some time ago near Paddington, but any person who examines that plan will perceive that it differs very essentially from the arch at Wearmouth...'

A Minute of the Proceedings of the Commissioners of the Bridge expressed thanks to Burdon '...for his liberality to the public in constructing the bridge upon principles for which he, as inventor, has a patent, without accepting any pecuniary consideration for the patent right.'

The Gentlemans' Magazine in 1796 felt that '...it is proper that the public should be informed that R. Burdon Esq., is not only the inventor of the principle on which the bridge was erected, but the patron by whose munificence it has been chiefly carried into execution.'

Finally Surtees in his History of Durham says that 'the use of iron had already been introduced in the construction of the arch at Coalbrookdale, and in the bridges built by Paine, but the novelty and advantage of the plan adopted at Wearmouth on Mr. Burdon's suggestion consisted in....', etc.

Then gradually the name of Paine replaces that of Burdon (although Miss Williamson points out that as early as 1812 Professor Charles Hutton in his History of Iron Bridges praises Paine's work). At first the claim is that the materials used were those of Paine's bridge, but by 1858 the Quarterly Review had dropped Burdon's name out altogether (indeed the Review not only attributes the bridge to Paine, it also attributes it to him in terms of Burdon's patent speaking of 'framed iron panels radiating towards the centre in the form of voissoirs'. Other commentators including Rix, not only give Paine

the credit but also go on to describe the bridge using the detailed figures attached to Burdon's patent, thus implying either that Burdon's patent was 'lifted' from Paine's, or, more likely, an ignorance of Burdon's patent. A small work published by the S.P.C.E. on bridges which had also given the credit to Paine was especially irritating to Burdon's son, 'This I regard as the unkindest out of all. That my father who was an excellent Churchman, should be thus treated by that venerable society, while Paine the infidel, is promoted to the place of honour, is at any rate to the credit of their liberality, so often called in question, though it may be somewhat at the expense of their accuracy of statement...'.

This process was probably helped, as Burdon's son claimed, by the fact that after the loss of his fortune Burdon 'resigned himself thence forth quietly to that retirement which his straightened means had forced upon him. No wonder that the public heard little of him afterwards', and because he was a country gentleman 'and that therefore there is great antecedent improbability that one of that class should have hit upon anything remarkable.... To escape this difficulty the invention has been tried first on Wilson, then on Grimshaw, the only other parties concerned in the building of the bridge, and, these failing, it has finally been fitted upon Tom Paine. Wilson had been a school master, Paine a staymaker - my father, unfortunately was a country gentleman'.

This sort of evidence cannot be conclusive because we have no way of knowing on what information these judgements are based.

Further 'circumstantial evidence' that has been adduced against Paine is that he was not the sort of man who would quietly have submitted to the stealing and exploitation of his own design. Miss Williamson does point out, reasonably, that during the building of the bridge Paine was in the Luxembourg Prison and in no position to be acquainted with events in Sunderland. On the other hand Sir Robert Smyth, a banker living in France and Paine's friend, did challenge, at the time, the right of Paine to claim compensation, but although Paine returned to America in 1802 he never pressed his claim.

It could also be argued, circumstantially, that the Patents Office, even in the eighteenth century, was unlikely to allow patents for two bridge designs which were substantially the same.

Both Paine and Burdon took out patents, the former in 1788 (No.1667), the latter in 1795 (No.2066). Obviously the problem should in theory be resolved on examination of the specifications, and, indeed, despite the availability of a number of 'red herrings' and problems of interpretation, this is decisive.

Burdon's specifications are very precise. The title itself is a good indication of the method, Application of Metal Blocks to the Construction of Arches. He describes the method of construction clearly:

'...my invention consists in applying iron or other metallic compositions to the purpose of constructing arches, upon the same principle as stone is now employed, by a subdivision into blocks easily portable, answering to the keystones of a common arch, which being brought to bear on each other, gives all the firmness of the solid stone arch, whilst by the great varieties in the blocks and their respective distances in their lateral position, the aid becomes infinitely lighter than that of stone, and, by the tenacity of the metal, the parts are so intimately connected that the accurate calculation of the extrados and intrados, so necessary in stone circles of magnitude is rendered of much less consequence'.

The cast iron blocks (known in engineering terminology as 'voussoirs') were to be of 5' depth, 4" thickness, with a middle arm of 2' length, and

the top and bottom arms in such proportion as to make each block a segment of a circle. These blocks would then be fixed by means of malleable iron tie rods to form ribs (in the Sunderland bridge each rib included 105 blocks). The ribs would be joined and supported laterally by hollow tubes six feet in length and four inches in diameter.

Paine's specification for Constructing Arches, Vaulted Roofs and Ceilings are, on the other hand, confused to some extent by the analogies he uses. 'The idea and construction of this arch is taken from the figure of a spiders circular web of which it resembles in section and from a conviction that when nature empowered this insect to make a web she also instructed her in the strongest mechanical method of constructing it....Another idea, taken from nature in the construction of this arch, is that of increasing the strength of matter by dividing and constructing it and thereby causing it to act over a larger space than it would occupy in a solid state, as seen in the quills of birds, bones of animals, reeds, cones....'

Burdon's son comments wryly that this language could embrace not only Burdon's bridge but also the catenary of the suspension bridge (spiders web) and tubular bridges (quills of birds, etc.), 'Yet we presume Mr. Stephenson will not feel much uneasiness lest in succeeding generations the bridge over the Menai or St. Lawrence be attributed to the genius of Tom Paine, whilst his own name is struck out of the roll of inventors and consigned to oblivion' (Robert Stephenson did, according to Burdon's son, write a letter to Burdon's brother stating that the two patents were clearly different).

However, it is clear from further reading that Paine's concept was different, since he goes on to say:

'The curved bars of the arch are composed of pieces of any length joined together to the whole extent of the arch and take curvature by bending. Those curves, to any number, height or thickness as the extent of the arch may require, are raised concentrically one above another, and separated, when the extent of the arch required it, by the imposition of blocks, tubes and pins, and the whole bottled close and fast together (the direction of the radius is the best) through the whole thickness of the arch, the bolts being made fast by a head pin or screw at each end of them. This connection forms one arched rib, and the number of ribs to be used is in proportion to the breadth and extent of the arch and those separate ribs are also combined and braced together by bars passing across all the ribs and made fast thereto above and below, and as often and wherever the arch, from its extent, depth and breadth, requires'.

Further information as to the design is given by Paine in a letter to Sir George Stainton:

'We soon run up a Centre to turn the arch upon, and begin our erection.. The raising an arch of this construction is different to the method of raising a stone arch. In a stone arch they begin at the bottom and work upwards meeting at the crown. In this we begin at the crown by a line perpendicular thereto and worked downward each way. It differs likewise in another aspect. A stone arch is raised by sections of the Curve, each stone being so, and this by concentric curves'.

In fact Paine's project was more appreciative of the potentialities of iron than either the Coalbrookdale Iron Bridge, based as it was on principles of wood construction, or Burdon's bridge, which, it was agreed by all observers, was based on the principles of stone construction.

It should be obvious from the above that what Paine was projecting was a modern girder type bridge, based on Bailey bridge or 'meccano' lines (otherwise it is difficult to see how it was so portable). So modern that Charles Schneider said, in his 1905 Presidential Address to the American Society of Civil Engineers, that 'Paine's experimental bridge became the prototype of the



modern steel bridge'.

It may be of course that Burdon did make use of the materials from Paine's bridge. There is no evidence for this but it was not at all unusual that Burdon should go to the Walkers since he could easily have been aware of their experience, and it is equally possible that Paine's materials should be worked upon with others. However, there the connection would end - the concepts were different, the spans different, and Paine's design would require malleable iron rather than cast iron.

The obvious conclusion is, then, that Paine did not design the bridge at Sunderland, that Burdon did not use Paine's design, and that not even did Paine and Burdon work on the same design at once. Any connection between Paine's experiments with Burdon's feat of engineering was purely coincidental.

The failure to recognise the contribution of Burdon to the development of Sunderland and the North-East and the expansion of the application of iron, apart from the production of a beautiful bridge, is made worse in a way by the fact that Burdon's sole excursions from his enforced retirement after 1803 were directed towards the freeing of the bridge from tolls which were maintained by those who had acquired his interest in a lottery held in October 1816 in order to reimburse themselves. On 27th. December, 1836 he wrote to the Sunderland Herald: 'The object yet remains to be obtained of seeing Monkwearmouth Bridge toll free if the Commissioners will be pleased to look steadily at the object and by raising money at a lower rate of interest or such other means as may occur to them would endeavour to discharge the claims of those who have by lottery obtained an invidious power over the tolls, it would give me more substantial satisfaction than my memorial that could be raised by means which the public would have the right to consider a misapplication of their funds'.

