Architectus Ingenio:

Robert Hooke, the Early Royal Society, and the Practices of Architecture

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ABSTRACT

The purposes of this thesis are twofold. Firstly, it will provide a new reading of the interrelationship between architecture and institutionalised science – as represented by the early Royal Society – in the late seventeenth century. Secondly, it will explore in detail the architectural career of the Royal Society's first curator: Robert Hooke. I will, in this volume, show how Royal Society members theorised both the subject of architecture and the figure of the architect. I will conclude that Hooke was in many ways the paradigmatic Royal Society architectural practitioner. In the remainder of the thesis I will use a number of case studies to explore how this paradigmatic architectural agent behaved in practice. First of all, I take the example of domestic architecture to show how Hooke had to adhere to contemporary conventions of architectural practice in his career. I will then show how the administrative rules present in the institutions that employed Hooke as an architect prevented the sort of informal collaboration to which he would have been accustomed in the Royal Society. Finally, I will explore the interface between the Royal Society and architecture in the context of a specific architectural design: Hooke's College of Physicians.

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ABBREVIATIONS

See Bibliography for full references.

A.S.	All Souls College, Oxford, Drawing Collection.
B.L.	British Library Manuscripts.
Chatsworth.	Chatsworth Manuscripts.
C.L.R.O.	Corporation of London Record Office.
C.L.R.O. Repertory	Corporation of London Record Office, Repertory of the Court of Aldermen.
C.L.R.O. Orders	Corporation of London Record Office, Orders of the City Lands Committee.
G.L.	Guildhall Library Manuscripts.
R.C.P.	Royal College of Physicians Library and Archive.
R.G.O.	Royal Greenwich Observatory Manuscripts.
R.S.C.P.	Royal Society Classified Papers.
R.S.J.B.	Royal Society Journal Book.
W.C.R.O.	Warwickshire County Record Office.
Diary	*The Diary of Robert Hooke, 1672-1680,* (London, 1935).
ODNB	The Oxford Dictionary of National Biography.
HKW	The History of the King's Works.
HMC	The Historic Manuscripts Commission.
Phil. Trans.	The Philosophical Transactions.
SL	The Survey of London.
VCH	The Victoria County History of England.
WS	The Wren Society.

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Julie, according to an author far wiser than this one: gratitude is a complex emotion. I have found it to be the opposite: with all my love and thanks.

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INTRODUCTION

My sons ought to study mathematics and philosophy, geography, natural history, naval architecture, navigation, commerce, and agriculture, in order to give their children a right to study painting, poetry, music, architecture, statuary, tapestry, and porcelain.[1]

John Adams,

Letter to Abigail Adams (1780)

Writing in the late eighteenth century, the future president of the United States, John Adams, was resolute that the study of science should precede the study of architecture. Only when one generation had mastered science and its sister discipline mathematics could the next begin the investigation of the arts. But even in Adams's day, architecture sat uneasily within this teleology, for in the eighteenth century science and architecture were by no means mutually exclusive categories. Might the presence of mathematics, philosophy and naval architecture amongst the activities of Adams's sons not overlap with and predict the architectural studies of his grandsons? Unlike some of the other arts catalogued by the future president, architecture straddled clumsily the intellectual endeavours of the Adams family generations.

One hundred years earlier, in the Royal Society of London, this boundary between the sciences and architecture was even harder to determine. Here, in another part of the English-speaking world, a newly institutionalised science interfaced with the design and

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[1] Adams, 1841: 68.

practice of architecture to such a degree that one generation alone was sufficient to master both. The distinctions that Adams would attempt to articulate were only just beginning to germinate. If the relationship between science and architecture was by no means clearly defined in 1780, in 1680 it was excessively blurred.

The central concern of this thesis is to explore this blurring: the epistemic entwinement of science and architecture in late seventeenth-century England, and the agency of early Royal Society members in architectural design and practice. It will examine the epistemological location of architecture within the Royal Society, its socio-cultural application in practice, and the theoretical problems associated with the translation of scientific ideas into architectural design and the subsequent built form. My interdisciplinary approach will infuse an architectural and socio-cultural historical narrative with early modern and current architectural theory, sociology, philosophy of science, and phenomenological philosophy. Only with such wide-ranging theoretical apparatus will I be able to do justice to the range of issues that have arisen over the course of my research. As the opening quotation of this thesis suggests, the relationship between architecture and science is a complex issue in many historical periods, as evidenced by a varied and often contradictory range of recent literature.[2] Moreover it is particularly difficult to translate this literature into a meaningful engagement with built architectural spaces. As a result in Chapter 1 I will establish a socio-cultural and epistemological base from which to confront examples of what we would now term scientific architecture that arose from within the Royal Society and its milieu.

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[2] See, for example, the discussion on general relationships between architecture and science in Gallison and Thompson, 1999: 1-28; and Picon and Ponte, 2003: 10-17.

An exploration of the relationship between late seventeenth-century architecture and science must acknowledge the potential instability of these concepts. Seventeenth-century meanings of the terms 'architecture' and 'science' are not consistent with their modern definitions. It would, therefore, be very easy to discuss them anachronistically. Although I will, with care, use the word 'architecture' within its modern parameters, in my first chapter I will define what Hooke and his contemporaries meant by the term. The term 'science' is considerably more problematic.[3] Andrew Cunningham and Perry Williams observe that 'it was not until the beginning of the nineteenth century that the term "science" was used for the enterprise of investigating the natural world in the way that it is used today'.[4] Instead, it encompassed much broader range of activities and did not necessarily include areas of research that would today be classed as science. Thus it would be dangerous to discuss late seventeenth-century architecture within what J.M. Bennett calls 'that conglomerate anachronistically labelled "science"' without very carefully defining the make-up of that conglomerate: a huge task and one outside the remit of this thesis.[5] To avoid this pitfall the following four chapters will concentrate on the practices of architecture within the specific institutionalised setting of the early Royal Society, rather than within the insecure notion of late seventeenth-century science in general. As Michael Hunter observes:

> in the seventeenth century it is often difficult to disentangle [science] from other intellectual pursuits, but the Royal Society was authentically devoted to a cluster of disciplines concerned with natural and mechanical phenomena to the exclusion of others, linked by common methods.[6]

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[3] For the problematic status of the word science in the late seventeenth century see Cunningham and Williams, 1993: 420-423; and Johns, 1999: 1126.
[4] Cunningham and Williams, 1993: 420.
[5] Bennett, 1986: 1.
[6] Hunter, 1989: 1.

I will also recognise that the Royal Society existed in the form of a corporate body, manifested in official meetings and publications, as well as within a more informal geography, located in coffee houses and private homes.[7] As Chapter 1 will show, it was in such informal meetings between individual members that architectural discourse tended to be disseminated and discussed.

The second main aim of my research is to shed light on the architectural career of Robert Hooke, the first curator of the Royal Society, and to provide the first extensive analysis of the architecture he designed and built.[8] My reasons for focussing on Hooke – rather than on his fellow Royal Society colleague, Christopher Wren – are numerous. First and foremost is the fact that throughout Hooke's architectural career he maintained much closer links with the Royal Society than Wren did. When in demand as an architect, mainly in the 1670s and 80s, Hooke managed to give a broadly equal amount of dedication and time to the Royal Society as he did to architectural pursuits.[9] Even when he was engaged on large numbers of commissions in the mid 1670s, he retained his position as curator to the Royal Society and was heavily involved in the day-to-day proceedings of the group. Although Wren was made president of the Royal Society in 1681, he contributed far less to the group's meetings after his appointment as Royal Surveyor in 1669.[10] Nor is there evidence to suggest that Hooke neglected his architectural duties in favour of his activities

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[7] For the formal and informal spaces of the Royal Society see Shapin, 1988: 373-404. For the corporate nature of the Society see Hunter, 1989: 2-6.

[8] This is not to say, however, that I will engage in the sort of historical rescue-missionary tactics, aimed at Hooke's posthumous reputation, that have been a feature of some recent scholarship; see for example Jardine, 2004: 247-258. From the outset I will assume that Hooke's reputation as both an important member of the Royal Society and as a practicing architect is secure, and seek instead to explore aspects of his architectural career that have not hitherto received scholarly attention.

[9] Although it is undeniable that there is considerable evidence for Wren's continuing interest in experimental philosophy and Royal Society matters after he became the Royal Surveyor and an established architect, he was never involved to the degree that Hooke was. For Wren's participation in Royal Society affairs and his scientific career in general see Bennett, 1982: 26-86; and Hunter, 1995a: 45-65.

[10] Hunter, 1995a: 64-65.

in the Royal Society. In many respects, therefore, Hooke's career offers a different position from which to view the interface between the Royal Society and architecture: one that it is more closely located within the workings of the institution.

A second important reason for focussing on Hooke is the survival of his invaluable diary.[11] This source has been widely used by historians of science, and whilst architectural historians have used it to confirm Hooke's authorship of a number of buildings, its potential relevance to the study of late seventeenth-century architecture has not been realised.[12] And yet it is the only surviving diary of an architect from the period, and therefore provides the only detailed account of an architect's quotidian activities.[13] The diary reveals the nature of Hooke's specific performance as an architect and his more general engagement with architecture as an intellectual subject. Although Wren's 'Tracts' on architecture, which remained unpublished until the eighteenth century, tell us much about his conceptual engagement with architecture as a discipline, it does not provide the in-depth account of the routine of a Royal Society architect to the extent that Hooke's diary does. The diary will be particularly important to Chapters 2 and 3, which will discuss issues concerning architectural practice.

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[11] Hooke's diary, which he kept intermittently and with lengthy intervals between 1671 and 1693 is published in a variety of locations. The largest and most extant section, covering the period 1672-1680 was published in 1935 (henceforth *Diary*); it is here that much of the architectural information in the diary can be found. The less complete sections for the first half of 1672 and for 1681-1683 are transcribed in Henderson, 2007: 129-175. Hooke's second diary, covering the period 1688-1693, was published separately, again in 1935 (Hooke, 1935a). For discussion of Hooke's diary in general and its original purpose see Mulligan, 1996: 311-342; Jardine, 2003b: 163-206; and Henderson, 2007: 129-133.

[12] For the attribution of architectural designs to Hooke see below.

[13] Only the notebooks of Roger Pratt can rival Hooke's diary as an account of the day-to-day processes of architectural design and building (Pratt, 1928). To date Hooke's diary has only been used to attribute architectural designs to him (discussed below) or to glean information about Wren's architectural practice and theory.

A final reason for concentrating on Hooke is the significance of the buildings he designed. As Christine Stevenson has shown, Hooke's design for Bethlem Hospital (1675-1676) was an innovative and influential piece of architecture (Fig. 1).[14] Bethlem remains his most studied and researched architectural commission, but other major buildings of the 1670s such as the Monument to the Great Fire of London, built in 1671-1676 (Fig. 2), Montagu House built between 1675 and 1679 (Fig. 3) and the College of Physicians dating from 1671 to 1678 (Fig. 4) are amongst the more significant designs of the late seventeenth century and demand further analysis.

ARCHITECTURE AND THE EARLY ROYAL SOCIETY

While my thesis presents a new and original reading of the practices of architecture in the early Royal Society, there have been a series of important publications on this subject. They need full elucidation here. To date there have been four coherent attempts to understand the relationship between architectural theory, design and practice and the experimental philosophical output of the early Royal Society. Three of these positions have been almost exclusively concerned with the architecture, writings and experimental philosophical activities of Wren. This has come at the expense of Hooke and another Royal Society member: John Evelyn, whose writings on architecture render him equally important to this debate.[15]

The first attempt, by John Summerson attempts to identify the direct influence of Royal Society ideas on Wren's buildings. Summerson locates the perceived relationship

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[14] Stevenson, 1996: 254-275; Stevenson, 2000: 32-44.
[15] I will discuss Evelyn's 1664 *Account of Architects and Architecture* extensively in Chapter 1.

between Wren's architecture and his training and continuing participation in scientific activities within a formalist narrative.[16] For Summerson, the frequent deviations from a classical norm in the style of Wren's architecture resulted from the rationalising and innovatory mindset provided by his training in experimental science. Over the course of two essays – *The Mind of Wren* and the shorter *Christopher Wren: Why Architecture?* – Summerson sees architectural style as subject to empirical thought: the 'tyranny of the intellect'.[17] The intellectual current of the day, the New Learning, was able to alter, influence and manipulate architecture through the medium of the experimental philosopher architect whose ingrained mindset made such subjection inevitable. According to Summerson:

> To transfer this concept of empiricism from philosophy to design is not difficult. Empirical design may be expressed as the antithesis of imaginative design; empiricism involves a conscious selection of formal relationships, imagination an unconscious selection.[18]

Thus in Wren's architecture, experimental philosophical ideas consciously and tyrannically suppressed unconscious imagination. The resulting architectural style was, according to Summerson 'empirical', and was the product of 'the profound disadvantages of intellectual domination'.[19] It is unclear whether Summerson believed this could work the other way, and he offers no suggestion of how architecture might operate within or upon experimental philosophy. Instead, Summerson's model suggests a dialogue between science and architecture in which architecture is presented as the inferior party. Science represented the cultural conditions which shaped Wren's architectural designs and left them 'unpoetical as

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[16] Summerson, 1949:51-86.
[17] Summerson, 1949: 51-86; Summerson, 1990: 63-68. As Geraghty has shown, Summerson based the notion of the tyranny of the intellect on T.S. Eliot's similar model of interpreting seventeenth-century metaphysical poetry; Geraghty, 2008: 26-39.
[18] Summerson, 1949: 74.
[19] Summerson, 1949: 86.

a result.[20] Summerson writes very little concerning Hooke's architectural output. However, he does suggest that the architectural style of Hooke's buildings was, if anything, an exaggerated manifestation of the experimental philosophical influenced deficiencies in Wren's architecture. Summerson sees Hooke's overall architectural output as 'somewhat mechanical and insensitive' and Hooke himself as 'a better scientist than [an] architect'.[21]

Jim Bennett's 1982 monograph *The Mathematical Science of Christopher Wren* provided a timely reappraisal of the relationship between architecture and experimental philosophy in the early Royal Society. Bennett suggests that it is 'misconceived' on the part of architectural historians 'to couch this problem in terms of how Wren's "science" influenced his "architecture"'.[22] Instead of analysing already identified stylistic characteristics of Wren's architecture through the prism of experimental philosophical ideas, Bennett retraces architecture's position as an intellectual subject within the late seventeenth-century scientific canon. In the resulting analysis he identifies architecture as a phenomenon which, to Wren's contemporaries, was conceived as an applied mathematical science. Bennett documents the history of the mathematical sciences in seventeenth-century England observing that 'a vigorous tradition of practical mathematics [existed], linking mathematicians and mathematical teachers with the practitioners of the mathematical sciences'.[23] Within the category of mathematical practitioners, the architect could and did exist, with Wren being the exemplar. Bennett ultimately uses this to explain the ease with which Wren became an architect:

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[20] Summerson, 1949: 64.
[21] Summerson, 1993: 238. Summerson, 2003: 45.
[22] Bennett, 1982: 2.
[23] Bennett, 1982: 6.

> Wren's move into architecture should be understood as professional rather than intellectual. Architecture had for long been accepted as part of the mathematical sciences and Wren had broad interests within this domain...[24]

In short, Wren's early architectural appointments should be considered entirely appropriate for someone trained and proficient in practical mathematics.

This thesis will also explore a third, more recent body of work: that of Lisa Jardine. Although Jardine is not primarily concerned with the relationship between science and architecture, over the course of two biographies – on Wren and Hooke – she calls for the wholesale reassessment of the activities and output of the early Royal Society (including architecture) as the manifestation and production of formal and informal collaboration.[25] She recognises that the traditional depiction of the early modern scientific practitioner as a solitary, lone scholar is not applicable to early Royal Society members but rather that social interaction fostered scientific discovery in the period.[26] As Jardine states in a revealing interview with reference to the early Royal Society and its wider milieu: 'Everywhere I looked, I saw fabulous teams of people collaborating to move the world forward'.[27] Despite the problematic scientistic outlook inherent in these words, her reading of the Society as social forum, in which collaboration between members was the norm, is not contentious. As is apparent from the diaries of individual members, such as Hooke's, there was indeed a

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[24] Bennett, 1982: 90.
[25] These two biographies were preceded by a 1999 book: *Ingenious Pursuits, Building the Scientific Revolution* (Jardine, 1999), in which, despite the architectural metaphor present in the work's title, Jardine did not concern herself with architectural matters. However this publication represented her first attempts to outline a reading of the early Royal Society as primarily a formal and informal collaborative enterprise.
[26] For a thorough, and more nuanced, discussion of the problematic identity of the solitary scholar in the early modern period and its relevance to the early Royal Society see Shapin, 1991b: 279-327.
[27] This quotation can be found in an interview with the author in the paperback edition of Jardine's biography of Hooke; Jardine, 2003a.

collaborative nature to their scientific activities.[28] According to Jardine, this close collaboration was translated into the architectural sphere where Wren and Hooke became an informal yet visible 'architectural firm'.[29] Jardine is not the first to claim Hooke and Wren were informal architectural collaborators. Previous authors have assumed that their friendship led to a high degree of collaboration over specific architectural projects. As early as 1935 Margaret Batten proposed that Hooke should be viewed as 'a partner to Wren', whereas in 1996 Paul Jeffery, whilst discussing Hooke's role in the City Church Office, suggested that when it came to architecture 'collaboration was normal practice for the two men'.[30] However, Jardine sees it as a fundamental characteristic of their relationship and applies it to numerous fields of study and activities:

> the collaboration between Wren and Hooke in significant and diverse areas of Wren's activities – architecture, engineering, town planning, astronomy, microscopy, anatomy, mathematics – was so close that often it is difficult to decide whose was the greater creative contribution.[31]

For architectural history – where questions of attribution have been such a feature of recent scholarship – Jardine's claim that Wren and Hooke were jointly responsible for a number of architectural designs is of major significance.

The final position is that of Li Shiqiao, whose *Power and Virtue, Architecture and Intellectual Change in England, 1660-1730* (2007) seeks to link Royal Society members'

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[28] See, for example, Bennett, 1975a: 32-61. For scientific collaboration in general see Johns, 1994: 3-22.
[29] Jardine, 2002: 294.
[30] Batten, 1935: 13. Jeffery, 1996: 57. As Jardine acknowledged, she based much of her discussion of Wren and Hooke's roles in the City Church Office on Jeffery's account; Jardine, 2002: 538n. The problems and limitations of Jeffery's monograph on the subject are discussed in Geraghty, 1997: 336-337 and in Chapter 3 of this thesis.
[31] Jardine, 2003a: 14.

conception and practice of architecture to forms of Baconian, utilitarian knowledge.[32] To a certain extent the argument that architecture was seen as a utilitarian destination for late seventeenth-century experimental philosophy is well rehearsed. Michael Hunter's work on the Royal Society in the 1980s and James Campbell's more recent studies of the Society's interest in structural engineering and building materials, have stressed architecture's importance to the group's drive for public utility.[33] Hunter's discussion of architecture's place in the Society's history of trades programme is particularly important and will be discussed in Chapter 1. However, unlike Hunter, who located architecture's utilitarian potential within the Society's rather narrower early interests in trades, Shiqiao sees a broad emphasis in Wren and his contemporaries' treatment of the subject that reflected a climate of utilitarian epistemology stretching back to Bacon. Identifying a direct link between Wren's architectural theory and design and Bacon's writings on utility – particularly the philosopher's short essay on building – Shiqiao sees architecture as a paradigmatic 'useful' form of knowledge.[34]

As part of this Shiqiao stresses the importance of what was termed 'the grounds of architecture' to Royal Society architects. This should be understood as correct classical architectural design and the Vitruvian emphasis on firmness and convenience in particular.[35] These ground rules of architecture were followed in specific architectural

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[32] Shiqiao, 2007: 15-54. Shiqiao first addressed this issue in an article on Wren in 2000. Much of the discussion was repeated in his 2007 book; Shiqiao, 2000: 235-266.
[33] Hunter, 1995a: 63-65; Campbell, 2008: 9-27.
[34] Shiqiao, 2007: 24. Shiqiao admits that to see a direct relationship between Baconian writings and the early Royal Society's epistemological programme is potentially problematic, as Hunter has observed; Shiqiao, 2000: 261n.
[35] Wren's attitudes to ancient architecture are also explored in depth in Soo, 1998. In particular Soo discusses Wren's reconstructions of ancient buildings in his 'Tracts' on architecture.

designs, for example Wren's Trinity College Library in Cambridge, of which Shiqiao notes that:

> the emphasis in design was clearly placed on firmness and convenience, and not on thoughtless imitations. The excellence of antiquity in architecture, in the minds of advocates of experimental knowledge such as Evelyn, Hooke and Wren, sprang from the same principles of scientific knowledge, and must be understood through the same ground rules. Firmness and convenience became the keys to the true knowledge in architecture for all ages; only there beauty in architecture was possible.[36]

Thus firmness and convenience – two thirds of Vitruvius's tripos – channelled through Baconian utilitarianism, dictated architectural design in Royal Society circles. Shiqiao also uses this conception of architecture to highlight its political use, demonstrating the close connection between power and knowledge in the period.[37] This thesis will seek to engage with all four of these positions. It will also build on the small but significant body of scholarship concerned specifically with Hooke's architectural career.

THE ARCHITECTURAL CAREER OF ROBERT HOOKE

Hooke will take centre stage in this thesis. Studying Hooke as an architect, however, presents unique difficulties, not least because so many of his principal buildings no longer survive. Major commissions such as the College of Physicians, Bethlem Hospital and Montagu House were all demolished in the nineteenth century whilst others, such as Ragley Hall in Warwickshire (1680), have been dramatically altered (Fig. 5). Another problem associated with the study of Hooke's architecture has been the tendency amongst architectural historians of previous generations to attribute his buildings to others, mainly

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[36] Shiqiao, 2007: 45.
[37] Shiqiao, 2007: 55-82.

Wren.[38] The first significant study of Hooke's architecture appeared in 1936 when Margaret Batten published a lengthy article in *The Walpole Society* that attempted to secure a corpus of Hooke's architectural designs.[39] This was the first time an author had used the vast amount of architectural information in Hooke's (recently published) diary to confirm his authorship of specific buildings. Among the commissions that Batten managed successfully to attribute to Hooke were the College of Physicians, the screen in the Merchant Taylors' Hall in the City of London (1673), the parish church of Willen in Buckinghamshire (1678-1679), and work at Londesborough House in Yorkshire (1676-1677).[40] Batten also shed light on other major Hooke buildings such as Bethlem Hospital, Montagu House, and Aske's Almshouses in Hoxton (1690-1693). Of particular importance was her publication of a series of surviving letters in the Public Record Office from Hooke to Lord Conway of Ragley Hall.[41] These reveal much about Hooke's architectural practice and will be analysed in depth in Chapter 2 of my thesis.

