

## The Victorian Palace of Science

The Palace of Westminster, home to Britain's Houses of Parliament, is one of the most studied buildings in the world. What is less well known is that while Parliament was primarily a political building, when built between 1834 and 1860, it was also a place of scientific activity. The construction of Britain's legislature presents an extraordinary story in which politicians and officials laboured to make their new Parliament the most radical, modern building of its time by using the very latest scientific knowledge. Experimentalists employed the House of Commons as a chemistry laboratory, geologists argued over the Palace's stone, natural philosophers hung meat around the building to measure air purity, and mathematicians schemed to make Parliament the first public space where every room would have electrically controlled time. Through such dramatic projects, Edward J. Gillin redefines our understanding of the Palace of Westminster and explores the politically troublesome character of Victorian science.

Edward J. Gillin completed a D.Phil. at the University of Oxford in 2015 and is now a Research Fellow at the University of Cambridge. He specialises in British science, technology, architecture and politics in the nineteenth century, with his current work focussing on the role of sound in the production of Victorian scientific knowledge. Previous works cover topics such as the Cunard Steamship Company, early twentieth-century political protest, and Isambard Kingdom Brunel's *Great Eastern* steamship. He received the 2015 Society of Architectural Historians of Great Britain's Hawksmoor Medal, and in 2016 was awarded the Usher Prize from the Society for the History of Technology.

*SCIENCE IN HISTORY*

*Series Editors*

**Simon J. Schaffer**, University of Cambridge

**James A. Secord**, University of Cambridge

**Science in History** is a major series of ambitious books on the history of the sciences from the mid-eighteenth century through the mid-twentieth century, highlighting work that interprets the sciences from perspectives drawn from across the discipline of history. The focus on the major epoch of global economic, industrial, and social transformations is intended to encourage the use of sophisticated historical models to make sense of the ways in which the sciences have developed and changed. The series encourages the exploration of a wide range of scientific traditions and the interrelations between them. It particularly welcomes work that takes seriously the material practices of the sciences and is broad in geographical scope.

# The Victorian Palace of Science

*Scientific Knowledge and the Building of the  
Houses of Parliament*

---

Edward J. Gillin

*University of Cambridge*



CAMBRIDGE  
UNIVERSITY PRESS

Cambridge University Press  
978-1-108-41966-6 — The Victorian Palace of Science  
Edward J. Gillin  
Frontmatter  
[More Information](#)

## CAMBRIDGE UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom  
One Liberty Plaza, 20th Floor, New York, NY 10006, USA  
477 Williamstown Road, Port Melbourne, VIC 3207, Australia  
314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre,  
New Delhi – 110025, India  
79 Anson Road, #06–04/06, Singapore 079906

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning, and research at the highest international levels of excellence.

[www.cambridge.org](http://www.cambridge.org)  
Information on this title: [www.cambridge.org/9781108419666](http://www.cambridge.org/9781108419666)  
DOI: 10.1017/9781108303873

© Edward J. Gillin 2017

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 2017

Printed in the United Kingdom by Clays, St Ives plc

*A catalogue record for this publication is available from the British Library.*

*Library of Congress Cataloging-in-Publication Data*

Names: Gillin, Edward John, 1990– author.

Title: The Victorian palace of science : scientific knowledge and the building of the Houses of Parliament / Edward J. Gillin.

Description: New York : Cambridge University Press, 2017. | Series: Science in history | Includes bibliographical references and index.

Identifiers: LCCN 2017040737 | ISBN 9781108419666 (hardback)

Subjects: LCSH: Westminster Palace (London, England) | Barry, Charles, 1795–1860. | Architecture and science – England – London. | Science – Great Britain – History – 19th century. | Westminster (London, England) – Buildings, structures, etc. | London (England) – Buildings, structures, etc.

Classification: LCC DA687.W6 G55 2017 | DDC 942.1/32–dc23

LC record available at <https://lccn.loc.gov/2017040737>

ISBN 978-1-108-41966-6 Hardback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

## Contents

---

<i>List of Figures</i>	page vi
<i>Preface</i>	ix
<i>Acknowledgements</i>	xiii
Introduction	1
1 A Radical Building: The Science of Politics and the New Palace of Westminster	19
2 Architecture and Knowledge: Charles Barry and the World of Mid-Nineteenth-Century Science	54
3 ‘The Science of Architecture’: Making Geological Knowledge for the Houses of Parliament	87
4 Chemistry in the Commons: Edinburgh Science and David Boswell Reid’s Ventilating of Parliament, 1834–1854	121
5 Enlightening Parliament: The Bude Light in the House of Commons and the Illumination of Politics	184
6 Order in Parliament: George Biddell Airy and the Construction of Time at Westminster	214
Conclusion: The House of Experiment	265
<i>Select Bibliography</i>	273
<i>Index</i>	307