He died in 1838 aged 82. Not until 1846 was the toll on foot passengers discontinued and other tolls reduced by 50%. It was announced that a profit of £79,666 had been obtained from the bridge since its opening in 1796, although Burdon's original concern was not, apparently, with profit. Not until 1885 was the bridge freed from toll completely. By then it had been remodelled by Sir Robert Stephenson (although he used the same ribs) in 1859. In 1929 this structure was replaced by the modern 'near perfect replica of Newcastle bridge' and Sunderland lost one of its unique features for ever.

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BOOK REVIEW

Audrey Williamson. Wilkes: 'A Friend to Liberty'. 254 pages. Illustrated. George Allen & Unwin. £4.95.

FOLLOWING HER EXCELLENT biographical study of Thomas Paine, Audrey Williamson has now given us one on another radical reformer, John Wilkes. Unlike Paine, Wilkes has been the central subject of many a learned book and article, and has not had the dead weight of the political 'establishment' move heaven and earth, so to speak, to smear his reputation, rather, whatever his early radicalism, they have sought to make him one of the historical figures of the 'establishment', as in later life he actually was.

There are many facets to the life of Wilkes; the radical reformer and writer, enemy of the Tory establishment; the amorous 'man-about-town' and member of the notorious Hell-Fire Club; the civic official and man who ordered troops to fire on and into a crowd of workers. Whatever his good deeds this last act has sullied his reputation for ever, for with it, and despite any excuse that might be made, it demonstrated that he had changed sides.

All the many aspects of Wilke's life are dealt with fully by Miss Williamson, who blends a warmth towards her subject with the objectivity so essential to a good biographer, thus we do not get a whitewash job from which Wilkes emerges spotless, a man beyond reproach. However, I do feel that there is a slight tendency to play down the change of sides so evident a characteristic of Wilke's later years. Perhaps in modern terms Wilkes was the revolutionary turned moderate, however, it is the early and middle years of Wilke's life that are the most interesting, and in this very readable work come they come to life.

Readers of Audrey Williamson's book on Paine will know that as a biographer she does not simply accept at face value what others wrote of her subject, thus giving us a 'rehash', which is all too often the case with many a biography; Miss Williamson checks on the facts behind the story, and her re-examination of the original material produces both new information and corrects errors. In this work will be found some important new data bearing directly upon a possible connection between Paine and Wilkes, and suggesting that further investigation might produce in its turn a whole new chapter on the obscure early days of Paine.

Wilkes: 'A Friend to Liberty' is a book which I have no hesitation about recommending. It is well written, well researched, excellently illustrated, and with a good index. Its price is regrettably high, but then this is an inflationary era. Whatever my personal reservations about Wilkes there is no doubt that he holds an important place in the history of social reform, and this book should introduce him to a new generation of students, or simply those curious about how our political institutions evolved.

RWM.

THE 1790's: PAINE AND THE AGE  
OF REASON

by  
Michael J. Williams

DESPITE VARIOUS CONFLICTING interpretations, there is general agreement that a significant extension of the political nation was one of the fundamental aspects of British social development during the 1790's. According to J.R. Western, whereas prior to the 1790's governmental stability depended upon a broad apathy and indifference toward the national political process among the lower orders, faced with the threat of major social upheaval agents of Pitt's government were responsible for the creation of a broad conservative consciousness among the bulk of the propertied classes. During this decade the poor began to be looked upon from a totally different aspect. 'The shock of the French Revolution had brought with it a new way of looking at the mass of the nation.' Previously the poor had merely rioted: they had rebelled only upon the instigation of members of the ruling class. 'After the French Revolution the tone was very different. The poorer classes no longer seemed a passive power: they were dreaded as a Leviathan that was fast learning his strength. Or we may say that before they were regarded as people naturally contented, they were now regarded as people naturally discontented.'<sup>2</sup> Such a relatively novel fear of social revolution, absent since the mid-seventeenth century 'served to draw the propertied together as a class.'<sup>3</sup> Those historians who have chosen as their subject the emergence of the working-class movement have adopted a similar view of the period. E.P. Thompson has argued that the 1790's witnessed for the first time the emergence of a national and international consciousness among significant numbers of working men.<sup>4</sup> According to Gwyn Williams, 1792 saw the entry of 'a new breed of men' into the political arena.<sup>5</sup>

Anxiety concerning this downward extension of the political nation was responsible for the prosecution of radical pamphlets in the 1790's. In 1793 Daniel Holt of Newark was prosecuted for publishing a pamphlet previously issued with impunity by the Westminster Committee. The only reason for this was his re-addressing it to 'tradesmen, mechanics and labourers.'<sup>6</sup> Paine's Rights of Man was prosecuted for libel not so much because of its contents but because, rather than confining his audience to 'the judicious reader', he had addressed 'the lowest orders of the people - people who...cannot, from their education or situation in life, be supposed to understand the subject on which he writes.'<sup>7</sup> The prosecution in 1794 of Eaton's Politics for the People stemmed precisely from the intended audience indicated by title, tone and price. The case for Eaton's defence on the other hand rested upon the right of access to political information on the part of the whole of the people.<sup>8</sup>

It is clear that both conservatives and radicals ascribed to pamphleteers and booksellers a central role in this struggle over the extension of the political nation.<sup>9</sup> The massive number of tracts published by Reeves's Loyal Association and under the Cheap Repository imprint were both the conservative reaction to Paine and a recognition of the irreversibility of that extension of the political nation which he, more than any other individual, had accomplished. Philip Brown observed that, 'Bookselling and publishing began to touch a new public... A new specialist in the trade, the "Political Bookseller", began to advertise himself.'<sup>10</sup> Thompson commented upon the central place within Sheffield Jacobinism occupied by Joseph Gale's journal, bookshop and pamphlet press.<sup>11</sup> The main targets for persecution on the part of the local Loyal Associations were apparently booksellers.<sup>12</sup> The principal agency, then, in this downwards extension of the political nation was the radical bookseller.

Hostile contemporary observers from Burke onwards emphasised the connection

between political radicalism and infidelity. It seems to have been Burke who, in his vastly influential Reflections on the Revolution in France (1790), initially established this connection, regarding the events in France as 'this philosophic revolution.'<sup>13</sup> 'Licentious philosophy' and 'insolent irreligion' had been the ruin of the French monarchy.<sup>14</sup> The Revolution itself he ascribed to the conspiratorial machinations of a cabal of so-called philosophers, 'whom the vulgar, in their blunt, homely style commonly call Atheists and Infidels.'<sup>15</sup> The Revolution's excesses he ascribed to savagery engendered by widespread diffusion of 'the spirit of atheistical fanaticism.'<sup>16</sup> The subsequent course of the French Revolution, especially in its Jacobin phase, apparently justified Burke's analysis and prediction of a full-scale attempt to extirpate Christianity.<sup>17</sup> The widely read and profusely documented works of Barruel and Robison (1798) reinforced the view of the Revolution as the first manifestation of an international conspiracy aiming at the overthrow of all governments and the extinction of Christianity.<sup>18</sup>

To ascribe the French Revolution to an atheistical conspiracy, and its political excesses to divine anger at that country's moral and religious apostacy, became the contemporary conventional wisdom among conservative Englishmen.<sup>19</sup> An anonymous contributor to The Gentleman's Magazine of 1797 succinctly expressed the prevalent attitude; 'Whatever proximate circumstances hastened the Revolution in a neighbouring state, Infidelity was its prime cause; and the vengeance of an offended God has been awfully manifested.'<sup>20</sup> In his Apology for the Bible (1796), Bishop Watson spoke of 'that evil heart of unbelief, which brought ruin on a neighbouring nation.'<sup>21</sup> For Wilberforce, the Revolution was an awful warning of the consequences of infidelity.<sup>22</sup> I. Padman, another critic of Paine, identified the French Revolution with Deism, its horror being the expression of irreligion and impiety.<sup>23</sup> The famous liberal Baptist divine, Robert Hall, saw the barbarities of the Revolution as justly chargeable on the prevalence of atheism. Let those who doubt of this, recollect that the men who, by their activity and talents, prepared the minds of the people for that great change - Voltaire, D'Alembert, Diderot, Rousseau, and others, were avowed enemies of revelation; that in all their writings the diffusion of scepticism and revolutionary opinions went hand in hand;...that the reign of atheism was avowedly and expressedly the reign of terror....