Since Batten, scholarly research on Hooke's architectural career has appeared infrequently. There have been several studies of individual buildings such as Howard Colvin and Hentie Louw's research on Hooke's Ramsbury Manor in Wiltshire and Peter Leach's work on Ragley.[42] In recent years there has been a wealth of new research and writing on Hooke's life from a history of science angle, but scholarship on his architecture has remained less developed. Of the three major collections of essays produced by historians of science on Hooke since 1989, only one has included essays on his

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[38] For example see Stratton, 1916: 68-72; in which one of Hooke's most significant designs, the College of Physicians, was assumed to be the work of Wren.
[39] Batten, 1936-1937: 83-113.
[40] Batten, 1936-1937: 89-90, 90-91, 96-97, 104.
[41] Batten, 1936-1937: 99-103.
[42] Colvin, 1975: 194-195; Louw, 1987: 45-459; Leach, 1971: 230-233; Leach, 1979: 265-68.

architectural career.[43] Even then only three out of sixteen papers were concerned with architecture. This is, of course, not to discredit historians of science, who have endeavoured to produce more and more sophisticated readings of Hooke's multifaceted career. Instead it is a recognition that architectural historians have been less willing to accept Hooke's importance as an architect. Since Batten's 1936 article, three biographies have also been published on Hooke: Margaret Espinasse's *Robert Hooke* (1956), Stephen Inwood's *The Man Who Knew Too Much, the Strange and Inventive Life of Robert Hooke 1635-1703* (2002), and Jardine's *The Curious Life of Robert Hooke* (2003).[44] These have tended to discuss Hooke's architecture in summary form, although Espinasse's book is the most architecturally focused of the three, with a chapter dedicated to his employment as Surveyor to the City of London as well as his private architectural career.[45] In fact, Hooke's work as a surveyor after the Great Fire of London has been the subject of considerably more interest amongst scholars than his architectural career.[46] Most prominent amongst this literature is Michael Cooper's comprehensive account of Hooke's activities as City Surveyor.[47]

Much of the recent architectural historical writing on Hooke has tended to focus on stylistic comparison and attribution. For example, Alison Stoessar-Johnston's research on Hooke attempts to identify stylistic links between his architectural designs and late

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[43] In 1989 Michael Hunter and Simon Schaffer edited the important collection *Robert Hooke, New Studies* (Hunter and Schaffer, 1989), this was followed in 2003 by *London's Leonardo – The Life and Work of Robert Hooke* (Bennett, Cooper, Hunter, Jardine, 2003). The final volume, *Robert Hooke, Tercentennial Studies*, was the proceedings of a conference held in 2003 to mark the anniversary of Hooke's death and was published in 2006 (Cooper and Hunter, 2006). It contains a small section on architecture with papers by Jacques Heyman, Alison Stoesser and Hentie Louw.

[44] Espinasse, 1956. Inwood, 2002. Jardine, 2003a.

[45] Espinasse, 1956: 83-105.

[46] Hooke has rightly featured prominently in accounts of the rebuilding of London such as Thomas Reddaway's important study (Reddaway, 1940), and Michael Cooper's work in this field.

[47] Cooper, 2003.

seventeenth-century Dutch architecture. In doing this Stoessar-Johnston provides the first comprehensive study of Hooke's architecture since Batten and Espinasse.[48] In addition to Stoessar-Johnston, there have been a number of recent studies of Hooke's architecture that have sought to attribute previously unattributed late seventeenth-century designs to him on the basis of stylistic comparison. In particular, Giles Worsley in a 2004 article provides the reader with a series of new, and striking, attributions to Hooke.[49] Observing Hooke's productivity in the 1670s, Worsley assumes that he could have been just as productive outside of these years.[50] Thus buildings designed during Hooke's lifetime but not dating from the period covered by his diary can be attributed to him on stylistic grounds. Another example of this approach is Jeffery's 1996 monograph on the City of London parish churches. Like Worsley, Jeffery attributes churches, previously thought to be by Wren and again designed before Hooke had begun to keep a diary, on the basis of stylistic similarity to Hooke's known architectural designs.[51] This approach to architectural history is, however, problematic. Attributing buildings to Hooke has spun out of control due to the build up of increasingly tenuous past attributions. As the art historian David Carrier insightfully observes: 'Controversial attributions involve an unavoidably circular argument – an artwriter's general view of the artist determining what works are attributed to him and those attributions, in turn, determining the writer's image of him'.[52] Just as Carrier suggests, Jeffery's and Worsley's appraisal of Hooke's architectural career add new and

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[48] Stoessar-Johnston, 1997. Stoessar-Johnston, 2000: 121-137. Stoessar, 2006: 165-180. I will, at points in this thesis, explore some of this body of work in more detail.
[49] Worsley, 2004a: 1-25. These attributions will be catalogued in Chapter 2.
[50] Worsley, 2004a: 13, 15.
[51] In fact, Jeffery bases most of his new attributions on designs for City churches then considered to be by Hooke. As I demonstrate in Chapter 3, Hooke's authorship of any City church is unlikely, therefore Jeffery's claims on this matter seem difficult to sustain.
[52] Carrier, 1991: 56.

tenuous attributions on the basis of previous tenuous attributions.[53] This thesis will resist this temptation and instead engage with buildings where Hooke's authorship can be securely demonstrated.

Other recent architectural historical scholarship on Hooke has focussed on and engaged with specific aspects of his career, most prominently Christine Stevenson's work on Bethlem Hospital and the Monument.[54] Stevenson locates both these buildings within their cultural and intellectual context. In the case of Bethlem she explores the building in light of contemporary theory relating to insanity and in the case of the Monument she sees the design as related to Hooke's writings on memory.[55] Partly as a result of Stevenson's careful research, my thesis will not be overly concerned with Bethlem. Instead, I will concentrate on lesser-known but vitally important commissions, while following Stevenson's attempts to place Hooke's designs in their intellectual context. Other studies of Hooke's architecture in recent years have also begun to do this. These include Hentie Louw's short article in 2006 which compares Hooke's status as an experimental philosopher architect to that of Wren and Claude Perrault, and Anthony Geraghty's research into Hooke's collection of architectural books and prints.[56] Again I will seek to build on and contextualise the work of these authors.

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[53] For example Worsley partly bases his attribution to Hooke of Wrest Park in Bedfordshire upon his attribution, also to Hooke, of Petworth House in Sussex; Worsley, 2004a: 20.
[54] Stevenson research on Bethlem is published in a 1996 article on the subject (Stevenson, 1996: 254-275), and within her 2000 monograph on hospital architecture in general; Stevenson, 2000: 32-46, 85-97. She has also published an article on the Monument; Stevenson, 2005: 43-73.
[55] Stevenson, 1996: 254-275. Although Stevenson analyses the Monument in the light of Hooke's writings she still attributes the building to both Hooke and Wren; Stevenson, 2005: 43-73. As Chapter 3 will show Hooke can now be considered the sole architect of the column.
[56] Louw, 2006: 181-202. Geraghty, 2004: 113-125.

The study of Hooke's architecture represents a unique, double opportunity of which my thesis will take full advantage: firstly, to generate new and exciting research on one of the late seventeenth-century's most important architects, and secondly, to provide a new angle from which to view the debate on the relationship between architecture and the intellectual culture of early Royal Society. It is for these reasons that Hooke is central to my thesis and they also highlight his importance to late seventeenth-century architectural history as a whole.

ARCHITECTURE AND THE EARLY ROYAL SOCIETY:

A NEW INTERPRETATION

This thesis will present a new reading of the interface between architecture and the early Royal Society using evidence from Hooke's architectural career. To achieve this it will seek to build on the four established positions on this subject, outlined above. The first chapter will establish the theoretical and epistemological location of architecture as well as the figure of the architect in the early Royal Society. In this respect it will corroborate and build upon the arguments outlined in Bennett's *The Mathematical Science of Christopher Wren*. Using the architectural theoretical writings of Evelyn, who, like Wren, clearly identified architecture's status as an applied mathematical pursuit, as well as evidence from Hooke's career, I will show that practical architectural knowledge was acquired and performed by Hooke and fellow Royal Society members on much the same lines as any other form of applied mathematical knowledge. I will then demonstrate that architecture in the Society was conceived as an intellectual subject in its own right, the equal of many

other concerns of the group and worthy of the experimental philosopher's attention. This will utilise evidence from official Royal Society sources and from Hooke's diary. In the first chapter I will also examine Royal Society members' attitudes towards the rules of classical architecture, in particular Evelyn and Hooke's. Like Shiqiao, I believe that Society members saw that some forms of architectural knowledge were to be prized above others and that the accurate elucidation of that knowledge was of paramount importance to Evelyn and Hooke. However, I argue that Evelyn and Hooke saw these correct forms of architectural knowledge as a classical norm that was not entirely based on ancient aesthetics or Vitruvian notions of firmness. I will show that contemporary European – and occasionally British – architectural design was also included in Evelyn and Hooke's realm of correct architectural knowledge. The appliance of that correct knowledge is witnessed in Chapter 2, where I will use the example of Hooke's Montagu House to show that his patrons could rely on Hooke to facilitate them with a knowledge of contemporary European design which could then be applied to their houses.

Following this, I will turn to an important area of the relationship between architecture and the Royal Society that has been, until now, largely overlooked: the conception of the architect. Here I will present a new reading of Evelyn's *Account of Architects and Architecture* (1664), arguing that Evelyn defines a paradigmatic architectural agent best exemplified in practice by Hooke. Consequently, in Chapter 2, I will show how Hooke performed his duties as a professional architect in private practice, based on the position set out in the preceding chapter. Overall, this work will build upon, critique and challenge the writings of the sociologist and historian of science Stephen

Shapin. Until now Shapin's influence on architectural history has been minimal, although his 1988 article 'The House of Experiment in Seventeenth-Century England' has been used by architectural historians and theorists interested in more general relationships between science and built space.[57] In this piece Shapin maps a geography of the new science in late seventeenth-century London, identifying formal and informal spaces where scientific discourse and production took place. However, Shapin's significance to my thesis goes far beyond this article. In particular, his 1994 book *The Social History of Truth* will be of paramount importance to my first two chapters. In this seminal text, Shapin outlines his belief that late seventeenth-century scientific discourse was based around the notion of credibility, and that the ability to produce or rely scientific knowledge was based on how credible and therefore trustworthy one was.[58] Credibility, according to Shapin, was produced by social status and social performance: thus a gentleman was the paradigmatic scientific truth-teller in the late seventeenth-century.[59] The functioning of knowledge ran along social and moral lines: 'credible knowledge was established through the practices of civility'.[60]

In the historiography of late seventeenth-century science, *The Social History of Truth* – along with Shapin's earlier *Leviathan and the Air Pump*, co-written with Simon Schaffer in 1985 – is perhaps the most influential text of the last thirty years.[61] On these grounds alone Shapin's argument deserves recognition in this thesis. However, I believe that its relevance to architectural history – specifically that of the seventeenth century – has

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[57] Shapin, 1988: 373-404; see Schwarte, 2005: 76n.
[58] Shapin, 1994: 66-125.
[59] In Chapter 1 I will discuss the problematic notion of the late seventeenth-century gentleman. For Shapin's discussion of the term see Shapin, 1991a: 279-327; and Shapin, 1994: 42-64.
[60] Shapin, 1994: 66.
[61] For a discussion of the importance of these texts see Johns, 1999: 1141-1143; and Hunter, 2003: 219-223.

been overlooked, as has its importance to the understanding of the relationship between architecture and the early Royal Society. Architectural commissioning in any period, like modern science, is dependent on the notion of credibility. It would be a mistake to assume that seventeenth-century patrons were willing to allow 'uncredible' people to design their buildings. As Chapters 1 and 2 will suggest, to be credible as an architect in the period one needed to possess – and be able to demonstrate – the correct forms of knowledge, relating to various aspects of architecture, including design, structure and materials. I will demonstrate that as architectural knowledge belonged in the epistemological programme of the Royal Society it also followed the formulae by which that epistemology functioned in practice. According to Shapin, gentlemanly credibility dictated the functioning of scientific knowledge: one of the key questions that my first chapter will ask is whether architecture – as practiced by early Royal Society members – followed suit.

The Social History of Truth and *Leviathan and the Air Pump* are the most prominent texts in the constructivist, externalist historiography of late seventeenth-century English science.[62] As a result they have been extensively criticised by a number of historians of science.[63] I will be alert to these criticisms and use them, in my first chapter, to create a modified version of Shapin's theory of epistemological credibility that can be applied to architectural theory produced in Royal Society circles. Furthermore, the historiography of late seventeenth-century architecture has not been dominated by an externalist/internalist debate, and architectural historians have been less reluctant to see architecture in light of broader, intellectual and cultural movements. The application of Shapin's theories to the

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[62] Golinski, 2005: 30; see Hunter, 2003: 220-221.
[63] These criticisms are addressed in Chapter 1; see the summary in Guarini, 1998: 66-74.

practices of architecture in the late seventeenth century is therefore less contentious than it has been in the discipline of the history of science.

In Chapter 2, I build on the position I established in Chapter 1 and demonstrate its application in practice. However, I will also explore how the desires of patrons and the need for Hooke to follow an unofficial code of practice in his private career might have shaped that application. The third chapter of this thesis will go further and strike a note of caution. Again seeking to explore the practical translation of the relationship between the Royal Society and architecture, I will examine Hooke and Wren's performance in the more strictly regulated world of institutional architectural commissioning. Here I will argue that the norms of institutional scientific practice could not be translated into the architectural domain. In this respect I will engage with, and in parts critique, the body of work on this subject undertaken by Jardine. At no point do I question her reading of the scientific world of the late seventeenth century where, as she rightly points out, informal collaboration was the norm. I will, however, challenge her attempt to translate that reading into Wren and Hooke's professional architectural relationship. In Jardine's admirable determination to see through 'the disciplinary boundaries traditionally policed under the labels "arts" and "sciences"' she assumes that what was the norm for the newly institutionalised experimental philosophy could be easily translated into the architectural sphere.[64] In fact, the types of institutions that both Hooke and Wren designed buildings for after the Great Fire, such as the City of London and the City Church Office, did not allow these types of informal collaboration. Jardine's suggestion that Hooke and Wren's working relationship crystallised 'into something novel and productive in the way of organisation of

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[64] Jardine, 2002: preface, x.

responsibility – something quite close to the modern architectural office' is perhaps an overstatement.[65] I will demonstrate that Hooke and Wren, instead of forming an 'architectural firm', played roles in the designing of institutional architecture that were limited by the institutions concerned. In fact, within these bodies, design tended to be conducted by individuals and was separate from administrative tasks. Thus, established modes of architectural practice could place limits on collaboration, limits that did not exist in the world of the Royal Society. Above all this chapter will demonstrate that the performance of Royal Society members in the institutional architecture sphere was shaped by the external forces of administrative practice and proto-bureaucracy at work in these institutions.

Once these questions – relating to the practical application of the interface between architecture and the Royal Society – have been answered, I will turn my attention to a specific architectural design. In my last chapter I will return to Summerson and address his reading of Hooke's anatomy theatre of the College of Physicians in London (Fig. 6). In Chapter 1, I, like Bennett, critique Summerson's suggestion that science exerted a malignant, external influence on architectural design in the late seventeenth century. If architecture was included in the Society's epistemological programme then the relationship between that programme and the specific architectural designs of the members needs revaluation. In Chapter 4 I will examine this relationship using as a case study Hooke's anatomy theatre. As I will demonstrate, this design, labelled by Summerson as an empirical quirk – 'more strange than beautiful' – was more closely linked to the Royal Society (both

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[65] Jardine, 2002: 297-298.

conceptually and in practice) than most other buildings in the period.[66] To show this I will present the reader with new evidence that highlights the nature of the close working relationship between Hooke and physicians of the College. Ultimately, I will propose that this relationship allowed Hooke to facilitate a more serious and complex interplay between contemporary experimental philosophical ideas and architecture in built form.

The investigation of the direct relationship between built architectural space and what we would now term scientific ideas is in many ways the hardest task of this thesis. Fortunately, recent architectural theorists have also been concerned with this, the most elusive component of the science/architecture interface.[67] Perhaps the most important investigation into the relationship between early modern science and architectural design came from the work of Alberto Pérez-Gómez. In his influential but controversial 1983 *Architecture and the Crisis of Modern Science*, Pérez-Gómez traces the perceived contemporary stranglehold upon architecture by positivist science and technology back to the late seventeenth century and in particular to the writings of the French architect and scientist Claude Perrault. Following Husserl's critique of modern science and its roots in Cartesian and Newtonian rationalism, Pérez-Gómez sees the influence of late seventeenth-century scientific organisations such as the French Royal Academy of Science – and by association the Royal Society – upon architecture as somewhat pernicious, breaking the mythical and sensory relationship between human experience and architectural space:

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[66] Summerson, 1993: 238.

[67] See Galison and Thompson, 1999; and Schramm, Schwarte, Lazardzig, 2005. Although this literature, on the whole, focuses on continental Europe and deals with the early Royal Society only in passing, it shares mutual theoretical concerns with this thesis. Much recent philosophy of science in this area has identified architecture as a facilitator of scientific research; see Gallison and Thompson, 1999: 1-28. I will explore this in Chapter 4.

> technique and craft were freed from their traditional magical associations [...] Architects began to consider their discipline a technical challenge, whose problems could be solved with the aid of two conceptual tools, number and geometry.[68]

Prior to this point, number and geometry, according to Pérez-Gómez, had still been an integral part of architecture but were more metaphysical agents than tools for solving problems. They were 'a *scientia universalis*, the link between the human and divine'.[69] In the narrative of *Architecture and the Crisis of Modern Science* it was late seventeenth-century science that first questioned and ultimately broke that link.

There is much to critique in Pérez-Gómez's book. As Dora Wiebenson observes in her 1987 review of *Architecture and the Crisis of Modern Science* there is next to no engagement with the work of English architects and theorists of the late seventeenth century, despite the 'interdependence of French and English cultural attitudes and architectural theory' in the period.[70] Others have pointed to the inadequacies of Pérez-Gómez's summary of architecture in the period before the late seventeenth century as consisting of 'dreams and myths'.[71] I am myself uneasy about his attempts to map a pre-ordained narrative of historical scientific development onto late seventeenth-century architecture and his readiness to retrospectively identify the perceived tyranny of nineteenth-century positivism in the architectural writings of Perrault. However, there are also aspects of Pérez-Gómez's book that I want to build upon in my thesis. In my first chapter I agree with his view that seventeenth-century architecture, as manifested in the architectural theory of the time, is something that can be discussed as an epistemological

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[68] Pérez-Gómez, 1983: 11.
[69] Pérez-Gómez, 1983: 10.
[70] Wiebenson, 1987: 154. In particular, Wiebenson highlights Wren's absence from Pérez-Gómez's text. However Hooke and Evelyn could be equally as important to his thesis.
[71] See McCleary, 1985: 263.

phenomenon. Echoing authors such as Bennett and Hunter, Pérez-Gómez saw that early modern architecture and architectural theory existed 'within an epistemological framework', in which 'not even the distinction between the sciences and the humanities was clear-cut'.[72] Further engagement with Pérez-Gómez will come in my fourth chapter. Here I will return to the phenomenologist critique of Cartesian and Baconian influence on architecture as an interpretive tool and use recent phenomenologist architectural theory – in turn influenced by Pérez-Gómez – to explain the problems identified by Hooke's contemporaries with attempts to build 'scientific' architecture. This discussion will not rely on a definition of pre-seventeenth-century architecture dependant on notions such as poetry and myth, but will identify and engage with a contemporary architectural experience that was inimical to the application of scientific technology to architectural space. Thus, I will finally return to Summerson and explore his notion that the architectural designs of Wren, and in particular Hooke, were in some way 'insensitive'.[73] I will show that the problems that Summerson articulates with these designs came from the uneasy early modern relationship between architectural space and contemporary scientific ideas.

This introduction has located the four chapters that follow within existing scholarship on the interrelationship between architecture and the Royal Society. It has also highlighted my conviction that the work of Shapin, as well that of recent architectural theorists, will vivify this discussion. My thesis reinterprets the interconnection between architecture and the Royal Society, placing Hooke in the centre of one of the late seventeenth century's critical intellectual frontiers.

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[72] Pérez-Gómez, 1983: 18.
[73] Summerson, 1949: 85; Summerson, 1993: 238.

CHAPTER 1

GENUS ARCHITECTUS: CLASSIFYING ARCHITECTURE AND ARCHITECTS IN THE EARLY ROYAL SOCIETY

The first part of this chapter will argue that Royal Society members such as Hooke, Wren and Evelyn saw architecture as an important constituent part of the Royal Society's wider programme of interests. It will show that architectural knowledge was regularly consumed by Royal Society members both for utilitarian ends – to be used in actual building projects – and to improve the individual or community's general knowledge of the subject. Additionally, the Royal Society saw itself as a functioning producer of architectural knowledge, which could in turn be disseminated. This system followed a general epistemological climate in which data, whether it was related to mechanical trades such as architecture or to natural philosophy, was collected and processed either for specific utilitarian aims, or out of a desire to acquire accurate and correct information relating to classical architecture. The second part of this chapter will be concerned with how Royal Society members, particularly Evelyn and Hooke, theorised the figure of the architect in society. Central to this chapter will be a close reading of Evelyn's *Account of Architects and Architecture*, first published in 1664 as an accompaniment to his translation of the French architectural writer Roland Fréart's 1650 text, *A Parallel of Ancient Architecture with the Modern*.[1] Evelyn's text represents the one major piece of published architectural theory to emerge from the

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[1] The first edition of the text was dedicated to John Denham and was reprinted in 1680 with a translation of Leon Baptise Alberti's *Treatise of Statues*. A second edition was produced in 1707 with a further dedication to Wren. See Harris and Savage, 1990: 196-201; Downes, 1968: 28-39; Friedman, 1998: 161; Levine, 1999: 163-165.

early Royal Society and, as I discuss below, Evelyn was clear that it was a text with explicit links to the rest of the Society's published output.[2] I will argue that Evelyn's architectural theoretical writings formulated an epistemological architective economy which privileged the acquisition of knowledge through European architectural illustrations and theory over traditional apprenticeships.[3] In this respect it followed the Society's general concerns for the promotion of correct classical architectural knowledge.