## Figures

---

Map A	The venues of science in early-Victorian Westminster	<i>page xv</i>
1.1	Joseph Mallord William Turner's 'The Burning of the Houses of Parliament' (1834). This is by permission of the Tate Britain, 2017	24
1.2	Committee rooms forming part of the temporary accommodation for the Houses of Parliament	24
1.3	Henry Brougham in training: The embodiment of science and politics in 1830s Britain	40
2.1	Charles Barry as the very model of a professional Victorian architect	57
2.2	Charles Barry's ground plans for the new Palace of Westminster	58
2.3	Charles Barry's Palace of Westminster, at the heart of London's commerce	60
2.4	A detail of the north-eastern end of Barry's new Parliament building	64
2.5	William Whewell, the polymathic Master of Trinity College Cambridge and definer of Victorian science	71
2.6	A cross-section architectural drawing of the Victoria Tower	81
2.7	The steam-powered crane used in the construction of the massive Victoria Tower	83
3.1	The Grove quarry on the Isle of Portland, from which St Paul's Cathedral's stone was cut	102
3.2	Various stone samples employed didactically as column shafts in the Oxford University Museum	110
4.1	David Boswell Reid's depiction of Edinburgh's poverty stricken industrial classes	126
4.2	Reid's designs for the flow of air through the temporary House of Commons, up through the floor and then extracted through the roof by the action of a furnace	150
4.3	Variations of Reid's 'carbonometer', for testing the purity of air inside the Palace of Westminster	152

List of Figures	vii
4.4 The temporary Houses of Parliament as a laboratory under Reid's chemical control	153
4.5 The treatment and purification of air beneath the House of Commons before entering the chamber	154
4.6 The three steamships of the Niger Expedition about to commence their ascent up the river	158
4.7 The central ventilation tower of the Palace of Westminster as it stands today	164
4.8 <i>Punch's</i> satirical depiction of Reid's ventilation system	170
4.9 Though a hardened veteran of wars in India and the Iberian Peninsula, the hero of Waterloo, the Duke of Wellington was no match for Reid's experiments. <i>Punch</i> reported how the Duke was reduced to encasing 'his venerable head in a Welsh Wig' and demolishing enormous bowls of thick gruel to recover	171
4.10 Henry Brougham 'imprisoned in an exhausted receiver'	173
4.11 Reid portrayed as the 'aerial Guy Fawkes', successfully blowing up the House of Commons	175
4.12 Honourable Members of Parliament enjoying refreshment from Reid's aerial brewery	181
5.1 Michael Faraday delivers one of his celebrated Christmas lectures in the lecture theatre of the Royal Institution. Permission from the Royal Institution, via the Science Photo Library, 2017	190
5.2 Gurney's Bude Light as installed to illuminate Trafalgar Square	199
5.3 An Enlightened Publisher: The <i>Bude Light</i> journal took full advantage of the satirical potential of Gurney's scheme. Reproduced by kind permission of the Bodleian Libraries, the University of Oxford. (Reference Per.2706 g.8, page 201)	210
6.1 <i>Punch's</i> gently mocking portrayal of George Biddell Airy, here aloft the Greenwich time-ball	222
6.2 <i>Punch's</i> own proposal for a clock to regulate Parliamentary business, with time allotted for dining, the opera, and enjoying pleasant company	233
6.3 Britain and France connected by submarine telegraphy for the first time	239
6.4 Denison's original plan of the vertical section of the Westminster Clock. Reproduced by kind permission of the Syndics of Cambridge University Library	246

viii List of Figures

- |      |   |     |
|------|---|-----|
| 6.5  | A vertical view of Denison's Westminster Clock, drawn in January 1852 for Airy's approval and Dent's instruction. Reproduced by kind permission of the Syndics of Cambridge University Library      | 249 |
| 6.6  | The full-scale drawing of Denison's three-legged gravity escapement for the Westminster Clock, dated 27 November 1852. Reproduced by kind permission of the Syndics of Cambridge University Library | 254 |
| 6.7  | The spectacular recasting of the Great Bell for the clock tower attracted a considerable crowd in Whitechapel   | 257 |
| 6.8  | The completed Westminster Clock mechanism under trial in Dent's workshop  | 258 |
| 6.9  | The House of Lords under the control of electrically distributed Greenwich time   | 259 |
| 6.10 | The iconic Westminster Tower, housing the Westminster Clock and the great bell, 'Big Ben'   | 261 |
| C.1  | The completed Palace of Westminster as it stands today  | 269 |