As the heathens fabled that Minerva issued full-armed from the head of Jupiter, so no sooner were the speculations of atheistical philosophy matured, than they gave birth to a ferocity which converted the most polished people in Europe into a horde of assassins.<sup>24</sup>

Not only did the extension of the political nation arouse considerable anxiety among the propertied classes, but also the observation that associated with political radicalism, the theological radicalism of infidelity was also penetrating the masses. Indeed their attitude towards contemporary French events predisposed them to make such a connection. By the close of the decade it was no longer felt possible to echo Burke's complacent assertion of 1790 'that there is no rust of superstition ... that ninety-nine in a hundred of the people of England would not prefer to impiety.'<sup>25</sup> A new proselytising zeal among lower-class infidels was the source of such anxiety, particularly in the light of what we have seen to be the standard conservative interpretation of the origin of the French Revolution. Gibbon, the most notorious of the late eighteenth century aristocratic sceptics, was prepared to forgive Burke's 'superstition' in the light of his trenchant criticism of democratic principles. Terrified by the course of the French Revolution and its destruction of his personal ease 'he, seemingly with seriousness, argued in favour of the Inquisition.' Referring to the possibility of any extension of his

own infidelity to the masses, he wrote:

I have sometimes thought of writing a dialogue of the dead, in which Lucian, Erasmus, and Voltaire should mutually acknowledge the danger of exposing an old superstition to the contempt of the blind and fanatic multitude.<sup>26</sup>

Robert Hall drew attention to

The efforts of infidels to diffuse the principles of infidelity among the common people... HUME, BOLINGBROKE, and GIBBON, addressed themselves solely to the more polished classes of the community, and would have thought their refined speculations debased by an attempt to enlist disciples from among the populace. Infidelity has lately grown condescending;... having at length reached its full maturity, it boldly ventures to challenge the suffrage of the people, solicits the acquaintance of peasants and mechanics, and seeks to draw whole nations to its standards.<sup>27</sup>

The parallel phenomena of the anti-Christian aspects of later phases of the French Revolution and Paine's dual authorship of Rights of Man and The Age of Reason served to demonstrate conclusively the association of popular radicalism and popular infidelity.

The Englishmen of the upper and middle classes had already learned from French history to associate political radicalism with infidelity, and now the development in England seemed only to prove an inalienable connection between the two. Such phrases as 'infidel democracy', 'sedition and blasphemy', etc., came almost unconsciously to be part of the intellectual equipment of these two classes. For Hannah More, 'Republicanism and infidelity..are sworn friends both here and in France.'<sup>29</sup> 'Churchman', attacking Paine, wrote: 'Republicanism and Deism, have the most intimate alliance in principle, and have seldom long been separated in practice....Scepticism and political licentiousness ....., Infidelity and contempt for the civil magistrate advanced with equal progression.'<sup>30</sup>

Paine's writings were the principal literary agencies responsible for both the deliberate extension of a radical political consciousness and a comparable extension of infidelity to new sections of the population. Whereas hitherto the 'rank weed' of infidelity had been confined to 'the great and opulent', Bishop Watson accused Paine of 'endeavouring to extend the malignity of its poison through all classes of the community.'<sup>31</sup> Robison, objecting to his popular tone, made a similar accusation,<sup>32</sup> Hannah More, writing in early 1797 to Zachary Macaulay, considered 'speculative infidelity, brought down to the pockets and capacities of the poor', as a 'new area in our history,' which required 'strong counteraction.'<sup>33</sup> As Reeves's Loyal Association was formed principally to counteract the influence of Rights of Man, so in comparable fashion were the Cheap Repository Tracts issued to counter The Age of Reason. A comment in a letter from Hannah More to Wilberforce in 1796 upon Watson's Apology clearly reveals the intent behind her tracts: 'I could tell him with great truth that I much admired it; but I told him also, that a shilling Poison, like Paine's, should not have a four shilling antidote.'<sup>34</sup> P.Q. of Salisbury advocated cheap editions of Watson to counteract Paine's work.<sup>35</sup>

From the above evidence, it is clearly apparent that Paine is, in both religion and politics, one of the crucial figures of the 1790's. His significance lies in his destruction of the symbolic universe of Christianity and Constitution, Church and King, in The Age of Reason and Rights of Man. Discussing the impact of infidelity in the 1790's R.N.Stromberg writes: Voltaire and Paine began to reach the English working classes.... about 1796.... This popular deism was not very important. Paine was effective through....Rights of Man, not The Age of Reason; if this extreme deist was to become the very 'centre and life' of the

'radical' political movement of the 1790's, it was not because he attacked religion, but because he spoke out against political corruption and inequality. This English Radicalism paid relatively little attention to religion.<sup>36</sup>

It should be apparent from the preceding pages, that such a separation of republicanism and infidelity is untenable, that in the minds of both radicals and conservatives, and especially among the latter, the two were inextricably fused. Perhaps it was in the interest of conservatives to emphasise, for purposes of propaganda, such an association. Retrospectively Southey considered that 'the union between infidelity and sedition during the late war.... ruined the democratic party.'<sup>37</sup> From its inception, infidelity and republicanism were inextricably connected within British popular radicalism.<sup>38</sup>

As a consequence of his pre-eminence in establishing such a connection, at least at an ideological level and within his own life, an examination of the writings of Thomas Paine, on both religious and political subjects, is essential. Although this part is concerned principally with Paine's writings on religion, it would be wrong to consider them either in isolation from the political writings of which the bulk of his work consists, or as a mere afterthought to these concerns. From his youth Paine was concerned with religion and in his declining years in New York State he was active primarily as a Deist. Politics were by no means his initial concern. A youthful interest in science preceded any political concerns:

The natural bent of my mind was to science... I had no disposition for politics. It presented to my mind no other idea than is contained in the word Jockeyship. When, therefore, I turned my thoughts upon matters of government, I had to form a system for myself that accorded with the moral and philosophic principles in which I had become educated.<sup>39</sup>

The understanding of Paine's intellectual background is dependent upon the interpretation of that final phrase. It was originally maintained by M.D.Conway, Paine's first serious biographer, that these principles were primarily those of a Quakerism acquired by assimilation during his childhood in Thetford.<sup>40</sup> Such an interpretation has been rendered obsolete, largely as a consequence of the detailed researches of H.H.Clark, who has argued that Paine's ideas on all subjects can be adequately explained only 'when the organic development of the complete body of his thought is considered in relation to the pattern of ideas germane to the Enlightenment, and, in particular, to scientific deism, which was powerfully reinforced by Newtonian doctrines of natural law and order.'<sup>41</sup> The crucial influences upon Paine's intellectual evolution were, argues Clark, the scientific lectures of those popularisers of Newtonianism, Benjamin Martin and James Ferguson, which 'may have aided in moulding his scientific deism.'<sup>42</sup> Far from his political preceding his religious opinions, 'his political theories...grew out of his religion, his scientific deism, and its moral and political implications', particularly his 'Newtonian' conception of the social harmony which would follow automatically upon the removal of traditional political impediments.<sup>43</sup>

As a believer in the applicability of scientific modes of thought and methods of investigation to all areas of existence, for Paine the essential task was to bring to bear the clarity of thought and simplicity of expression characteristic of science upon those regions where mystification had previously been dominant. It was upon the maintenance of such mystification that despotic power rested. Apropos the 'science' of government he wrote in 1795:

Notwithstanding the mystery with which the science of government has been enveloped; for the purpose of enslaving, plundering, and imposing upon mankind, it is all things the least mysterious and most easy to be understood. The meanest capacity cannot be at a

loss, if it begins its enquiries at the right point. Every art and science has some point, or alphabet, at which the study of that art or science begins; and by the assistance of which the progress is facilitated. The same method ought to be observed with respect to the science of government.<sup>44</sup>

Paine's writings are expressive of his belief in the decisiveness of an appeal to the innate rationality of his readers. In Common Sense he wrote:

In the following pages I offer nothing more than simple facts, plain arguments, and common sense: and have no other preliminaries to settle with the reader, than that he will divest himself of prejudice and prepossession, and suffer his reason and his feelings to determine for themselves: that he will put on, or rather that he will not put off, the true character of a man, and generously enlarge his views beyond the present day.<sup>45</sup>

Paine was the enemy of all forms of 'superstition', be they political or religious. His possession in full measure of the characteristic contemporary faith in the power of reason and his experience during the American Revolution convinced him of the immense potential impact of the political pamphlet addressed directly to the masses.<sup>46</sup> In 1792, when sales of cheap editions of Rights of Man were claimed to exceed 30,000 monthly, Paine wrote, apropos his impending prosecution in absentia for seditious libel:

...it will hereafter be placed in the history of extraordinary things, that a pamphlet produced by an individual, unconnected with any sect or party, ...that should compleatly frighten a whole Government, and that in the midst of its most triumphant security. Such a circumstance cannot fail to prove, that either the pamphlet has irresistible powers, or the Government very extraordinary defects, or both.<sup>47</sup>

In the same pamphlet he remarked that, 'Truth, whenever it can fully appear, is a thing naturally familiar to the mind, that an acquaintance commences at first sight', and that 'it is impossible to calculate the silent progress of opinion, and also impossible to govern a nation after it has changed its habits of thinking, by the craft or policy that it was governed by before.'<sup>48</sup>

A decade later he considered that had conditions in England approximated to those existing in the Colonies in 1776, Rights of Man would have produced results similar to those effected by Common Sense.<sup>49</sup>

Paine's faith in the power of reason, stemming both from personal experience and his scientific deism, in association with a democratic conception of politics as the concern of every man rather than the mysterious prerogative of a privileged minority, had certain definite stylistic consequences.<sup>50</sup> The central characteristic of this style was what might be termed 'the technique of demystification.' The simplicity and clarity of scientific discourse, which had been presented as an ideal prose model by Bishop Sprat as early as the 1660's, was opposed to the elaborate periods characteristic of the traditional literary manner.<sup>51</sup> As Clark observes, 'the distinctive features of Paine's theories of literary composition...were in no small measure conditioned by scientific deism.'<sup>52</sup> Just as the natural sciences were the enemies of superstition, in analogous fashion a prose modelled on scientific discourse was the appropriate instrument for the destruction of other forms of superstition. In Rights of Man his principal target was the 'political superstition' of hereditary government.<sup>53</sup> 'A superstitious reverence for ancient things' maintains the ignorance upon which tyranny rests.<sup>54</sup> He condemned Burke's 'contemptible opinion of mankind...as a herd of beings that must be governed by fraud, effigy and show.'<sup>55</sup> Men must be awakened from the dreams of superstition to a rational conception of their real interests. In contrast to Burke's melodramatic mystification and complex prose, clarity, vigour and economy of expression were essential in effecting the destruction of the great enemies, prejudice and ignorance.<sup>56</sup>



It is precisely the recognition of the difficult necessity of breaking through the centuries old prejudices forming so firm a bulwark of traditional authority that accounts for the force and brutality of Paine's style.<sup>57</sup> Only by demonstrating clearly to men their real interests, can prejudice be destroyed.<sup>58</sup> As Thompson observes, many expressions in Rights of Man have 'some of the dare-devil air of...blasphemy...He was the first to dare to express himself with such irreverence; and he destroyed with one book century-old taboos.'<sup>59</sup> His intention was to destroy the unthinking deference upon which traditional sources of authority depended; his technique was to present the familiar in an unfamiliar fashion, to make men observe the old in an entirely novel manner. Burke provides a description of this process of demystification as acute as it is hostile:

All the pleasing illusions, which made power gentle, and obedience liberal...are to be dissolved by this new conquering empire of light and reason. All the decent drapery of life is to be rudely torn off. All the super-added ideas...are to be exploded as a ridiculous, absurd, and antiquated fashion.

On this scheme of things, a king is but a man; a queen is but a woman.<sup>60</sup>

Paine himself offers what is by implication a valuable metaphor for this process of shock demystification when, discussing that 'silly contemptible thing', monarchy, he writes:

I compare it to something kept behind a curtain, about which there is a great deal of bustle and fuss, and a wonderful air of seeming solemnity, but when, by an accident, the curtain happens to be opened,<sup>61</sup> and the company see what it is, they burst into laughter.

The principal target for this treatment in his political writings is monarchy, 'the master-fraud, which shelters all others.'<sup>62</sup>

Demystification is as essential, if more difficult a task, in the realm of religion as of politics, the two congruent sources of the ignorance upon which tyranny was founded:

It has been the scheme of the Christian Church and all the other invented systems of religion to hold man in ignorance of his Creator, as it is of government to hold him in ignorance of his rights. The systems of the one are as false as those of the other, and are calculated for mutual support.<sup>63</sup>

Precisely because he is encountering an area far more beshrouded in an unthinking superstitious reverence, this technique is most pronounced in The Age of Reason. It was in areas so heavily invested with a mysterious significance that it was necessary to 'speak a language full and intelligible', to 'deal not in hints and intimations.'<sup>64</sup> His method is to present the Bible stories in the bald manner of everyday speech in order to demonstrate their patent absurdity when deprived of their traditional mode of presentation. Translated into such language, the narrative of the Fall and Atonement serves merely to 'excite laughter or detestation by its profaneness' and the Book of Genesis, once Moses' claim to authorship is disposed of, becomes 'an anonymous book of stories, fables and traditionary or invented absurdities, or downright lies. The story of Noah and his ark, drops to a level with the Arabian Tales.'<sup>65</sup> After translating the narrative of Christ's conception into 'intelligible language', he comments, 'When told in this manner there is not a priest but must be ashamed to own it.'<sup>66</sup> His later retelling of the conception narrative reinforces its absurdity by exiting incredulous laughter:

Were any girl that is now with child to say...that she was gotten with child by a ghost, and that an angel told her so, would she be believed? Certainly she would not. Why then are we told to believe the same thing of another whom we never saw, told by nobody knows whom, nor when nor where? .... Can any man of serious reflection hazard his future happiness upon the belief of a story



naturally impossible, repugnant to every idea of decency, and related by persons already detected of falsehood?'<sup>67</sup>

The vehement antagonism aroused by such passages among his critics is perhaps an index of their effectiveness.

It is common ground among students of Paine that his religious views were of long standing.<sup>68</sup> Conway's apparently sound conclusion that the first part of The Age of Reason was written prior to Herschel's discovery of Uranus in 1781 seems to have remained unchallenged.<sup>69</sup> Thus before offering any consideration of the origins and nature of Paine's infidelity, it is necessary to provide some kind of solution to the apparently bibliographical problem: why did Paine delay the publication of The Age of Reason until 1793 and why was it published then? There seems little reason to question Conway's view that the publication of at least Part 1 was the result of the threat of imminent execution, but this does not account for the continuing assault on Christianity which occupied the bulk of his remaining years.<sup>70</sup>

Paine's fierce criticism of Christianity was to a considerable extent a reversal of earlier views. While he had always defended an unlimited liberty of conscience from a position essentially detached from formal Christianity, rather like Franklin or David Williams he had always defended religion.<sup>71</sup> He avoided religious disputation, considering that 'Every religion is good that teaches man to be good; and I know of none that instructs him to be bad.'<sup>72</sup> Nevertheless, with his Protestant background, he had always associated 'spiritual freedom' with 'political liberty.'<sup>73</sup> Monarchy he considered comparable to popery.<sup>74</sup> Before the 1790's he did not see in religion a significant bar to political liberty. His observation in 1792 that 'religion is very improperly made a political machine', while an intimation of a changing opinion, still did not lead him beyond the demand of liberty of conscience into an attack on Christianity itself.<sup>75</sup>

As regard the origin of The Age of Reason, as distinct from any earlier manuscript in Paine's possession, Clark has argued that it was a growing recognition of the utilisation of religion for politically conservative purposes that was responsible for Paine's increasingly emphatic opposition toward Christianity.<sup>76</sup> Conway and Foner, following more directly Paine's own explanation, have argued that it was events in France which stimulated his overt criticism of Christianity.<sup>77</sup> In his own later account of its origins Paine offers two main explanations:

In the first place, I saw my life in continual danger...  
In the second place, the people of France (sic) were running headlong into Atheism, and I had the work translated and published in their own language to stop them in that career (sic), and fix them to the first article... of every Man's Creed who has any creed at all, I believe in God.'<sup>78</sup>

But Aldridge has offered the naively justifiable objection, that in a work intended to counteract atheism, the greater part consists of a criticism of Christianity.<sup>79</sup> Such an objection is valid insofar as it draws attention to the connection discerned by Paine between such apparent extremes; 'As to the Christian faith, it appears to me a species of atheism; a sort of religious denial of God....(which) produces only atheists and fanatics.'<sup>80</sup>