ARCHITECTURE

Although this thesis will use the word architecture in its modern definition, encompassing all aspects of design and built space, Hooke and his contemporaries understand the term somewhat differently. As Evelyn's writings make perfectly clear, architecture was already seen as a profession, albeit one that operated in very different ways from today. However, the theoretical position of architecture – as a discipline defined by the early Royal Society members – must first be outlined. In the first edition of his *Account*, Evelyn is also clear that, as he understood it, architecture was still defined in Vitruvian terms:

> *Architecture* (says our Master *Vitruvius*) is a *Science* qualified with sundry other *Arts,* and adorn'd with variety of *Learning,* to whose judgment and approbation all other Works of *Art* submit themselves.[4]

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[2] The other major architectural texts produced by prominent members of the Society were John Aubrey's unpublished *Chronologia Architectonica* (see Colvin, 1968: 1-27), and Wren's 'Tracts' on architecture, which remained unpublished until the eighteenth century when they were included in *Parentalia* (Wren, 1675). See Soo, 1998: 119-152.

[3] Throughout this chapter I will use the word 'architective' to relate specifically to architects rather than architecture as a whole.

[4] Evelyn, 1664: 121. For a discussion of a 'Vitruvian' definition of architecture in late seventeenth-century England see Bennett, 1982: 12-13. For the influence of the Vitruvian system on seventeenth-century science and mathematics in general see Bennett, 1975b: 141-152.

In other words, Evelyn identifies architecture as a practical mathematical art in the same way as Vitruvius. Furthermore, for Evelyn, architecture was the finest of all these practices: 'an exact and irreprochable Piece of *Architecture* should be *χολοφων totius Matheses* the Flower and Crown as it were of all the *Sciences Mathematical*'.[5] In other writings Evelyn is again clear that architecture belonged, conceptually, with mathematics. For example in an unpublished 1661 proposal for the order of books in a library, today amongst the Royal Society papers, he classifies architecture under the heading 'Geometry', along with 'Machines' and 'Paynting'.[6] Within this broad definition as a mathematical discipline, architecture was a category which encompassed theory, design, and practical building matters. It was, in Evelyn's words, 'the result of an assiduous and manual practice upon apt materials according to the Model propounded'.[7] Evelyn, like Vitruvius, is clear not to give theory and design, or 'Speculation', as he calls them, priority over the practical and the mechanical. Instead he sees 'Speculation' in architecture as the tabernacle to the practical element of the discipline's temple, and that to operate in architecture one needed both how to 'know', and to 'apply'.[8]

It is to this conclusion that Bennett comes in his 1982 study of the relationship between Wren's science and architecture. In the late seventeenth century, architecture was an occupation which, as Bennett demonstrates, was seen by Royal Society members such as Wren and Evelyn as the exercise of applied mathematics.[9] Wren, in

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[5] *χολοφων totius Matheses*: the colophon or end-point of all the mathematical sciences; Evelyn, 1664: 118.
[6] R.S.C.P. XVII, 1, fol.1r.
[7] Evelyn, 1664: 121.
[8] Evelyn, 1664: 121.
[9] Bennett, 1982: 87-91. As Pérez-Gómez observes, if any late seventeenth-century architectural theorist moved beyond Vitruvius' definition of architecture it was Claude Perrault, and he alone. However even Perrault 'never denied the importance of *mathesis* in architecture'; Pérez-Gómez, 1983: 38.

his 'Tracts' on architecture, explicitly labels architecture a 'Mathematical Science'.[10] In defining architecture as a mathematical pursuit early Royal Society members were building on a long tradition in England of seeing architecture and mathematics as mutually inclusive.[11] They also located architecture alongside surveying, with which Hooke, Wren and other Royal Society members such as Jonas More, were frequently involved.[12] Architecture's continual association with surveying in this period – architects were frequently referred to as surveyors – is perhaps due to the two disciplines' mutual status as applied mathematical pursuits.

Architecture's theoretical location within the gamut of applied mathematics did not result in early Royal Society members denigrating it in any way. Although a reluctance to engage with the practical application of mathematics seems to have existed in the group, its theoretical, epistemological place within the Society was secure.[13] In fact, interest in applied mathematical activities such as architecture and surveying was part of a general engagement on the part of Royal Society members with mechanical professions.[14] Hooke sat on the Society's committee charged with creating a history of trades, an exercise first proposed by Francis Bacon and one taken up by Hooke and his generation.[15] In his *Method of Improving Natural Philosophy*, composed sometime in the 1660s, Hooke observes that experimental philosophers had to:

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[10] Soo, 1998: 188; see Bennett, 1982: 87. As Shiqiao shows, John Wilkins, another member of the Royal Society and Hooke and Wren's mentor in their Oxford days, also places architecture amongst the 'mechanical arts' in his 1648 exploration of mathematics: *Mathematical Magick or the Wonder that may be Perform'd by Mechanical Geometry*; Shiqiao, 2007: 32.

[11] For the early seventeenth-century English belief that architecture was a mathematical science see Bennett, 1993: 23-29 and Gerbino and Johnston, 2009: 65-82.

[12] For discussion of the Royal Society, mathematics and surveying see Willmoth, 1993: 104-129; for Hooke's surveying activities see the extensive study by Michael Cooper (Cooper, 2003).

[13] This reluctance is discussed in detail below.

[14] For an important discussion of the role played by mechanics and the mathematical sciences in general in the early Royal Society see Bennett, 1986: 1-28.

[15] Bacon, 1857, 3: 332-333. For general information on the history of trades project see Houghton, 1941: 35-38; and Ochs, 1985: 129-158. For more specific information on architecture and the history of trades see Campbell, 1999: 15-44; and Campbell, 2008: 10-16.

> take notice of and enumerate all the Trades, Arts, Manufactures, and Operations, about which Men are employed, especially such as either contain some Physical Operation, or some extraordinary Mechanical Contrivance, for such as these will very much inrich a Philosophical Treasury.[16]

The history of trades project was partly conceived with utilitarian aims in mind. As Michael Hunter demonstrates, early Royal Society members were 'obsessed by the usefulness of their studies' and actively promoted their overall worth to mankind.[17] As a group, the Royal Society was anxious to advertise the usefulness of experimental philosophy through the individual talents of its members. Tensions existed in the organisation over accusations of an inability to justify experimental philosophy in practical spheres. Such criticism reached a head in *The Virtuoso*, Thomas Shadwell's 1676 satire on the Royal Society, in which the group was accused of indulging in introverted experiments with little or no benefit to the common good.[18] Two of its more prominent members, Hooke and Boyle, came in for particular criticism.

It is clear from surviving evidence that architecture was seen as an area in which Royal Society members could prove their worth to society as a whole. A letter to Boyle by the Royal Society's secretary Henry Oldenburg, illustrates the belief that the achievements of the members in building matters would reflect glory on the group as a whole. In September 1666 following the Great Fire, Oldenburg had heard that Wren had submitted to the King his plans for rebuilding the City, without consulting the Society. He reports to Boyle that:

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[16] This text was not published until 1705 when it was done so posthumously; Hooke, 1705: 24. For an examination of Hooke's opinions on practical and technological advances see Westfall, 1983: 85-110.
[17] Hunter, 1981:87. Hunter shows elsewhere that this obsession began to diminish towards the end of the seventeenth century, when even Hooke questioned the importance of applied knowledge; Hunter, 1995a: 177-178; see also Louw, 2006: 118. For Hooke and utility in general see Westfall, 1983: 85-110; and Bennett, 1986: 7-8.
[18] See Shadwell, 1966: xv-xxvi; and Hunter, 1981: 70. For Hooke's reaction to being lampooned by Shadwell see Inwood: 2002: 236-239.

> If I had had an opportunity to speake with him sooner, I should have suggested to him, that such a model, contrived by him, and reviewed and approved by thee R. Society, or a Committee thereof, before it had come to the view of his Majesty, would have given the Society a name, and made it popular, and availed not a little to silence those, who aske continually, What have they done?[19]

Here Oldenburg is clear that Royal Society members could counter claims that the group was in some way self-indulgent and of little public use by undertaking the tasks of town-planning, surveying and architecture that the rebuilding necessitated. He was also concerned that the Society's collective knowledge had been overlooked, and as a result the members decided to approach the City and offer their support claiming that 'if they or any of their members could do any service for the good of the city' they were willing to assist.[20] The historian and chief publicist of the Society, Thomas Spratt, also expresses the belief that the rebuilding of London presented an opportunity for members to utilise the knowledge relating to architecture, building materials, surveying and engineering that they already possessed:

> A *New City* is to be built, on the most advantageous Seat of all *Europe*, for Trade, and command. This therefore is the fittest Season for men to apply their thoughts, to the improving of the *materials* of building, and to the inventing of better *models*, for *Houses, Roofs, Chimnies, Conduits, Wharfs*, and *Streets:* all which have been already under the consideration of the *Royal Society*.[21]

Again, Society members felt that they possessed appropriate forms of knowledge that could be put to good use in the rebuilding.

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[19] Oldenburg, 1967, 3: 231; Shiqiao, 2007: 33. Wren's response to Oldenburg was that he had been pressured into submitting the plan as soon as possible and did not have time to show it to the Royal Society, see Cooper, 2003: 111-112.

[20] Birch, 1756-57, 2: 115. This suggestion came after the Society had seen Hooke's model for rebuilding the city which, it was noted, had been preferred 'very much to that, which was drawn up by the surveyor of the city', who at that date was Peter Mills; see Cooper, 2003: 112; and Chapter 3.

[21] Spratt, 1667: 122-123. I recognise Michael Hunter's argument that Sprat's *History* is not the straightforward representation of the Royal Society's programme of interests that some authors have taken it to be. However, in Sprat's brief discussion of town planning and architecture he is unequivocal in the belief that this was an opportunity for the Society to expand its utilitarian credentials; Hunter, 1989: 45-68. Even if there is a hint of idealism in Sprat's discussion of architecture and town planning it remains in line with other Royal Society published positions on the subject. As discussed below, there is considerable idealism on Evelyn's part in his discussion of architectural practice in the *Account*.

Another example of architecture's place in the Society's drive for utility and public usefulness – hitherto overlooked by scholars – came in 1676 when Evelyn intervened in an incident relating to one of Hooke's domestic architectural commissions, defending his fellow member against accusations of self-indulgence and praising the utilitarian goals of the Society as a whole. Evelyn had recently recommended Hooke's architectural services to his friend Margaret Godolphin, whose Whitehall house was in need of repairs. Shortly after Hooke had begun drawing up plans for the work, Godolphin attended a performance of *The Virtuoso*, when she realised that the play's protagonist, Sir Nicholas Gimcrack, was an amalgamation of several Royal Society figures, including her newly appointed architectural advisor.[22] She wrote to Evelyn expressing her doubts about Hooke.[23] Evelyn's reaction is a furious defence, crucially not of Hooke, but of the Royal Society as a whole:

> I have learnt more profitable and useful things from some hours conversation in that Meeting than ever I have done from the quintessence and sublimest rapture of those empty casks whose noise you so admire in court.[24]

Evelyn's diatribe reveals the perceived analogousness of Hooke's private architectural employment and the Royal Society's justification for its ongoing experimental scheme. Thus the designing and building of architecture had a function to play within its quest for public legitimacy. The letter also demonstrates that Hooke was seen as a representative of the Society even when he was engaged in more private forms of architectural employment.

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[22] Harris, 2002: 257; see also Espinasse, 1956: 99.
[23] Unfortunately this letter does not survive.
[24] The letter is published in Harris, 2002: 259.

However, to view architecture as a mere destination for Royal Society members seeking utilitarian credentials would be to place it outside the Royal Society's epistemological canon. Michael Hunter does just this in his 1981 monograph on the Royal Society, *Science and Society in Restoration England*, and again in a 1995 article on Wren.[25] Hunter portrays Wren's decision to take up the Surveyorship of the Works in 1669 as a 'move away' from science after he became 'dissatisfied with what science and academic life could offer'.[26] Although Wren did indeed leave an academic post in 1669 (the Savilian Professorship of Astronomy at Oxford University), he was not, I suggest, abandoning institutional science. Like other practical pursuits in which the Society showed an interest, architecture was seen as an intellectual subject worthy of the members' interests and worthy of inclusion in the Society's research programme. Hunter's suggestion that Wren (and to a lesser extent Hooke) somehow left science for architecture after becoming frustrated with the former's lack of utilitarian opportunities does not take into account the inclusive nature of the early Royal Society's relationship with the processes of designing and building architecture.[27] As Bennett observes, Wren's move into architecture 'should be understood as professional rather than intellectual': it may well have been motivated by financial reasons and certainly did not take him outside of familiar intellectual boundaries.[28] Other areas of practical mathematics, such as engineering and surveying, would likewise not have been seen as conceptually outside of the Society's remit.[29]

Instead, architecture's importance *within* the epistemological programme of the Society is best represented iconographically in the frontispiece of Sprat's 1667 *History*

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[25] Hunter, 1981:111. Hunter, 1995a: 63-65.
[26] Hunter, 1981: 111.
[27] Hunter, 1995a: 65.
[28] Bennett, 1982: 90.
[29] See Bennett, 1986: 1-28. For the Society's involvement, through Jonas Moore, in practices such engineering and surveying see Willmoth, 1993: 121-138.

of the Royal Society (Fig. 7). This famous image, which was designed by Evelyn and engraved by Wenceslas Hollar, articulates the chief concerns of the Society and makes explicit the group's debt to Bacon, the figure shown to the right of the bust of Charles II (the other figure is the Society's first president Lord Brounker). Although the frontispiece has been reproduced and interpreted, most notably by Hunter, little mention has been made of the architectural elements of the design.[30] The figures of Bacon and Brounker sit within an imaginary loggia, surrounded by books, instruments and various other accoutrements of the new science. Behind them is an imaginary landscape dominated by a large telescope, apparently a depiction of the 35ft instrument given to Gresham College by Sir Paul Neile in 1658.[31] Crucially a large architectural façade is also included in this landscape. Resembling a contemporary country house, it has been tentatively suggested by Hunter that this building represents 'Solomon's House', the idealised location of experimental science proposed by Bacon in the *New Atlantis*.[32] However, rather than directly associating the house with the utopian building of Bacon's text, I believe it is more plausible to see the façade as another example of the material products of Baconian-inspired experimental philosophy that populate the image.

If Solomon's House is represented in the image then the loggia itself makes a more convincing candidate: it is, after all, the interior in which Bacon himself sits. Unlike the loggia, the large house does not seem to be part of the architectural setting of the ensemble and should instead be viewed in the same context as the books and instruments that surround Brounker and Bacon and the telescope with which it shares

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[30] Hunter demonstrates convincingly that the illustration was originally designed for another history of the Society written by John Beale but transferred to Sprat's text when the Beale project was abandoned; see Hunter, 1981: 194-197.
[31] For information on Neile's telescope see Hartley, 1960: 159.
[32] Hunter, 1981: 197.

the background of the image. The viewer is clearly meant to read the collection of barometers, quadrants and other devices as the products of the Royal Society's increasingly sophisticated research programme and its subsequent translation into useful material objects. Some of the devices are even depictions of specific inventions formulated within Royal Society circles, such as Boyle's air pump and Neile's telescope. A musket to the right of Bacon presumably represents the Royal Society's belief that its accumulated knowledge could facilitate military innovation while the large collection of books is probably a reference to the Society's already considerable published output.[33] If viewed within this collection the large architectural façade becomes another production of the knowledge of England's scientific elite. Evelyn designed the frontispiece at the same time as the Society was compiling lists of occupations and mechanical processes for the history of trades project.[34] The presence of architecture in the lists strengthens the likelihood of its iconographic inclusion in Evelyn's engraved tableau of Royal Society achievements and aims. Other mechanical trades such as military technologies and navigation are clearly represented in the image and it would perhaps have seemed odd if architecture had been omitted. The actual house depicted is unclear, and is possibly imaginary given that the Royal Society's members had yet to produce any major piece of architectural design when Evelyn designed the image. However, it resembles the type of domestic buildings that Society members would be designing ten years later, Hooke's Montagu House (Fig. 3) and Ragley Hall (Fig. 5) for example.[35] It is also very similar to Euston Hall in Suffolk, the

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[33] For the Royal Society and military innovation see Hunter, 1981: 94-95; and A.R. Hall, 1983: 111-141.
[34] Strangely, when Evelyn drew up his list of trades in 1660, the manuscript of which survives in the Royal Society papers, he does not include architecture; R.S.C.P. III, 1, ff. 1-2. This initial list is published in Sieveking, 1923-24: 41-47. It is discussed in Houghton, 1941: 49-56; Hunter, 1995a: 72-84; and Johns, 1999: 1125-1126. The Society drew up their list in 1664; see Birch, 1757, 1: 407.
[35] As the image was produced in the 1660s, before Hooke and Wren had become established architects there was no significant large building designed by Royal Society members that Evelyn could choose to depict, hence the probable imaginary design in the frontispiece. For information on Montagu House and Ragley Hall see Chapter 2.

home of the Earl of Arlington, which had been rebuilt in 1666 (Fig. 8).[36] Although Evelyn would, in 1671, design the gardens of Euston, the resemblance is presumably coincidental.[37] However such parallels do show that the house in the frontispiece was very much a contemporary design – and in particular one inspired by French architecture – rather than a reconstruction of the potentially antique Solomon's House. It is significant that Evelyn made the decision to represent the Society's interest in architecture through a depiction of a contemporary building. It suggests that, alongside more theoretical concerns about architecture, the members saw the production of actual buildings as a goal for the Royal Society.

Evelyn is also the source of another piece of compelling evidence for locating architecture within the Royal Society's epistemological programme. Beyond providing an essentially Vitruvian definition of architecture, his *Account* is a text which seeks to provide a lexicon of architectural terminology for English practitioners and investigate the nature of contemporary architectural practice. Crucially, it represents the clearest and most detailed explanation of the architect, both theoretically and professionally, in late seventeenth-century England.[38] Thus Evelyn set himself the task of not only explaining architectural terms and concepts, but identifying just who might be the beneficiary of such an explanation. Architectural agency, Evelyn claims, is the central theme of the text 'Since the *Agent* does always precede the *Action*, and the *Person* or *Workman* is by natural Order before his *Work*'.[39] The persona of the architect or 'a

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[36] The identity of the architect of Euston Hall is not known, although it has been suggested that it was designed by William Samwell; see Colvin, 2008: 895.
[37] For information about Evelyn's involvement with the Euston Hall see Darley, 2006: 236-237.
[38] Previous architectural texts produced in England, such as John Shute's *The First and Chiefe Groundes of Architecture* (Shute, 1563), and Henry Wotton's *Elements of Architecture* (1624), had not explored the persona of the architect to anywhere near the extent that Evelyn did; see Harris and Savage, 1990: 418-422, 499-502. Neither did Balthazar Gerbier's *A Brief Discourse Concerning the Three Chief Principles of Magnificent Building*, published in 1665, the year after Evelyn's *Account*; Harris and Savage, 1990: 207-208.
[39] Evelyn, 1664: 114.

person skilful in the Art of Building' must be elucidated before their activities can be outlined. Hence the text is split into two sections: the first concentrating on the figure of the architect, the second on architectural terminology.

Crucially for this chapter, Evelyn's *Account of Architects and Architecture* is also the most prominent architectural publication to be generated within the milieu of the early Royal Society.[40] However, the importance of this text amounts to more than just Evelyn's prominent position within the organisation. The treatise itself explicitly aligns its theoretical position with that of the Royal Society's broader research interests. In the preface, Evelyn likens his publication to a number of mechanical and natural philosophical works that had already developed from within the Society. The *Account* should be read, Evelyn states, as part of an emerging interest in the 'Interpretation of the *Tearms* of so many useful *Arts,* I mean the *Mechanical*'.[41] However, he then notes that such attempts to interpret 'things artificial', such as architecture, can be viewed in the same bracket as the 'exact notices of the several and distinct Species of Birds, Fishes, Insects, Stones, Colours &c, in which divers Worthy Members of the Royal Society have already made so considerable a Progress'.[42] In other words, his treatise and the study of all mechanical processes – including architecture – were analogous in character

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[40] Evelyn presented the text to the Society in a meeting on 9 November 1664; Birch, 1757, 1: 487; Campbell, 2008: 20.

[41] Evelyn, 1664: 114.

[42] Although this comparison between the *Account* and other Royal Society texts is present in the 1664 first edition, Evelyn expands it in the 1706 second edition and includes a list, in the margin, of authors whose works had emerged from the Society and to which the *Account* could be directly compared. These writers are: Francis Willoughby, the author of *De historia piscium* (1686) a natural history of fish and the *Ornithology* (1676) the equivalent for birds and an unfinished history of insects; Christopher Merrett and Walter Charleton, physicians and authors of numerous works on biological subjects, human or otherwise; Richard Waller, the publisher of Hooke's posthumous works and the author of a number papers on natural historical subjects that appeared in *Philosophical Transactions*; John Ray, the famous naturalist who had collaborated with Francis Willoughby on the texts listed above as well as producing his own classificatory projects; and finally John Harris, whose 1704 *Lexicon Technicum, or, an Universal English Dictionary of Arts and Sciences* Evelyn singles out for particular comparison with his own text; Evelyn, 1706: preface. For taxonomy in the early Royal Society and the work of Merrett and Charleton in particular see Booth, 2005: 118-120. For classifying natural philosophical data in general see Hunter, 1989: 152-153.

to more familiar natural philosophical taxonomies.[43] Furthermore, his handling, within the main body of text, of the concepts of the architect and of architecture in general is concurrent with Evelyn's conscious methodological alignment of the *Account of Architects and Architecture* alongside other Royal Society projects, including those which sought to classify natural phenomena.

This becomes apparent in the first section of the text, in which Evelyn explains the figure of the architect. To do so he presents a tri-partite system of architective classification, mirroring attempts by other Royal Society members to structure previously unstructured data whether it be 'artificial' or natural. Evelyn divides the practice of architecture into three roughly drawn areas: design and theory ('speculation'), construction, and patronage. He then allocates each area of practice to a species within the genus *Architectus*. First Evelyn identifies the *Architectus Ingenio*: the learned architect or '*Superintendent*' whose responsibilities lay chiefly in the designing of buildings. Second comes the *Architectus Manuarius*: the workman or builder whose responsibilities did not extend to design. Evelyn's third category is the *Architectus Sumptuarius* or the architectural patron.[44] Evelyn also recognises the existence of an architective meta-species, outside of this triumvirate, which he calls the *Architectus Verborum*. This was the writer or critic of architecture and Evelyn clearly locates himself in this category: 'least whilest I thus discourse of the *Accomplishments* of our

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[43] There is an interesting parallel here between Evelyn's text and fellow Royal Society member John Aubrey's comparison of natural philosophical research and the study of antiquities, including ancient architecture, in his various antiquarian texts. For example, in his unpublished *Natural Historie of Wiltshire*, Aubrey includes various accounts of historical architecture because they 'doe belong to this this Historie & to be printed with it'; cited in Hunter, 1975: 193.