## Preface

---

The Palace of Westminster is probably the most recognizable nineteenth-century building in the world. Home to Britain's Houses of Parliament, it is the seat of the nation's democratically elected political representatives. As far as architecture goes, the Palace is the ultimate symbol of political power. Though to look at the Houses of Parliament building is not to see a bastion of democracy, but a fantastic shrine to the medieval powers of monarchy, church, and aristocracy. Adorned with glorious sculptures of English kings and queens (obviously Oliver Cromwell has to wait outside) and decorated with Queen Victoria's monogram and frescoes depicting idealized episodes in British history, this is every bit a royal palace. Even the style exudes aristocratic privilege. Although a Classical silhouette with obvious Italian influences, it is unmistakably Gothic, and while the Classical holds notions of republicanism (both from classical Rome and revolutionary France), the Gothic is feudal and ecclesiastical. Step inside and all the fantasy of Augustus Pugin's Roman Catholic imagination is overwhelming. One cannot help think that this romanticized mock-medieval illusion is a rather inappropriate venue from which to govern a modern nation. If this is Britain's representative legislature, then it is unclear which particular bit of Britain it represents.

It is the premise of this book that to interpret the Palace of Westminster in this way is to misconstrue it. Indeed, it is to fall into an architectural trap set long ago; the building is meant to seem traditional, medieval, and emphasizing of a British constitution in which the Crown is central. After all, this was a Parliament building to allay fears of radical political change in an age of reform. Yet beyond the reassuring symbols of ancient authority lies a far more modern, radical, and perhaps dangerous power: science. Parliament's architecture might appear medieval, but it was designed as a startlingly modern legislature, embracing the latest scientific learning. The Palace is a vast network of early Victorian science and was, in the mid-nineteenth century, a site of knowledge production.

Historical comparisons are always risky, but it is hard not to feel that now is an appropriate time to revisit the 1830s with a focus on the new

Parliament building. Built in an age of great social and political uncertainty, where existing institutions struggled to survive in the face of radical and popular pressures, this was a time when both the physical form of Parliament and the British state were recast. And at the centre of all this turmoil was the problem of knowledge. With religious teachings and aristocratic powers challenged, new bodies of scientific knowledge, such as geology and chemistry, provided alternate cultural authorities. If 2016 was the year in which substantial elements of society ‘had enough of experts’ and the Oxford Dictionaries opted for ‘post-truth’ as their Word of the Year, then the 1830s was a time when purveyors of science worked hard to fashion their knowledge as ‘truth’ and build cultural authority for themselves.

The political upheavals seen recently will engage historians for years to come as they devise explanations and historical comparisons. Yet in the background, Britain’s parliament building has attracted headlines. In the context of immense political uncertainty, the future of the Palace has been a quiet, yet important, cause for discussion. With its physical state dilapidated, its appearance and practicality in question, and the costs of renovating and maintaining the property divisive, the Palace of Westminster has itself become controversial again. A recent committee of MPs and Lords have warned that without a restoration costing at least £4billion, the future of the building is in peril.

Politicians have often commented on Parliament’s physical setting, either as a cause for celebration, ridicule, or disgust. Perhaps most recently, in her book *Honourable Friends?* (2015), the MP Caroline Lucas condemned the physical setting of Parliament and described it as a place of privilege and indolence. She proposed a dramatic solution. Electronic voting instead of division lobbies, iPads replacing paper, meetings beyond Westminster, office space, and an architectural redevelopment to include glass walls through which the public might see the machinations of their government, as can be done in Berlin and The Hague. What is so interesting about such proposals is that they echo some of the more radical calls for a new Parliament made in the 1830s. Attention to efficiency, architecture, division of space, public access, and even the location of the building were all central to the debates surrounding the new Palace. The problems faced in the 1830s are still resonant today.

Popular and architectural historians have contributed to this growing interest in the Palace, providing new interpretations of the building. While Henrik Schoenefeldt has drawn attention to the elaborate ventilation schemes and their significance within architectural and design history, Caroline Shenton’s *Mr Barry’s War* (2016) has provided an

entertaining account of the Palace's construction from architect Charles Barry's perspective. His enigmatic partner and co-designer of the Palace, Augustus Pugin, was the subject of Rosemary Hill's hugely successful biography, *God's Architect* (2007). At the University of York, John Cooper has been leading a considerable research project on the architecture of St Stephen's Chapel (the original home of the Commons) between 1292 and 1941. In London, at the Institute of Historical Research, Rebekah Moore has investigated the temporary accommodation used for Parliament during the 1830s and 1840s. All this activity has reminded us that the architecture of Parliament presents us with important questions over the history of our political system. The form a nation's legislature takes is not straightforward, but reflects the ideas and values a society holds dear. What past studies have failed to show is the extent to which the Houses of Parliament embody science and the degree to which Victorian society wanted their legislature to be a bastion of scientific knowledge.