Paine seems to have been anxious during the period of dechristianisation in France 'lest in the general wreck of superstition...and false theology, we lose sight of morality, of humanity, and of the theology that is true.'<sup>81</sup> He had clearly become steadily more pessimistic about the prospects of political action alone during the 1790's, largely as a consequence of the unexpected strength of English reaction and the consuming ferocity of the French Revolution's factional struggles, the source of major personal suffering on Paine's part. Rights of Man contains numerous examples of Paine's optimism concerning the prospects of a rapid and relatively peaceful revolutionising within the decade of the whole of Europe.<sup>82</sup> Conceiving

of an imminent revolution in England comparable to those of France and America, he wrote: 'The present age will hereafter merit to be called the Age of Reason, and the present generation will appear to the future as the Adam of a new world.'<sup>83</sup> Only a year later, writing to Jefferson in April, 1793, he observed that, as a result of what he considered the Jacobins' immorality and imprudence in executing Louis XVI, these opportunities had vanished.<sup>84</sup> Evidently Paine saw in the excesses of the French Revolution the legacy of the inhumanity fostered by Christianity. Describing the origins of The Age of Reason, he wrote in the Preface to Part II:

The just and humane principles of the revolution...had been departed from. The idea...that priests could forgive sins... had blunted the feelings of humanity, and callously prepared men for the commission of all manner of crimes. The intolerant spirit of Church persecutions had transferred itself into politics; the tribunals, styled Revolutionary, supplied the place of an Inquisition; and the Guillotine of the State outdid the fire and faggot of the Church.<sup>85</sup>

In 1797 he wrote:

When we reflect on the long and dense night in which France and all Europe have remained plunged by their governments and their priests, we must feel less surprise than grief at the bewilderment caused by the first burst of light that dispels the darkness.<sup>86</sup>

It was to help to destroy a religion whose consequence was a 'practical atheism' which had fatally marred the early achievements and anticipations of the Revolution that Paine wrote The Age of Reason.

His fundamental concern with the immorality fostered by Christianity is plainly evident throughout his theological writings.<sup>87</sup> He argued that insistence upon exclusive divine revelations to particular individuals or groups had resulted in murderous intolerance between adherents of competing faiths and the neglect of God's universal revelation within the natural world and within the minds of men themselves.<sup>88</sup> Far from improving human dispositions, 'the obscene stories, the voluptuous debaucheries, the cruel and torturous executions, the unrelenting vindictiveness' which form a considerable portion of the Old Testament are 'a history of wickedness, that has served to corrupt and brutalise mankind.'<sup>89</sup> Paine's central objections to Christianity from a relatively early age were primarily moral and religious.<sup>90</sup> It was because of its inadequacy as a religion, because of its barbarous conception of a Deity and of the appropriate standards of human conduct that Paine regarded Christianity as inferior to Deism.<sup>91</sup>

How inadequate any conception of Paine is which considers him as basically irreligious has, since first criticised by Conway, been repeatedly emphasised by his biographers.<sup>92</sup> Paine's fundamentally religious impulse permeates all of his writings on the subject. He indignantly rejected the appellation of infidel given to him by Erskine:

Mr. Erskine is very little acquainted with theological subjects, if he does not know there is such a thing as a sincere and religious belief that the Bible is not the word of God. This is my belief; .... It is not infidelity, as Mr. Erskine profanely and abusively calls it; it is the direct reverse of infidelity. It is a pure religious belief, founded on the idea of the perfection of the Creator.<sup>93</sup>

In the same letter he wrote:

morality and religion, which is the most solid support thereof, are necessary to the maintenance of society, as well as to the happiness of mankind.<sup>94</sup>

Paine always regarded Deism as a religious position and towards the close of his life considered himself, according to the signature appended to one of his letters to The Prospect, 'A MEMBER OF THE DEISTICAL CHURCH.'<sup>95</sup>

Deism in its simplicity and genuine catholicity was the highest form of religion:

There is a happiness in Deism... that is not to be found in any other system of religion. All other systems have something in them that either shock our reason, or are repugnant to it, and man, if he thinks at all, must stifle his reason in order to believe them. But in Deism our reason and our belief become happily united.<sup>96</sup>

A further demonstration of Paine's religiosity can be found in his belief in personal immortality ridiculed as 'superstitious' by Carlyle.<sup>97</sup>

Although superficially paradoxical, it can be claimed that both his devastatingly effective critique of Christianity and the equally eloquent advocacy of natural religion originate in Paine's fundamental interest in science. We have already observed a youthful interest in science which preceded any corresponding interest in politics.<sup>98</sup> As he observed, 'The natural bent of my mind was to science.'<sup>99</sup> It is interesting to observe that a developing acquaintance with natural philosophy, particularly astronomy, reinforcing the moral revulsion already in existence, proved the culminating agency in his rejection of Christianity:

After I had made myself master of the use of the globes and of the orrery, and conceived an idea of the infinity of space and the eternal divisibility of matter, and obtained at least a general knowledge of what is called natural philosophy, I began to compare - or, as I have said, to confront - the eternal evidence those things afford with the Christian system of faith.<sup>100</sup>

He proceeded to argue that an awareness of the plurality of worlds 'renders the Christian system of faith at once little and ridiculous.'<sup>101</sup> His conception of the mechanistic sublimity of the universe supplied the basis for the kind of ridicule of Christianity which caused either delight or apoplectic horror:

From whence then could arise the solitary and strange conceit that the Almighty, who had millions of worlds equally dependent on his protection, should quit the care of all the rest and come to die in our world, because they say one man and one woman had eaten an apple? And, on the other hand, are we to suppose that every world in the boundless creation had an Eve, an apple, a serpent, and a redeemer? In this case, the person who is irreverently called the Son of God, and sometimes God himself, would have nothing else to do than travel from world to world, in an endless succession of deaths, with scarcely a momentary interval of life.<sup>102</sup>

The introductory observation makes it clear that there is another aspect of Paine's interest in science. For him natural philosophy leads on ineluctably to natural theology:

That which is called natural philosophy, embracing the whole circle of science, of which astronomy occupies the chief place, is the study of the works of God, and of the power and wisdom of God in his works, and is the true theology.<sup>103</sup>

Such an attitude to natural philosophy would vanquish both the fanaticism resulting from a search for God within any particular revelation and the atheism consequent upon the 'teaching (of) natural philosophy as an accomplishment only... instead of looking through the works of creation to the Creator himself.'<sup>104</sup>

Writing in 1804, he even uses that mainstay of natural theology, recently re-emphasised by Paley, the 'watchmaker' argument from design, to prove the existence of God.<sup>105</sup>

The paradox of Paine's attitude to science lies precisely in this combination of the platitudes of eighteenth-century natural theology and, considering the specific English context, the relatively novel critical

use of science. The prominence in eighteenth century England of a natural theology based upon widespread popularisation of Newton is well known.<sup>106</sup> A teleological conception of the universe was the common heritage of both rational Christian and freethinker. As Lecky observed in 1878: 'One of the most remarkable differences between eighteenth century Deism and modern freethinking is the almost complete absence in the former of arguments derived from the discoveries of science.'<sup>107</sup> Christianity customarily found itself under attack on the basis of its irrationality, immorality, and, increasingly, its inadequate historical veracity, rather than its incompatibility with the dominant Newtonian scientific world view.

How can the appearance in The Age of Reason of arguments derived from Newtonian natural philosophy alongside more traditional criticisms be accounted for? As a consequence of almost a century of itinerant scientific lecturing, Paine was able to assume the existence of a general scientific awareness among significant sections of his intended audience.<sup>108</sup> Paine's natural theology consisted entirely of the popularised Newtonianism purveyed at these lectures. However, while these lectures were aimed, with ambiguous results, at reinforcing belief in God's existence, they correspondingly proved dissolvent of the traditional conceptions of revelation and providence, of incarnation and resurrection, the theological and emotional foundations of Christianity. This perhaps may not have been significant during much of the eighteenth century when the debate on Christianity seemed confined to the respectable classes within a basically stable society and when even its principal defenders emphasised its rationality. But from the 1790's onwards when, particularly as a consequence of the impact of Evangelicalism upon these classes, the most irrational components of Christianity, the emphasis on innate human depravity and the threat of hell, began to be utilised as ideological agencies of social control against an emerging popular radicalism, for the first time one encounters, in Paine's Age of Reason, the use of scientific arguments against Christianity alongside the older ones mentioned above. It was at this moment that the radical implications of popular science first began to be evident, and it may be argued that Paley's Natural Theology (1802) was as much a response to a fearfully anticipated spread of infidel doctrines as Watson's Apology for the Bible (1796) or Wilberforce's Practical View (1797).

