**SCIENCE AND SOCIAL CHANGE
IN BRITAIN AND EUROPE
1700–1900**

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1700–1900

Colin A. Russell

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Contents

<i>List of Figures</i>	viii
<i>List of Plates</i>	ix
<i>General Editor's Preface</i>	xii
<i>Preface</i>	xiii
<i>Abbreviations</i>	xvi
1 Approaching the Problem	1
2 The Shape of Enlightenment Science	
2.1 Prologue	13
2.2 'Laws sublimely simple'	16
2.3 Science in the Shadow of Newton	20
3 Nature in the Enlightenment	
3.1 Nature and Ideology	33
3.2 Nature and Man	35
3.3 Nature and God	41
4 Nature and Society	
4.1 'His marvellous Providence'	49
4.2 Newtonianism as a Political Weapon	52
4.3 Some Alternatives to Newtonianism	61
5 The Social Organisation of Enlightenment Science	
5.1 Royal Science	69
5.2 Private Patronage of Science	76
5.3 Virtuosi and Collectors	80

5.4	Scientific Training on the Continent	85
5.5	The Special Case of Scotland	89
6	Science in the Early Industrial Revolution	
6.1	Introduction	96
6.2	The Chemical Revolution	99
6.3	Institutionalised Science in the Industrial Revolution	103
7	Interlude: Change and Continuity in French Science	
7.1	Aristocratic Science, 1789–1793	114
7.2	Democratic Science, 1793–1795	118
7.3	Bureaucratic Science, 1795–1799	125
7.4	Imperial Science, 1799–1815	129
8	Radical Science in Britain, 1790–1830	136
9	Science for the Masses, 1825–1850	
9.1	The Demolished Staircase	151
9.2	New Routes to Science in England	154
9.3	The Rhetoric of Useful Science	160
9.4	The Mythology of Social Control	165
9.5	The Symbolism of Progress	171
10	Strongholds of Amateur Science in England	
10.1	‘Not the Land of Science’?	174
10.2	The ‘Lit. and Phil.’ Movement	175
10.3	The Natural History Movement	181
10.4	The British Association	186
11	The Rise of the Specialist	
11.1	Language and Institutions	193
11.2	Geology for Gentlemen?	195
11.3	Chemistry for Chemists	203
11.4	Specialists Overseas	212
12	The Road to Professionalisation	
12.1	Science as a Profession	220
12.2	The first Institute for Professional Science	226
12.3	Postscript: through a glass darkly	231
13	The State and Science	
13.1	Pressures for Government Support	235

	CONTENTS	vii
	13.2 Opposition to Government Support	241
	13.3 The Conclusion of the Matter	245
14	Epilogue: Science Triumphant?	254
	<i>Notes and References</i>	260
	<i>Bibliography</i>	291
	<i>Indexes</i>	294

List of Figures

Figures

Figure 1	Numbers of Chemists and Chemical Laboratories in Germany, 1700–1800	87
Figure 2	H. Boerhaave and Scottish Science	93
Figure 3	French Manufacture of Gunpower	122
Figure 4	The Leblanc Process	123
Figure 5	Lectures to the Newcastle Lit. and Phil., 1830–1858	180
Figure 6	Dates of Formation of National Scientific Societies	213
Figure 7	Membership of the Institution of Mechanical Engineers, 1840–80	224

List of Plates

1. Priestley's chemical apparatus.
2. Eighteenth-century electrical machines. From Priestley's *History of Electricity*.
3. Natural history cabinet.
4. The starry heavens. From James Harvey, *Medications and Contemplations* (1796).
5. Instrument makers' workshop. From the *Encyclopédie* (1767).
6. Eighteenth-century chemical laboratory. From C. Singer, *The Earliest Chemical Industry* (1948).
7. Sulphuric acid manufacture. From C. Singer, *The Earliest Chemical Industry*.
8. Cartoon of Joseph Priestley.
9. 'Church and King' riots.
10. The Royal Institution.
11. The title page of the *Mechanics' Magazine*.
12. The Manchester Mechanics' Institution. From the Jubilee Book of the Manchester College of Technology.
13. A laboratory in the London Mechanics' Institution. From the *Mechanics' Magazine*.
14. The Sheffield Mechanics' Institute. From the *Illustrated London News*.
15. The Leeds Mechanics' Institute. From the *Illustrated London News*.
16. The Newcastle Literary and Philosophical Society Building. From R. S. Watson, *History of the Literary and Philosophical Society of Newcastle* (1897).

17. The Royal College of Chemistry.
18. The Felling Chemical Works. From the *Penny Magazine*.
19. The Leblanc rotary convertor. From G. Lunge, *Manufacture of Sulphuric Acid and Alkali*.
20. The Crystal Palace Exhibition. From the *Illustrated London News*.
21. Exhibition commissioners.
22. Darwin's funeral. From *The Graphic*.