I first came across this relationship between science and the new Parliament building by accident in early 2012. While undertaking research on the cultural significance of the Houses of Parliament's architecture during the nineteenth century, I had to read through a host of parliamentary debates, minutes from select committee meetings, and commission reports. Throughout these, the names of individuals well known within the history of science, but perhaps obscure in architectural circles, kept appearing. The Astronomer Royal, George Biddell Airy, was a frequent contributor to royal commissions, while experimentalists Michael Faraday, Goldsworthy Gurney, David Brewster, and David Boswell Reid regularly provided evidence to committees. Charles Wheatstone, John Frederic Daniell, and John Tyndall were all officially employed to perform chemical investigations into various building materials. William Whewell and William Buckland were unofficially consulted for advice, and geologists Henry De la Beche and William Smith worked on a royal commission to select stone for the building. The naval architect John Scott Russell, railway engineer George Stephenson, and several of Isambard Kingdom Brunel's relatives sat on committees to provide technical knowledge. In short, it was clear that the celebrities of early-Victorian science were drawn together to help build the nation a new Parliament. On looking through their personal papers and newspaper articles, it became apparent that scientific knowledge played a central part in the building's construction. As I delved deeper it was also obvious that this role was far from simple. The use of such new and untried knowledge was full of epistemological and political problems.

xii Preface

There is no volume which closely examines all of this scientific activity and places it in its political and social contexts. My study unites histories of science, architecture, and politics into a cultural history of the building. This book argues that knowledge and architecture were interlinked through the act of governing in mid-nineteenth-century Britain. Unpacking exactly how this happened is the aim of this book.

## Acknowledgements

---

Thanks go first and foremost to William Whyte, without whom this project would simply not have been possible. He has provided kindness and support beyond all expectations, and has been the most fantastic mentor throughout the last five years. I must express my thanks to Crosbie Smith who has been a constant inspiration and trustworthy guide in all I do. Without him, I would not have had the confidence and knowledge to produce this work. I am grateful and honoured to have had critical advice from Simon Schaffer and Geoffrey Tyack. Simon's guidance earlier in the project was invaluable, and later on he was instrumental in transforming what was a D.Phil. thesis into a book. Geoffrey's enthusiasm has been a great source of energy throughout; especially his recommendation to focus on the architecture itself when this volume was at an embryonic stage. I have been privileged to have had conversations and feedback from Christina de Bellaigue and Jane Garnett. This project began with a chat at Girton College with Ben Griffin, and I have been grateful to him ever since. In recent months I have benefitted from excellent advice from Lucy Rhymer at Cambridge University Press, as well as Jim Secord and two immensely constructive reviewers; together they have made the publishing process exceedingly smooth. Indeed I am grateful to all the staff at Cambridge University Press who have made the experience most enjoyable, especially Julie Hrischeva and Allan Alphonse. A very special thanks goes to Silke Muylaert for all her insights and support. Not only is she one of the most intelligent critics I've been able to discuss ideas with, but also she has been constantly at my side throughout this work.

