

# Wissenschaft in Worstedopolis: Public Science in Bradford, 1800–1850

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I TAKE as my text today an epistle of John—John Phillips writing from Birmingham in 1839: ‘in quieter towns like . . . York . . . peace, good order, [and] leisure favour the expansion of a philosophical spirit’.<sup>1</sup>

Some of you no doubt think that it is pointless to study science in places which have not been associated with eminent savants and their discoveries. Others may regard provincial science as a hyperborean cave from which the talented were fortunately released by a beckoning metropolis. Prima facie the case of science in Bradford in the nineteenth century seems to support this first view capitally: science as a cultural formation was so fragile that there appears little to study. For the historian of Whiggish persuasion there seems no paean to sing, only a threnody. The contrast with Manchester is simply dismal. If Manchester was Lancashire’s shock city of the industrial revolution, it was also a city of science; whereas Bradford was Yorkshire’s shock city but not apparently a scientific town. Though it nurtured distinguished Georgian virtuosi such as Abraham Sharp and Richard Richardson, in the nineteenth century it lacked renowned heroes equivalent to the Daltons, Joules and Roscoes, who remain secure in the scientific pantheon. Institutionally it lagged behind: the first Bradford Philosophical Society to last more than four years was launched in 1864, when the Manchester Lit and Phil was approaching its centenary. The Bradford Technical College, opened in 1882, came a generation after Owens College, *the* prototype British provincial science-based university.<sup>2</sup> Bradford’s record in producing scientific journals was

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<sup>1</sup> Phillips to Ann Phillips, 11 August 1839, Phillips papers, reproduced in J. B. Morrell and A. W. Thackray (eds), *Gentlemen of Science: early correspondence of the British Association for the Advancement of Science*, London, 1984, p. 322.

<sup>2</sup> An excellent account is given by J. F. Donnelly, ‘The development of technical education in Bradford, 1825–1900’, unpublished MEd thesis, University of Leeds, 1982, of which pp. 17–44 deal with scientific activity and education in Bradford before 1867.

miserable: none of its philosophical societies ever published separate memoirs or proceedings; and the town's first enduring journal came as late as 1884 when the Society of Dyers and Colourists was formed.<sup>3</sup> For a general science journal one waits until this century (1904) when the *Bradford Scientific Journal* was launched by the Bradford Scientific Association.<sup>4</sup> Even writers sympathetic to the West Riding of Yorkshire have either found little to say about Bradford science or deprecated the town's philistinism. In his important study of Yorkshire's contribution to science, Sheppard noted rightly that the spirit of Yorkshire science had moved around the county, but it never alighted on Bradford.<sup>5</sup> In recent years, Musson and Robinson have examined scientific aspiration as well as achievement; but they offered only one reference, and a passing one at that, to Bradford.<sup>6</sup> Two of the best local Victorian historians lamented the town's lack of encouragement to intellectuals. John James noted sadly that by 1840 science and literature still did not walk hand in hand with the genius of trade;<sup>7</sup> while in 1889 William Scruton stressed that the obsessive pursuit of commercial prosperity and material success had relegated science and philosophy to a subordinate position, even though the town was vastly wealthy and densely populated.<sup>8</sup> The popular object of worship in Bradford was not Minerva but what Ruskin in a speech at Bradford called 'the great Goddess of "getting on"'.<sup>9</sup> T. S. Eliot in *The Waste Land* merely reinforced a dominant image when describing a carbuncular young man as

'One of the low on whom assurance sits  
As a silk hat on a Bradford millionaire.'

And, of course, from the 1820s immigration and emigration helped to make the town into a settlement of strangers. Certainly there has been for decades a march of mind from the city. One remembers Fred Delius, Rothenstein, Sir Edward Appleton, J.B. Priestley, John Braine, Barbara Castle, Alan Bullock, Vic Feather, and that doyen of emigrants, my distinguished predecessor as President, Robert Fox. But some of us have steadfastly stayed where we were born, following the admirable example of

<sup>3</sup> F. M. Rowe and E. Clayton (eds), *The Jubilee issue of the Journal of the Society of Dyers and Colourists: 1884–1934*, Bradford, 1934.

<sup>4</sup> The Bradford Scientific Association, like the Bradford Natural History Society, was founded in 1875. It specialised at the research level in geology, leaving field biology to the Naturalists.

<sup>5</sup> T. Sheppard, *Yorkshire's contribution to science, with a bibliography of natural history publications*, London, 1916, p. 8.

<sup>6</sup> A. E. Musson and E. Robinson, *Science and technology in the industrial revolution*, Manchester, 1969, p. 181.

<sup>7</sup> J. James, *The history and topography of Bradford, (in the county of York,) with topographical notices of its parish*, London and Bradford, 1841, p. 19. This was not just routine rhetoric: pp. vii, ix, revealed that he could not publish by subscription because of the poor local response and that his research had not been greatly assisted by Bradfordians.

<sup>8</sup> W. Scruton, *Pen and pencil pictures of old Bradford*, Bradford, 1889, pp. 107–8.

<sup>9</sup> J. Ruskin, *The crown of wild olive*, London, 1906, p. 97, from his lecture 'Traffic' delivered in Bradford, 21 April 1864 (first published 1866).

the Bronte sisters, including the forgotten fourth sister, Doreen, alias Mavis, alias Dawn, alias Tracey, alias Julie, Bradford's answer to Mary Somerville.<sup>10</sup> All this seems to indicate that Bradford offers little scope for a Kargon-like study stressing enterprise and expertise or a Thackray-like analysis of cultural geography.<sup>11</sup> This conclusion will be welcome to those who think provincialism is a regrettable state of mind, but unacceptable to those who see provincialism as instructing us to recognise the complexities which the yearning for metropolitanism obscures.<sup>12</sup>

The historian of local urban science will gain much from Lord Briggs' classic study of Victorian cities. He stressed that industrialisation did not standardise towns but differentiated them. He demonstrated the importance of separate provincial cultures until the 1890s. He saw that lit and phils represented what *he* called 'the local cultural élite', a phrase subsequently bandied about by others. He has some splendid pages on Bradford, buried in a chapter on the civic pride of Leeds.<sup>13</sup> This is, of course, a historical solecism because when writing to Leodensians Victorians always addressed their letters 'Leeds, near Bradford'. In the last twenty years the value of local studies has become apparent through works which have managed to avoid the Scylla of antiquarianism and the Charybdis of boosterism because they have been informed by an awareness of national features and of historiographical issues. One of the most fruitful areas has been local administration, important in this country because much national legislation was implemented locally. In any case local bodies themselves had or could acquire considerable powers. That was why G.M. Young could assert that the change from early to late Victorian England was symbolized by the contrast between Manchester, home of free trade, and Birmingham with its civic gospel.<sup>14</sup> Matters such as incorporation of boroughs, sanitary reform, factory act agitation, chartism, elementary education, and the new poor law took different forms in different places: locality determined whether paupers lived in palaces or hovels.<sup>15</sup> Even more strikingly, some historians have mounted general theses of national scope on the basis of mainly local evidence. The most important contribution of the last twenty-five years to our understanding of class was made in 1963 by E.P. Thompson. This book was written in Yorkshire and coloured by sources from the West Riding of Yorkshire.<sup>16</sup> In any event, two years ago my predecessor discoursed eloquently on science,

<sup>10</sup> It is inexplicable that E. C. Patterson, *Mary Somerville and the cultivation of science 1815-1840*, The Hague, 1983, fails to mention Doreen Bronte.

<sup>11</sup> R. H. Kargon, *Science in Victorian Manchester. Enterprise and expertise*, Baltimore, 1977; A. W. Thackray, 'Natural knowledge in cultural context: the Manchester model', *American historical review*, 1974, 79, 672-709.

<sup>12</sup> R. Hoggart, *Speaking to each other. Volume 1. About society*, London, 1970, p. 74.

<sup>13</sup> A. Briggs, *Victorian cities*, Harmondsworth, 1968, pp. 43, 47, 140-163.

<sup>14</sup> G. M. Young, *Victorian England: portrait of an age*, Oxford, 1953, p. 124.

<sup>15</sup> D. Fraser (ed), *The new poor law in the nineteenth century*, London, 1976; A. Digby, *Pauper palaces*, London, 1978.

<sup>16</sup> E. P. Thompson, *The making of the English working class*, Harmondsworth, 1968, p. 14-15.

industry, and the social order in Mulhouse, concluding inter alia that history from the periphery is necessary to demolish shibboleths.<sup>17</sup> I intend to follow his approach by discussing some telling episodes in the annals of public science in Bradford, of Wissenschaft in Worstedopolis. At the same time I shall try not to ignore today's theme of science, technical change and work, though I do reserve for myself the Presidential prerogative of relative independence.