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TO MY FATHER
AND IN MEMORY
OF MY MOTHER

General Editor's Preface

SINCE the Second World War there has been a massive expansion in the study of economic and social history generating, and fuelled by, new journals, new academic series and societies. The expansion of research has given rise to new debates and ferocious controversies. This series proposes to take up some of the current issues in historical debate and explore them in a comparative framework.

Historians, of course, are principally concerned with unique events, and they can be inclined to wrap themselves in the isolating greatcoats of their 'country' and their 'period'. It is at least arguable, however, that a comparison of events, or a comparison of the way in which different societies coped with a similar problem – war, industrialisation, population growth and so forth – can reveal new perspectives and new questions. The authors of the volumes in this series have each taken an issue to explore in such a comparative framework. The books are not designed to be path-breaking monographs, though most will contain a degree of new research. The intention is, by exploring problems across national boundaries, to encourage students in tertiary education, in sixth-forms, and hopefully also the more general reader, to think critically about aspects of past developments. No author can maintain strict objectivity; nor can he or she provide definitive answers to all the questions which they explore. If the authors generate discussion and increase perception, then their task is well done.

Clive Emsley

Preface

STUDIES of science in its social context have become so fashionable in recent years that historical analyses of internal developments within the sciences have become comparatively rare. Combined with this trend has been a proliferation of highly specialised studies of great interest to scholars in the field, but unfortunately inaccessible to a wider public. In this respect the History of Science is in some danger of becoming a victim of its own new-found professionalism. For some years one has searched publishers' lists anxiously, but in vain, for works on the present subject that could reasonably be expected to serve as a general introduction or as student texts. It was this gap in the literature, more than any other consideration, that goaded a rather reluctant author into producing the present book. It is intended for any who are seriously concerned to study the historical dimensions of the relations between science and society, whether approaching the subject from general history or from science itself. Some ten years' experience at the Open University has persuaded me that such an enterprise, though apparently foolhardy, is indeed possible, and that the common ground between historians and scientists is surprisingly great.

The theme of this book is the multitude of ways in which science has reflected, influenced and indeed become part of the wider phenomena of social change. Considerations of length have limited the period to a mere two centuries, and also concentrated attention largely on one country, Britain, though

attempts have been made to place the British experience in a wider international context. An area that has been covered far less thoroughly than I should have wished is the impact of science on living and working conditions, and on the means of destroying or prolonging life. Adequate treatment of these themes would require another book-length study.

Warm thanks are offered to the staffs of many institutions including the Public Record Office, the British Library, The Wellcome Historical Medical Library, Bedfordshire County Library, Bedford Central Library, Lancaster Public Library, Newcastle City Library, and the Libraries of the Open University, the University of London, the Royal Society of Chemistry, Guildhall, London and Preston Polytechnic. I am grateful to the Royal Institution for permission to cite the manuscript notebook of Thomas Webster and to Mr George Rolleston for permission to quote from a Davy letter in his possession; also to the Harvester Press for permission to make extensive citations from *The Newtonians and the English Revolution 1689 to 1720*, by Margaret Jacob. Acknowledgement for illustrations will be found on page x.

It will be apparent that my debt to other scholars is enormous, especially to those represented in the footnotes. I can only hope that none have been misrepresented, especially when I have disagreed with their conclusions. One work above all others has been a catalyst, inspiration and (in some respects) a model. Its excellence has at the same time relieved me of the necessity of covering much of the same ground: Donald Cardwell's *The Organisation of Science in England*, 2nd edn (London: Heinemann, 1972).

I am most grateful to several colleagues who have read and criticised parts of the book: Dr John H. Brooke, Dr Robert Fox and Dr Gerrylynn K. Roberts, and especially to the Editor of this series, Mr Clive Emsley, whose comments on the whole manuscript have been invaluable. Needless to say the responsibility for what follows is mine alone.

My thanks must also go to Dr Eamann Duffy for allowing me to see a manuscript version of his forthcoming paper on 'The Whiston circle and heterodoxy'; to Dr Robert Fox for showing me an as yet unpublished essay on the profession of science in nineteenth-century France; and to Dr Jim Moore for

a pre-publication copy of his paper on the burial of Charles Darwin in Westminster Abbey.

Nor must I forget the often passionate debates with colleagues at the Open University where many of these issues first became sharpened in my own mind. To them all I am very grateful, as I am to the Open University for a year of study leave during which this book took shape. My gratitude also goes to our two secretaries in the History of Science group, Mrs Patricia Dixon and Mrs Stephanie Lansdown, who between them have coped valiantly with innumerable drafts of chapters and the collection and collation of appropriate illustrations.

Finally, I have to thank my family who have had to live for far too long with my preoccupation with the book but who have nevertheless exhibited monumental patience and understanding.