But why should the advocacy of natural philosophy figure so prominently in The Age of Reason and Paine's other theological writings? The importance of scientific instruction is clearly evident in Paine's programme for his Theophilanthropic Church in Paris in 1797, which aimed to 'combine theological knowledge with scientific instruction', principally for artisans.<sup>109</sup> There are, however, a considerable number of reasons why science should figure so prominently in the writings of Paine and later infidels. The appeal of science to Paine as a means of radically devaluing the learning and status of traditional intellectuals was absent among the earlier undemocratic opponents of Christianity. Science and traditional theology were the popular paradigms of useful and useless knowledge. Paine took the Baconian point of view that the progressive accumulation of the scientific knowledge resulting from the study of the works of 'the great mechanic of the creation, the first philosopher and original teacher of all science' was responsible for social progress.<sup>110</sup> Christianity, on the contrary, was responsible through its sustained persecution of science, for ignorance and stagnation.<sup>111</sup> Paine asserted the value of scientific knowledge against the forms of learning characteristic of traditional intellectuals, theology and the study of the classical, the 'dead' languages, distinguished equally by their practical inutility and their social exclusivity.<sup>112</sup> The priests had substituted 'the study of the dead languages instead of the sciences' as a means of maintaining the ignorance upon which their authority was based.<sup>113</sup> This was because of the democratic principles inherent within scientific knowledge.<sup>114</sup> Scientific knowledge was available and accessible to all literate and numerate individuals, offering a method of challenging and radically devaluing

society's traditional intellectuals and their ideology, for here in the person of Paine, was a self-taught artisan contemptuously vanquishing the clergy of England.

The sum total of a parson's learning, with very few exceptions, is a b, ab, and hic, haec, hoc; and their knowledge of science is three times one is three.<sup>115</sup>

The culmination of this democratic attack on traditional intellectualism which aroused so much antagonism was his suggestion of replacing churches with lecture halls and the clergy with scientific lecturers, a position which was to remain fundamental to infidel theory and practice and whose implications have remained unappreciated and unexplored.<sup>116</sup>

It has been argued that the traditional conception of Paine as the individual solely responsible for extending infidelity to the masses, largely a consequence of the semi-hysterical contemporary reaction to The Age of Reason, is to a considerable extent erroneous. That work's novelty lay almost entirely in the context in which it was both written and received. This changed context, that of social revolution in France and crisis of authority in England, was responsible for The Age of Reason's novelty and the reaction it elicited. This accounts for the firm association of congruent radical political and religious attitudes, on the part of both radical and conservative, absent in the previous controversies over religion which had taken place within a relatively stable society. Paine's brusqueness of style, the source of much antagonism, was demonstrably an integral component of his total literary and ideological project. Similarly, the critical reliance upon an almost entirely internal textual analysis of the contradictions and absurdities of the Bible in addition to arguments derived from an elementary scientific knowledge simultaneously appealed to the self-taught audience at which Paine was aiming and gave them the means and confidence to challenge the traditional intellectual's panoply of classical and historical learning so radically devalued in his writings. What remains to be considered is the extent of the circulation and impact of The Age of Reason and other similar works in the 1790's, insofar as this can be discovered.

Part 2 of this paper, 'The Impact of Infidelity' will appear in our next issue.

#### NOTES

1. J.R.Western. 'The Volunteer Movement as an anti-revolutionary Force'. E.H.R. (1956).p.603-5, 613: cf. A.Mitchell. 'The Association Movement of 1792-3'. Hist.Jl.(1961).p.57.
2. J.L.& B.Hammond.The Town Labourer 1760-1832. (Longmans,1920).p.93-4.
3. H.J.Perkin. The Origins of Modern English Society. (R.K.P.,1969).p.195.
4. E.P.Thompson. The Making of the English Working Class. (Penguin,1968). p.112-4, 202-3.
5. G.A.Williams. Artisans and Sans-Culottes. (Arnold,1968).p.66.
6. State Trials, xxii.p.1201,1237.
7. Ibid., p.381, 780.
8. Ibid., xxiii. p.1019, 1023, 1027, 1034.
9. Cf.Thompson. p.118.
- 10.P.A.Brown. The French Revolution in English History. (Cass,1918).p.71.
- 11.Thompson. p.166.
- 12.Mitchell. p.69.
- 13.E.Burke. Reflections on the Revolution in France. (Penguin,1968).p.237.
- 14.Ibid. p.244, 125.
- 15.Ibid. p.185-6.
- 16.Ibid. p.262.
- 17.Ibid. p.256.
- 18.A Barruel. Memoire pour servir a l'histoire du Jacobinisme; J.Robison. Proofs of a Conspiracy against all the Religions and Governments of Europe. The latter went through five editions in two years.R.A.Soloway. Prelates and People. (R.K.P.,1969). p.36n.

19. See Soloway, Chapter 1. M.J. Quinlan, Victorian Prelude. (N.Y., 1941), chapter III. V. Kiernan. 'Evangelicalism and the French Revolution', Past and Present, 1952.
20. The Gentleman's Magazine. LXVII (i). 1797. p. 188.
21. R. Watson. An Apology for the Bible. (London, 1797). p. 384.
22. W. Wilberforce. A Practical View of the Prevailing Religious System, etc. (London, 1797). p. 10, 398.
23. I. Padman. A Layman's Protest against... Thomas Paine. (1797). p. 190-1.
24. R. Hall. 'Modern Infidelity Considered with Respect to its Influence on Society' (1799). In Works. (7th. edition, 1841). i. p. 46-7.
25. Burke. p. 187.
26. E. Gibbon. Autobiography. (O.U.P., 1907). p. 249, 262, 216.
27. Hall. i. p. 59, 63.
28. H.A. Faulkner. Chartism and the Churches. (Columbia U.P., New York, 1916). p. 16. cf. Quinlan. p. 78. Brown. p. 182.
29. 'Will Chip' (Hannah More). A Country Carpenter's Confession of Faith. (1794). p. 21.
30. 'Churchman'. Christianity the Only True Theology; or, Answer to Paine's Age of Reason. (n.d.). p. 7-9.
31. Watson. p. 382.
32. Robison. p. 479-80.
33. W. Roberts. Memoirs of the Life and Correspondence of Mrs. Hannah More. (Seeley, 1834). ii. p. 458.
34. Ibid. p. 446. cf. Quinlan. p. 123.
35. Gentleman's Magazine. LXVI (i). 1796. p. 270.
36. R.N. Stromberg. Religious Liberalism in Eighteenth-Century England. (O.U.P., 1954). p. 164. This opinion is virtually repeated in the most recent article on The Age of Reason, F.K. Prochaska, 'Thomas Paine's The Age of Reason Revisited. Jl. Hist. Ideas. 1972, passim.
37. R. Southey. Letters from England (first published 1807; reprinted The Cresset Press, 1951). p. 400.
38. E.J. Hobbsbawn. Primitive Rebels. (Manchester U.P., 1959). p. 128. E. Royle. Radical Politics 1790-1900: Religion and Unbelief. (Longman, 1971). p. 3.
39. T. Paine. The Age of Reason. (Watts, 1938). p. 39-40.
40. M.D. Conway. The Life of Thomas Paine. (Putnam, 1892). i. p. 4-5, 231; ii. p. 182-220.
41. H.H. Clark. 'Toward a Reinterpretation of Thomas Paine'. American Lit., 1933. p. 133-4. On the question of Paine's relationship to Quakerism, see also, R.P. Falk. 'Thomas Paine: Deist or Quaker?' Pennsylvania Mag. of Hist. and Biog., 1938. R.R. Fennessy. Burke, Paine and the Rights of Man. A Difference of Political Opinion. (Martinus Nijhoff, The Hague, 1963). p. 12-14.
42. Clark. p. 135.
43. Ibid. p. 136-9.
44. T. Paine. 'An Essay on the First Principals of Government' (1795). Edited by M.D. Conway. Collected Writings. (republished. Franklin, N.Y., 1969). iii. p. 257.
45. Paine. 'Common Sense' (1776). Edited by W.M. Van der Weyde. Collected Works. (Thomas Paine National Hist. Assoc., N.Y., 1925). ii. p. 122-3.
46. If the American Revolution demonstrated to Paine the power of reason, it also demonstrated its limitations. Advocating a people's war against the German monarchies in 1792, he wrote: 'to reason with despots is throwing reason away. The best of arguments is a vigorous preparation.' (Conway, C.W., iii. p. 79).
47. Paine. 'Address to the Addressers' (1792). C.W., iii. p. 58, 55.
48. Ibid. p. 46, 94.
49. Paine. 'Letters to the Citizens of the United States'. C.W., iii. p. 382.
50. Cf. Fennessy. p. 245. J.T. Boulton. The Language of Politics in the Age of Wilkes and Burke. (R.K.P., 1963). p. 139.