During the first half of the nineteenth century Bradford became one of the major towns of Victorian England on the basis of the mechanisation of the worsted textile industry and its concentration there. In 1801 it was a small place with a population of c13,000; by 1851 its population had topped the 100,000 mark, making it the seventh largest English town outside London, with an astounding population growth rate of more than 50% per decade from 1811.<sup>18</sup> After 1851 population growth was less rapid. Not surprisingly the decades from 1820 to 1850 were ones of turmoil. In 1825 the textile industry was in a state of transition: spinning was fully mechanised but combing and weaving hardly at all. Fearful of mechanisation, the combers and weavers launched the great strike of 1825 which ensured that class antagonism henceforth never abated until the 1850s.<sup>19</sup> It was this class antagonism which fuelled riots against the Poor Law in 1837, fed Owenite socialism which flourished from 1837 to about 1842, encouraged the Chartist disturbances of 1839 and 1848, prompted the plug riots of 1842, and most obviously made Bradford one of the leading centres for the factory reform movement. It was after all in Bradford that in 1830 Richard Oastler was awakened to the enormity of white slavery.<sup>20</sup> The mechanisation of weaving by 1850 and the slump which began in 1837 produced simultaneous structural and cyclical unemployment, which together ensured that industrialisation and its effects on different classes remained dominant issues in the town throughout the 1840s.

Socially Bradford was bottom-heavy. It was a raw and rough place. Its middle class was overwhelmingly commercial and manufacturing, but small in comparison to the vast lower-middle class and working class around it. Bradford was a town of migrants. In 1851 51% of the population had been born outside it, a far higher proportion than elsewhere in Yorkshire; of the population aged over 20, 70% had been born elsewhere. Roughly 10% of the population came from Ireland desperate for unskilled

<sup>17</sup> R. Fox, 'Science, industry, and the social order in Mulhouse, 1798–1871', *British Journal for the history of science*, 1984, 17, 127–68.

<sup>18</sup> The population figures were: 16,000 in 1811; 26,000 in 1821; 44,000 in 1831; 67,000 in 1841; 104,000 in 1851. See *Census of Great Britain, 1851. Population tables. I. Numbers of the inhabitants, in the years 1801, 1811, 1821, 1831, 1841, and 1851*, Parliamentary Papers, 1853, 85, cxxvi–cxxvii.

<sup>19</sup> For general material on Bradford there are two excellent recent books: D. G. Wright and J. A. Jowitt (eds), *Victorian Bradford: essays in honour of Jack Reynolds*, Bradford, 1982; J. Reynolds, *The great paternalist: Titus Salt and the growth of nineteenth-century Bradford*, Hounslow, 1983. D. G. Wright, 'Politics and opinion in nineteenth-century Bradford 1832–1880', unpublished PhD thesis, University of Leeds, 1966, is also very valuable.

<sup>20</sup> C. Driver, *Tory radical: the life of Richard Oastler*, New York, 1946, pp. 36–70.

work, giving Bradford the largest Irish population in Yorkshire and the 'Orange' disturbance of 1844.<sup>21</sup> It was a parvenu place full of strangers who lived in a settlement rather than a community, so that persons of taste found it difficult to become known to each other.<sup>22</sup> The machinery of social intercourse and the means of improving the small and beleaguered middle classes were not prominent.<sup>23</sup> Moreover, as Bradford was little more than an overblown village in 1800, it had a thin eighteenth-century heritage on which the burgeoning nineteenth-century industrial town could draw.<sup>24</sup>

Ecclesiastically and politically Bradford was a cock-pit of conflict, especially in the 1830s and 1840s. Renowned nationally as a citadel of dissent, in 1851 Bradford had the third highest proportion of nonconformists in urban England.<sup>25</sup> Most of these were evangelical nonconformists, the Congregationalists, Baptists, and Methodists, with the rational dissenters, Quakers and Unitarians, in a minority. Chapel-church strife reached its peak in the early 1840s with the seven-years long church-rate controversy won by the dissenters, many of whom politically were Liberals. In the 1840s the Liberals were in the ascendant in the town: they nourished *The Bradford Observer*, Bradford's first enduring newspaper, founded in 1834 as its analogue to Baines' *Leeds Mercury*; and after a long struggle against the Conservatives in the 1840s, they achieved the incorporation of Bradford in 1847 and municipal hegemony. In this decade several issues such as public health provided occasions for local party political battles between the Liberal incorporators and their Conservative opponents.<sup>26</sup> The flavour of the deep hostility between Conservative and Liberal was exquisitely revealed in 1834 when Richard Oastler launched a diatribe against the Liberal millocracy which founded *The Bradford Observer*. Its flavour may be judged from its title, *A letter to those sleek, pious, holy, devout dissenters, Messrs. Get-all, Keep-all, Grasp-all, Scrape-all, Whip-all, Gull-all, Cheat-all, Cant-all, Work-all, Sneak-all, Lie-well, Swear-well, Scratchem, etc, the shareholders in the 'Bradford Observer' . . .*

Physically and socially the town was offensive. It lay in a basin, a geographical fact which was associated with appalling housing, bad sanitation, air pollution, low life expectancy, and high infant mortality. In the 1840s these things were noted by a variety of observers, from public officials such as Chadwick and James Smith to private individuals such as

<sup>21</sup> A. Elliott, 'Social structure in the mid-nineteenth century' in Wright and Jowitt, *Victorian Bradford*, pp. 101–113.

<sup>22</sup> *Bradford observer*, editorial, 4 August 1859; *The Bradfordian*, editorial, 1860, 1, 30.

<sup>23</sup> Behrens, J. (ed), *Sir Jacob Behrens 1806–1889*, London, n.d., p. 38; *The Bradford Review*, editorial, 22 December 1864.

<sup>24</sup> I owe this important point to Tony Jowitt. In 1838 Behrens thought Bradford, with a population of about 60,000 was still an overgrown village: Behrens, *Behrens*, p. 38.

<sup>25</sup> J. A. Jowitt, 'The pattern of religion in Victorian Bradford' in Wright and Jowitt, *Victorian Bradford*, pp. 37–61.

<sup>26</sup> W. Cudworth, *Historical notes on the Bradford Corporation*, Bradford, 1881; A. Elliott, 'The establishment of municipal government in Bradford 1837–1857', unpublished PhD thesis, University of Bradford, 1976; G. B. Hurst, *Closed chapters*, Manchester, 1942, pp. 4–5. 18.

Engels and Weerth. Their general verdict was that Bradford was a 'most filthy town'.<sup>27</sup> Here are the impressions of a German immigrant, Georg Weerth, in the 1840s:

'Every other factory town in England is a paradise in comparison to this hole. In Manchester the air lies like lead upon you; in Birmingham it is just as if you were sitting with your nose in a stove pipe; in Leeds you have to cough, because of the dust and the stink, as if you had swallowed a pound of Cayenne pepper at one go; but you can still put up with all that. In Bradford, however, you think you have been lodged . . . with the Devil incarnate . . . If anyone wants to feel how a poor sinner is . . . tormented in Purgatory, let him travel to Bradford.'<sup>28</sup>

Morally, too, the town's promiscuity and drunkenness were notorious. The ratio of brothels to all places of worship was about 1.4 to 1.<sup>29</sup> Drunken fighting was endemic and was the speciality of the Irish: whereas Yorkshiremen sensibly laid still and grunted when knocked down, the belligerent Hibernians, full of war and whisky, jumped up again and felled their antagonists.<sup>30</sup> The deterioration of the town was so alarming that in 1849 Titus Salt, then Mayor, launched an enquiry into the best means of improving its moral, social and religious condition. The report of 1850 drew attention to the infidelity rampant in the lower orders, but reserved its heaviest fire for the beershops and brothels, with their vicious and enervating pleasures; and it proposed measures (some implemented) for raising the town's moral and intellectual character which it saw (like beershops and brothels) as being intimately connected. Salt's own reaction was instructive. In 1851, having decided that the town's problems were intractable, he began building his own industrial township of Saltaire, on the salubrious banks of the river Aire, away from Bradford's various pollutions.<sup>31</sup>

In the turbulent, divided, and violent town there was no shortage of pressure groups especially after the 1820s devoted to alleviating or removing intolerable social evils. Besides the obvious example of factory reform agitation, there was in the town a strong temperance movement. Indeed, in February 1830 Henry Forbes, a worsted merchant of Scottish provenance, established in Bradford the first English temperance society. It inspired neighbouring Leeds to follow suit, and (for a time) Anglicans and dissenters, Liberals and Conservatives worked in harmony in it. In 1837 the Bradford Temperance Society was the first in England to build a

<sup>27</sup> *Second report of the Commissioners for inquiring into the state of large towns and populous districts. Appendix. Part II*, Parliamentary Papers, 1845, 18, 315.

<sup>28</sup> Quoted in J. Reynolds, *Saltire: an introduction to the village of Sir Titus Salt*, Bradford, 1976, p. 8.

<sup>29</sup> I. and P. Kuczynski (eds), *A young revolutionary in nineteenth-century England: selected writings of Georg Weerth*, Berlin, 1971, p. 187. Georg Weerth (1822–56).

<sup>30</sup> G. Firth, *Poverty and progress: social conditions in early and mid nineteenth century Bradford*, Bradford, 1979, p. 6.