[44] Evelyn, 1664: 117-118. Harris and Savage, 1990: 198. Lubbock and Crinson claim that by *Architectus Sumptuarius* Evelyn means gentlemen who designed their own houses and the gentleman architect in general; Lubbock and Crinson, 1994: 18. I believe this to be an incorrect reading of Evelyn's text, as he is clear that the *Architectus Ingenio* is the sole agent of design in this system. Instead, Evelyn claims the defining attribute of the *Architectus Sumptuarius* is the possession of 'a full and overflowing *Purse*', thus defining this figure as patron only; Evelyn, 1664: 117.

Artists, and defects of the *Pretenders,* I my self be found *Logodædalus,* and as they say, *Architectus Verborum*'.[45]

Evelyn's concern to classify architecture along the lines of natural philosophical taxonomies suggests that architecture was seen as analogous with forms of scientific knowledge. The second section of the treatise handles architectural terminology as collected data, to be recorded and explained to English practitioners. In Evelyn's words it represents a:

> finish'd and compleat enumeration of the several *Parts* and *members* of the *Orders* as they gradually succeed one another in *Work,* illustrated with more full and exact *definitions,* than by any has yet been attempted for the benefit of our *Countrymen.*[46]

Thus there is an investigative element to Evelyn's text: it is an attempt to shine light on the classical orders of architecture and to reveal them to English readers in their true guise. In this respect, like much Royal Society literature there is also a pioneering aspect to Evelyn's project.[47] Above all, the concern for accuracy in Evelyn's text locates it with the Society's broader epistemological programme. As Shapin demonstrates, precision and accuracy in the relying of factual information, regardless of its nature, was highly prized by late seventeenth-century experimental philosophers.[48] Sources of

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[45] Evelyn, 1664: 121. Logodædalus: an obsolete word meaning one who is skillful in words. Although Evelyn saw himself as *Architectus Verborum,* he did very occasionally partake in the designing of buildings (for brief sketches of Evelyn's architectural career see Downes, 1968: 28-39; Freidman, 1998: 161-167; and Colvin, 2008: 370-371) including aiding Hugh May in the partial rebuilding and the addition of a chapel at Cornbury House, Oxfordshire; see Newman, 1993: 81-81. A sketch of plans for the rebuilding, in Evelyn's hand, survives and is reproduced in Newman, 1993: 83. Additionally he designed a number of gardens and composed one of the plans for the rebuilding of London after the Great Fire; see Darley, 2006: 219-221.

[46] Evelyn, 1664: 113. For Evelyn and antiquity in general see Levine, 1999: 3-22. More will be said of Evelyn's attitude to English architectural practitioners later in this chapter.

[47] For the collecting and publishing of natural philosophical data in the early Royal Society see Hall, 1975: 173-175, 184-190. For the Society's published output in general see Johns, 1998: 444-542.

[48] Shapin, 1994: 310-312. Shapin ultimately locates this concern for accuracy within a moral epistemological economy, or in his words within a system of 'epistemological decorum', whereby the accuracy, and therefore the credibility of the information was measured by the moral and social standing of the person relating it. These ideas will be discussed below in relation to architecture.

architectural knowledge, including his own *Account*, were judged by Evelyn on their abilities to convey precisely and accurately the norms of classical architecture and the orders.[49]

This becomes abundantly clear in Evelyn's original decision to publish, in English, Fréart's *Parallel of Ancient Architecture with the Modern*, which he had selected as early as 1653 because it was the one architectural theoretical text that most precisely and accurately described and recorded the appearance of classical architecture.[50] In the 1664 dedication of the translation to the Royal Surveyor John Denham, Evelyn praises Fréart's text in for its precision and for its clear elucidation of these rules, which, in post-medieval England, were under threat of being lost forever:

> You well know, that all the mischiefs and absurdities in our modern *Structures* proceed chiefly from our busie and *Gotic* triflings in the *Compositions* of the *Five Orders* [...] That there is not in the whole *Catalogue* of *Authors* who have Written on this Subject, a more safe, expedite and perfect guide than this *Parallel;* where, from the noblest *Remaines* of *Antiquity* accurately *Measur'd,* and perspicuously *Demonstrated,* the *Rules* are lay'd down; and from a solid, judicious, and mature comparison of *modern Examples,* their *Errours* are detected; so that were but a little more pains taken by our young *Architects* and their *Subsidiaries,* about the easier *Principles* of *Geometrie,* the *Rudiments* of *Perspective,* and a ready address of well *Designing,* we might by the conversation of this *Author* alone, promise our *Country,* and the *Age* to come, a miraculous improvement of their *Buildings* in a short time.[51]

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[49] I use the word 'norm' here in the sense that the art historian Hans Belting defines it: as a historicised aesthetic set of rules to which artists or architects strive to in any period. For Belting 'the most celebrated norm was that known as the "classical": a norm which appeared to have been established in antiquity and therefore provided the Renaissance with a goal'; Belting, 1987: 68. Thus for Evelyn, a set of classical architectural rules represent the aesthetic towards which, in his view, contemporary architects should strive.

[50] For information about Fréart's text see Lermerle, 1999: 37-47; and Harris and Savage, 1990: 197-198. As Lermerle observes, Fréart's *Parallel* was seen as a reactionary polemic in France, given its claim that ancient architecture was superior to modern in every way. It is interesting that Evelyn – and for that matter its readership in England where it was not regarded as a controversial publication – sees the text as accurate rather than conservative in its treatment of both ancient and modern, classical architecture. For the popularity of Fréart amongst English architects see Hind, 1993: 35. The original French edition is republished in Fréart, 2005. Evelyn decided to translate Fréart in the early 1650s, although he would not publish the translation for another ten years; see Hunter, 1995a: 78; and Darley, 2006: 129.

[51] Evelyn, 1664: Dedication to John Denham. Harris and Savage, 1990: 197.

Thus Fréart's *Parallel*, accompanied by Evelyn's own explanatory text, provides a comprehensive and systematic description of a set of architectural rules that were, according to Evelyn, still unclear in the minds of English practitioners. Like other Royal Society texts it was an 'accurately *Measur'd*' and 'perspicuously demonstrated', explanation of data that had previously been unclassified. The obvious link between this aspect of the publication and the Society's drive for public utility will be discussed later in this chapter.

In this respect, Evelyn's translation and the *Account* can be compared to another of his early publications, the longer and better-known *Sylva*. In this text Evelyn seeks to classify and describe trees and examine various mechanical processes and trades which involved arboriculture or timber.[52] As Hunter shows, this was a publication with explicit links to utility and the history of trades project and was directly commissioned by the Society.[53] Interestingly, in the dedication to Charles II of his translation of Fréart, Evelyn draws a direct and chronological link between the subject matter of his new text and that of the previous publication. After *Sylva*, with its discourse of trees and timber, he had 'advanced to that of *Building* as its proper and natural consequent'.[54] While the translation and the *Account* share *Sylva*'s utilitarian drive, they also attempt to classify data, albeit of an 'artificial' nature, rather than the more natural philosophical subject matter of the earlier publication.[55] Consequently the *Account of Architects and Architecture* should not be dismissed as a mere investigation into a profession which lay outside the Society's epistemological mandate. Instead, it treats architectural phenomena in much the same way as *Sylva* deals with arborous data. Architecture and

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[52] Evelyn, 1670. See Darley, 2006: 179-185; and Evelyn, 1995: 173-180.
[53] Hunter, 1981: 93.
[54] Evelyn, 1664: Dedication to Charles II.
[55] *Sylva* is, however, as much concerned with documenting the mechanical processing of timber as it is with aborous information.

architectural practice were unexplained, unclassified phenomena which Evelyn subjects to a clear systematic elucidation.

Evelyn's concerns are mirrored in the writings of two other Royal Society authors: Aubrey and Wren. Although their writings on architecture were not published in their lifetime, and furthermore did not have the explicit links that Evelyn's text had with the Royal Society, Aubrey and Wren's treatment of the rules of classical architecture is remarkably similar to Evelyn's. As Hunter and Colvin show, in his unpublished *Chronologia Architectonica* Aubrey seeks to establish an accurate and precise chronology of British architecture which would allow correct elucidation of any Roman classical architecture in the country.[56] Most importantly, however, Wren handles the rules of ancient architecture in a very similar manner to Evelyn. As discussed in the introduction to this thesis, Shiqiao identifies Wren's desires to rediscover 'the Grounds of Architecture'. According to Shiqiao, the ancient, Vitruvian rules of architectural design were reconstructed 'empirically' by Wren in both his theoretical writings and his buildings.[57] In his 'Tracts' he applies contemporary scientific method to the collecting of information about ancient architecture. In doing so Wren presents a series of reconstructions of classical buildings using accounts from texts.[58] Like Evelyn, Wren tries to accurately and correctly uncover knowledge of classical architecture along the lines of Royal Society investigation. However, as will be discussed below, Evelyn's conception of the correct forms of architectural knowledge encompassed the modern as well as the ancient.

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[56] The *Chronologia Architectonica* was part of Aubrey's *Monumenta Britannica*; see Colvin, 1968: 1-27; and Hunter, 1975: 165-167.
[57] Shiqiao, 2007: 37.
[58] Soo, 1998: 124-126.

ARCHITECTURAL KNOWLEDGE

I now wish to examine evidence of architecture's functioning in the early Royal Society to show that in practice, architectural knowledge was indeed treated like natural philosophical data, to be collected and accurately explained. If, as Evelyn's writings demonstrate, architecture's epistemological place in the early Royal Society's interests was secure, how did the group treat it in practice? In fact, despite its apparent suitability as a subject within the canon of the Society, the official minutes of the group's meetings actually contain very little material relating to architecture. In the first twenty years of the Society there are very few conspicuous instances when the official minutes mention architectural matters and, even then, they tend to be architectural in a broad sense. The most specific reference to architecture in the minutes, comes in 1663 when Wren showed the members his wooden model of design for the Sheldonian Theatre in Oxford.[59] This was not a model of the executed design, but a larger preliminary design that included facilities for the performance of plays and anatomy lectures as well as the theatre's main function as the setting for the university's degree ceremonies.[60] This represents the only example of the Society being shown a design for a contemporary building. Presumably its purpose was to highlight Wren's appointment as the architect of the theatre and therefore raise the Society's public, utilitarian profile. On 9 July 1684, the group was also shown Hooke's reconstruction of the legendary tomb of the Etruscan King Lars Porcenna along with 'a discourse concerning it'.[61] Hooke's attempts, with

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[59] Birch, 1757, 1: 230. As Campbell notes, in its first fifty years, the only other architectural designs that the Society viewed as a group were the plans produced by various members for the rebuilding of London (discussed above), and various designs for a proposed new home for the Society in 1668. Both Wren and Hooke prepared designs for a new building (to be located in the grounds of Arundel House) but the Society was unable to raise money for the scheme; Campbell, 2008: 17-18; see also Hunter, 1989: 171-180.

[60] In fact the design shown to the Society was the preliminary scheme that is mentioned in *Parentalia* (Wren, 1750: 335) that Wren had to scale back in his final plans for the building; see Geraghty, 2002: 278-279.

[61] Birch, 1757, 4: 315. See Soo, 1998: 122; and Campbell, 2008: 19.

Wren, to establish the appearance of this building will be discussed below. However, the fact that Hooke's model was shown to the Society demonstrates that Evelyn's concern that lost ancient architecture was accurately reconstructed extended to the official meetings.

Another attempt to show evidence in meetings of the utilitarian achievements of Society members came in 1667 when Hooke demonstrated a machine that he had developed to aid the mass production of bricks.[62] This machine was the result of an order, given the previous year by the Society, to their curator of experiments to investigate the properties of bricks in the hope that more lasting types might be produced in the group's name. On 31 October 1666 'It was ordered, that Mr. Hooke should make trials of several earths by burning them in a wind-furnace, to see, which kind would yield the best brick'.[63] That the members commissioned Hooke to develop new building technologies is significant, as it further demonstrates the drive for utility and the suitability of the architectural domain for that purpose. However, this potential piece of innovation was a failure. In the meeting Hooke initially tried it with 'some clay, but that being too stiff, the trial succeeded not'.[64] In the next meeting it was decided that Hooke's way of making bricks 'would require vast spaces of ground to lay the bricks upon' and the members 'thought best to lay [the invention] aside'.[65]

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[62] Birch, 1757, 2: 168. Inwood, 2002: 98; Campbell, 2008: 13. For the manufacture of bricks in general in the period see Campbell and Saint, 2002: 170-183.
[63] Birch, 1757, 2: 119; see Cooper, 1997: 163. For a discussion of the connection between the Society's interest in the properties of bricks and Hooke's involvement in the drawing up of new building regulations see Jardine, 2003a: 146. Hooke's involvement in a successful brick-related innovation at the College of Physicians in London is discussed below.
[64] Birch, 1757, 2: 168.
[65] Birch, 1757, 2: 172. In its failure, Hooke's brick making machine was not alone amongst Royal Society forays into technological innovation. As Hunter shows, numerous Society attempts to intervene in professional trades came to nothing, whilst Wren was openly rebuffed by the navy after he had tried to apply his theoretical knowledge of mechanics to ship design in 1690s; Hunter 1981: 106-107.

A third presentation of architectural material was made in a meeting in 1671 when Hooke demonstrated the theoretical working of a catenary arch. He had spent some time attempting to establish 'the True Mathematical and Mechanical form of all manner of Arches for Buildings' and had realised that an inverted catenary (a flexible chain hanging freely from two points of suspension) would effect the most stable and rigid form of arch.[66] Yet again, this attempted innovation was a failure. Hooke never managed to solve the problems of thrust and load on the inverted catenary arch and it would not be until the nineteenth century that a working arch could be built. Yet this incident does at least provide evidence of the anticipated translation of architectural knowledge generated by the Society into the professional sphere as non-inverted catenary arches were employed in the foundations of Hooke's Montagu House in London. This is documented by Hooke's friend Joseph Moxon in the 1703 edition of his famous manual of mechanic processes, *Mechanick Exercises*, who informs his readers that 'The Ingenious Surveyor Mr *Hook*, made use of this Artifice, as I am informed, in building the Lord *Montague*'s brave House in *Bloomsbury*, in the County of *Middlesex*, and where he was the Surveyor'.[67] Wren's Trinity College Library in Cambridge also had inverted catenary arches in its foundations (Fig. 9), and it has been suggested that Wren attempted to base the inner dome of St. Paul's Cathedral on the cubico-parabolic conoid that Hooke drew after examining the catenary in more detail (see below).[68] More than just a hidden aesthetic acknowledgement of the theoretical strength of the inverted catenary, the non-inverted catenary foundation was structurally successful and dissipated the load of the members above more efficiently than traditionally

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[66] Birch, 1757, 2: 461-465. On the final page of his 1676 publication *A Description of Helioscopes and some other Instruments*, Hooke lists some inventions that he planned to publish in the future, including the catenary arch problem, which, he claimed, 'no *Architectonick* Writer hath ever yet attempted, much les performed'; Hooke, 1676: 31. For information this and on Hooke's struggles to solve the problems of a working catenary arch in general see Heyman, 1998a: 79-80; and Heyman, 1998b: 39-50.

[67] Moxon, 1703: 257. This reference is discussed by Colvin in McKitterick, 1995: 41; and Heyman, 1998b: 49.

[68] Campbell, 2007: 138-144; Heyman, 1998b: 47. For the use of inverted catenary arches in the foundations of Wren's Trinity College Library see McKitterick, 1995: 41.

foundational structures. Thus, a technological innovation that had emerged directly from Society meetings had been successfully implemented in practice.

Why, in spite of Evelyn's and other members' claims that architecture was of paramount importance to the Society, was it so conspicuously absent from the meetings of the group? The reasons are, I suggest, down to apathy and lack of interest on the part of some of the members, but also the unsuitability of architecture as an object of display in meetings. As historians of the early Royal Society have demonstrated, the desire to know more about the processes of mechanical trades, including architectural matters, was by no means universally held within the group.[69] However, architecture had its own specific problems that left it unsuitable for meetings. These are articulated by Wren in a letter written in 1663 to the Society's first president Lord Brouncker and subsequently published in *Parentalia*.[70] In the letter, which concerned a forthcoming visit of the King to a Society meeting, Wren expresses the belief that some intellectual subjects lent themselves to display in the newly-formed organisation while others did not. Royal Society meetings took place in Gresham College's large meeting room and often adopted the form of a spectacle with the curator Hooke, aided by technicians, demonstrating experiments in front of the members.[71] Wren therefore admits that a variety of matters although 'thought upon divers' by himself were not outwardly entertaining enough for meetings. These include 'Designs in Architecture' which Wren claims would 'be too tedious for an Entertainment'.[72] His use of the word 'Tedious',

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[69] On Royal Society members' reluctance to engage with the History of Trades project see Hunter,1981: 96-99; and Campbell, 2008: 25-27. Additionally Long has suggested that some seventeenth-century experimental philosophers – although not those necessarily associated with the Royal Society – showed a lack of interest in architecture as part of a general disinterest in anything practical or mechanical, due to a prioritising of the purely 'experimental'; Long, 1999: 93-94.

[70] Wren, 1750: 225. *Parentalia*'s transcription of this letter is incomplete although it does contain the lines quoted here. For the full version see Birch, 1757, 1: 288-289.

[71] For information on the content of Royal Society meetings see Hunter, 1981: 32-51. See also Shapin, 1988: 381.

[72] Wren, 1750: 225.

was presumably an acceptance that architectural designs were often – but not always – two dimensional, had to be viewed at close proximity, and were in all cases static in nature. By contrast, much of the material viewed in the early meetings of the Royal Society tended to be highly demonstrative, utilising visually arresting practices such as anatomy and vivisection or popular inventions such as Robert Boyle's air-pump and Dennis Papin's pressure cooker.[73] Wren's letter also highlights the fact that architectural models or drawings were 'appropriated to some work in hand', and in other words difficult to display without the audience being aware of the building with which the material was associated.[74] Unlike the air pump, the effect of which was immediately obvious, architectural designs required the viewer to know something of the nature of the site and the function of the commissioned building. Thus perhaps the relatively static and often two-dimensional nature of architectural material as well as its frequently referential quality rendered it inappropriate for a forum involving a large number of spectators.

That architecture was not visually impressive enough for Society meetings is further evidenced by the fact that it is more conspicuously present in the published proceedings of the Society – the *Philosophical Transactions* – where the static and two-dimensional nature of material mattered less. The group's journal, edited until his death in 1677 by the secretary Henry Oldenburg, contained far more architectural content than their meetings.[75] Once again, the presence of this architectural material had a utilitarian drive behind it, as Oldenburg himself observes in the Epistle Dedicatory of the 1675 volume:

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[73] Shapin, 1988: 394-395. For a specific discussion of Boyle and Hooke's demonstrations of the air pump see Shapin, 1984: 484-491. For Pappin's pressure cooker see Inwood, 2002: 285.
[74] Wren, 1750: 225.
[75] For an account of the early years of the *Philosophical Transactions* see Andrade, 1965: 9-27; and Johns, 2000: 165- 174. For Oldenburg's role and his involvement in scientific correspondence and publication in general see Hunter, 1989: 245-256; and Hall, 2002: 125-156.

> *for the* general benefit of Mankind, *I have not omitted to record the growth of* Ingenuous Arts, *according to the best Intelligence which I have received, either from within, or from abroad. And me thinks, that* Astronomy, Geometry, *all the* Noble Mechanicks, *and especially* Architecture, *hasten to the highest perfection.*[76]

Hence the *Philosophical Transactions* featured articles on building materials and other practical architectural considerations. For example, the 1669 issue contained a lengthy essay on building slate by Samuel Colepress entitled 'Some considerations touching the variety of Slate, together with a computation of the Charges in generall, for Covering Houses therewith'.[77] A more general account of building materials appeared in the 1673 volume with the title 'Directions for Inquiries concerning Stones and other Materials for the Use of Building, together with a suggestion for retriving the Art of hardening and tempering Steel for cutting Porphyre and other hard Marbles'.[78] Here the author is explicit about the utilitarian aim behind the essay and, in particular, its location within an ongoing process, stretching back to antiquity, of improving building materials:

> The retriving of which skill would be of good use, now that Curiosities of workmanship begin to recover, and many eminent persons do countenance and encourage the endeavors of such, as apply themselves to the retriving of such commendable practices, as were familiar to the Ancients, and improve what they know of them and of others with new additions and inventions, which in this knowing and inquisitive age is like to be driven on as far as humane industry can go.[79]

Again, there is an interest here in recovering what Wren might term the 'Grounds of Architecture', albeit one concerning building materials rather than design. The utilitarian implications in this quotation also reinforce Shiqiao's argument that Baconian

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[76] *Phil. Trans.* 1675, 10: Epistle Dedicatory. For a detailed examination of Oldenburg, the *Philosophical Transactions* and utility in general see Hall, 1983: 21-47.
[77] *Phil. Trans.* 1669, 4: 1011. Campbell, 2008: 13.
[78] *Phil. Trans.* 1673, 8: 6010.
[79] *Phil. Trans.* 1673, 8: 6015.

conceptions of epistemological usefulness underpinned much of the Society's manipulation of architectural material.[80]

The *Philosophical Transactions* also published architectural information of a more theoretical nature. Over the course of its first twenty years the publication reviewed major European architectural publications including Claude Perrault's 1673 French translation of Vitruvius – praised for its illustrations 'done with no ordinary care and elegancy' – the first part of François Blondell's *Cours d'Architecture* published in 1675 and Raffaello Fabretti's treatise on Roman aqueducts *De Aquis et Aquaeductibus Veteris Romae* in 1684.[81] These reviews were anonymous but, as Geraghty has surmised, they were probably written by Oldenburg, whose correspondence throughout the 1670s shows him keeping abreast of the latest architectural publications from the Continent.[82] The review of Perrault's translation of Vitruvius is typical of the *Philosophical Transactions*' treatment of architecture, as it is primarily concerned with furthering the Society's knowledge of ancient buildings and their appearance. Thus it stresses the importance of Perrault's publication and, like Evelyn, advocates the accurate elucidation of ancient architecture in general. It notes Perrault's own claim that 'One of the Obstacles to the advancement of Architecture was the want of being able to draw the Precepts of that Art out of its true and genuine source, by reason of the great obscurity of Vitruvius', and praises the French writer for rendering 'this Author more clear and useful to those, that embrace the profession and practice of that Noble Art'.[83] Here again is a concern for public utility, but these words are also reminiscent of Evelyn's quest for clarity and accuracy in contemporary engagement with ancient

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[80] Shiqiao, 2007: 18-31.
[81] *Phil. Trans.* 1675, 10: 279; 1675, 10: 549; 1684, 14: 466. These reviews are discussed in Geraghty, 2004: 119-120.
[82] Oldenburg heard of the Perrault translation of Vitruvius from Gottfried Leibniz in 1673 and subsequently wrote to Paris to obtain a copy, Oldenburg, 1965, 4: 597, 656-657; see Geraghty, 2004: 120.
[83] *Phil. Trans.* 1675, 10: 279; see Geraghty, 2004: 119.

architecture. On the other hand, the review of Blondel's *Cours* was atypical of the majority of the architectural information in the journal, given the text in question's preoccupation with contemporary practice. However, this review shared a similar concern with other architectural material in the *Philosophical Transactions* for accuracy in the dissemination of classical architectural rules. In discussing the French Academy, where the *Cours* had first been delivered as a series of lectures, the review notes with approval the teaching of 'the exactest and most correct Rules of Architecture' in Paris.[84] Therefore, the Royal Society's stress on accuracy in architectural writings was not necessarily limited to discourses of ancient architecture. Instead, it prioritised an exact reading of a set of normative architectural rules that applied to both ancient and modern buildings.