COLIN A. RUSSELL
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1982

Abbreviations

<i>Amer. Hist. Rev.</i>	<i>American Historical Review</i>
<i>Ann. Sci.</i>	<i>Annals of Science</i>
<i>B. J. Hist. Sci.</i>	<i>British Journal for the History of Science</i>
<i>Berichte</i>	<i>Berichte der Deutschen chemischen Gesellschaft</i>
<i>Biol. J. Linnaea Soc.</i>	<i>Biological Journal of the Linnaea Society</i>
<i>Bull. Inst. Hist. Res.</i>	<i>Bulletin of the Institute of Historical Research</i>
<i>Chem. Age</i>	<i>Chemical Age</i>
<i>Chem. and Ind.</i>	<i>Chemistry and Industry</i>
<i>Chem. Brit.</i>	<i>Chemistry in Britain</i>
<i>Chem. News</i>	<i>Chemical News</i>
<i>DNB</i>	<i>Dictionary of National Biography</i>
<i>DSB</i>	<i>Dictionary of Scientific Biography</i>
<i>Econ. Hist. Rev.</i>	<i>Economic History Review</i>
<i>Hist. J.</i>	<i>Historical Journal</i>
<i>Hist. Sci.</i>	<i>History of Science</i>
<i>Hist. Stud. Phys. Sci.</i>	<i>Historical Studies in the Physical Sciences</i>
<i>J. Chem. Educ.</i>	<i>Journal of Chemical Education</i>
<i>J. Hist. Ideas</i>	<i>Journal of the History of Ideas</i>
<i>J. Roy. Inst. Chem.</i>	<i>Journal of the Royal Institute of Chemistry</i>
<i>J. Roy. Soc. Arts</i>	<i>Journal of the Royal Society of Arts</i>
<i>J. Soc. Bibliography Nat. Hist.</i>	<i>Journal of the Society for the Bibliography of Natural History</i>
<i>J. Soc. Chem. Ind.</i>	<i>Journal of the Society of Chemical Industry</i>
<i>M. & B. Lab. Bull.</i>	<i>May and Baker Laboratory Bulletin</i>

<i>Med. Hist.</i>	<i>Medical History</i>
<i>Notes and Records</i>	<i>Notes and Records of the Royal Society</i>
<i>Oxford Rev. Educ.</i>	<i>Oxford Review of Education</i>
<i>Proc. Chem. Soc.</i>	<i>Proceedings of the Chemical Society</i>
<i>Proc. Inst. Chem.</i>	<i>Proceedings of the Institute of Chemistry</i>
<i>Proc. Roy. Inst.</i>	<i>Proceedings of the Royal Institution</i>
<i>Proc. Roy. Soc. Edinburgh</i>	<i>Proceedings of the Royal Society of Edinburgh</i>
<i>Qu. J. Chem. Soc.</i>	<i>Quarterly Journal of the Chemical Society</i>
<i>Qu. J. Geol. Soc.</i>	<i>Quarterly Journal of the Geological Society</i>
<i>Rep. Brit. Assoc. Adv. Sci.</i>	<i>Reports of the British Association for the Advancement of Science</i>
<i>Soc. Stud. Sci.</i>	<i>Social Studies of Science</i>
<i>Trans. Newcastle Chem. Soc.</i>	<i>Transactions of the Newcastle Chemical Society</i>
<i>Trans. Newcomen Soc.</i>	<i>Transactions of the Newcomen Society</i>
<i>Trans. Roy. Geol. Soc. Cornwall</i>	<i>Transactions of the Royal Geological Society of Cornwall</i>
<i>Trans. Roy. Soc. Edinburgh</i>	<i>Transactions of the Royal Society of Edinburgh</i>
<i>Trans. Tyne Chem. Soc.</i>	<i>Transactions of the Tyne Chemical Society</i>

SUPPLEMENTARY LIST OF ABBREVIATIONS

<i>Adv. Sci.</i>	<i>Advances in Science</i>
<i>B. J. Educ. Studies.</i>	<i>British Journal of Educational Studies</i>
<i>Comptes Rendus</i>	<i>Comptes Rendus Lebdonadaires des Séances de l'Académie des Sciences (Paris)</i>
<i>Eng. Hist. Rev.</i>	<i>English Historical Review</i>
<i>J. Brit. Astronom. Assoc.</i>	<i>Journal of the British Astronomical Association</i>
<i>J. Soc. Arts.</i>	<i>Journal of the Society of Arts</i>
<i>J. Soc. Hist.</i>	<i>Journal of Social History</i>
<i>J. Textile Inst.</i>	<i>Journal of the Textile Institutions</i>
<i>Proc. Roy. Soc.</i>	<i>Proceedings of the Royal Society of London</i>
<i>Trans. Beds. Nat. Hist. Soc.</i>	<i>Transactions of the Bedfordshire Natural History Society</i>