<sup>31</sup> For Salt's report, see *Bradford observer*, 7 March 1850; on Saltaire, Reynolds, *Titus Salt*, especially pp. 88–147 for penetrating analysis of the period 1834–1850, which he designates as years of crisis. Titus Salt (1803–76), *DNB*.

permanent temperance hall. Like the anti-slavery movement on which it was modelled, the temperance movement was devoted to moral and religious issues, though in a textile town like Bradford it also promised the secular advantages of security of property, a more disciplined work force, and an expanded home market in worsted goods (not alcohol!).<sup>32</sup>

Evangelical fervour against intolerable evils was one thing; the creation of groups devoted to intellectual ends, such as science, another. With the exception of its private Subscription Library (founded 1774), its Choral Society (founded 1823), and its second Mechanics' Institute (founded 1832) cultural formations were difficult to establish and to maintain. The history of organised science in Bradford until the mid 1860s is mainly one of struggling ephemerality. The first lit and phil lasted from 1808 to 1810, the second lasted only a few months in late 1822, and the third four years from 1839 to 1843. Bradford did not contribute to the county-wide boom of the lit-and-phil movement in the 1820s; and its enduring mechanics' institute came as late as 1832.<sup>33</sup> Compared with Sheffield and Liverpool it spawned relatively few scientific groups.<sup>34</sup> Compared with Mulhouse, on which my predecessor dilated so eloquently, it had no equivalent to the Société Industrielle (founded in 1826) until the Society of Dyers and Colourists was established partly on the Mulhouse model in 1884. Science as a cultural mode was not dominant as it apparently was in Manchester: the Bradford 'team' of performers in a county peripatetic organisation such as the Yorkshire Geological Society (founded 1837) was small compared with the Leeds and Sheffield contingents, membership of the British Association for the Advancement of Science was low, and that philosophical carnival waited until 1873 before visiting the town. Even that visit by the touring scientific lions did little to disturb the town's apparent apathy in all scientific and literary matters.<sup>35</sup> Privately Bradfordians were not conspicuous as patrons of scientific books about Yorkshire: in 1836 John Phillips' classic study of the limestone part of the county attracted only five subscribers from Bradford.<sup>36</sup> Even by 1860, as a local cultural pundit put it, science and literature were still 'the

<sup>32</sup> For the Bradford temperance movement see: B. Harrison, *Drink and the Victorians*, London, 1971, pp. 95–97, 104–5, 191; *Second annual report of the Bradford Temperance Society. Presented June 29, 1832*, Bradford, 1832, pp. 9–13; *Proceedings at the opening of the Bradford Temperance Hall on . . . 27th and 28th February, and 1st and 2nd March 1838*, Bradford, 1838. Henry Forbes (1794–1870).

<sup>33</sup> The dates of foundation of the principal Yorkshire lit and phils were: Leeds, 1818; York, Sheffield, Hull, and Whitby, 1822; Scarborough, 1827. H. Dirks, *Popular education: a series of papers on the nature, objects, and advantages of mechanics' institutions*, Manchester, 1841, p. 3, stressed that 1823–24 was the boom session, with large towns vying with each other.

<sup>34</sup> On Sheffield and Derby and much else see I. Inkster, 'Studies in the social history of science in England during the industrial revolution', unpublished PhD thesis, University of Sheffield, 1977.

<sup>35</sup> *Bradford observer*, editorial, 2 May 1874. Contrast the National Association for the Promotion of Social Science which held its third annual meeting in Bradford in 1859, and the British Association which held its 43rd annual meeting in the town in 1873.

<sup>36</sup> J. Phillips, *Illustrations of the geology of Yorkshire. Part II. The mountain limestone district*, London, 1836, pp. v–vii. The Bradford subscribers were John Armistead, John Wilmer Field, Samuel Hailstone, Henry Leah and John Hustler.

drudges of social necessities': the town had no philosophical society, no antiquarian or historical society, no literary society, no public museum, and no free library.<sup>37</sup> Another commentator, the weaver poet Ben Preston, attributed what he called the 'mental degradation' of the town to the long hours spent in the mills: Bradford was full of perpetual workers, both masters and hands, who exemplified the motto chosen by the Corporation, 'Labor omnia vincit'.<sup>38</sup> Clearly the scientific enterprise at the savant level was fragile in the period of Bradford's rise to international economic importance; though as Dame Mabel Tylecote stressed years ago the 1832 Mechanics' Institute was remarkably resilient.<sup>39</sup> Why was this? To answer this question let us now turn to what is very much work in progress on public science in Bradford.

The first Bradford Literary and Philosophical Society, which lasted from 1808 to 1810, was explicitly industrial in its aims. It was in intention devoted not only to science but mainly to the improvement of mechanical arts and manufactures. Not surprisingly it was dominated by men with industrial interests, especially those from the Low Moor and Bierley Iron Works both of which flourished during the Napoleonic period through manufacturing armaments. The first President was Joseph Dawson, principal partner of the Low Moor Iron Works, who was also President of the Association of Iron Masters of Yorkshire and Derbyshire. A former Unitarian minister, Dawson combined in himself nonconformity, science, and industry. Bierley Iron Works was represented by its lessee, Henry Leah, who discovered the hot blast process independently of Neilson. The principal founder of the Society was the craggy Samuel Hailstone, a ranking expert on Yorkshire flora, by occupation a leading local lawyer who was heavily involved in the local iron industry and in a couple of local canal companies. Another leading spirit was Joseph Priestley, chief manager of the Leeds-Liverpool Canal Company. These four worthies were the only performers the Society could muster from a town with a population of 15,000: practising clerics and medics offered no papers and were thinly represented in the membership. The Society expired in 1810 not because of conflict between Tories and Whigs or between Anglicans and dissenters or because of legislative repression, but because it quickly ran out of local intellectual steam: in spring 1809 five consecutive meetings were all adjourned because there was no paper.<sup>40</sup>

<sup>37</sup> *The Bradfordian*, editorial, 1862, 2, 2; J. Hanson, *Free libraries; their nature and operations: four letters addressed to Mr Alderman Godwin*, Bradford, 1867.

<sup>38</sup> W. Scruton, *Bradford fifty years ago*, Bradford, 1897, p. 97.

<sup>39</sup> M. Tylecote, *The mechanics' institutes of Lancashire and Yorkshire before 1851*, Manchester, 1957, pp. 224–5.

<sup>40</sup> My account is based on: 'The first Bradford Philosophical Society', *Bradford Antiquary*, 1905, 4, 462–4; minute book of the Bradford Philosophical Society, 1808–10, York Minster Library, Add Ms 204. There were three Yorkshire Joseph Priestleys who are still confused by the unwary: the discoverer of oxygen (1733–1804), *DNB*; the manager of the Leeds-Liverpool Canal (1739/40–1817); and a son (c. 1767–1852) of the Canal manager, author of the still useful *Historical account of the navigable rivers, canals, and railways, throughout Great Britain*, London, 1831. Joseph Dawson (1740–1813); Henry Leah (1772–1846); Samuel Hailstone (1768–1851), *DNB*.



The next attempt to form a philosophical society was made in 1822, with Hailstone again to the fore. This time the industrial motive was mixed with others, such as natural theology, individual moral improvement, and local pride. Bradford's wealth was to be devoted to emulating other northern industrial towns, especially neighbouring Leeds, so that in the glorious race of learning she would not be outstripped by her contemporaries. The aims were correspondingly wide: to promote literature, science, and natural history by erecting a philosophical hall, replete with a library, specimens, apparatus, a news room, a circulating library, and a laboratory. Some 42 affluent locals took seriously Bacon's view that academies, colleges, and halls are the storehouses of knowledge: they subscribed £50 each towards a building which would give permanence to the projected Society and be a local facility worthy of a town of 28,000 people. Unfortunately they started at the wrong end: instead of first cultivating the local taste for science and then paying for an expensive local habitation, they were initially consumed by the vaulting ambition of heroic provincialism (to use Philip Lowe's happy phrase). But some of them soon had second thoughts when Henry Heap, the vicar of Bradford, preached a sermon in which he castigated the irreligious tendency of philosophy: lacking moral and scientific force, they took fright, withdrew their pledged subscriptions, and the whole project collapsed.<sup>41</sup>

Three years later the first Mechanics' Institute failed, even though 1825 was in general a propitious year for the formation of such institutes in the north of England (Manchester, Bolton, Ashton, Hull, Halifax). At the inaugural meeting, held in the parish church Sunday School, local governing and professional élites were sparsely represented: of the town's respectable citizens, only Joshua Pollard, an Anglican manufacturer, and Thomas Beaumont, a Methodist doctor, attended, so that the audience of 200 was composed of mainly mechanics. The chief speaker was Edward Baines, junior, from Leeds, who stressed that all classes could unite in the scheme because they have common interests; accordingly he appealed to the rich, the enlightened, the employers, the ministers, and the magistrates to support the venture. Two speakers referred to a view in the town that a mechanics' institute would promote ideas at variance with religion and the laws of the country. The 1825 scheme foundered on these two rocks of political hostility and religious suspicion. From the start the Institute was

<sup>41</sup> My analysis of the 1822 Society draws on: list of subscribers reproduced in *Bradford Review*, 24 December 1864; *Leeds Mercury*, 21 September 1822; *Leeds Intelligencer*, 25 November 1822; *Leeds Mercury*, 18 and 23 January 1823, giving details of a meeting held on 15 January 1823 at which resolutions were adopted to establish a literary and philosophical Society, John Hustler in the chair; Scruton, *Old Bradford*, pp. 90–91; James, *History of Bradford*, pp. 245–6; Thomas Beaumont's speech, *Bradford observer*, 31 January 1839. John Hustler (1768–1842) of the well-known Quaker family; Thomas Beaumont (1795–1859), a surgeon; Henry Heap (1789–1839), vicar of Bradford 1816–39, was curiously one of the 42 subscribers. For Lowe's characterisation see P. D. Lowe, 'Locals and cosmopolitans. A model for the social organisation of provincial science in the nineteenth century', unpublished MPhil thesis, University of Sussex, 1978.