Returning to ancient architecture, such concerns are further articulated by Oldenburg in the preface to the seventh year of the *Philosophical Transactions* in 1671. Here he notes that although the Society had been accused of '*neglecting and despising all* Antiquities', it had, in fact, taken care to '*revive Old Arts, and to extricate considerable Antiquities*', including '*the soundest Foundations of Holy Cities, Temples, Thrones of Wisdome, Palaces of Glory, and Monumental Pillars*'.[85] He also highlights the reading of ancient texts on buildings as a potential direction for the Society's architectural learning. These included accounts of famous temples and mausolea, as well as feats of engineering and monumental sculpture:

> *Hence we wish an exact scrutiny into Old Authors, to give us an accurate Accompt of the Temple of* Belus, *the Gardens of* Semiramis, *the Bridge over* Euphrates, *the Walls and Towers in* Babylon *and* Ninive, *and the Obeliskes and other Wonders of the* Assyrian *Monarchy*: *Of the Persian* Cyrus *his Palace, and*

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[84] The review's concern with the French Academy is discussed below and in Geraghty, 2004: 119.
[85] *Phil. Trans.* 1671, 6: 2089. For a discussion of the Royal Society's interest in antiquarianism, albeit in Britain, see Hunter, 1995a: 172, 181-182; and Hunter, 1975: 162-177. For a brief discussion of the role of buildings archaeology in the *Philosophical Transactions* see Campbell, 2008: 18-21.

> *the Groves, Orchards, and spacious Amœnities of the* Medes *and* Persians: *Of the* Pharos *of* Alexandria; *the* Mausolæa; *the* Colossus *of* Rhodes; *the Image of Olympick* Jupiter; *the Temple of* Diana, *and other Monuments of* Greece: *Of the* Roman Theaters *and* Amphi-theaters, *their August and Pompous Structures, Arches, Aquæ-ducts...*[86]

Again, Oldenburg stresses the importance of accuracy in documenting this range of ancient structures, and his call for 'exact scrutiny', in the reading of architectural texts is remarkably similar to Evelyn's praise for Fréart's 'accurately *Measur'd,* and perspicuously *Demonstrated*' explanations of the classical orders.

Another way in which the Society could build up a reliable body of information about correct forms of architecture was through accounts of classical buildings on the continent. These could then be published in the *Philosophical Transactions* for dissemination amongst the members. However, as Shapin has observed, contemporaries were acutely aware that the accuracy of accounts from abroad was difficult to verify and sought to select only the most reliable sources of information.[87] Therefore Oldenburg tended to publish accounts of classical architecture that were provided by reliable English authors or were notable for the richness of classical architectural detail. The best example of this in the *Philosophical Transactions* is Francis Vernon's lengthy account of the architecture he had witnessed on his travels from Venice to Smyrna in Turkey. Vernon was known to Oldenburg and the Royal Society and his account was obviously deemed accurate enough to publish.[88] Sure enough, in his description of the buildings he had seen, Vernon carefully details architectural proportions as well as the

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[86] *Phil. Trans.* 1671, 6: 2090-2091.

[87] Shapin, 1994: 243-249. For a general discussion of Oldenburg's accumulation of factual accounts from abroad see Hall, 1965: 282-290; and Hunter, 1988: 165-176. Specifically relating to architecture and archaeological matters see Campbell, 2008: 21.

[88] Vernon wrote frequently to Oldenburg, firstly from Paris, where he sent a lengthy description of the Parisian Academy of Sciences (Oldenburg, 1965, 7: 33) and then in his travels through Europe. After sending this account in Smyrna he was killed in a quarrel at Esfahan in 1677; see *ODNB*, 56: 364-365. Hooke recorded this event in his diary noting that he had heard the 'ill news of poor Fr. Vernon's death, killd by Turks with cimeters at Ispahan'; 28 May 1677; *Diary*: 292.

types and qualities of materials. His description of the Parthenon is particular rich in proportional information:

> The length of the *Cella* or Body of the Temple without side, is 168 Feet English, The breadth is 71 Feet English. The *Portico* of the *Dorique* Order, which runs round it, hath 8 Pillars in front, 17 on the sides; the length of the Portico is 230 feet English. I have taken all the dimensions within, with those of the ϖξσναδs and Portico's; but they are too long for a Letter. The *flute* or shaft of the Pillars is 19½ feet in circumference: The *Intercolumnium*, 1¼ of the diameter of the pillars.[89]

Moreover, seemingly aware of the importance of accuracy in the relying of architectural information, he informs his readers that 'these measures you may rely on, as exact to ½ a foot'.[90]

Perhaps the lengthiest description of a single building in the journal was the Royal Society member and physician Tancred Robinson's account of the Roman bridge Pont-Saint-Esprit in France published in 1684.[91] Although the piece focussed mainly on the structural properties of the bridge, Robinson informed the Society that he was trying to obtain more information about the architectural detailing and the materials of the structure, suggesting that this would be of as much interest to the members as the architectonics of the design:

> This Sir, is all I conceive at present, I mean as to the superficial design, whether there is any particular Architecture within the Pedestals, or at the feet of the Arches within them, or in the general fabric of the Bridge itself, I cannot tell; no body being able to inform me; or whether the *Romans* had some peculiar Cements not known to us.[92]

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[89] *Phil. Trans.* 1676, 11: 578.
[90] *Phil. Trans.* 1676, 11: 578.
[91] Robinson's account was passed onto the Society through the physician and Society member Martin Lister who added some comments of his own to the piece. Hooke was interested in the bridge at Pont-Saint-Esprit and recorded obtaining an account of it in his diary on 10 July 1675 (see below); *Diary*: 168. For information about Robinson see *ODNB*, 47: 408-409; and Munk, 1878: 469.
[92] *Phil. Trans.* 1684, 14: 585.

Robinson seems aware that his account might not meet the journal's scrupulous standards of architectural reporting and appears to promise more information in the future. Towards the end of the seventeenth century the journal's interest in ancient architecture did not diminish and accounts of the ruins of Persepolis and Palmyra appeared in 1695.[93]

Beyond the review of Blondel's *Cours*, there is little material relating to modern architecture in the *Philosophical Transactions*. However an unpublished account, hitherto overlooked by historians, survives in the Royal Society's papers of St. Peter's and the Vatican Library in Rome, which was presumably intended for publication in the journals. Written in January 1671 by a 'Mr St. John', to Society member and regular contributor to meetings, Samuel Tuke, the letter gives a lengthy description of 'Two of the most remarkable things that were to be seen in Rome among many thousand of other rarities both Ancient and Moderne'.[94] The account describes Bernini's piazza 'in forme oval & encompassed with 4 Rowes of exceeding great Pillars (every one being as much in Circumference as 4 men can graspe)' and the facade of the church 'which has five great gates with 12 great round Pillars at every gate, yet every one of them 86 foot high'.[95] A lengthy description of the interior follows with details of statuary and liturgy and much architectural information including a description of Bernini's baldacchino: 'a Canopy of brass guilt, upheld by 4 great Pillars of the same metal, every one 50 foot high, and 25000 weight'.[96] Again, the account stresses the materials and proportions of the building, although the architectural terminology seems less confidently handled than the published accounts in the journal, with references, for example, to 'gates' instead of

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[93] *Phil. Trans.* 1694, 18: 117-118; *Phil. Trans.* 1694, 19:83-110, 129-160; see Soo, 1998: 125.
[94] R.S.C.P. VII(1), 12: fol. 27r. It is interesting that the letter was sent to Tuke, a prominent royalist during the civil war and a catholic, as it gives a lengthy description of the liturgy of St. Peters; see *ODNB*, 55: 532-533.
[95] R.S.C.P. VII(1), 12: fol. 27r.
[96] R.S.C.P. VII(1), 12: fol. 27r.

doors. Presumably this account was not published because of the availability of images of St. Peter's in London at the time, mainly through the sets of engravings in G.G. de Rossi's *Nuovo teatro delle fabriche et edificii in prospettiva di Roma moderna* (published in a series throughout the 1660s and available in England by the 1670s) and Jean Marot's engraving after Jacques Tarade.[97] Therefore St. John's account was potentially of less use to the readers of the journal, which perhaps explains why it was left unpublished.

A final reference in the *Philosophical Transactions* provides further evidence for the Society's treatment of architectural material in the published domain. In 1671 the journal advertised a proposed project to translate Vitruvius into English, requesting help with the illustrations from the readers:

> Tis supposed, the Ingenious Reader will not be displeas'd to be inform'd, That Vitruvius is done into English; Containing the whole Body of Architecture, under which are comprehended the Elements of Musick, Picture in Fresco, Water-levelling or Hydrostatics; Water-Organs or Hydraulics; Astronomy and Dialling; Mechanical Powers and Engins. To which are to be added Illustrations by proper Cuts and Diagrams; with some Comparison of Ancient and Modern Architecture; and with cert in other necessary Notes, compiled partly from the extant Comments, and partly by the help of other Able persons. The Cuts and Diagrams will be many and costly; so that the Learn'd Interpreter. Mr. Christoph. Wase, will have need of the aid of such as are freely dispos'd to encourage the Work, that the Book may come forth with the more exquisite Ornaments within a Twelve-month.[98]

Christopher Wase was a classicist and friend of Evelyn's and his appeal to the Society, through its journal, presumably led to Hooke's involvement.[99] On 21 September 1676 Hooke recorded in his diary that he had 'met Wase, Drunk. Discoursd about Vitruvius.

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[97] Hooke recorded buying engravings from the Rossi publication on 10 June 1677; *Diary*: 294-295. See below and Geraghty, 2004: 117.
[98] *Phil. Trans.* 1671, 6: 2190. See Harris and Savage, 1990: 462; and Geraghty, 2004: 113-114.
[99] For information about Wase see *ODNB*, 57: 527-528.

Demanded £50 for translation, £5 each book'.[100] Hooke then, it seems, tried to enlist Sir John Hoskins as later that year the diary details a meeting that took place in which 'Sir J. Hoskins read the proposition of Vitruvius'.[101] This is Hooke's last reference to the project and it is unclear why it was abandoned. Nonetheless, the advert in the *Philosophical Transactions* and Hooke's later involvement reveals that the Society was enthusiastic about the idea. An English translation of Vitruvius with links to the group would obviously increase the Society's public, utilitarian profile. It would have also answered Evelyn and Oldenburg's calls for a more accurate, general knowledge of classical architecture in England as a whole. Overall, the architectural material in the early years of the *Philosophical Transactions* tended to serve a combination of two purposes: firstly, to meet the demands of the Society's drive for utility and secondly, to build up a broad but accurate picture of classical architecture and its rules.

A similar situation seems to have existed in the more informal spaces of the Society, outside of its official meetings and publications. As Shapin has shown, the spaces in which the Royal Society's activities took place were numerous, including coffeehouses, taverns, collegiate rooms such as Gresham's meeting room, the associated college rooms of fellows, such as Hooke's, and the private homes of the members.[102] Within this geography, the accumulation and exercise of architectural knowledge ran in parallel to scientific knowledge and it is here, in the informal spaces of experimental philosophy that one can again witness Society members engaging with architectural knowledge. In fact architectural information was regularly consumed by Royal Society

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[100] *Diary*: 250. Hooke first recorded meeting Wase at Garaways coffeehouse on 7 February 1674 when Wase told him 'of an old maniscrip of Engines with the figures curiously graved beleived to be as old as Archimedes'; *Diary*: 85.
[101] 5 October 1676; *Diary*: 252. Geraghty, 2004: 114.
[102] Shapin, 1988: 378. For information about Hooke's rooms in Gresham see Shapin, 1988: 382-383. For the importance of coffee houses see Stewart, 1992: 115-174. For a more general, theoretical discussion of the geography of scientific knowledge from the early modern period onwards, see Livingstone, 1995: 20-22; and Golinski, 2005: 79-102.

members, and the surviving evidence, particularly from Hooke's diary, shows that a climate of architectural knowledge exchange flourished in these more informal locations of the Society.[103]

Much of the information that Hooke recorded collecting, whether structural or material techniques and practices, or data relating to design and theory, seems to have had a directly utilitarian aim. Hooke's specific building projects provided an outlet for this. In his diary he often records architectural knowledge that he had acquired from Royal Society sources in the form of memoranda presumably to be used when appropriate. A prominent example of this can be found in the entry for 10 October 1675. Hooke was in the coffeehouse Garraways with the mathematician and Royal Society member Sir Jonas Moore where they 'Discoursed of metals, that Brasse put in fire would keep Iron plates from joyning. Query whether it may not be good for making the plates for Laton [lantern]'.[104] Appropriate materials for the covering of lanterns of buildings was an interest of Hooke's, and he evidently saw this as an area in which technological improvements could be made. In April 1676, during the construction of his anatomy theatre at the College of Physicians, Hooke, in conversation with Wren, Sir John Hoskins, the future president of the Royal Society, and Abraham Hill, the then treasurer, heard about a new way of preparing tin or iron for buildings involving hammering plates together and covering them with 'melted Rosin' (or resin). Although the diary entry in question is in parts difficult to decipher, it is still clear that this information was to be remembered and used specifically on the lantern of the College theatre:

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[103] For information about Hooke and the exchange of scientific and material knowledge in the more informal spaces of the Society see Illife, 1995: 285-318.

[104] *Diary*: 186. Hooke frequently discussed matters relating to buildings with Moore, who as surveyor to the Board of Ordnance had more than a passing interest in surveying, engineering and architecture, they would also work together on the building of Greenwich Royal Observatory; see Chapter 3 and Willmoth, 1993: 158-195.

> With Mr. Hill and Sir. J. Hoskins to Sir Chr. Wrens. Memorandum the way of making tin is by hamering many plates together, those by lying in whey are whitened then is the melted tin coverd with a quantity of melted Rosin and Through that the plate is Dipt into the tin which makes the tin take. Sir J. Hoskins named whey to brighten iron. this is an Excellent covering for Lanthorn and I Designe to cover that at the Colledg of Physitians in the Same Manner.[105]

Hooke's use of the word 'Memorandum' makes it clear that this was information to be stored and remembered until a situation arose in which it would become useful. It is also noteworthy that the exchange took place at Wren's house and the passage gives an insight into the nature of group discussions relating to architecture that took place between Society members in more informal locations.

Further evidence from the building of the College of Physicians demonstrates Hooke's attempts to apply knowledge he had acquired from Royal Society sources on actual building projects. Even if it was not always possible to implement such knowledge, Hooke still displayed an enthusiasm to bring it into the professional architectural sphere. Furthermore, this did not necessarily have to be strictly what might be termed architectural. For example when Hooke was instructed by his patrons to acquire a bust of Baldwin Hamey, a major benefactor to the College, he tried to commission the piece in the newly discovered porcelain. The Royal Society had recently been shown the developments in porcelain-ware made by John Dwight – the first English potter to discover 'the mistery of transparent Porcellane' – and his work had been presented in Society meetings.[106] In February 1675 Hooke quickly acquired some of Dwight's work and sent it to the President of the College, Sir George Ent,

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[105] 15 April 1676; *Diary*: 226. Espinasse, 1956: 89. Hooke, in his diary, recorded that the construction of the lantern took place in late 1678 but failed to mention whether this new technique was implemented during construction; 9 December 1678; *Diary*: 388. Unfortunately the building no longer survives. For the building of the anatomy theatre see Chapter 4.

[106] This quotation, from the Public Record Office Patent Roll, is cited in Edwards, 1974: 58. For information on Dwight's career see Edwards, 1974: 56-59; and *ODNB*, 17: 455-457. For Hooke's relationship with Dwight see Iliffe, 1995: 308-309.

'about Dr. Hamey bust'.[107] The head was eventually carved from marble, probably for financial reasons, but the incident further demonstrates Hooke's enthusiasm for Royal Society associated technological innovation, and its possible application through specific building projects.[108] Furthermore, Hooke was not alone in seeking to apply knowledge gained in Royal Society circles to building projects. In June 1675 he recorded in his diary that Wren intended to use Hooke's theoretical work on the catenary arch in the design of the dome for St Paul's Cathedral noting that Wren had listened to 'my principle about arches and alterd his module [of the cathedral] by it'.[109] As Heyman and Campbell show, the inner masonry dome of the cathedral does indeed seem to have been based on the cubico-parabolical conoid that Hooke developed from his investigation of the catenary arch.[110] However this reference should not be considered evidence of Hooke's involvement in the design of the dome of St. Paul's cathedral.[111] As Higgott demonstrates, the design of the dome incorporating the cubic parabola dates to c.1690, long after Wren and Hooke had discussed the catenary principle.[112] Instead Higgott suggests that this diary reference relates to the vaults of the window apertures in the crypt of the cathedral, which, in a Wren drawing dating from the 1670s, are shown with catenary profiles.[113] Regardless of where in the cathedral Wren intended to apply Hooke's 'principle', the diary entry represents important proof that Wren also accumulated architectural information from Royal Society sources, in this case Hooke, with the intention of using it on specific building projects. In 1679

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[107] 24 February 1675; *Diary*: 149.
[108] The final bust, which was carved by Edward Pearce, survives at the College, see Davenport, McDonald, Moss-Gibbons, 2001: 129.
[109] 5 June 1675; *Diary*: 163; Inwood, 2002: 211; Jardine, 2002: 422. For a detailed discussion of Hooke, Wren and the catenary problem see Higgott, 2009: 154-169.
[110] On 7 December 1671 Hooke showed the Royal Society a drawing of a cubico-parabolic conoid, a curve produced, as Campbell shows, by 'flipping the curve of a $y=x^3$ graph around the around the y-axis'; Birch, 1757, 2: 48; Campbell, 2007: 143. Also see Heyman, 1998b: 47; and Higgott, 2009: 163.
[111] Jardine suggests that Hooke acted a sort of engineering consultant playing an 'important advisory role in the engineering involved in the construction process' of St Paul's; Jardine, 2002: 420-423. For the problems of reading too much into Hooke and Wren's professional relationship see Chapter 3.
[112] Higgott is able to demonstrate that the design of the dome with the cubic-parabolic conoid dates to c.1690 on the basis of a drawing, in Wren's hand, currently in the British Library; Higgott, 2009: 155.
[113] Higgot, 2009: 197n.

Hooke told Wren about the possibility of 'double vaulting Paules with cramps between', but again this does not suggest Hooke's involvement in the designing process.[114] Rather it shows that Hooke had been thinking about techniques for vaulting and proposed that Wren could use the information on the cathedral. It is unclear whether this technology was implemented, or what it in fact entailed.

As these references show, Hooke himself was one of the Society's most active innovators when it came to architecture, particularly in the field of building technology. The College of Physicians was frequently a location in which Hooke tried out new technological ideas. Perhaps it was the fact that the building project had such direct ties to the Society that gave Hooke the freedom to experiment with new technology on site.[115] For example an early eighteenth-century builder's dictionary reveals that a new technique in brick-laying was first used at the College, when the chore of wetting individual bricks before use was negated by the application of water to a whole course after the bricks were laid.[116] This was done 'by order of the Surveyor the Ingenious Mr. *Robert Hooke*' who must have either invented the new process or acquired it from one of his London associates.[117] The College was also notable in having very early sash-windows, an invention with which Hooke is sometimes credited. Indeed Hentie Louw's research on the origin of the sash has revealed that the windows on the ground floor of the College were amongst the first installed in England.[118] Pioneering designs of sash-

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[114] 4 September 1679; *Diary*: 423. Espinasse, 1956: 104. For the vaulting of St Paul's see Campbell, 2007: 105-114. However, Campbell does not mention this reference.
[115] For information on the College of Physicians and the Royal Society during the building of the Warwick Lane buildings see Chapter 4.
[116] Neve, 1703: 50. For general information on this text see Harris and Savage, 1990: 131-333.
[117] Neve, 1703: 50.
[118] Louw, 1983: 65. See also Inwood, 2002: 132-133. Evidence of Hooke's involvement in the installation of the sashes comes from his diary where he records that he had asked the carpenter Thomas Fitch to make 'rowlers' for the College windows; 10 April 1673; *Diary*: 38.

windows would continue to feature throughout Hooke's architectural career and later he would use equally progressive types at Montagu House.[119]

Finally, a nineteenth-century source suggests that the scaffolding of the Monument to the Great Fire of London was regarded as structurally significant in its day (Fig. 10).[120] This was apparently the first scaffolding used to erect a monumental free-standing column in England, and was probably designed by Hooke, rather than Wren, as this source believed. As Chapter 3 will set out, Wren had no involvement in the day-to-day construction of the column, instead it fell under Hooke's remit as City Surveyor. Although they do not mention this scaffold, City sources suggest that it was Hooke's work as they contain orders to the City Surveyors to erect later scaffolding around the base of the Monument to allow the carving of the plinth to take place without hindering traffic.[121] As Hooke seems to have taken a leading role in the building of the column it is likely that he was responsible for this innovation in 1671 when the building work began.[122]

Thus Hooke's architectural commissions were the recipients of knowledge generated by or acquired from Royal Society sources, himself included. Yet the accumulating of architectural knowledge did not need to fulfil such an overtly utilitarian brief. Like the architectural material in the *Philosophical Transactions*, much of the information that Hooke and his fellow members collected seems to have served functions beyond the direct application on specific building projects. Instead it seems to

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[119] Louw and Crayford, 1998: 110-111.
[120] Civil Engineer and Architects Journal, 1838: 267.
[121] On 9 October 1672 the City Lands Committee, which was responsible for the administering of the Monument, ordered 'that the Surveyors of the New buildings or one of them shall sett out and appoint so much of the ground on new Fish Street Hill adjoining the Publique Collumne in Memoriall of the late and dismall fire as is necessary to be inclosed and scaffolded for the Carving the front of the Pedestal of the said Columne, having regard to the Convenience of passage of Carts & and that the same may be enclosed and Scaffolded accordingly'; C.L.R.O. Orders, 2, fol. 37v.
[122] See Chapter 3.

have served the purpose of increasing the members' knowledge of classical architecture and its rules. The most important source for this material is Hooke's diary, which contains much supplementary collecting and processing of more general architectural knowledge. Furthermore, it is surprising just how much of this information, which related to modern as well as ancient architecture and was textual or visual, came from Royal Society associates, who sometimes had no other documented interest in the arts of building. Thus Hooke often exchanged architectural books with Robert Boyle, whose published works and contributions in Royal Society meetings fail to register any involvement or concern with architecture. For example in November 1677 Hooke borrowed Boyle's copy of André Félibien's 1676 *Principes de L'Architecture*, a text devoted to all aspects of architectural design and containing a lengthy analysis of the classical orders.[123] He had also borrowed the first part of Blondell's *Cours* from Boyle in June that year.[124] In addition to Boyle, Hooke also borrowed an edition of Vitruvius belonging to the mathematician Sir Jonas Moore in 1674, and he purchased another copy from Oldenburg in November that year.[125] As Geraghty has shown this was probably the 1673 Perrault translation that Oldenburg reviewed for the *Philosophical Transactions*.[126] At the same time, Hooke also bought from Oldenburg a copy of Jean Marot's book of engravings of recent French buildings, the *Recueil des plans profils et elevations des plusiers palais chasteaux eglises sepultures grotes et hostels* (known as *Petit Marot*).[127] Overall, a wide range of texts are being exchanged here; they include the ancient (Vitruvius), the modern and practical (Félibien), and the modern and visual (Marot). It is also easy to identify a desire, shared with the architectural content of *Philosophical Transactions*, for the general elucidation of classical architecture in its

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[123] 18 November 1676; *Diary*: 257. Geraghty, 2004: 115.
[124] 24 June 1676; *Diary*: 238. Geraghty, 2004: 115.
[125] *Diary*: 103.
[126] Geraghty, 2004: 114.
[127] Geraghty, 2004: 114.

ancient and modern guises, and for the establishment of a body of knowledge to that effect.