51. T.Sprat. The History of the Royal Society of London. (1667). p.112-3.
52. Clark. p.144.
53. Paine. Rights of Man. (Watts, 1937). p.149.
54. Ibid. p.172.
55. Ibid. p.147.
56. Cf. 'Common Sense'. C.W. (Weyde). ii. p.93, 102, 106; Rights of Man. p.128; The Age of Reason. p.222.
57. Cf. Boulton. p.137-147.
58. Rights of Man. p.128, 121.
59. Thompson. p.100. Cf. Williams on Rights of Man: 'Most shattering is the tone; probably most effective of all was the contempt and jovial ferocity.....His insolence was the best cure for deference.' (op.cit., p.14, 15).
60. Burke. p.171. Of course he is not referring specifically to Paine.
61. Rights of Man. p.155. The differing uses made of the metaphore of the theatre are illuminatingly discussed in Boulton, op.cit., p.143-5. See also Tolstoy's description of the theatre as a source of corruption and mystification in War and Peace, Bk.VIII, Chap.IX, X.
62. Rights of Man. p.180.
63. Age of Reason. p.116. Since examples of this literary technique can easily be located within any of Paine's writings, it is unnecessary to burden the text with quotation. Here, for example, is his famous contemptuous dismissal of the claims to traditional authority of the English monarchy in Common Sense:  
A French bastard landing with an armed Banditti and establishing himself king of England against the consent of the natives is in plain terms a very paltry rascally original..... The plain truth is, that the antiquity of the English monarchy will not bear looking into.  
(C.W., Ed. Conway. i. p.80-1)
- In Rights of Man (p.145-6):  
Kings succeed each other not as rationals, but as animals...  
It requires some talent to be a common mechanic; but to be a king requires only the animal figure of a man - a sort of breathing automaton.
64. Age of Reason. p.222; cf. p.51.
65. Ibid. p.9, 77. See also p.86, 90, 106, 109, etc., etc...
66. Ibid. p.128-9.
67. Ibid. p.133, 132.
68. Clark. p.133-6. Conway, C.W. iv. p.4.
69. Conway, ed., C.W. iv. p.3-4. This argument is founded upon Paine's references to only five planets, Saturn, Jupiter, Mars, Venus and Mercury, neglecting the recently discovered Uranus (Age of Reason, p.33). Conway argues that, considering his well-known and intense interest in astronomy, it is inconceivable that Paine would have remained ignorant of Herschel's discovery for so long. Rather it would appear that Part I of The Age of Reason had remained in MSS for at least thirteen years before Paine, under threat of imminent execution, had it published without revision in France in 1793.
70. C.W. iv. p.12.
71. 'Common Sense', C.W. (Weyde). ii. p.162-3. Rights of Man, p.52. See chapter I, section III, on David Williams.
72. Rights of Man. p.240; cf. p.251.
73. 'Thoughts on Defensive War' (1775), C.W. (Weyde). ii. p.83.
74. Rights of Man, p.158.
75. Ibid. p.252.
76. Clark. p.136.
77. Conway, Life of Paine. i. p.209. Foner, Biographical Essay, C.W. of Paine, (1945). i. p. xxxvi.
78. Paine. Letter to S. Adams. 1802. C.W., iv. p.205. cf. Age of Reason. p.60.



79. A.O.Aldridge. Man of Reason. The Life of Thomas Paine. (Cresset Press, 1960).p.230.
80. The Age of Reason. p.28,165.
81. Ibid.,p.1.
82. 'For what we can foresee, all Europe may form but one great republic.' (Rights of Man,p.185). For other examples of such optimism, see ibid.p.82,114,127,254.
83. Ibid.p.149.
84. Paine.C.W.,iii.p.132-3: 'Had this revolution been conducted consistently with its principles, there was once a good prospect of extending liberty through the greatest part of Europe; but now I relinquish that hope.' In a letter to Danton dated 6 May, 1793, he wrote in a similar vein: 'I now despise of seeing the great object of European liberty accomplished, and my despise arises not from the combined foreign powers, not from the intrigues of aristocracy and priestcraft, but from the tumultuous misconduct with which the internal affairs of the present revolution are conducted.' (C.W.,iii,p.135). Cf. also 'Forgetfulness', (N.D.): 'Ah, France! thou hast ruined the character of a Revolution virtuously begun, and destroyed those who produced it.' (Ibid.,p.319).
85. The Age of Reason.p.60.
86. 'Agrarian Justice'. C.W.,iii.p.324.
87. Cf.Conway.Life of Paine. ii.p.198-9,202.
88. The Age of Reason. p.160-1.
89. Ibid.,p.13. The Age of Reason contains so many references to the immorality, of the Bible, by which Paine means the Old Testament, that it would be superfluous to give examples. The following passage, from a letter dated May 12, 1797, summarises succinctly the grounds for his objection to the Bible: 'It is from the Bible that man has learned cruelty, rapine, and murder; for the belief of a cruel God makes a cruel man.' (C.W.,iv.p.198). The complete letter is very important for an understanding for an understanding of Paine's theological views.
90. For a famous autobiographical passage see The Age of Reason, p.41.
91. Ibid.,41-2.
92. Conway called The Age of Reason, 'the work of an honest and devout mind' (Life, ii.p.182). Weyde considered it 'the work of a profoundly religious man' and 'essentially a religious work' (Life of Paine,vol.1. of C.W., p.394,402). Aldridge writes: 'he at all times defended religious belief as socially beneficial and individually satisfying' (Man of Reason, p.229). Leslie Stephen eventually modified his original opinion of Paine and wrote: 'Paine's appeal was not simply to licentious hatred of religion, but to genuine moral instincts. His 'blasphemy' was not against the Supreme God, but against Jehovah' (History of English Thought in the Eighteenth Century. (Harbinger,1962). i.p.392).
93. Paine. 'Letter to Erskine', 1797. C.W.,iv.p.230.
94. Ibid.p.233.
95. 'Prospect Papers',1804.C.W., iv.p.334.
96. Ibid.,p.316. For evidence that Paine's religious impulse was not purely intellectual, see ibid.,p.324-5 and The Age of Reason.p.42.
97. The Age of Reason.p.1,59,143,155-6,233-4. Carlyle.The Republican,April 2,1824,ix.p.437.
98. See above.
99. Age of Reason.p.39.
100. Ibid.,p.42.
101. Ibid.,p43.
102. Ibid.,p.49.
103. Ibid.,p.28.
104. 'The Existence of God',1797.C.W.,iv.p.236-40.
105. 'Prospect Papers'. C.W..iv.p.317.



106. C.G.Gillispie.Genesis and Geology. (Harper Torchbooks,N.Y.,1959), chapter 1. P.Heimann.'Newtonian Natural Philosophy and the Scientific Revolution'. Hist.of Science,1973.
107. W.E.H.Lecky. A History of England in the Eighteenth Century. (Longmans,1892).iii.p.5-7.
108. See chapter 1.
109. Paine.C.W.,iv.p.245.
110. The Age of Reason.p.169.
111. Ibid.,p.36-7.
112. Ibid.,33-5.
113. Ibid.,p.39.
114. Ibid.,p.35. The following quote should have appeared after the word 'knowledge' - 'the human mind has a natural disposition to scientific knowledge' (author's italics).
115. Ibid.,p.150.
116. Ibid.,p.169-70. Cf.C.W.iv.p.252.

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## THOMAS PAINE'S ASTRONOMY

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IN PART 1 OF THE AGE OF REASON, written during the French Revolution and completed we are told only a matter of hours before his arrest, Paine devotes some pages to a general account of astronomy as an introduction to his ideas on Christian theology. It is worth looking at this account in the light of knowledge as it was then and as it is now, and also to consider the sources of Paine's information.

He begins with a comment on the 'plurality of worlds', an idea from the ancient philosophers gaining acceptance in scientific circles in the eighteenth century largely by virtue of the work of Halley and Herschell, indicating the vastness of space and the lack of uniqueness in the existence of the Earth.

He then describes the Solar system - the sun and its six satellites or worlds, all in annual motion around the Sun, some satellites having their own satellites or moons in attendance, each world keeping its own track (the ecliptic) around the Sun. Each world spins around itself (rotates on its own axis) and this causes day and night. Most worlds, in their self-rotation, are tilted against their line of movement around the Sun (the obliquity of the ecliptic) and Paine quotes the correct figure for Earth of  $23\frac{1}{2}^{\circ}$ . It is this tilt that is responsible for the changing seasons and for the variation in the length of day and night-time over the world and throughout the seasons. Earth makes 365 rotations in one year's orbit of the Sun.

The six planets are then described with their distances from the Sun. These figures are incorrect now, but the figure he gives for Earth's distance, 88 million miles, agrees with the eighteenth century figure derived from Kepler's Laws of about 1620. In 1772 Bode formulated his empirical law of planetary distances giving the measurements more accurately than hitherto, but this information would not have permeated the circles in which Paine moved after his departure for America.