effectively in the hands of the mechanics themselves and not a paternalistic middle-class coterie. The organising committee was to be elected annually by ballot, with artisans always in a majority. Moreover some of the Institute's supporters were well-known political activists. The Secretary, Squire Farrar, a law-clerk, was especially obnoxious to the middle classes because of his revolutionary republicanism and religious scepticism. Other political radicals involved were: Christopher Wilkinson, a printer and freethinker; and John Jackson, a woolcomber and later a moral-force Chartist.<sup>42</sup> The only clergyman to join such men was the Unitarian Nicholas Heineken who in late 1824 had argued publicly that the Devil did not exist, that scriptural geology was a fable, that the Bible was a mere historical record to be interpreted like other histories, that terms such as redemption and atonement were merely anthropomorphic and figurative terms which did not imply a vicarious sacrifice, and that he was not disposed to trace 'common events to supernatural causes'. Such views appalled local Anglicans and evangelical dissenters who thought Heineken was encouraging secularism, atheism, and materialism. For them Heineken's Socinian scoffing was 'more dangerous than a draught of hemlock'.<sup>43</sup> They had a point: 10 years later Heineken's arguments were being used by Bradford atheists to attack Christianity. Not surprisingly most Anglicans and evangelical dissenters in the town boycotted the Institute which collapsed in the turmoil of the long strike later in 1825. It is significant that Heap, the vicar of Bradford, opposed popular education because he saw it as a vehicle of political and religious subversion; but from 1825 he took a prominent share in establishing and supporting the Bradford Dispensary.<sup>44</sup>

In spring 1832, at the height of reform agitation and with the memory of the 1825 strike still fresh, a permanent Mechanics' Institute was established through the organisational acumen of a group of young tradesmen who saw it was essential to gain the support and money of the accredited wealthy middle class, and to co-opt their clergymen, in order to avoid the political and religious disadvantages which had led to the demise of its short-lived predecessor. In spite of the proclaimed unsectarianism of

<sup>42</sup> James, *History of Bradford*, p. 248; British Library Add Mss 27, 824, ff. 71–2; *The journal of Dr John Simpson of Bradford. 1st of January to the 25th of July 1825*, Bradford, 1981, pp. 13–14, 42; *Rules of the Bradford Mechanics' Institute, established February 21st, 1825*, Bradford, 1825. Joshua Pollard (1794–1887), Tory merchant and manufacturer; Edward Baines (1800–90), *DNB*; Squire Farrar (1785–1873); John Jackson (d. 1873).

<sup>43</sup> For the views of Nicholas Thomas Heineken (1763–1840), and the controversy they provoked see his *A discourse on the supposed existence of an evil spirit, called the devil; and also, a reply to the observations of Mr William Carlisle, of Dudley Hill, near Bradford, the ostensible author of an 'essay on evil spirits', written in opposition to the discourse which was delivered in the Unitarian chapel, Bradford*, London, 1825; W. Carlisle, *An essay on evil spirits; or, reasons to prove their existence, in opposition to a lecture, delivered by the Rev. N. T. Heineken, in the Unitarian chapel, Bradford*, Bradford, 1825, p. 8 (quote); I. Mann, *Strictures on the Rev. N. T. Heineken's reply to Mr William Carlisle, in which is proved the close alliance that exists between Socinianism and Deism*, Bradford, 1826; N. T. Heineken, *Observations on the unity, supremacy, and free unpurchased mercy of God, in answer to the Rev. I. Mann's intemperate and arrogant strictures, on Mr Heineken's reply to Mr William Carlisle's essay on evil spirits*, London, 1826. Isaac Mann (d. 1831) was Baptist minister at Shipley near Bradford.

<sup>44</sup> On Heap, see James, *History of Bradford*, pp. 213–14; Scruton, *Old Bradford*, p. 34.

the Institute, the Anglican clergy and laity and their then allies, the Wesleyan Methodists, generally boycotted it on the grounds that it would favour rabid democracy and infidelity.<sup>45</sup> Their absence meant that from its inception the ostensibly non-sectarian Institute was controlled on a day to day basis mainly by Congregationalists, graced by Baptist clergymen in the Presidency, and supported by Quakers as rich Patrons. These managers knew that public support was contingent upon the exclusion of infidel tendencies: the Institute's rules made it clear that it was Christian and opposed to irreligion, immorality, and scepticism; and moreover, controversial theology like party politics would be excluded. The 1832 Mechanics' Institute enjoyed a continuous life because its managers produced a formula which was both a tactic for survival *and* a means of containing political radicalism and religious scepticism. That was why they repeatedly stressed that the 1832 Institute was not 'a seminary of disaffection, a school for infidelity, and a nursery for political demagogues and anarchists'.<sup>46</sup> These managers also saw that in a town of population 45,000, the vision of science for the workers could sustain middle-class concern and might produce beneficial *class* effects.<sup>47</sup> Leading spokesmen for the Mechanics' Institute were convinced that the improvement of the lower classes was to the advantage of the superior ones, because 'the common people are the ground on which the superior classes, the palaces and pyramids of society are raised'. They also argued that the Mechanics' Institute would preserve rank in society, keep anarchy at bay, and provide the common ground on which different classes and sects could meet without either sacrifice of principle or danger of collision.<sup>48</sup>

The scheme of social and religious insurance embodied in the Mechanics' Institute was quickly questioned when the atheist controversy erupted in 1834, the year which witnessed the start of sustained hostility between church and chapel, in addition to the existing division between Christianity and infidelity. The polemicists were Benjamin Godwin, a Baptist minister and prominent Liberal, and Wilkinson and Farrar, known

<sup>45</sup> My account draws on: J. F. C. Harrison, *Learning and living 1790–1960: a study in the history of the English adult education movement*, London, 1961, pp. 61–2, 174–7; C. A. Federer, *The Bradford Mechanics' Institute. A History*, Bradford Public Library, typescript, 1906; M. Tylecote, *Mechanics' institutes*, pp. 224–240; J. Farrar, *Autobiography of Joseph Farrar*, Bradford, 1889, pp. 45–51; Benjamin Godwin, *Autobiography*, Bradford Public Library archives, typescript, pp. 537–9. For the start of Anglican default, see Bradford Mechanics' Institute minutes book, 1832–1834, 27 March 1832, Bradford Public Library archives: Heap was invited to be a patron but declined.

<sup>46</sup> *Second annual report of the committee of Bradford Mechanics' Institute . . . presented January 31, 1834*, Bradford, 1834, p. 1.

<sup>47</sup> Compare S. Shapin, 'The Pottery Philosophical Society, 1819–1835: an examination of the cultural uses of provincial science', *Science studies*, 1972, 2, 311–36 (esp. 333).

<sup>48</sup> *Account of the proceedings connected with the inauguration of the Rev. J. Acworth as President of the Bradford Mechanics' Institute, September 26th, 1837*, Bradford, 1837, 7 (quote), 8, 24. Speeches were given by: the Reverend Walter Scott (1779–1858), Principal of Airedale Congregationalist College, Bradford, 1834–58; and the Reverend James Acworth (1798–1883), President of the Baptist College, Bradford, 1835–59. Acworth enjoyed a double succession to the Reverend William Steadman (1764–1837), who was first President of the Baptist College, 1806–35, and first President of the Mechanics' Institute, 1832–7.

secularists who at that time were also active in running the Bradford Radical Association which represented the interests of the labour aristocracy. Godwin had long been appalled by Bradford's 'daring spirit of infidelity' which drew heavily on works popular among sceptics: these were principally Mirabaud's *System of Nature* in English translation (3rd ed., 2 vols., 1817), Hume's *Dialogues on natural religion*, Elihu Palmer's *Principles of nature*, and Richard Carlile's *The Deist*. Given the general drift of these works, Godwin decided to route infidelity by reference to nature and not to the Bible. Early in 1834 he gave a crowded course of lectures in Sion Chapel attacking atheism, drawing heavily on his long experience of teaching science, his advocacy of a liberal and not dogmatic Baptist approach, his conviction that public debate, not fining or jailing, was the best way to defeat infidelity, and above all on his belief in natural theology. Objecting to the way that atheism dressed itself out in the garbs of science, Godwin made a distinction which John Henry Newman was to promulgate later, i.e., that tracing God's hand in nature leads to enlarged and exalted views of God, only if connected with 'the religious principle'; if not so connected, the study of nature, urged on by unaided pride of intellect, can lead to infidelity.<sup>49</sup> Undeterred by this distinction, Godwin's lectures relied on a natural theological approach, using such recent sources as three Bridgewater Treatises (those by Whewell, Kidd, and Roget), and Sedgwick's *Discourse on the studies of Cambridge* (3rd ed., March 1834). Using Lyell's arguments he tried to dispose of Lamarckian evolution and Mirabaudian spontaneous generation, which he rightly saw as impugning inter alia the uniqueness of man. In contrast to many natural theologians of the 1830s, Godwin faced up squarely to Hume's views about the inadequacy of design arguments.<sup>50</sup>

Godwin was soon answered by Wilkinson and Farrar in a publication which was such a defence of 'the most absolute atheism' that booksellers would not handle it and its printer tried to suppress it. Even so 150 copies appeared. Wilkinson and Farrar, drawing largely on Hume and Mirabaud, paid Godwin the tribute of bracketing him with Lord Brougham, whose *Natural Theology* had just been published, in order to show that neither Godwin nor Brougham realised the flaws in analogical and anthropomorphic arguments. Wilkinson and Farrar paraded their materialism and radicalism confidently, arguing that man is a purely material being, and that the relation between mind and matter is like the relation between capital and labour. In their view capital was the mind of labour,

<sup>49</sup> B. Godwin, *Lectures on the atheistic controversy; delivered in the months of February and March, 1834, at Sion chapel, Bradford, forming the first part of a course of lectures on infidelity*, London, 1834, pp. v (quote)-xi; Godwin, *Autobiography*, pp. 577-8; for Newman on scientific pursuits, see his *Letters on an address delivered by Sir Robert Peel on the establishment of a reading room at Tamworth*, London, 1841, esp. p. 41. Godwin (1785-1871) left Bradford in 1836 for ten years. A good general survey of the infidel tradition is E. Royle, *Victorian infidels: the origins of the British secularist movement 1791-1866*, Manchester, 1974, esp. pp. 9-58.