Of all the personalities that exchanged architectural information with Hooke, Wren is the most prominent in the diary. The pair often met to discuss architectural matters, and, as outlined above, they often exchanged information to be used on specific building projects. However, their favoured topic of debate was the appearance of ancient and biblical buildings. As Soo has shown, Wren was very interested in this subject and attempted a number of reconstructions of such structures in his 'Tracts'.[128] Hooke, however, seems to have been just as intrigued. For example, in the autumn of 1677 Hooke and Wren devoted much spare time to establishing the appearance of the tomb of Porcenna, from the account of the monument in Pliny.[129] As discussed above, Hooke would eventually show his reconstruction of the tomb to the Society in 1684. Prior to this, on 4 October 1677, Hooke recorded in his diary that he had met Wren in the Crown tavern on Threadneedle Street and 'Discoursed of Porsennas tomb of which Sir Ch. Wren gave a description, but comparing it with the words it agreed not. I found the form of it quite otherwise and describd it'.[130] The general Royal Society concern for accuracy in the recording of ancient architecture is clearly present here, to the extent that Hooke was willing to openly disagree with his friend over the credibility of Wren's account. Two weeks later Hooke visited Wren's house and in a diary entry with an accompanying diagram claimed that they had 'Discoursd with him long of Porcena's tomb which he had thus drawn. a. signifying the Labyrinth and ground plat. B. the

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[128] Buildings that Wren explores in the 'Tracts' include the Temple of Diana at Ephesus, the Temple of Peace, the Temple of Mars Ultor and the Mausoleum of Halicarnassus; Soo, 1998: 121-122. See also Du Prey, 2000: 15.

[129] For the original Porcenna's tomb and Pliny's text see Colvin, 1991: 74.

[130] *Diary*: 317. Porcenna's tomb is discussed by Wren in Tract V; see Soo, 1998: 122, 193-195.

upright &c. of which see the figure' (Fig. 11).[131] Hooke then went home and 'Drew a rationall porcena', again suggesting a concern for clear and accurate elucidation that recalls Evelyn's *Account*.[132]

There are other examples in Hooke's diary of the pair discussing such matters. On the same day as they had discussed Porcenna's tomb at Wren's house, they also discussed the ruins of the ancient Persian city of Persepolis, before turning their attention to more practical matters specifically 'the making of tyles for Enamelling like the pipe metal or Porcelain'.[133] Other buildings that received Hooke and Wren's attention included Hagia Sophia in Constantinople, for which Hooke again drew a plan of in his diary after their conversation (Fig. 12).[134] While on 6 September 1675 Hooke recorded that he had been 'With Sir Chr. Wren. Long discourse with him about the module of the Temple at Jerusalem'.[135] Wren also showed Hooke an engraving of the Septizonium on the Palatine in Rome in 1679.[136] Finally, as Soo has demonstrated, there were attempts by a number of Royal Society members – most prominently Hooke, Wren and John Aubrey – to acquire information about the remains of Roman buildings in Britain. Some of this material, relating to London's Roman past, was included in Aubrey's unpublished *Monumenta Britannica* and credited to Hooke and

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[131] 17 October 1677; *Diary*: 320-321.

[132] It has been suggested that the purpose of these conversations regarding Porcenna's tomb was for Wren to base his design of the unexecuted mausoleum for Charles I – which he would prepare the following year – on the ancient building. For Wren, at least, this may have been the case, although his designs for the mausoleum do not resemble Porcenna's tomb in any way; Hart, 2002: 51. For Wren's designs of the proposed mausoleum see Beddard, 1984: 36-48. As Du Prey has shown, Wren's reconstructions of ancient buildings such as Porcenna's tomb – in turn informed by his discussions with Hooke – would influence Nicholas Hawksmoor in his designs for his London churches in the early eighteenth century; Du Prey, 2000: 15-16.

[133] *Diary*: 321. Soo, 1998: 124.

[134] 14 November 1677; *Diary*: 328. For Wren's interest in Hagia Sophia see Jardine, 2002: 414-420.

[135] *Diary*: 178. Worsley, 1995: 50; Du Prey, 2000: 20.

[136] 6 December 1679; *Diary*: 432. Soo, 1998: 121.

Wren, as well as Wren's own 'Notes on the Antiquities of London', also unpublished.[137]

Evidence of Royal Society members accumulating knowledge about architecture in the more informal spaces of the Society follows a certain agenda, also found in the *Philosophical Transactions* and articulated by Evelyn in his *Account of Architects and Architecture*. This agenda combined a concern for utility with an ongoing desire to see the rules of classical architecture correctly established. Furthermore, the existence of such a vibrant culture of knowledge exchange also demonstrates how seriously Royal Society members treated architecture as an intellectual subject and this culture lay within the Society's broader epistemological programme. As Evelyn suggests in his *Account*, architecture was of equivalent value to more traditional natural philosophical forms of knowledge and was treated, as knowledge, in a similar way.

ARCHITECTS

I now want to examine the Society's attitude to the figure of the architect and the delegation of architectural responsibilities between architect and craftsmen. This is relevant because of the number of words Evelyn dedicates to the subject in his *Account*. He argues that responsibilities within architectural practice should be decided by how one acquires knowledge. I will conclude that the Royal Society saw itself as a potential instrument of architective change through being able to circulate and possess the right forms of architectural knowledge. The morphology of the late seventeenth-century architect also has important significance for a study of Hooke as his architectural career

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[137] Soo, 1998: 18-21. As Soo suggests, some of this information relating to London archaeology came from Hooke's surveys of the City made immediately after the Fire.

reveals much about how architects and craftsmen interacted with architectural knowledge on a quotidian basis.

Evelyn's discussion of the architect must first be located in the general climate of architectural agency in England. In practice, the majority of seventeenth-century architects were still master-craftsmen who oversaw the building of their designs. As Colvin shows, master-craftsmen who had served an apprenticeship in one of the building trades and followed a subsequent career in that trade were generally seen by patrons as appropriate people to design buildings as well as construct them.[138] The experience gained through this career was deemed an appropriate qualification to design. However, at the beginning of the seventeenth century, Henry Wotton in his 1624 *The Elements of Architecture*, begins to question this situation. As Harris and Savage show, Wotton was the first English architectural theorist to distinguish between the architect and the artificer in his writings. Unlike, sixteenth-century English writers such as John Shute and Leonard Digges, whose concerns were to improve the classical architectural knowledge of English master-craftsmen architects, Wotton calls for the nature of the English architect to change.[139] In his text, architects are 'expressely distinguished' from 'Under Artisans' by their design responsibilities:

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[138] Colvin, 2008: 22-25. See also Wilton-Ely, 1977: 180-183; and Crinson and Lubbock, 1994: 17-20. There are numerous example of this type of architect in the late seventeenth century. Among those that Hooke came into contact with were Thomas and John Fitch, who will be discussed below, and William Hurlburt, the master-carpenter whose involvement in Ragley Hall will be discussed in Chapter 2 but who also designed Maiden Bradley in Wiltshire and perhaps Tredegar House in Monmouthshire; Colvin, 2008: 548-549. For a general discussion of the figure of the architect in English history see Jenkins, 1961.

[139] Leonard Digges was the author of the 1556 *A Boke named Tectonicon*; see Harris and Savage, 1994: 182-183; and Gerbino and Johnston, 2009: 45-50. As Harris and Savage show Shute and Digges, in calling for a general improvement in standard of architectural practitioners were following the Italian theorist Serlio; Harris and Savage, 1994: 500-501. See also Bennett, 1975b: 150; and Van Eck, 2003: 57-60. For a discussion of the late sixteenth and early seventeenth century conception of the architect see Girouard, 1983: 14-18. Additionally Colvin shows that early seventeenth-century architectural patrons followed this lead and tried to educate their master-craftsmen by providing them with books; Colvin, 2008: 25. For Evelyn's thoughts on the education of master-craftsmen see below.

> The *Architect,* whose glory doth more consist, in the Designement and *Idea* of the whole *Worke,* and his truest ambition should be to make the *Forme,* which is the nobler Part (as it were) triumph over the *Matter*...[140]

Wotton further notes that the 'gracefull and harmonious contentment to the Eye' which had to be met for a design to be completed and be appropriate was 'perhaps too subtile, and too sublime,' for 'Vulgar Artizans' to achieve.[141] As discussed in Harris and Savage, Wotton's conception of the architect as an entity exclusive from the builder is ultimately descended from Leon Battista Alberti's *de re Aedificatoria* (first published in 1485).[142]

Later seventeenth-century English authors such as Roger Pratt and Roger North follow Wotton in separating architectural responsibilities between architect and artificer. However, unlike Wotton, who does not specify how his architect might come to be in the position, these authors are clear regarding the experience one needed to become a designer of buildings. Furthermore, Pratt and North are adamant that a background as a master-craftsman was not suitable. In the 1660s, Pratt in his unpublished notebooks on architecture suggests that to obtain a design for one's country house a patron should approach a gentlemen rather than a 'home-bred architect'.[143] By 'home-bred architect' Pratt clearly means someone whose knowledge of architectural design had developed from an apprenticeship and a subsequent

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[140] Wotton, 1624: 20-21.
[141] Wotton, 1624: 64. See Harris and Savage, 1994: 501.
[142] Alberti's paradigmatic architect was a learned, humanist figure whose chief responsibilities lay in design. Although knowledgeable in construction techniques and materials the architect was morally and intellectually superior to a craftsman: 'I should explain exactly whom I mean by an architect; for it is no carpenter that I would have you compare to the greatest exponents of other disciplines: the carpenter is but an instrument in the hands of the architect. Him I consider the architect, who by sure and wonderful reason and method, knows both how to devise through his own mind and energy, and to realize by construction, whatever can be most beautifully fitted out for the noble needs of man, by the movement of weights and the joining and massing of bodies. To do this he must have an understanding and knowledge of all the highest and most noble disciplines. This then is the architect'; Alberti,1988: 3. Thus there is clear distinction between architect and artificer, drawn up on moral and intellectual lines. For a detailed discussion of Alberti's figure of the humanist architect see Westfall, 1969: 61-79.
[143] Pratt, 1928: 60.

professional career.[144] Pratt is also specific about the kind of gentleman a patron should entrust his country house design to. He was to be 'an ingenious gentleman who has seen much of that kind abroad and been somewhat versed in the best authors of Architecture: viz. Palladio, Scamozzi, Serlio etc...'[145] Thus, as Pratt sees it, an education in architecture from continental sources was superior to the experience gained in an apprenticeship and subsequent career in the building trades. However, also present in his text is the recommendation that the architect should be a gentleman.[146]

Pratt's contemporary, North, who was also an acquaintance of Hooke and Wren, went even further in dividing the architect from the master-craftsman.[147] In his writings on architecture, which remained unpublished until the twentieth century, North mounts a lengthy attack on the notion of the master-craftsman architect. Like Pratt, he suggests that the role of the architect should be filled by a gentleman. However, his writings differ in that they imply a belief that the superiority of the gentleman in the capacity of architectural designer was socially and morally constructed. The production of architectural design, North notes, was not a matter for artisans on account of their lowly status in society: 'a head workman pretending to the designing part, is full of paultry vulgar contrivances'.[148] Instead, North suggests that if his readers required an appropriately designed building they should do it themselves, observing that 'None can

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[144] Pratt, 1928: 60. See Colvin, 2008: 25; and Wilton-Ely, 1977: 183. On Pratt in general see Worsley, 1995: 32-34; and *ODNB*, 45: 226-227.
[145] Pratt, 1928: 60. Worsley, 1993: 14; Gerbino and Johnston, 2009: 83.
[146] I recognise the problems associated with using the social category 'gentleman'. However, for the time being I will merely catalogue seventeenth-century architectural theorists' persistent use of the term. I will discuss these problems in more depth below. For attempts to define the nature of the early modern English gentleman see Bryson, 1990: 136-153; and Shapin, 1994: 43-64.
[147] For information on North, and in particular his writings on architecture, see the introduction by Colvin and Newman in North, 1981: xi-xxii.
[148] This quotation, from an unpublished manuscript of North's, is referenced in Colvin, 2008: 25-26; and Arnold, 2002: 54.

contrive well but himself'.[149] As North's writings focussed on large domestic buildings, it can be assumed that his intended reader – and by implication, the ideal architect – was a gentleman. Again, North's motives for recommending gentlemanly agency in architectural design relate to the unsuitability of master-craftsmen for that purpose:

> I cannot but digress in complaint of this age, for laying aside the care of building for themselves, and family's; but leaving it to workmen, such as bricklayers, carpenters, glaziers &c. It is scarce known that a person of quality hath built in of neer London; but all is done by profest builders, and the gentry hire or buy them. It is manifest from what I have urged, that their pinching spirits will infect all their works, and whatever they pretend to for accommodating great men, there is always some scantyness that spoyles all.[150]

Thus gentlemen were advised to produce their own designs, as master-craftsmen architects tended to spoil domestic buildings by their ignorance and meanness. There is clearly a social and moral agenda at work here. The master-craftsman was unsuited to the task of architectural design because of their vulgarity and their 'pinching spirits'.

Implicit in North's text is the assumption that some people were seen as naturally more disposed to learning about and acquiring knowledge relating to architecture – in particular architectural design – than others. According to North, that person was represented by a member of the upper classes, ideally an aristocrat, and failing that a gentleman of some description. Thus, in their writings on architectural agency, late seventeenth-century authors formulate and explore a moral and socially defined architective economy. This goes beyond earlier concerns that master-craftsmen architects were simply not knowledgeable enough. Unlike gentlemen, they were now

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[149] North, 1981: 22. Here North differs from Pratt (and Evelyn), who recommends the use of another, learned gentleman.
[150] North, 1981: 25.

seen as unsuited to the practice of architectural design on account of their social status and a perceived vulgarity that followed.[151]

It must be stressed that the position of the architect, as defined by these theorists, was at odds with the contemporary architective scene, where the master-craftsman architect still made up the majority of designers of buildings. Patrons on the whole still approached artisans to acquire designs, even when it came to the designing of their own houses.[152] However, these texts do highlight a theoretical architective paradigm that had developed and was being followed by some. It was increasingly common for members of the upper class who had not held apprenticeships in the building trade to design buildings on a regular basis. Despite his recommendation that gentlemen should design their own houses, North lists a selection of those figures whose careers best exemplify the move away from the master-craftsmen designer, namely Inigo Jones, John Webb, Pratt and Wren.[153] Therefore, in spite of the idealised nature of Pratt and North's economy of architectural responsibilities, the careers of some seventeenth-century architects suggest that the model was firstly feasible and secondly that it might, in the future, emerge as the norm in architectural practice.

It is within this debate that Evelyn's discussion of the figure of the architect lies. In fact his classification of the different architective species is similar to Pratt and North's discussion of the role of the architect, but with crucial differences. Pratt's use

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[151] The rise of the so-called gentleman architect in the seventeenth century is charted in Bold, 1989: 15-17; Worsley, 1993: 14-20; and Colvin, 2008: 24- 26. Examples of these figures include John Webb, Hugh May, Roger Pratt and, later William Talman and John Vanbrugh. Lubbock and Crinson attempt to distinguish between the gentleman architect and a type of architect who had been a professional in other fields, such as Hooke, Wren and Vanbrugh. However, it is unlikely that these figures would have seen themselves as any different from the gentlemanly Pratt and North; Lubbock and Crinson, 1994: 20.

[152] Colvin, 2008: 25.

[153] North, 1981: 23. Perhaps North did not know that Jones had probably been a joiner originally, as information about Jones' early life was and is still scant; see *ODNB*, 30: 527. Webb, Pratt and Wren more comfortably fit into the category of gentleman, despite the problems associated with the term (see below).

of the word 'Ingenious' to describe his ideal designer of architecture is of course an anglicised version of the Latinate *Ingenio*, the species in the genus *Architectus* to which Evelyn designates the responsibility of architectural design. In fact, in the *Account of Architects and Architecture* Evelyn discusses the divisions of architectural responsibility in contemporary practice in far greater detail than any other English author of the period. In his resulting analysis, Evelyn formulates an architective economy that is considerably more complex than that of Wotton, Pratt or North. As discussed above, he allocates the practice of design to the *Architectus Ingenio*, whereas the craftsman – the *Architectus Manuarius* – was not to involve himself in such matters. Evelyn is insistent that these two categories were not to be confused with each other, noting that:

> No Architect is to be presum'd for the commonly illiterate *Mechanick* (which may bring it into contempt) but for the Person who *Superintends* and *Presides* over him with so many advantages…[154]

However, unlike North, Evelyn does not hold complete contempt for the builder, and his description of the *Architectus Manuarius* acknowledges the importance of master-craftsmen in the building practice, while still insisting on their exclusion from the design process. Thus he defines the *Manuarius* species as:

> the third and last, but not the least of our *Subsidiaries,* for in him I comprehend the several *Artizans* and Workmen, as *Masons, Stone-cutters, Quarry-men, Sculptors, Plasterers, Painters, Carpenters, Ioyners, Smiths, Glaziers,* and as many as are necessary for the carrying on of a *Building* till it be arriv'd to the perfection of its first *Idea.* But though it is not (as I said) expected that these should trouble themselves with much Learning, or have any thing to do with the Accomplishments of our *Master* Superintendent[155]

In other words, the 'carrying on of a building' – the task of the *Architectus Manuarius* – did not entail the production of the original 'idea'. That was the responsibility of

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[154] Evelyn, 1664: 117.
[155] Evelyn, 1664: 121, 117-118.

another figure, his *Architectus Ingenio*. The exclusive responsibility of an architective figure to design, identified by other seventeenth-century English authors, is clearly present in Evelyn's *Account*. Evelyn also identifies the socio-economic category of the gentleman as the most suited to learning about and practicing architectural design. 'Our Nobility and Gentry' he observes, 'being Persons of better Parts, are most likely to be furnish'd with the best Abilities to learn.'[156] At first glance then, Evelyn's classification of the architect seems neatly to fit into a broader architectural theoretical arguments regarding agency in architecture, and in particular architectural design.

As Evelyn makes clear, his *Account* was a text produced in the same climate as Royal Society publications relating to natural and mechanical philosophy. Therefore his claims regarding architectural agency need to be discussed in relation to similar ideas within the Society. Although idealised, Evelyn's model of how architectural practice should take place is reminiscent of Stephen Shapin's paradigm of gentlemanly epistemological credibility in late seventeenth-century scientific practice.[157] It must be stressed that Evelyn's architective economy represents a theoretical paradigm rather than the situation in practice, with which Shapin is primarily concerned.[158] However, Evelyn's apparent belief that this ideal could, and in a few cases had, become reality, means a reading of his text based on Shapin's theory is still valid. As discussed in the introduction to this thesis, Shapin, in *The Social History of Truth* argues that the gentleman was deemed trustworthy on moral and social grounds and therefore was a

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[156] Evelyn, 1664: 120. Here Evelyn is in agreement with John Aubrey who, in his unpublished *An Idea of Education of Young Gentlemen*, includes architecture in a list of subjects to be taught to young gentlemen; see Hunter, 1975: 54-55.
[157] See Shapin, 1994.
[158] Although as Feingold observes, much of Shapin's analysis relies on courtesy literature and gentlemanly conduct books, and therefore may represent more of an ideal rather than the situation in practice; Feingold, 1997: 138.

credible purveyor of knowledge.[159] Applied to the scientific sphere, Shapin finds fertile ground for the development of this theory of gentlemanly credibility and truth-telling in the figure of Robert Boyle.[160] Boyle's explicit gentlemanly status coupled with the respect with which his fellow Royal Society members treated him made him a paradigm of credibility.[161] The figure of the gentlemanly truth-teller in science is then countered by the persona of the scientific technician. These figures, though they possessed skill and expertise, are defined within an economy of knowledge by their social and moral position beneath the gentleman philosopher.[162] Thus Shapin notes that although technicians were experienced and possessed skill, they lacked the social and moral qualifications to produce knowledge.