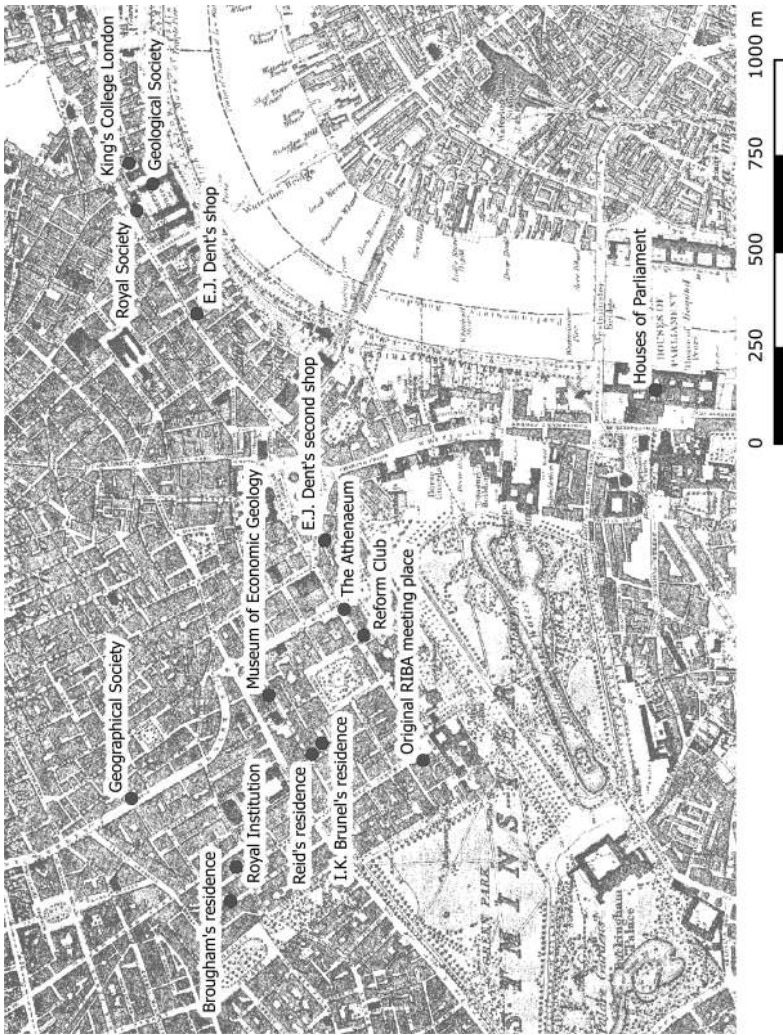
For their extensive and generous support, I should like to thank Robert White, Laura Treloar, Alexander Teague, Peter Exell, Steve Teague, Montgomery Spencer, and the late Estelle White. Thanks go also to Tim Marshall, Mark Curthoys, David Boswell, Harry Rodgers, Peter Mandler, Graham Lott, Lyndal Roper, Oz Jungic, Oliver Zimmer, Horatio Joyce, Mark Collins, Craig Muldrew, Grayson Ditchfield, Diego Rubio, Perry Gauci, Graham Harding, Penny Tyack, Richard

xiv Acknowledgements

Parfitt, Susan Brigden, Alana Harris, David Ormrod, Sam Burgess, Ben Marsden, Mark Collins, Philip Boobbyer, Robert Parker, Yakup Bektas, Jon Agar, Don Leggett, Sir Mark Jones, Judith Pfeiffer, Frank James, Stephen Courtney, Oliver Carpenter, Rachel North, Jenny Bulstrode, Keith Shephard, Ben King, Robert Hall, Harry Mace, and the one and only Chris Yabsley. I am immensely grateful to Henrik Schoenefeldt, Geoffrey Cantor, Graeme Gooday, and Peter Roberts. It has also been a privilege to discuss this project with Robert Thorne and Robert Bowles, who have an incredible knowledge of the buildings. The Modern British History and the Architectural History seminars in Oxford have provided an incredibly constructive atmosphere in which to work. Late direction was provided by David Trippett, for which I am very grateful. Thanks go also to my students, especially Ting Ma, Ayush Mehta, Sarah Nagle, Katharine Ogburn, and Yi Xie. The help and assistance of the inspirational David Lewis has been fantastic and will not be forgotten.

I owe immense debts to Andrew Morrison and Gill Nixon at the British Geological Survey, Annie Pinder and all the staff at the Parliamentary Archives, and Kathleen Santry at the archives of Oxford University Museum of Natural History. Thanks also go to the staff at Tate Britain, the British Library, King's College London Archives, Kent University Templeman Library, the National Archives at Kew, the Royal Observatory at Greenwich, the Sackler Library, Edinburgh University Centre for Research Collections, University of Edinburgh New College Library, Cambridge University Library, the Radcliffe Science Library, the Duke Humphrey Room, and the Weston Library. The staff at the Bude Castle Heritage Museum were lovely and enthusiastic in helping me to research Goldsworthy Gurney's career. For funding I thank the Arts Humanities Research Council, St John's College Oxford, St Cross College, the Oxford Wellcome Unit for the History of Medicine, and the University of Oxford History Faculty. The map work is entirely due to Michael Athanson at the Bodleian Library. I should like to thank the Bodleian for offering me reduced cost image permissions, while Cambridge University Library kindly waived these altogether. At the 2015 'Making Constitutions, Building Parliaments' conference, Joseph Coohill, Rebekah Moore, Caroline Shenton, Martin Spychal, Rosemary Hill, and Philip Salman were all fantastic and provided some essential late inspiration. A final word of thanks is due to Paul Roberson for personally introducing me to the Westminster Clock. Behind this project stand two unseen but incredible figures, without whom it would not have been possible, namely my parents Steve and Louise Spencer, and it is to them that I dedicate this work.





Map A The venues of science in early-Victorian Westminister