<sup>50</sup> For the attack on Lamarck, Godwin, *Lectures*, pp. 170-80; for that on Hume, pp. 180 6, 190 231.

but could act only through the intervention of labour. Hence they concluded that 'to attribute the works of man to mind or intelligence is like attributing the improvements of the age to capital', and that to claim that mind originated matter is as daft as saying that capital has originated labour.<sup>51</sup>

This atheistic controversy gained for Godwin two American editions in 1835 and 1836, and a Columbia DD in 1842. Nearer home it showed that the promotion and justification of natural knowledge as theological edification could be strongly opposed. Indeed the controversy launched a series of public debates in the town between Christians and non-Christians, culminating in the early 1850s with the ageing Godwin confronting Holyoake, the advocate of atheistic socialism in its new guise of secularism, and giving a repeat performance of the 1835 lectures.<sup>52</sup> Nor did the class aspect of the controversy disappear. The vigour of Owenite socialism in the town from 1837 to 1842 presented a political vision alternative to that of Liberals, Whigs and Conservatives; while simultaneously offering a view of science different from that espoused by the mechanics' institute and lit-and-phil movements.

As a Bradford Socialist, Samuel Bower, made clear, Robert Owen had extended the Baconian method of philosophy to the study of man.<sup>53</sup> Moreover Owenite science, the science of the influence of external circumstances over human nature, claimed to be 'the most important science that has yet been discovered by the human faculties'.<sup>54</sup> During the general Owenite ferment from 1838 to 1842, Owenite science and its laws of nature proclaimed a political vision based on equality, brotherhood, collective self-help, and democratic control; it promulgated a related opposition to priestcraft, to the 'mental bondage' it exerted, and to natural theology. Some of its adherents promoted it as identical with practical Christianity as taught by Christ. Others buttressed it with Comte's positivism which provided useful ammunition against the priesthood and against Christian views of nature.<sup>55</sup> Owenite socialists appropriated from Christians such forms as missionaries, sermons, hymns, Sunday schools,

<sup>51</sup> S. Farrar and C. Wilkinson, *An examination of the arguments for the existence of a deity, being an answer Mr Godwin's lectures on the atheistic controversy; with an appendix, containing observations on Lord Brougham's Discourse of Natural Theology*, London, Leeds, Bradford, 1835, p. 33 (quotes). For publication details of the 1835 work see Farrar and Wilkinson, *An examination of the arguments for the existence of a deity; being an answer to Dr Godwin's 'Philosophy of atheism examined and compared with Christianity'*, London and Bradford, 1853.

<sup>52</sup> Godwin, *Autobiography*, pp. 735–42; Godwin, *The philosophy of atheism examined and compared with Christianity. A course of popular lectures delivered at the Mechanics' Institute, Bradford, on Sunday afternoons, in the winter of 1852–1853*, London, 1853.

<sup>53</sup> S. Bower, *The peopling of utopia; or, the sufficiency of socialism for human happiness: being a comparison of the social and radical schemes*, Bradford, 1838, p. 9.

<sup>54</sup> *New moral world*, 1835, 1, 170. Volume 4 of this Owenite periodical was subtitled 'Manual of science'.

<sup>55</sup> S. Bower, *A sequel to the peopling of utopia; or, the sufficiency of socialism for human happiness: being a further comparison of the social and radical schemes*, Bradford, 1838, p. 13; *New moral world*, 1835–6, 2, 336–8; 1837–8, 4, 384–5; 1838–9, 5, 493.

and baptism, marriage and death services, leading to vehement clerical outrage especially in 1839 and 1840.<sup>56</sup>

The Owenite programme gave cold comfort to respectable and paternalistic science. Lit and phils, and especially the British Association for the Advancement of Science, were deemed inadequate because they focussed on material nature and not on human and social science. For the Owenites, the Association's incomplete hierarchy of science was a good example of the extent to which 'class prejudices, class interests, and, above all, religious and political partizanship' obstructed social reformation. Mechanics' institutes were seen as more useful, as precursors in which the diffusion of physical science was paving the way for the higher concern with moral and social science. But mechanics' institutes, for some Owenite missionaries, had become overgrown with sectarianism, levied an aristocratic price of admission, and burked their lectures to humour popular prejudices.<sup>57</sup>

The Bradford branch of Owen's Association of All Classes of All Nations, opened Sunday 29 October 1837, was soon the subject of clerical denunciation. In late February 1838 Owen himself lectured to a crowd of 700 at exactly the time when the Bradford Temperance Hall was being opened with speeches from the Bishop of Ripon and from Walter Scott, a Congregationalist minister, both of whom were prominent in denouncing socialism that year for its specious doctrine that man was not responsible for his own actions, an idea which they thought destroyed all social order.<sup>58</sup> By November 1839 some Bradford clergy (Scoresby, Bull, Acworth and Glyde) and Anglican laymen (G. Pollard, J. and W. Rand) were so worried that they attended the second anniversary meeting of the Bradford branch in order to deplore its irreligious aspects. Prominent among these clerics was William Scoresby, appointed vicar of Bradford in summer 1839, who was internationally known in scientific circles as a polar voyager and magnetic researcher. In November 1839 he began a series of lectures in the parish church, denouncing atheism and Owenite environmental determinism, and proving that man is essentially evil 'by the method of inductive philosophy as usually applied in science'. Of course Scoresby saved his best shafts for what he regarded as the destructive influence of the sensual system of Owenite polygamy practised by harlots and adulterers.<sup>59</sup>

<sup>56</sup> E. Yeo, 'Robert Owen and radical culture' in S. Pollard and J. Salt (eds), *Robert Owen prophet of the poor: essays in honour of the two hundredth anniversary of his birth*, London, 1971, pp. 84–114.

<sup>57</sup> *New moral world*, 1841–2, 10, 68–9 (quote); *ibid*, 1843–4, 12, 119–20; *ibid*, 1837–8, 4, 362; *ibid*, 1840, 8, 333.

<sup>58</sup> *Ibid*, 1837–8, 4, 20, 171–2; 1838–9, 5, 74, 478; for the anti-Owenite speeches of Scott and Edward Grubb (1801–78), the total abstinence advocate, see *Proceedings at the opening of the Bradford Temperance Hall*, pp. 70, 74–6.

<sup>59</sup> William Scoresby (1789–1857), *DNB*, was vicar of Bradford 1839–47; Scoresby, *Lectures on socialism: delivered in the parish church, Bradford, on the evenings of the twenty-first and twenty-ninth of November, and the sixth of December, 1839*, London, 1840, pp. 8, 24 (quote); *Bradford observer*, 21 November 1839; *New moral world*, 1839, 6, 923–4. George Stringer Bull (1799–1864), Anglican minister at St James', Bradford; Jonathan Glyde (1808–54), Congregationalist minister, Little Horton chapel, Bradford; George Pollard was the brother of Joshua Pollard; John Rand (1794–1873) and his brother William (1796–1868) were worsted manufacturers.

Undeterred, Wilkinson replied to Scoresby's first lecture and the Bradford Socialists opened their Hall of Science in March 1840. Even though the Bradford Gas Company persistently refused to supply gas and some Owenites were sacked by their employers, the Bradford Socialists believed that their Hall would encourage 'salvation revealed to us by SCIENCE and MIND'. In April 1840 they engaged as district missionary John Ellis, a former Baptist, now a believer in Jesus Christ and Robert Owen. He was immediately on the attack, denouncing 'those intellectual slaughter houses where Methodism is mistaken for religion'.<sup>60</sup>

The third Bradford Philosophical Society, established in April 1839 when the town had a population of 60,000, had two origins. Firstly, the laying of the Foundation stone of the new Mechanics' Institute building on 1 April reinforced a sense of civic embarrassment that in a town of such size, wealth and political importance, no public provision had been made either for the encouragement of science and literature or for a local museum.<sup>61</sup> Secondly, William Sharp, senior surgeon at the Bradford Infirmary and a conspicuous factory reformer, had given a course of lectures in winter 1838–9 with the express intention of cultivating a taste for science among the respectable and establishing a local philosophical society. His general justifications for science were standard for the time: it administers to the wants and comforts of man; it has useful practical applications; it shows the power, wisdom, and benevolence of God; it develops the culture of man's mental and moral character, producing modesty and humility; for those in business it provides valuable habits of application when at work and when not at work relief from the cares of commerce.<sup>62</sup> The primary object of the Society was defined by Sharp, namely, to form a local museum containing natural productions of the Bradford district, an aim which invaded some of the territory already claimed by both the Yorkshire Philosophical Society and the Yorkshire Geological Society.<sup>63</sup> With membership at  $\frac{1}{2}$  guinea paid in advance, respectability was ensured. Following the practice of the Mechanics' Institute, local or party politics and controversial divinity were deliberately excluded. Again like the Institute, the Society was a tool of one party, but in this case a Tory/Anglican caucus led first by Sharp and then by Scoresby. Throughout the Society's short history, its managers and performers were mainly Tories. The leading spirits in the Mechanics' Institute, such as James Acworth, a Baptist minister who was its President, and Joseph Farrar, its indefatigable Secretary, never joined the Philosophical Society. Indeed attendance during its first session was a problem for

<sup>60</sup> *New moral world*, 1840, 7, 1173 (quote); 1841–2, 10, 159; 1840, 8, 92 (quote).