It would be easy to apply this scientific epistemic economy to the contemporary architectural theoretical debates about architectural agency, particularly given the prominence that Evelyn's text holds within them. As the first part of this chapter demonstrated, architecture as an intellectual subject was treated by Evelyn and his contemporaries as knowledge to be collected and produced. Thus the *Architectus Ingenio* figure in Evelyn's *Account* can equate to Shapin's gentlemanly natural

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[159] Shapin, 1994: 65-125. Shapin spends the previous chapter attempting to define the late seventeenth-century persona of the gentleman. The problems with his conclusions will be discussed below.
[160] Shapin, 1994: 126-127, 170-192.
[161] Boyle's gentlemanly honour is particularly important for Shapin, as is the financial freedom with which his considerable family wealth provided him. Interestingly, Shapin also notes Evelyn's admiration for Boyle and in his 1667 text *Publick Employment and an Active Life Prefer'd to Solitude* Evelyn uses Boyle as a paradigmatic learned gentleman whose freedom of action led to the furthering of the public good rather than idleness; Shapin, 1994: 189. For an opposing biographical view of Boyle's life and career that attempts to challenge Shapin's reading see Hunter, 2000: 1-14.
[162] Shapin, 1994: 392-403. In this chapter and in another earlier article Shapin stresses that scientific technicians in the period are difficult figures to analyse due to their invisibility in the historical record. He nonetheless uses evidence from Boyle's laboratory and from Hooke's diary to build up a convincing picture of their status in scientific knowledge economies; Shapin, 1989b: 554-565. Shapin also observes that it was not the fact that technicians were 'simply distrusted', it was that they '*might* be distrusted' that prevented them from producing knowledge, hence the reliance that gentlemen philosophers had on their technicians while conversely being reluctant to acknowledge that reliance in the presentation of the resulting knowledge; Shapin, 1994: 392. Ultimately Shapin's analysis of the relationship between gentlemen philosophers and their technicians is based upon the contemporary domestic sphere, where the trustworthiness of servants was continually questioned and compared to their masters' honour and credibility; Shapin, 1994: 393-395.

philosopher: the Boyle figure whose credibility came from his moral and social standing in society and who therefore was able to process and produce architectural knowledge, albeit concerning design. Conversely, the master-craftsman or *Architectus Manuarius* can equate to the technicians that Shapin also identifies and to whom the process of producing design knowledge was ideally – but not in practice – denied.[163] As Evelyn suggests, the *Architectus Maunuarius* need not 'trouble' himself with 'much learning'.[164] Certainly the apparent social and moral dichotomy between the gentleman architect and the master-craftsman that North seems to advocate, might lend itself to this analysis.

However, just as his reading of the contemporary scientific sphere has been questioned by subsequent historians of science, Shapin's model, whilst seemingly relevant, does not entirely fit the economy of architectural agency present in Evelyn's text.[165] Critics of Shapin have noted that the term 'gentleman' is by no means a stable social category in the late seventeenth century. Reviews of *The Social History of Truth*, by Mordechai Feingold, Barbara Shapiro and Howard Cook have all pointed out the inadequacy of Shapin's definition of the seventeenth-century 'gentleman', particularly when applied to late seventeenth-century institutional science.[166] Shapin appears in his book to define the gentleman as landed aristocracy, yet as Feingold observes, almost all producers of scientific knowledge in the period seem to be addressed as gentlemen.[167]

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[163] Here a problem with applying Shapin's model to architecture immediately becomes apparent. This theory would seem to deny the ability of the master-craftsman to produce forms of knowledge not related to architectural design, particularly material and structural. As discussed below, Evelyn in fact argues otherwise.
[164] Evelyn, 1664: 118.
[165] For helpful summaries of the broad range of criticisms that have been levelled at *The Social History of Truth* since its publication see Guerrini, 1998: 66-74; and Hunter, 2003: 222-226.
[166] Feingold, 1996: 131-139; Shapiro, 1994: 1-16; Cook, 1995: 271-273. Shapin himself accepted that the term gentleman was a contested one in the seventeenth century; Shapin, 1994: 56-57.
[167] Feingold, 1996: 133.

In terms of contemporary architectural theory, where the term gentleman features so prominently, this is an important criticism to bear in mind.[168]

However, I do not want to reject out of hand the relevance of Shapin's paradigm to the question of how Royal Society members might have viewed the handling of architectural knowledge in practice. Instead I want to modify his broader model of identifying economies of knowledge in contemporary scientific practice and interpret Evelyn's text accordingly. In fact, Evelyn is clear about whom he meant by a 'gentleman' and is less insistent on the exclusivity of gentlemanly agency in architectural design than he at first seems to be. Evelyn's clarity on this issue allows a reading of his text that bypasses the problems of gentlemanly identity in the early modern period. In fact, he formulates in the *Account* a subtly but significantly different economy of architectural knowledge to the one North presents. In Evelyn's model the gentleman is seen as an economically and epistemologically determined category only. The fact that Evelyn's architective economy does not preclude someone of nominally un-gentlemanly birth from agency in architectural design allows a reading of the text that further escapes the problems associated with Shapin. Instead I will argue that for Evelyn and other Royal Society members credibility in architectural design rests on how one acquired one's knowledge rather than who one was.

Although Evelyn sees the 'nobility and gentry' as more immediately suited to the role of *Architectus Ingenio* than anyone else in society, his reasons for this suitability seem to be different from the other authors under discussion. For North, the

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[168] For a good example of the problems of using the word 'gentleman' in the context of architectural practice see the career of Wren's draughtsman Edward Woodroofe. As Geraghty shows, Woodroffe began his career as a craftsman (he was probably a master-mason) but by the end of his life, when he was the surveyor to Westminster Abbey and Wren's draughtsman, he was frequently referred to as a 'gentleman'; Geraghty, 2001: 474.

gentleman was superior in moral and social standing and therefore superior in the capacity for architectural design. Evelyn's reasons are different. As we have seen, he writes that the nobility and gentry 'being Persons of better Parts, are most likely to be furnish'd with the best Abilities to learn' but for reasons that they are 'consequently enabl'd to examine, and direct such as they shall set on Work, without reproch either to their conveniency or expence when they at any time Build'.[169] Thus Evelyn's gentleman had the time and the money to dedicate himself to learning about architecture and seeing through the completion of his designs. The gentleman's capacity for financial freedom of action made him particularly suited to learning about architecture because he could afford the resources and the time.[170]

Evelyn, however, identifies another reason why a member of the nobility or gentry might be better qualified to become his *Architectus Ingenio*. He laments the fact that many gentlemen did not engage in the act of learning about architecture because they:

> either imagine the Study of Architecture an absolute Non-necessary, or Forsooth a Diminution to the rest of their Education, from whence proceeds that miserable loss of so many irrecoverable Advantages during their Travels in other Countries.[171]

Thus Evelyn sees the traditional education of a gentleman, which might have included a trip to the continent (which he had undertaken in the 1640s) as a potentially useful attribute for the *Architectus Ingenio*.[172] There is therefore a more practical and

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[169] Evelyn, 1664: 120.
[170] For Shapin, the gentleman's financial freedom of action was just one of the attributes that made him a credible truth-teller; Shapin, 1994: 43-52. For Evelyn it seems that this is main reason why gentleman should make better architects.
[171] Evelyn, 1664: 120.
[172] For wider ranging discussion of gentlemanly education in the seventeenth century see Stone, 1965: 303-331; and relating to the Royal Society and specifically John Aubrey see Hunter, 1975: 54-55. Shapin's discussion of gentlemanly education does not discuss foreign travel; Shapin, 1994: 56-64. For Evelyn's European travel see Levine, 1999: 6-14; and Darley, 2006: 37-76.

circumstantial reason for gentlemanly credibility in architectural design than a moral, social one and, although Shapin also identified the gentleman's economic position as a key factor in their truth-telling status in society, his emphasis remains on the moral and social.[173] To a certain extent, Evelyn is in agreement with Pratt, who does not give reasons why gentlemen made better designers of buildings but at least suggests what gentlemen should do to become credible in that field: namely travel abroad or least be well-versed in Renaissance architectural theory. Unlike North, Evelyn does not see the gentleman as morally superior in matters of architectural design. Instead, as he sees it, members of the upper classes were in a better position, practically, to learn about architecture than those nominally below them in society. He prioritises the gentleman out of convenience only and his treatment of this social category is essentially an economically determined phenomenon. This makes it easier to test out the relevance of the architective economy present in his text on the architectural careers of his contemporaries. Therefore, does this practical designation of the gentleman to the status of *Architectus Ingenio* work in practice? In the context of this thesis, this question needs to be answered with reference to Evelyn's fellow Royal Society members.

Hooke, as a key member of the Society, a person continually engaged in the designing of buildings, and someone who Evelyn defended as an architect in the face of criticism, must surely have met the credentials of the *Architectus Ingenio*, particularly as he was a practicing architect who had never served an apprenticeship in the building trades. Yet Hooke, at first glance, was neither economically nor circumstantially privileged in the way that Evelyn suggests. In fact, Hooke's social status as a gentleman has been the subject of much recent debate, mainly as a result of Shapin's 1989 article 'Who was Robert Hooke?' and Mordechai Feingold's subsequent reply, published in

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[173] Shapin, 1994: 49.

2006.[174] Shapin's conclusion is that Hooke's actual and perceived social status is the key to understanding his position within the social networks of late seventeenth-century scientific circles, and that Hooke's claim to gentlemanly status was in fact problematic.[175] This drew an incendiary response from Feingold, who argues that Shapin's 'insidious comparison' of Hooke with Robert Boyle amounted to 'a merciless – not to say spurious – representation, grounded on misinterpretation of the evidence and on gross misunderstanding of the nature of seventeenth-century science and its cultural milieu'.[176] However, even Feingold would (and indeed does) admit that Hooke, the son of an Isle of White curate, was not the social equal of Christopher Wren, let alone Robert Boyle. Yet Hooke's achievements in a variety of academic fields placed him above the level of London's artisans, craftsmen and technicians.[177] Feingold is correct to identify 'a powerful network of support' that was mobilized behind Hooke to push him through Westminster School and Oxford and subsequently rendered his humble beginnings irrelevant, and Feingold is certainly right to observe that Hooke was treated as a gentleman and addressed as such by the 1670s.[178] As we have seen, Evelyn does not seem to be concerned with the moral standing of a gentleman, only the economic and circumstantial attributes the gentleman might be expected to possess. Therefore Hooke's potentially questionable status as a gentleman does not necessarily exclude him from the category of *Architectus Ingenio*.

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[174] Shapin, 1989a: 251-285; Feingold, 2006: 203-217. Feingold's response to Shapin's 1989 article should be viewed alongside his equally critical review of *The Social History of Truth*, which is discussed above. In both cases Shapin is accused of poor historical scholarship.

[175] Shapin, 1989a: 285.

[176] Feingold, 2006: 203.

[177] Feingold may well be correct about Hooke's social position within scientific circles in the 1670s and 80s but he concedes that Hooke's initial social standing, at least before his induction into experimental philosophical groups at Oxford, was below that of the vast majority of the Royal Society's members; Feingold, 2006: 208. Hooke's brief, but telling, apprenticeship with the painter Sir Peter Lely in the early 1650s is a clear indicator of the type of career that a talented, but humbly born, young man of Hooke's type might be expected to follow in this period, for the nature of this apprenticeship see Inwood, 2002: 9-10.

[178] Feingold, 2006: 207. Whether Feingold is right about the 'Royalist' nature of this support network is a matter for debate. For an argument to that effect, with reference to Wren see Jardine, 2002: 145-163.

More problematic is the fact that Hooke, and Wren for that matter, were both employed throughout their architectural careers: Wren was salaried in the Office of Works and the City Church Office whereas Hooke was employed by the City of London, the City Church Office, the Royal Society and Gresham College.[179] This suggests that neither could claim financial freedom of action that Evelyn saw as an attribute the designer of buildings should ideally possess. Neither did they possess the free time Evelyn also recommends. As his diary testifies, Hooke rarely had any time on his hands and his frenetic day-to-day life consisted of one engagement after the next.[180] Equally troubling for Hooke's claims to the status of *Architectus Ingenio* was the fact that he had never been abroad in Europe to view French and Italian architecture. On the other hand Wren visited Paris, not as part of his education but on his own in 1665 just as he was beginning to acquire architectural commissions.[181] Wren's claim – in a letter written from Paris – that he had returned with 'almost all France in paper', is testimony to the amount of architectural material that he collected whilst he was there.[182]

Hooke could not therefore claim credibility as an *Architectus Ingenio* on economic or social grounds: instead he had to acquire it in other ways. To a certain extent Hooke's education and early career in institutional science was important. As Bennett has shown, using the example of Wren, a knowledge of practical mathematics qualified one to be an architect in late seventeenth-century England and undoubtedly those were the grounds on which Hooke initially became Surveyor to the City of London and a privately practicing architect.[183] Here it is important to stress that the

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[179] See Chapter 3 for the nature of their respective employments as Royal and City Surveyor.
[180] See Jardine, 2003b: 163-181.
[181] For a discussion of Wren's visit to Paris see Whinney, 1958: 229-242; Bennett, 1982: 90; and Jardine, 2002: 240-241.
[182] Soo, 1998: 105. In a letter to Ralph Bathurst Wren also reveals that he had met the architects François Mansard and Gian Lorenzo Bernini in Paris; *WS*, 5: 14-15. Bennett, 1982: 91; Jardine, 2002: 240.
[183] Bennett, 1982: 88-90.

knowledge that the *Architectus Ingenio* had to acquire did not exclude the practical and the mechanical. Evelyn's rejection of the master-craftsman as a designer of buildings did not mean that his ideal architect had to prioritise knowledge relating to theoretical or aesthetic matters, hence his praise for architects 'who both know and apply'.[184] From his years at Oxford and his tenure as professor of geometry at Gresham College, Hooke would have been able to draw on a considerable experience of practical, applied mathematics. However, as Evelyn and Pratt suggested, it was imperative that the architect was also familiar with European architectural design and theory. This would not have been provided by Hooke's educational and professional experiences at Gresham and instead he had to look elsewhere.

As has been shown, Royal Society sources provided Hooke with access to various forms of architectural knowledge. However, as Geraghty demonstrates, Hooke's diary provides evidence of an ongoing and much broader quest to acquire texts and images relating to buildings that took him outside the domain of the Society.[185] Much of the architectural information he acquired was in the form of engravings of continental buildings and it was here that he met Evelyn and Pratt's specification. He regularly used booksellers and other outlets in London, and the diary records frequent purchases. For example on 10 June 1677 Hooke made a list of all the architectural prints of well-known European buildings and their details that he had recently acquired. The list reveals the range of Hooke's collecting:

> Separated prints 7sh., of St Peters 10sh., Tarripan Jesuits church, 1s 8d., Piazza del populo 1s. 3d., chiesu di St Maria della pace 1s.3d., two propsa of the Louvre, 2s 3d., Berninis St Pieter 5sh., Merchants hall at Paris 5sh., St. Peters chair 6s. 3d., Fornesys Jesuits church at Rome 3s.4d., Scavans large sheets of the Jesuits

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[184] Evelyn, 1664: 121.
[185] Geraghty, 2004: 113-125. For a general discussion of architects, including Hooke and Pratt, collecting books in the period see Hind, 1993: 33-39.

> church at Paris 10sh., Fifteen of Perill's prospects 3s 1½d., eighteen chimneys and altars 4s.3d., 109 views of Israells 22s. 8½d.[186]

Similarly on 3 June 1676 he had bought '90 pages of Bachinall grotescues, Ceelings, gates, compartments and Sheilds' as well as engravings of 'the Pallace of Richleu and the church of the Sorbon'.[187] A few of these prints of European architecture survive, in Hooke's drawing collection in the British library.[188] Also present in this volume is a drawing of the Nieuwe Kerk in the Hague which serves as an example of another way in which architectural designs could be circulated (Fig. 13). The drawing, in Hooke's hand, was possibly copied from an image provided by an associate and retained for future reference.[189] As Hooke often recorded seeing glimpses of prints that he did not own, in the homes of his associates, this would seem to be the case.[190]

As well as engravings and prints, Hooke owned a large collection of texts on architecture, most of which would have contained images. These he mainly bought from booksellers in London.[191] Geraghty has established the nature of this collection, using evidence from the sale catalogue of Hooke's library compiled after his death in 1703.[192] Hooke owned a broad selection of European books, including those by French, Italian, Dutch and German authors and a large number of the various editions of

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[186] *Diary*: 294-295. Geraghty has shown what each of these refer to; Geraghty, 2004: 116-117. The engravings of St. Peter's Church in Rome are probably from the Rossi publication discussed above.
[187] *Diary*: 235. These images were purchased from the estate of Wren's draughtsman Edward Woodroofe. Again Geraghty has shown exactly what these references relate to, in this case engravings by Jean Marot; Geraghty, 2004: 116.
[188] Geraghty, 2004: 117.
[189] B.L. Sloane, 5238, 47. See Kuyper, 1980: 115-116; and Stoesser-Johnston, 1997: 33. For the original attribution of the drawing to Hooke, and the suggestion that Hooke may have himself visited Amsterdam see Downes, 1971: 150. For information about the Nieuwe Kerk itself see Kuyper, 1980: 24-27.
[190] For example, as Geraghty has shown, Hooke saw glimpses of the second part of Rossi's *Palazzi di Roma* and a set of Gabriel Perelle's engraving of French country houses on 13 April 1675, *Diary*: 158. He recorded owning both of these by 1677; Geraghty, 2004: 117
[191] Hooke's preferred booksellers, John Martyn and Moses Pitt, did not tend to stock architectural books. Instead, as Geraghty has shown, Hooke used Robert Scott and Robert Littlebury, both in Little Britain, for purchasing architectural material; Geraghty, 2004: 117-118. Scott was also Roger North's preferred architectural bookseller; Geraghty, 2004: 118.
[192] Geraghty, 2004: 113-115. For Hooke's acquisition of his library see Rostenberg, 1989: 113-122.

Vitruvius. Judging by the sale catalogue, Hooke mainly sought modern practical manuals and texts that were heavily illustrated with examples of contemporary European architecture.[193] Coupled with his collection of prints, this body of texts would have been used as source material for specific commissions as well as to build up a general knowledge of all aspects of architectural design and practice.[194] Hooke was part of a much broader system of architectural epistemological exchange based in London and he also lent his own material relating to European buildings to others engaged in learning about architecture. For example in November 1676 he noted in his diary that he could not find his book on the Ville de Richelieu in France adding 'q[uery]. to whom lent[?]'.[195] Evidence suggests that Evelyn also owned a large collection of architectural prints and it was evidently the responsibility of the *Architectus Verborum* to engage in collecting of architectural knowledge as well.[196] Significantly, this material did not just concern itself with ancient architecture. In contrast to Wren's theoretical 'Grounds of architecture' as discussed by Shiqiao, the forms of architectural knowledge that Hooke and Evelyn considered important also included information on contemporary design and practice.[197]

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[193] The collection includes Evelyn translation of Fréart; a 1565 edition of Alberti's *De re aedificatoria*; two editions of Palladio's *Quattro Libri*; books by Vignola, le Muet and Marot; as well as Dutch publications including Philips Vingboon's 1648-1674 *Gronden en afbeeldsels der voornaamste gebouwen.* It is significant that Hooke did not own major French theoretical texts such as Blondel's *Cours* and Perrault's 1683 *Ordonnance*, although as discussed above he borrowed the first part of the Blondel publication from Boyle in 1676; Geraghty, 2004: 114-116. For the sale catalogue itself see Feisenberger, 1975 and Rostenberg, 1989: 141-221.

[194] As we shall see in Chapter 2, Hooke was able to apply his knowledge of French architecture to Montagu House in London. For further claims, often over-exaggerated, that Hooke based his architectural designs on contemporary European architectural images, particularly from Dutch sources, see Stoesser-Johnston, 1997; and Stoesser-Johnston, 2000: 121-137.

[195] 12 November 1676; *Diary*: 256.

[196] Darley, 2006: 149. The surviving sale catalogue of Evelyn considerable library remains unpublished, for summaries see Keynes, 1968: 13-17, 295-303; Hunter, 1995b: 82-91 and Mandelbrote, 2003: 71-94. Hunter shows that Evelyn owned architectural publications including Wotton's *Elements of Architecture*; Hunter, 1995a: 74.

[197] As Shiqiao discusses, contemporaries of Wren, Hooke and Evelyn were aware that the prioritising of ancient architectural knowledge over modern did not necessarily sit easily with the core aims of the Royal Society; Shiqiao, 2007: 45-46.

Hooke also collected information relating to technological and structural innovation that had been used previously on European architectural projects. Presumably this was intended to supplement the information provided by the texts he owned relating to practical architectural concerns. In July 1674 for example, the master-mason and associate of Hooke's, Abraham Story had just returned from Amsterdam and had told Hooke of the new Lutheran Church in the city, the roof span of which was '70 foot Diameter and 70 foot over' according to Hooke.[198] Story also gave Hooke details of 'the Burghers hiordiage' which is presumably a reference to the New Town Hall or Burgher's Hall designed by Jacob Van Campen in 1655 and 'the Jews new Synagogue 100 foot square', which was the Grote Sjoel, the Ashkenazi Great Synagogue designed by Elias Bouwman in 1670-1671.[199] On 10 July 1675, Hooke, again at Garraways, was told about the bridge at Pont de St Esprit, which would appear in *Philosophical Transactions*, and he noted that the arches on the bridge were 90 feet high and 3 feet thick.[200] Intriguingly, in 1676 Hooke had intended to follow in Wren's footsteps by visiting France and experiencing European classical architecture first-hand. He was given the opportunity by one of his architectural patrons, Ralph Montagu, the owner of Montagu House. On 8 July 1676 Hooke revealed in his diary that he 'Resolved [...] to goe into France with Mr. Montacue' and later that month he was 'At Mr. Montacues' where 'he advised me for France and proferd me his favour'.[201] A final entry relating to the proposed visit came in August when Hooke 'Talkd long with Mr. Montacue. He promised and invited me to France'.[202] This is the last one hears of the matter and presumably Hooke decided his numerous London-based engagements could not be

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[198] 7 July 1674; *Diary*: 111. Kuyper, 1980:116; and Stoesser-Johnston, 1997: 32. For information on Story, see below.
[199] For information on the Grote Sjoel and Hooke's interest in it see Kuyper, 1980: 38-39; Stoesser-Johnston, 1997: 32n; and Kravtsov, 2005: 327-328, 333.
[200] *Diary*: 169.
[201] *Diary*: 241; 24 July 1676, *Diary*: 245. See Espinasse, 1956: 98; Inwood, 2002: 240; and Geraghty, 2004: 120
[202] 31 July 1676 – 10 August 1676; *Diary*: 245.

abandoned for a lengthy trip abroad. Nonetheless the incident doubtless demonstrates Hooke's awareness that it would have been in his interests to go to Europe.