As proof that it is possible for man to know these distances he cites the fact that for centuries the precise date and time of eclipses and also the passage of a planet like Venus across the face of the Sun (a transit) have been calculated and forecast.

Beyond the Solar system, 'far beyond all power of calculation' (until Bessel calculated the distance of 61 Cygni in 1838) are the "fixed" stars, and these fixed stars 'continue always at the same distance from each other, and always in the same place, as does the Sun in the centre of the system'. William Herschell communicated to the Royal Society in 1783 that this was not in fact so, and that all stars were moving but at rates indiscernible as yet to man. Paine repeats a current idea that these 'fixed' stars or suns probably all have their own planets in attendance upon them. Thus the immensity of space.

'All our knowledge of science is derived from the revolutions those several planets or worlds of which our system is composed make in their circuit round the Sun'. He regards this multiplicity as a benefit bestowed by the Creator - otherwise, all that matter in one globe with no revolutionary motion (there are echoes of Newton here) would have deprived our senses and our scientific knowledge, - 'it is from the sciences that all the mechanical arts that contribute so much to our earthly felicity and comfort are derived'. He even suggests that the devotional gratitude of man is due to the Creator for this plurality.

The same opportunities of knowledge are available to the inhabitants of neighbouring planets and to the inhabitants of planets of other suns in the universe. The idea of a society of worlds Paine finds cheerful - a happy contrivance of the almighty for the instruction of mankind. What then of the Christian faith and the 'solitary and strange conceit that the Almighty, with millions of worlds equally dependent on his protection, should devote all his care to this world and come to die in it'? 'Has every world an Eve, an apple, a serpent and a redeemer?' And so to the rest of The Age of Reason.

Where did Paine obtain his astronomical information and instruction? It is unlikely he had any books with him, he certainly did not have a bible. Paris, seething with the Revolution, had Astronomer Bailly as mayor until his execution in 1793. Condorcet (author of Progress of the Human Spirit) and Lavoisier (the 'father of modern chemistry') were deeply involved and died in the Revolution. Laplace ('the French Newton') and astronomer Lalande were also in and around Paris at this time. But all these scientists, like Paine, would have been too busy to teach or discuss astronomy. So Paine would have had to recall the lectures and practical demonstrations he attended in London before he went to America. They were given by Benjamin Martin, James Ferguson, and Dr. John Bevis. It is worthwhile looking at the careers of these three men, mentioned only by surname early in The Age of Reason, because the facts, derived from the Dictionary of National Biography, afford some light on Paine's life in London.

Benjamin MARTIN (1704-1782). A ploughboy to begin with, he began to teach the 'three Rs' at Guildford while studying to become a mathematician, instrument-maker, and general compiler of information! He read Newton's Opticks (1705) and became an ardent follower of his ideas. He used a £500 legacy to buy instruments and books in order to become an itinerant lecturer. He had over 30 major publications to his name as well as a number of inventions. He perfected the Orrery (not named after its inventor, as Paine states, but after the patron of the copier of the invention!), and used his own version in his lectures. He lived in London, at Hadley's Quadrant in Fleet Street, from 1740 onwards. He died following attempted suicide in 1782.

James FERGUSON (1710-1776). A shepherd-boy in Banffshire at the age of ten. He took up medicine at Edinburgh but gave up to sketch embroidery patterns and then to paint portraits and continue his interest in astronomy. He used the income from his painting to enable him to begin as a teacher and lecturer in London in 1748, where he had arrived five years before. His book, Astronomy explained on Sir Isaac Newton's Principles (1756), went to at least thirteen editions and was used by William Herschell for his own study of astronomy. George III called on Ferguson for tuition in mechanics, and he was made a Fellow of the Royal Society in 1763. He became a busy lecturer in and around London in the middle of the eighteenth-century, sometimes also travelling to Newcastle, Derby, Bath and Bristol for speaking engagements. He occasionally had public disagreements with his wife - even in the middle of lectures!

Dr. John BEVIS (1693-1771). He studied medicine at Oxford and travelled widely in France and Italy before settling in London prior to 1730. Newton's Opticks was his favourite reading matter, and in 1738 he gave up his practice and moved out to Stoke Newington where he built his own observatory. Here, and at Greenwich, assisting Edmund Halley (who died in 1742) he did much astronomical work, and made a unique star-atlas, the Uranographia Britannica, the plates of which, however, were sequestered in chancery when the printer, John Neale, became bankrupt, and earned quite a reputation (internationally) as an astronomer. When Maskelyne became Astronomer Royal following the death of Bliss in 1764, Bevis, who had hoped for the appointment himself, returned to his medical

practice, setting up at the Temple. He was made a Fellow of the Royal Society in 1765. But astronomy got him in the end, for, continuing his studies, he was turning quickly from his telescope one day when he fell, sustaining injuries from which he died. It could only have been at this period of his life, at the Temple, as a F.R.S., that Paine knew him. 'As soon as I was able I purchased a pair of globes, and attended the philosophical lectures of Martin and Ferguson, and afterward acquainted with Dr. Bevis of the society called the Royal Society, then living in the Temple, and an excellent astronomer'.

Moncure Conway in his Life of Paine mentions that Rickman assigns the period of instruction in astronomy to the year 1767, but that he himself preferred the earlier time of 1757, when Paine would have been 20 years of age. Moreover, he suggests that Paine would have been too poor to afford globes in 1766-7. A study of the lives of his mentors shows clearly that he met Martin and Ferguson fairly certainly at the earlier time, but Dr. Bevis only at the later period, having bought his globes, terrestrial and celestial, ten years previously. On the first occasion he was a staymaker with Mr. Morris of Hanover Street; on the second he was teaching at Mr. Goodman's and then in Kensington.

There were some important events taking place in astronomy at this time but they seem to have escaped Paine's notice. William Herschell discovered the seventh, telescopic, planet in 1781. He wanted to call it 'George's Star', but it is now called Uranus. The scientists in Paris would have known all about this important discovery but one supposes that there would have been no occasion to discuss it with Paine; in any case he did not speak French fluently. There had been transits of Venus across the Sun in 1761 and 1769 (the only occasions that century) and Paine mentions them in a footnote to prove how man can know sufficient to predict these and similar events. They must have been occasions of much general public comment - especially when scientists were trying to calculate accurately the distance of the Sun from Earth at these events. And then in 1789, Herschell made his great 40 foot telescope, the envy of astronomers everywhere, indeed, the National Assembly were later to promote a prize for such an undertaking. However, time, scarcity of the necessary metals, and the shortage of money prevented any such project succeeding in stricken France.

Thomas Paine had minimal experience at the eyepiece of a telescope and he showed no inclination later in his life to pursue astronomical studies. But in these brief pages of The Age of Reason he shows he had gained a very clear understanding of the Solar system from those early days in London.

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BOOK REVIEW

David Rubinstein, Editor. People for the People. Radical Ideas and Personalities in British Social History. Introduction by Michael Foot. 254 pages. Illustrated. Ithaca Press. £3 (paper: £1).

WHEN I RECEIVED this book I thought that in the light of its title I would find a section on Richard Carlile. I was wrong. Once again Carlile, like Thomas Spence, remains one of the forgotten people in English (British) social history. Perhaps it can be argued that Spence achieved little and left less, although his political tokens have presented coin collectors not only with a multitude of problems but quite an historical bonanza, but at least the East German published tribute to William Gallacher did include a long and important essay on Spence. Carlile, alas, a pioneer in the fight for a free press, and a working class press at that, is ignored.

In this collection of essays you get the predicatable, Owen, Paine, Morris, Besant, Hardie, and one is tempted to say Old Uncle Tom Cobley and all, but that is being just a little naughty, or is it? The book contains some quite outstanding contributions, and some pretty dismal efforts too. Into the former category come the late Henry Collins contribution on Paine, Edward Thompson's on Peterloo and David Rubinstein's on Annie Besant, to name three. In the latter category there are.....well charity perhaps forbids me to mention them, but I must confess that I find the inclusion of Bradlaugh (an over-rated character if ever there was one, indeed a reactionary not a radical for all his use of secularism for his own ends) strange. Personally I would have thought that Holyoake had the better claim for inclusion in a work of this character.

Well after hitting out what does one make of the book as it stands? Well its good, even if it deals in the main with the familiar. Its worth getting, although I am uncertain as to what section of the reading populace towards which it is directed. Its time span is long and its field broad, perhaps if anything it fails only in that it is too ambitious in scope and so just as you expect to get deep into a subject the writer has reached his last paragraph. But then if it wets the appetite for more it has perhaps achieved its purpose.

Bari Logan.