<sup>61</sup> *Bradford observer*, 21 and 28 March 1839.

<sup>62</sup> *Ibid.*, 11 April 1839. William Sharp (1805–96), *DNB*.

<sup>63</sup> *Ibid.*, 11 and 18 April 1839; *The laws and regulations of the Bradford Philosophical society, instituted the twelfth of April, 1839*, Bradford, 1839. The Yorkshire Philosophical Society devoted itself inter alia to the geology of the whole of Yorkshire, whereas the Yorkshire Geological Society (founded 1837) concentrated on the geology and technics of the coal-field. Bradford is situated on the northern end of the coal measures and in 1839 was not negligible as a producer of coal and iron.

dissenters because the meetings clashed with the dissenters' missionary prayer meetings.<sup>64</sup> As first President of the Society, Sharp showed 'alert Conservatism' in early 1840, offering his gratuitous services to the Institute and serving as its Vice-president 1840–42, in an attempt to show that science was above party, just at the time of the Chartist uprising and great distress in the town caused by unemployment.<sup>65</sup> He also had taken good care to have his scheme of a local museum approved by leading savants at the British Association in 1839. Though well aware of the difficulties of his undertaking in a town like Bradford, it prospered in terms of membership (172), papers, and attendance in its first session.<sup>66</sup> Then from summer 1840 it began to run into difficulties, even with Scoresby as President from 1841, and with rescheduled meetings to suit the dissenters. For lectures it relied heavily on itinerants, such as James Montgomery, the Sheffield poet, and the odd savant imported from Leeds (Baker, S. Sharp, Nunneley). Contributions to the museum were negligible: by late 1842 Samuel Hailstone sent specimens to the Yorkshire Museum at York, a going concern, the Bradford Museum scheme having folded.<sup>67</sup> In session 1842–3 attendances at meetings were embarrassingly low compared with those at the Mechanics' Institute. The end came at the anniversary meeting on 9 May 1843 when the Society's solitary mourner was John Darlington, its Treasurer and Secretary.<sup>68</sup> The President, the Reverend William Scoresby, FRS, FRSE, Corresponding Member of the Institute of France, doughty survivor of twenty punishing arctic voyages, did not bother to attend to confer the last rites.

The career of the Bradford Philosophical Society, mark 3, may be analysed in terms of audience, performers and local politico-ecclesiastical affairs. The Society attracted a membership of about 200 but the meetings were soon only thinly attended. Gifted members such as Titus Salt and

<sup>64</sup> *Bradford observer*, 6 February 1840. Joseph Farrar (1805–78) was a hatter and later insurance agent of dissenting and Liberal persuasions.

<sup>65</sup> *Ibid.*, 23 January, 12 March, 23 April 1840; Bradford Mechanics' Institute minutes book, 1835–46, 10 March 1840, Bradford Public Library archives. For the notion of alert conservatism see M. Neve, 'Science in a commercial city: Bristol 1820–60', in I. Inkster and J. Morrell (eds), *Metropolis and province: science in British culture, 1780–1850*, London, 1983, pp. 179–204. For the abortive Chartist rising in Bradford in January 1840, see A. J. Peacock, *Bradford Chartism 1838–1840*, York, 1969; for distress in Bradford, see W. Scoresby, "What shall we do?" or, *the enquiry of the destitute operatives considered. A sermon, preached at the parish church, Bradford, on Sunday, the 22nd of December, 1839*, London, 1840.

<sup>66</sup> *The Times*, 27 August 1839; Sharp, 'On the formation of local museums', *Report of the ninth meeting of the British Association for the Advancement of Science held at Birmingham in August 1839*, London, 1840, p. 65; Sharp to Greenough, 16 January 1840, Greenough papers; *Annual report of the Council of the Bradford Philosophical Society, for 1839. Presented to the annual meeting, 4th May, 1840*, Bradford, 1840.

<sup>67</sup> Only two more annual Council reports were produced, i.e. for sessions 1840–1 and 1841–2; they reveal the Council's growing concern about the Society's viability. James Montgomery (1771–1854), *DNB*; Robert Baker, a surgeon; Samuel Sharp (1808–74), an architect; Thomas Nunneley (1809–1870), *DNB*, a surgeon. For Hailstone's donations of specimens in 1842 to the Yorkshire Philosophical Society, see *Annual report of the Council of the Yorkshire Philosophical Society, for MDCCCXLII*, York, 1843, pp. 11, 20–21.

<sup>68</sup> *Bradford observer*, 3 November, 1 and 8 December 1842; Sheppard, *Yorkshire's science*, p. 17; John Darlington (1807–1891) a solicitor and bank manager.

<sup>69</sup> Details of membership have been gained from Darlington's 'Members of the Bradford Philosophical Society 1839', Bradford Public Library archives, case 3, box 4, item 5.



William Edward Forster apparently did not respond positively to Sharp's encomia about the advantages of science.<sup>70</sup> For performers the Society relied on a tiny core of people. Of the 12 local medical members (all but one surgeons), some of whom had formed a short-lived Bradford Medical Association in 1839, only Sharp and Beaumont did anything, perhaps the rest being discouraged by the Society's exclusion of practical medicine. In any event, Sharp left Bradford for Hull in 1843. Crucially there were very few physicians to draw on. For twenty-five years from 1820 the population and the number of surgeons expanded rapidly, but the number of consultant physicians decreased. Compared with all other major West Riding towns, Bradford had the lowest percentage of physicians per population unit. In 1845 there was only one physician for each 45,000 of the population. This clearly was connected with Bradford being bottom heavy socially and with the proximity of well known physicians in Leeds. Until the mid 1850s one suspects that there were not the physicians in the town to do what they had done earlier and elsewhere for provincial science.<sup>71</sup> When we turn to another professional élite, we find that no dissenting ministers, so prominent otherwise in the town, appeared as either performers or managers, though they were happy to lecture gratuitously at the Mechanics' Institute (Glyde, Miall, Scott, Acworth, Ryland). Of Anglican clergymen Scoresby and Joshua Fawcett, abetted by Theodore Dury of Keighley, gave papers. Two solicitors were active but not John James, the distinguished local historian, who was not a member.<sup>72</sup> The local iron, building, textile and chemical industries (56 members) between them offered only J. G. Horsfall, and he was hardly a William Fairbairn. Samuel Cunliffe Lister and Henry William Ripley, two leading industrial innovators, were not even members.<sup>73</sup> All the local gentry joined but were non performing. Of the two aristocratic members, Lord Oxmantown, later third Earl of Rosse, had married into a Bradford family in 1836 but he was busy at Birr Castle, Ireland, with his great reflecting telescope.<sup>74</sup>

<sup>70</sup> For Salt's preoccupations in the early 1840s, see Reynolds, *Titus Salt*; for those of Forster (1818–86), *DNB*, see T. Wemyss Reid, *Life of the Right Honourable William Edward Forster*, London, 1888, i, pp. 128–65.

<sup>71</sup> These conclusions about physicians are drawn from local directories; and they agree with those of Donnelly, 'Technical education in Bradford', pp. 29–30, based on the 1851 Census returns.

<sup>72</sup> James Goodeve Miall (1805–96), Congregationalist minister, Salem chapel, Bradford; John Howard Ryland, Unitarian minister; Joshua Fawcett (1809–64), *DNB*, Anglican minister, Low Moor, Bradford; Theodore Dury (1789–1852), rector of Keighley. The two active lawyers were Darlington and John Crofts, the Society's Curator; John James (1811–67), *DNB*.

<sup>73</sup> In 1826 John Garnett Horsfall, a Tory manufacturer, was the first in Bradford to use power looms; William Fairbairn (1789–1874), *DNB*, the Manchester structural engineer was a competent experimental investigator. Samuel Cunliffe Lister (1815–1906), *DNB*, developed machine combing and velvet power-loom weaving; Henry William Ripley (1813–1882) solved the problem of dyeing mixed fabrics and by mid century owned the largest worsted dyeworks in the world.

<sup>74</sup> In 1836 William Parsons (1800–67), *DNB*, married the elder daughter of John Wilmer Field of Heaton Hall, Bradford, and through her inherited property in the Bradford area; but he took no part in the third Philosophical Society, of which Lord Morpeth was the other aristocratic member.

The question of the relation of the Society to politico-ecclesiastical squabbles is best approached through William Scoresby, vicar of Bradford 1839–47.<sup>75</sup> He arrived in the town in October 1839, next month attending his first meeting of the Society and being repeatedly cheered.<sup>76</sup> Though his fellow Anglicans initially welcomed him as the very man for Bradford, ‘a hot-bed of Socialism and Popery’, by November 1839 he was at loggerheads with many of them, both clergymen and laymen. He wished to revive Anglicanism in the town; and his vicarship was worth just under £500 pa, from which he had to pay his curates. Accordingly he devised a Plan, approved by the Bishop of Ripon, ensuring adequate finance and authority for the parish church and its vicar. His Plan quickly alienated leading Anglican laymen, such as John Outhwaite, a prominent physician who ran the Infirmary and the Subscription Library, and the Hardy family of the Low Moor Iron-works; Outhwaite was never a member of the Philosophical Society, and Charles Hardy disappeared from its Council when Scoresby became President.<sup>77</sup> Scoresby’s stand about church dues led to great dissension with his fellow Anglican clergymen whom he regarded as his subordinates. From 1840 to 1842 there were difficulties with three unconsecrated churches, where Scoresby took the line that no dues meant no consecration. He was at daggers drawn with Parson Bull, the well-known factory reformer, incumbent of St James’. Another minister, Charles Pearson, of St John’s, Manchester Road, took the general question of the relation of the vicar to his curates up to the Bishop for a ruling eventually given in 1843. By 1841 Scoresby was on bad terms with William Morgan, incumbent of Christ Church and a leading Temperance supporter, about the extent of Morgan’s district. That year Scoresby was reduced to calling a public meeting to justify his removal of John Meridyth, his own curate; and Charles Hardy formally complained to the Bishop about serious evils in the existing state of the church in the parish.<sup>78</sup>

In November 1839 the *Leeds Intelligencer* had concluded that ‘Bradford is the stronghold of dissent, whiggism, socialism, chartism, and infidelity’, all of which were anathema to Scoresby. In combatting the Owenites, he lectured at the parish church in late 1839 and supported the views of the anti-Owenite John Brindley. Whereas Christopher Wilkinson opposed Brindley’s arguments based on contrivance and denounced him as ‘one of

<sup>75</sup> Scoresby has been served by two biographies: R. E. Scoresby-Jackson, *The life of William Scoresby*, London, 1861; T. and C. Stamp, *William Scoresby, Arctic scientist*, Whitby, 1975.

<sup>76</sup> *Bradford observer*, 10 October, 7 November 1839.

<sup>77</sup> For this characterisation of Bradford, see *ibid.*, 24 October 1839; Scoresby, *Plan submitted to the Lord Bishop of Ripon by the Vicar of Bradford, for the appointment of districts for spiritual purposes, and for a due and necessary maintaining of the rights and revenues of the mother church within the parish*, n.p., n.d., signed 21 January 1840, approved by the Bishop 6 February 1840; John Outhwaite (1792–1868); Charles Hardy (1813–67). For Scoresby’s tribulations in Bradford, see Stamp, *Scoresby*, pp. 140–61, 186–201.

<sup>78</sup> *Retirement of the Rev George S. Bull from St James Church, Bradford, Yorkshire, Bradford*, 1840; *Judgment of the Lord Bishop of Ripon on the charges preferred by the Rev C. J. Pearson against the Rev Dr Scoresby, Vicar of Bradford*, unpublished but signed 11 March 1843; Stamp, *Scoresby*, 148; *Bradford observer*, 1 and 8 October, 1840, 5 and 12 August 1841.

the most unprincipled libellers that ever calumniated humanity', Scoresby hoped in public that Owenite atheism would be 'spued out (as it were) from the land'. In response to Chartism and the distressed condition of the unemployed poor, a time of much trial for Scoresby, he chaired relief meetings, having been peacefully surrounded by a crowd of 1,500 unemployed people on his way home on 16 December 1839. He also preached in response to a request made by the distressed. His practical solution was to urge the Poor Law Guardians to be less severe and the affluent to help voluntarily.<sup>79</sup>

As if this were not enough, November 1839 also witnessed the start of protracted warfare between Scoresby and Baptists and Congregationalists about the imposition of the church rate on dissenters. For Scoresby the church rate was lawful, to be administered, and necessary to re-invigorate local Anglicanism. For the dissenters the church rate was evidence of Anglican dominance and an attack on their civil liberty. Their tactic was to pack the vestry meeting and defer the rate for a year. In 1841 the frustrated churchwardens declared the rate passed on their own authority. Some prominent Liberal dissenters refused to pay and in autumn the bailiffs, known locally as the 'ecclesiastical police', seized goods from them in lieu. John Dale, a printer devoted to the Mechanics' Institute, refused to pay; his case went to the High Court where in 1847 he was vindicated. In 1842 the dissenters retaliated by contesting the elections for churchwardens and returned none other than Dale; and at the vestry again used their adjournment technique for the last time. Scoresby was furious at this defeat at the hands of the dissenters, who at various meetings hissed him, shouted at him, labelled him an enemy, and threatened by letter to assassinate him and to burn his 'bloody old church to ashes'.<sup>80</sup> At the personal level, Scoresby gained the enmity of three Liberals prominent in the Mechanics' Institute, Dale, William Byles of the *Bradford Observer* who chaired the vestry meeting of July 1842, and above all, of James Acworth, President of the Institute. In November 1841 Acworth lectured on the unscripturalness of ecclesiastical impositions to the Bradford Voluntary Church Society, formed in autumn 1840 to nurture religious freedom and to oppose the profane union of church and state. Acworth's polemic deeply hurt Scoresby because as a deliberate argumentum ad hominem it accused Scoresby of belonging to an avaricious priesthood, of being thoroughly secularised, of being indurated by an unhallowed connection with the state, and of supporting coercive interference which was 'the very essence of the spirit of Antichrist'.<sup>81</sup> Presumably this personal attack by Acworth

<sup>79</sup> *Leeds intelligencer*, 30 November 1839; Scoresby, *Lectures on Socialism*; *Bradford observer*, 12, 19 (quote), 26 December 1839; Scoresby, *What shall we do*.

<sup>80</sup> Reynolds, *Titus Salt*, pp. 107–8; Elliott, 'Municipal government in Bradford', pp. 56–72; Scoresby, *The position of the church, and duties of churchmen to unite for her defence. An address delivered at the formation of the Church Institution at Bradford, July 4th, 1843*, Halifax 1843, pp. 10–11 (quote).

<sup>81</sup> On William Byles (1807–91) see D. James, 'William Byles and the *Bradford observer*', in Wright and

made Scoresby unsympathetic to a proposal made to him in September 1842 by the Mechanics' Institute, which by then was concerned that its middle class support, mainly from dissenters and Liberals, was not wide enough. In order to tap Tory Anglican support it asked Scoresby twice to consider succeeding as President of the Institute none other than Acworth, who had agreed to step down. As the intermediary in these negotiations was Willson Cryer, a doctor and one of the rare Tories who supported the Institute, the proposal to Scoresby was probably conciliatory and not a cynical device for aggravating him.<sup>82</sup>

Scoresby was wounded but not paralysed by the church rate fracas. In 1840 he began his work of extending parochial schools, where his success made for him enemies among the mill-owners and dissenters.<sup>83</sup> In July 1842, stung by the church rate defeat, he engineered the expulsion from the Bradford Workhouse of the dissenting ministers who had previously taken the services, giving himself exclusive Anglican domination. As Joshua Pollard, Scoresby's staunch ally, put it: 'it was not right to preach Christ in the morning and John Wesley in the afternoon'.<sup>84</sup> Most importantly, in July 1843 Scoresby founded the Bradford Church Institute as a union to defend the Anglican church against the combination of Bradford dissenters, the terms 'union' and 'combination' being his. It was partly an Anglican riposte against the Mechanics' Institute and partly Anglican retaliation against the Voluntary Church Society run by dissenters. Scoresby was well aware that the real battle concerned the relations of the Church of England with the state and the monarchy.<sup>85</sup>

Surrounded by uncouth and undeferential Bradfordians, Scoresby was so busy that for two years from 1843 he had no time to correspond with Joule in Manchester. In spring 1844 he suffered a nervous breakdown and was given six months leave of absence by his Bishop. When he returned in Autumn 1844, he renewed his work for the Church Institute, for his parochial schools, for factory reform, and for the Bradford Operative Conservative Society. In a crafty move to outflank the supporters of incorporation of the borough, he acted as chairman in June 1845 of a short-lived Sanitary Committee which was devoted to the solution of public health problems by voluntary means. Though he gave scientific lectures at the Church Institute and the Mechanics' Institute, he did not try to revive the Philosophical Society of which he had been President.

Jowitt, *Victorian Bradford*, pp. 115–36. For the Scoresby-Acworth polemic: Scoresby, *Position of church*, pp. 8–10; J. Acworth, *On the unscripturalness of ecclesiastical imposts. A lecture delivered in the Exchange Buildings, Bradford, November 30, 1841*, Bradford, 1841, p. iv (quote). See also W. Scott, *The objects of the Voluntary Church Society, stated and defended*, Bradford, n.d. [1841].

<sup>82</sup> Bradford Mechanics' Institute minute book, 6 and 22 September 1842; W. Cryer, *A lecture on the origin and reception of several important discoveries, delivered to the members of the Bradford Mechanics' Institute, in the theatre of their institution, January 2nd, 1843*, London, 1843; Willson Cryer (1805–53).

<sup>83</sup> Stamp, *Scoresby*, 150–4; Scoresby, *Records of the Bradford parochial schools; from the year 1840 to 1846, inclusive. Appendix*, n.p., 1848.

<sup>84</sup> *Bradford observer*, 14 and 21 July 1842.

<sup>85</sup> Scoresby, *Position of church*.

Worn out by interminable trials, difficulties, persecution, and contention, Scoresby resigned as vicar of Bradford, left the town in 1847, and promptly had a second breakdown.<sup>86</sup>

In conclusion, I don't think that I find myself in the same situation as Dr Johnson when he gave to the last chapter of his masterpiece *Rasselas* the title 'The conclusion in which nothing is concluded'. It is true that quirky localism remained important in British science as long as centralized state direction was non-existent or ineffective. We all appreciate that different places nourished a public scientific life *sui generis*. Though historians should be aware of *la longue durée*, they should not be ashamed of responding as sensitively as they can to the specific features of an event or process: the individual and idiosyncratic actions of agents, and their choices from the options available to them are as much the stuff of historical change as long-term preconditions and movements. Arthur Engel's recent book on the rise of the academic profession in nineteenth-century Oxford is *not* vitiated by his conclusion that what occurred there was a distinctive product of Oxford conditions.<sup>87</sup>

That being said, what can we learn from a study of Wissenschaft in Worstedopolis, of science in Coketown, Bruddersford and Grimedale during the industrial revolution? Quite obviously the professionalisation model provides little illumination, and can be dismissed. Again the notion of German influence gives little purchase: up to 1850 there were no Schuncks in Bradford, and subsequently the German migrants were active in philanthropy, music, and medicine rather than science.<sup>88</sup> The idea that provincial science at the savant level either directly served industry, or was directly stimulated by it, takes a heavy beating from the Bradford case. The rapid urbanisation and population growth caused by industrialisation were extremely *dislocating* in ways I have described. Bradford was an extreme example of the general case argued by the radical journalist, Stephen Morley, in Disraeli's *Sybil*, i.e., that the Queen reigned over two nations, the rich and the poor; *and also that* 'There is no community in England; there is aggregation but aggregation under circumstances which make it rather a dissociating, than a uniting, principle.'<sup>89</sup> In Bradford's years of crisis from 1834 to 1850 politico-denominational conflicts within

<sup>86</sup> See especially Scoresby, *American factories and their female operatives; with an appeal on behalf of the British factory population, and suggestions for the improvement of their condition*, London, 1845; and *Position and encouragements of Christian teachers: a discourse to Sunday School Teachers. Preached, March 9th, 1845, in the parish church of Bradford*, London, 1846; *A report of the Bradford Sanitary Committee appointed at a public meeting, held May 5th, 1845*, Bradford, 1845; and generally, Stamp, *Scoresby*, pp. 177, 186–201.

<sup>87</sup> C. Rosenberg, 'Science in American society', *Isis*, 1983, 74, 356–67; A. J. Engel, *From clergyman to don: the rise of the academic profession in nineteenth-century Oxford*, Oxford, 1983.

<sup>88</sup> On Henry Edward Schunck (1820–1903) see Kargon, *Science in Manchester*, pp. 95–103, and W. V. Farrar, 'Edward Schunck, FRS: a pioneer of natural-product chemistry', *Notes and Records of the Royal Society of London*, 1977, 31, 273–96. The German contribution to Bradford medicine reached its culmination in the successful work on anthrax of Frederick William Eurich (1867–1945); see M. Bligh, *Dr Eurich of Bradford*, London, 1960.

<sup>89</sup> B. Disraeli, *Sybil or the two nations*, Harmondsworth, 1980, p. 94 (first published 1845).

the middle class and the condition of England question were the results of industrialism. These conflicts and this question together led such a tough nut as Scoresby to two nervous breakdowns. Though he valued the iron specimens from the local Bowling Iron Works for his magnetic researches, Bradford's incessantly wearing version of industrialisation deprived him of time and energy for science, private or public. Bradford's case would seem to indicate that industrialisation could on occasion produce such class hostility, political party spirit, and religious sectarianism, that exclusively middle-class science and access to polite culture had little chance of survival; whereas the Mechanics' Institute endured because it appealed to the Liberal dissenting middle class *and* to the labour aristocracy.<sup>90</sup>

Bradford, I suggest, presents an extreme case. There was a paucity of organised savant and exclusively middle-class science; but, as Ian Inkster has stressed to me, the 1851 Census material confirms the picture of the resilience and buoyancy of mechanics' institutes and mutual improvement societies in the Bradford area in the 1840s. In town which was socially bottom heavy, the third Philosophical Society faded in the early 1840s and the Mechanics' Institute survived because the latter bridged classes, however uneasily, and was not the object of vehement class hostility. It is therefore tempting to see the Mechanics' Institute as preparing the ground for that accommodation between classes which was such a feature of Bradford in the 1850s. More generally, the contrast between savant and artisan science in Bradford reminds us that one can too easily be dazzled by the great successes of the lit and phil movement, say at Manchester and at York, so that one ignores other types of participation in science.<sup>91</sup> It is salutary to bear in mind that at Leeds in 1850 the Mechanics' Institute had seven times as many members and books as the Phil and Lit had; and that at York the Philosophical Society, which in 1831 was capable of fathering the British Association, had slightly fewer members than the Institute of Popular Science and Literature and considerably fewer books.<sup>92</sup>

In recent years there has been an attempt to relate science and industry *indirectly*, via the marginality thesis. On this interpretation, doing or patronising science was a means of upward mobility for marginal men seeking recognition and ultimately Gramscian hegemony in manufacturing areas. Apart from the internal difficulties of this thesis, it is high time that historians took into account those local social, economic, class, political and denominational elements, exacerbated or produced by

<sup>90</sup> *Bradford observer*, editorial, 19 September 1839. Compare the relative fortunes of the philosophical society and the mechanics' institute in the Potteries as recounted in S. Shapin, 'Pottery Philosophical Society, 1819–1835'.

<sup>91</sup> See A. D. Orange, *Philosophers and provincials: the Yorkshire Philosophical Society from 1822 to 1844*, York, 1973.

<sup>92</sup> *Census of Great Britain 1851. Education. England and Wales*, Parliamentary Papers, 1852–3, 90, pp. 248–9, 251. The figures for Leeds were: Mechanics' Institute, 1848 members, 7747 books; Philosophical Society, 219 members, 800 books. For York: Institute of Science, 496 members, 4053 books; Philosophical Society, 458 members, 1928 books.

industrialisation, which acted as restraints or stimuli on local public science.<sup>93</sup> For example, in the 1830s and 1840s alliances and hostilities apropos such matters as factory reform and civil liberties determined the face of public science in Bradford far more than the alleged marginality of its supporters. It is true that the aim of hegemony was central to local agendas and rivalries; but science could be just one of several vehicles for the display of cultural signals, the acquisition of urban power, and the adjustment of social relations.

It is clear that mono-causal explanations and single factor analyses are now passé. Indeed in a penetrating analysis of provincial scientific culture, Ian Inkster has proposed that no less than twelve factors need to be considered.<sup>94</sup> Slightly transformed by me, these are: population size; population growth; industrial structure; occupational characteristics; class structure; economic stability or vulnerability; geographical location; existing scientific traditions; other cultural or pressure groups, especially competing ones; the relation to the metropolis; the contingent presence of leading savants; and the local political structure. Much of my analysis is compatible with his scheme and indebted to it. Even so, I think we should add two further considerations. Firstly we might combine the Marxist stress on conflict and the Namierite emphasis on interests, without devaluing the intellectual choices made by individuals and the knowledge they produce. Provincial public science, like much else, may be explained in terms of competition between various groups and individuals, who use whatever resources they can to serve whatever interests they have in mind. Secondly, it is useful to be aware of local religious and denominational structure, as well as that of politics, though of course the two were often related. The fragility of scientific culture at the savant level in Bradford shows, above all, that it was all too easy for the bark of science to founder on those religious and political shoals and quicksands which in Worstedopolis in the 1830s and 1840s endangered every cultural project floated for the public weal.<sup>95</sup>

Sir Henry Irving died in Bradford, a renowned graveyard of actors and comedians. In thanking his audiences for their suffrage, he often ended with words which Sir John Barbirolli later used to quote verbatim in his speeches at great musical occasions in this city, the home of the Hallé Orchestra.<sup>96</sup> I wish to maintain that Mancunian tradition: 'Ladies and gentlemen, I am your most humble and obedient servant'.

<sup>93</sup> On Antonio Gramsci see the highly sensible J. Joll, *Gramsci*, London, 1977. For the practical difficulties facing historians in using the marginality thesis, see I. Inkster, 'Variations on a theme by Thackray: comments upon provincial science culture, c. 1780–1850', *British Society for the History of Science Newsletter*, 1982, no. 8, 15–17; for criticism of the social control thesis, C. A. Russell, *Science and social change 1700–1900*, London, 1983, pp. 160–73.

<sup>94</sup> I. Inkster, 'Introduction: aspects of the history of science and science culture in Britain, 1780–1850 and beyond', in Inkster and Morrell, *Metropolis and province*, pp. 11–54.

<sup>95</sup> James, *Bradford*, i, 248.

<sup>96</sup> M. Kennedy, *Barbirolli: conductor laureate: the authorised biography*, London, 1971, p. 288.

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