Hooke was able, however, to visit actual buildings in England. For example, in June 1680, on the way to the site of one of his private commissions, Ragley Hall in Warwickshire, he visited Wren's Sheldonian Theatre in Oxford.[203] When he visited another of his commissions, Ramsbury Manor in Wiltshire, in August 1682 he also viewed Donnington Castle in Berkshire.[204] In London he frequented the building site of St Paul's cathedral and recorded in his diary any interesting developments. In November 1672, for example, he 'Saw model of St. Pauls approved by the King' whilst in February 1673 he noted that he had seen Wren's 'Designe of burying vaults under Paules and the Addition of Library Body and portico at the West'.[205] He remained interested in St. Paul's and visited often to witness the construction. Sometimes he would ask Wren about specific aspects of the design and in 1677 he spent an afternoon interrogating his friend to discover the water carrying potential of the pipes underneath the cathedral, as well those under the Sheldonian Theatre and the Banquetting House in Whitehall.[206] Hooke was not alone in keeping abreast of architectural developments in the capital and evidence suggests that Roger North also went to St. Paul's every Saturday morning to observe building work and consult Wren, who 'like a true philosopher, was always obliging and communicative and, in every matter we inquired about, gave short but satisfactory answers'.[207] To return to Hooke, his potentially

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[203] On 21 June 1680, whilst in Oxford, Hooke 'saw theater'; *Diary*: 446. For Hooke's trip to Oxford see Inwood, 2002: 303-304.
[204] 8 August 1682; Henderson, 2007: 154.
[205] 2 November 1672; *Diary*: 12; 8 February 1673; *Diary*: 27. The model in question was the so-called great model for the cathedral which Hooke later reported that he had 'walkd through'; 21 February 1674; *Diary*: 87. See Espinasse, 1956: 104-105; and Campbell, 2007: 29.
[206] 20 September 1677; Hooke, *Diary*: 313. Presumably Hooke asked Wren about the Banqueting House water pipes because Wren, as Royal Surveyor would have been nominally responsible for the building.
[207] This quotation, from North's *The Lives of the Norths*, unpublished in his lifetime, is cited by Colvin and Newman in North, 1981: xvii.

dubious claims to gentlemanly status and his lack of time and foreign travel mattered little. Instead Hooke's undisputed credibility as an architect came from the ways in which he had acquired his knowledge of architecture. This included both general mechanical and mathematical knowledge obtained during his education and subsequent career as a professor of geometry and specific architectural knowledge obtained through a variety of printed and verbal sources. Hooke met Evelyn's specification for the *Architectus Ingenio*, and his career demonstrates that it was a more flexible category than North's morally defined gentleman architect.

So far, this chapter has outlined the morphology of Evelyn's *Architectus Ingenio*, and has ignored the other two main species in his system of architective classification. As Chapter 2 will discuss the role of the patron, the *Architectus Sumptuarius*, in the career of Royal Society architects, the figure that now needs further elucidation is the builder, the *Architectus Manuarius*. Unlike other architectural writers in the period, Evelyn directly addresses the subject of the training in architectural design provided by a traditional apprenticeship in the building trades. It is here that the nature of his architective economy is fully revealed. Evelyn criticises master-craftsmen who produced crude architectural designs and, when subsequently questioned, drew justification for their agency in design from their apprenticeship:

> For let one find never so just a fault with a *Workman,* be the same of what *Mystery* soever, immediately he shall reply, *Sir,* I do not come hither to be taught my *Trade,* I have serv'd an *Apprenticeship,* and have wrought ere now with *Gentlemen* that have been satisfied with my work, and sometimes not without language of reproach, or casting down his Tools, and going away in wroth; for such I have frequently met withal.[208]

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[208] Evelyn, 1664: 119.

Thus for Evelyn, an apprenticeship and a subsequent career in the building trades did not make one a credible designer of buildings, despite the apparent protestations of the master-craftsmen he had encountered.

Crucially, Evelyn does not question the innate ability of the master-craftsman to produce architectural designs. Instead, he suggests that contemporary apprenticeships did not provide a grounding in the appropriate forms of architectural design knowledge. In the context of Evelyn's discussion of architecture in general, he seems to cast the knowledge provided by apprenticeships as inaccurate, as opposed to the accurate knowledge provided by European texts and prints. However, Evelyn expresses the hope – unlike Wotton, North and Pratt – that master-craftsmen could be taught the correct forms of architectural knowledge. In this respect his text is closer to sixteenth-century manuals for English practitioners discussed above. Evelyn, though, is more explicit about how this process should proceed. Firstly, as Hooke and Wren had done, the master-craftsman needed to acquire a general knowledge of mathematics. This, Evelyn suggests, could be achieved by apprenticeships, provided they change in nature:

> it were infinitely desirable that even every vulgar *Workman* whose calling is conversant about *Building,* had attained to some degree of competent knowledg in the more easy and useful principles of those *lineary Arts*[mathematics], before they were admitted to their *freedom,* or employed in designes of moment.[209]

Thus the entire workforce, including craftsmen who did not engage in the designing of buildings, needed more general mathematical training. However, anyone who was responsible for architectural design needed access to specific sources of ancient and contemporary classical architecture. To this effect, Evelyn appeals to his readers for:

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[209] Evelyn, 1664: 118.

> some industrious Person who shall oblige the *Nation* with a th[o]rough examination of what has already been written by *Vitruvius* [...] *Palladio* [...] *Leon Albert* [...] *Dan. Barbato* [...] Sir *H. Wotton* in his concise and useful *Theorems,* &c. [...] it were I say, becoming our great needs that some ingenious Person did take this in hand, and advance upon the *Principles* already establish'd...[210]

However, as Evelyn warns, this was likely to be a thankless task, as English workmen were not particularly given to learning:

> at least in the apprehension of our vulgar Workmen, who for want of some more solid directions, faithfull and easy rules in this nature, fill as well whole *Cities* as *private dwellings* with rubbage and a thousand infirmities, as by their want of skill in the profession, with the most shameful incongruities and inconveniencies in all they take in hand; and all this for want of *Canons* to proceed by, and *humility* to learn, there being hardly a Nation under heaven more conceited of their understanding and abilities, and more impatient of direction than our ordinary *Mechanicks*...[211]

There are hints of North's distinction on moral grounds between artificer and architect here, particularly in Evelyn's consistent use of the word 'vulgar' to describe English workmen. Furthermore, this, combined with a perceived arrogance on the part of the nation's master-craftsmen, threatened to derail any attempts to educate them. However, unlike North, Evelyn clearly believes that master-craftsmen could produce correct architectural designs if educational texts and images, or the '*Canons*' of architecture, were produced. Consequently, this would lead to a rise in the general standard of English architectural design.

In many ways, Evelyn's translation of Fréart and his accompanying *Account* attempts to do just that. As discussed above, he claims that the first edition was published for the 'benefit of our *Countrymen.*[212] However, in the second edition of

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[210] Evelyn, 1664: 118. Dan. Barbato: a reference to Daniel Barbaro, whom Evelyn cites for his 1556 commentary on Vitruvius.
[211] Evelyn, 1664: 119. Friedman, 1998: 165.
[212] Evelyn, 1664: 113.

1707, he notes that the first publication had proved so informative for master-craftsmen, particularly to some of the contractors at St. Paul's, that he had been induced to republish it. In the new dedication to Wren he notes that:

> I was Importun'd by the *Book-Seller*, to add something to a *New Impression*; but to which I was no way Inclin'd, till Not long since, going to St. *Paul*'s, to Contemplate that *August Pile*, and the Progress You have made, some of Your *Chief Work-men*, gratefully Acknowledging the Assistance it had afforded them...[213]

In fact throughout his text he is clear that master-craftsmen could use this work, his translation of Fréart and other works of architectural theory to improve the quality of their designs and therefore obtain the status of the *Architectus Ingenio*. Therefore, Evelyn questioned the nature of architectural knowledge provided by apprenticeships. The knowledge that the master-craftsman acquired from these sources was the equivalent of unreliable knowledge in the natural philosophical sphere; it was from a dubious source and was not to be trusted as. Architectural knowledge from specific European sources, such as Fréart, was accurate and to be trusted: it was indeed credible.

Evelyn was not alone amongst Royal Society members in believing this. Wren, twenty years later in 1694, lamented the fact that the standard of design produced by the nations master-craftsmen was still very low, but that it could be improved quickly if the correct knowledge was circulated to them:

> our English Artists are dull enough at Inventions but once a foreigne patterne is sett, they imitate soe well that commonly they exceed the original. I confess the observation is generally true, but this shows that our Natives want not a Genius, but education in that which is the ffoundation of all Mechanick Arts, practice in designing or drawing, to which everybody in Italy, France and the Low Countries pretends to more or less...[214]

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[213] Evelyn, 1707: Dedication.

[214] Wren wrote this in a letter dated 24 November 1694 to Treasurer Hawes of Christ's Hospital; *WS*, 11: 74. See Bold, 1989: 17; and Geraghty, 2007: 8.

Thus, as Evelyn does, Wren calls for an overhaul of the training provided for master-craftsmen with the emphasis placed on correct design, as practiced on the continent. But he also admits that existing English practitioners could improve the standard of their designs by being provided with the appropriate 'foreigne patterne'. Another Royal Society author Joseph Moxon, whose 1703 third edition of *Mechanical Exercises* was primarily concerned with building practices such as carpentry and bricklaying, recognised that many craftsmen did not know where to obtain knowledge relating to architecture in general. Although, Moxon noted, 'Books of Architecture are as necessary for a Builder to understand as the use of Tools,' he added that as 'some Builders should not know how to enquire for them, I shall at the latter end [...] give you the Names of some Authors, especially such as are Printed in the *English* Tongue.'[215] The texts he recommended were:

> *Sebastion Seirleo*, in Folio. *Hans Bloom*'s Five Collumns, Folio. *Vignola*, in Folio. *Vignola*, Or the *Compleat Architect*, in Octvo. *Scamotzi*, Quarto. Palladio, Quarto. *Henry Wotton*'s Elements of Architecture, Quarto.[216]

He also pointed out that 'These Books are all Printed in English: But there are many others extant in several other Languages, of which Vitruvius is the chief'.[217] Implicit in Moxon's recommendations of architectural theoretical texts for workmen is the assumption that the experience gained through apprenticeships and a career in building did not include obtaining a knowledge of such publications. However Moxon, like Evelyn and Wren, did not rule out the possibility that they could learn about architecture from the right sources and therefore become more capable designers of buildings.

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[215] Moxon, 1703: 117. For Moxon and architecture in general see Harris and Savage, 1990: 324-325.
[216] Moxon's list is similar to Evelyn's list of recommended texts (discussed above), with major Italian treatises accompanied by Wotton's *Element of Architecture*. Moxon also adds the German writer Hans Blum's 1550 *On the Five Columns*; Moxon, 1703: 156. For the popularity of Blum's text in England see Shiqiao, 2007: 2.
[217] Moxon, 1703: 156.

In practice the education of English master-craftsmen in classical architectural design had been taking place for some time. For example the London based bookseller and publisher Robert Pricke translated European architectural texts for the benefit of English craftsmen throughout the late seventeenth century.[218] However, some evidence exists to suggest that early Royal Society members, most prominently Hooke, were also involved in the providing of 'correct', architectural information to master-craftsmen. Hooke's relationship with his master-contractors is revealed in his diary.[219] He had a core group of master-masons, carpenters and bricklayers that he would employ on his major building projects. This group consisted of the master-carpenter Thomas Fitch (the head contractor on the project to wharf the Fleet Canal in the City of London in the 1670s), his brother the master-bricklayer John Fitch, the master-masons Joseph Lem and Abraham Story, and the master-carpenter Roger Davies.[220] Hooke was remarkably loyal to this group – particularly the Fitch brothers – and this is evidenced by his continuing attempts to persuade Wren to employ them as head contractors at St. Paul's and other major building projects. On 24 August 1674, for example, Hooke 'Spoke for [John] Fitch to be bricklayer to St. Paules' and on 5 March 1675 he spoke to 'Sir Ch: Wren for Mr. Fitch about Cambridge theater', which was presumably Wren's Senate House project in Cambridge.[221] After the contracts for the building of the cathedral had been announced in May 1675, Hooke noted, with apparent regret, that there had been

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[218] For information on Pricke see Rostenberg, 1989: 60-61; and Harris and Savage, 1990: 379-380. As Geraghty shows, among the texts Pricke translated were Alexandre Francine's *A New Book of Architecture* in 1669 (which Hooke bought from him); Julien Mauclerc's *A New Treatise of Architecture* also in 1669; Jean Barbet's *A Book of Architecture* in 1670; Pierre Le Muet's *The Art of Fair Building* also in 1670; and Simon Bosboom's *A Brief and Plain Description of the Five Orders of Architecture* in 1676; see Geraghty, 2004: 119.

[219] For a general discussion of Hooke's relationship with his master-craftsmen as well as his scientific technicians see Illife, 1995: 285-318.

[220] For information about the Fitch brothers see Colvin, 2008: 377-379; for Lem see *WS*, 20: 125; for Story see Knoop and Jones, 1935: 21 and Gunnis, 1954: 374; for Davies see Beard, 1981: 255.

[221] *Diary*: 118; see Colvin, 2008: 377. *Diary*: 151; see Geraghty, 200: 29. Both Fitch brothers worked on the City Churches, but John Fitch would ultimately be turned down by Wren with regards to the cathedral. Jardine's claim that both John and Thomas Fitch were 'Wren's bricklayers', in the Office of Works is incorrect, neither of them were employed by the Office and, furthermore, Thomas was a carpenter not a bricklayer; Jardine, 2003a: 173.

'nothing for us'.[222] Presumably he was referring to his favoured workmen and he implies that he saw them as a coherent group whose success in their architectural careers was linked to his own advancement.

As well as trying to promote their services, Hooke also socialised with these figures and regularly met them in coffee houses and taverns. He occasionally discussed architectural matters with them that were unrelated to the building projects they were engaged on. Thus on the 28 March 1674 Hooke was in a coffee house with Story 'discoursing about Arch', which is possibly a reference to the catenary arch problem.[223] As outlined above with the case of Story's trip to Amsterdam he also trusted them to relay information back to him on architectural designs. He also seems to have promoted their learning, and after he realised that he could not go to France with Montagu, Roger Davies was sent in his place.[224] Interestingly when Davies left on 2 April 1677, Hooke gave a set of instructions: 'Davys here. To Bloomsbury [...] Writ a note of all Querys to Mr. Montacue, another for books'.[225] When the joiner returned the next month Hooke went to see the architectural prints that he had brought back. Although Hooke was disappointed in their quality, Davies also had the books he had ordered: 'At Davys, saw his prints, little worth. I received books from Davys and paid him'.[226] Thus Hooke did not have the moral objections to craftsmen that North displays in his writings and furthermore seems to have been comfortable discussing architectural design and theory with them. His involvement with Davies's visit to Paris and Story's trip to Amsterdam suggests that he supported his master-craftsmen obtaining the forms of architectural knowledge that Evelyn saw as the correct ones.

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[222] 15 May 1675; *Diary*: 161.
[223] *Diary*: 93.
[224] Hooke had already tried to send his technician and servant Harry Hunt to Paris: on the 21 August 1675 he recorded that he had been 'At Mr. Mountacues, he promised to send Harry beyond sea'; *Diary*: 176.
[225] *Diary*: 283. See Geraghty, 2004: 121.
[226] 17 May 1677; *Diary*: 291.

To return to Evelyn, it is important to stress that his call for the improvement of master-craftsmen's knowledge went beyond local initiatives such as those displayed by Pricke and Hooke and his contractors. Instead he calls for an institutionalisation of architectural learning in England that would remove the need for apprenticeships to provide training in architectural design altogether. Evelyn identifies a number of existing institutions that could fulfil this function. Firstly the universities:

> Great pitty I say it is, that amongst the *Professors of Humanity* (as they call it) there should not be some *Lectures* and *Schools* endow'd and furnish'd with *Books, Instruments, Plots, Types* and *Modells* of the most excellent Fabricks both in *Civil* and *Military Architecture,* where these most noble and necessary *Arts* might be taught in the *English* and Vulgar Tongue, reriv'd to their proper, and genuine significations[227]

Thus universities were appropriate places for learning about architecture in the correct way; from books, models and prints rather than on-site experiences provided by apprenticeships. However, Evelyn seems to identify liberal arts degrees as the best location for this enterprise, so that it would not be 'thrust out as purely *Mechanical*'.[228] Again Evelyn reflects certain prejudices towards applied mathematics, held by elite institutions, but proposes to negate them by placing the study of architecture in more liberal and polite company. Evelyn also suggests other institutions that could provide the correct form of architectural training including the royal palaces:

> it is to be hoped, that when his *Majesty* shall perfect his Royal *Palace* of *White-Hall* according to the design, he will [...] destine some *Apartiments* for the ease and encouragement of the ablest Workmen in *this,* as in all other *useful, Princely* and *Sumptuous* Arts: I mean for *Printers, Painters, Sculptors, Architects,* &c. by such liberal *honoraries* as may draw them from all parts of the World to celebrate his *Majesty* by their works to posterity, and to improve the Nation: For from such

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[227] Evelyn, 1664: 118. See Harris and Savage, 1990: 197; Lubbock and Crinson, 1994: 30-31; and Friedman, 1998: 165. For information on humanities faculties in English universities, and Oxford in particular, see relevant essay by Feingold in Tyacke, 1997: 211-358. For the Royal Society and education in general see Hunter, 1975: 29-63.
[228] Evelyn, 1664: 118.

> a bounty and provision as *this* it appears to have been, which made *Vitruvius* to leave us those his incomparable Books, that we have now enjoy'd for so many ages; for so he acknowledges it to the great *Augustus*...[229]

Therefore Charles could emulate the Roman emperor Augustus – the paradigmatic architectural patron – by actively promoting correct architectural learning. This might then produce classical architectural knowledge as accurate and correct as that of Augustus' subject: Vitruvius.

Evelyn's calls for appropriate institutionalised architectural learning was also taken up by Oldenburg. In his review of Blondel he agrees with Evelyn and praises the French Academy for training architects and encouraging them to travel and acquire architectural knowledge from the best sources:

> For the Improvement of which Art his Majesty of *France* hath instituted an Academy at *Paris*, which meets weekly to confer about the subject, and thereby endeavours to free Architecture its vicious dresses, to retrench the abuses which the ignorance of Workmen had introduced, and to enrich the same with those natural embellishments and graces, which have rendered it so commendable among the Ancient; not forgetting to teach in the same the exactest and most correct Rules of Architecture, and so to form a Seminary of young Architects, to be encouraged by certain *brabeums* or prices for such as shall do best, and these to be sent afterwards, as his said Majesties charges, into *Italy*, there to prefect their knowledge and skill, and so to be made capable to serve him in the Survey of his Buildings all over his Kingdom.[230]

The French academy was therefore celebrated in the *Philosophical Transactions* for the 'correct' architectural education that it provided. The prioritisation, over apprenticeships, of institutionalised architectural learning along the lines of the French academy, is clear in Oldenburg's review. Over the course of the seventeenth century

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[229] Evelyn, 1664: 118. Harris and Savage, 1990: 197.
[230] *brabeum*: a now obsolete word meaning prize or reward. *Phil. Trans.* 1675, 10: 549. See Geraghty, 2004: 119. For information on Blondel, the French academy and its aims to replace the apprenticeship as the chief provider of architectural training, see Pérez-Gómez, 1983: 29.

there had been attempts to set up similar academies in England but these had failed.[231] Now Evelyn and Oldenburg envisaged another establishment which would provide correct, accurate architectural learning: perhaps they even intended the Society to provide this function, although this is never stated. As Campbell shows, the Royal Society's library contained works by Alberti, Palladio, Labacco, Scamozzi, Vasari, Vignola and Vitruvius.[232] These must have been collected to facilitate the members with knowledge of architecture. However, it might also be suggestive of attempts to institutionalise architectural learning in the Society.

Royal Society members' calls for an improvement in education partly stem from general utilitarian aims. However, the importance of correct architectural training is consistent with the Society's insistence of accuracy in the handling of classical architecture. In conclusion, the members' treated architecture as an intellectual subject to be discussed and disseminated as knowledge. Evelyn in his *Account of Architects and Architecture* formulates a complex economy of knowledge whereby certain sources of architectural information were prioritised over others. Although his text represents a theoretical ideal, Hooke's actual career often shows Evelyn's ideas translated into practice. Evelyn's classification of the architect and in particular his conceptualisation of an ideal architectural practitioner, the *Architectus Ingenio*, is consistent with the early Royal Society's general treatment of architectural material. Architecture was treated like other subjects in their broader epistemological programme: as something that

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[231] As Bold demonstrates, in 1635 Sir Francis Kynaston founded the Musaeum Minervae, which sought to educate young nobles in a range of subject that were not taught at universities, these included architecture. Likewise architecture was included in the list of subject to be taught at Balthasar Gerbier's Academy at Bethnal Green, founded in 1649, neither of these projects were a lasting success; Bold, 1989: 17; see also Lubbock and Crinson, 1994: 10-11, 12-13. It has been suggested that Wren envisaged the Office of Works as provider of architectural education, and he does indeed seen to have promoted the private architectural careers of some of his employees and craftsmen. However, there is no evidence to suggest that he consciously intended the Office to fulfil the function of an informal architectural academy as some have proposed; Lubbock and Crinson, 1994: 13-15.

[232] Campbell, 2008: 20-21. Much of the library was donated by the Duke of Norfolk in 1667, but Hooke was responsible for the acquisition of books until the Society appointed a librarian; see Hall, 1992: 2.

needed to be accurately elucidated for the good of society. The *Architectus Ingenio* was the personification of this drive: he was an accurate, credible agent of architectural, and thus social, improvement.

CHAPTER 2

'MUCH MADE USE OF IN DESIGNING BUILDINGS': HOOKE'S DOMESTIC ARCHITECTURAL CAREER

The quotation in the title of this chapter – taken from John Aubrey's short biography of Hooke – suggests that Hooke was seen as a resource that patrons could tap when looking for appropriate architectural designs.[1] As Chapter 1 demonstrated, Hooke was engaged in an ongoing process of accumulating the correct and accurate forms of architectural knowledge. His credibility as an architect came from his education and positions in Gresham College and the Royal Society as well as his ownership of a large amount of information about architecture. The purpose of this chapter is to show how he was able to put that knowledge into practice and how he built and maintained an architectural career. To this end it will explore an important facet of Hooke's career as a privately commissioned architect: his employment as a designer of domestic buildings in the 1670s and 1680s. During this period he designed major houses for important patrons and should be considered one of the most successful London-based architects of domestic buildings.

This chapter will present the reader with a series of sociocultural circumstances by which Hooke was able to acquire domestic patronage. I will demonstrate that Hooke tended to meet his architectural patrons in the Royal Society, although a number were also contacts

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[1] Aubrey, 1898: 411.

made in his employment in the City of London. Thus the Society was not only the source of much of the architectural knowledge that Hooke possessed: it was also the facilitator of his career in practice. This, I suggest, was not a coincidence since Royal Society members were in a position to know about Hooke's knowledge and talents. The chapter will then examine Hooke's performance as a practicing architect, and will show that he appeared to follow contemporary modes of good practice in architecture – an informal set of rules regarding the designing and building of large houses – as spelt out in contemporary architectural discourse. This will demonstrate the importance of remaining a credible practitioner in late seventeenth-century architectural practice. However, that credibility again came not from social and moral status but instead from an adherence to the more internalised rules of architectural discourse. One of the norms of architectural practice in the period was an expectation that the architect consulted the patron over the design of their house. To explore this I will use the example of Hooke's Montagu House in London. This case study will show how Hooke could apply his knowledge of contemporary design to specific commissions, but it will also highlight the extent to which a patron could influence the final design no matter how knowledgeable and credible the architect was.

In a period when detailed evidence for the design and construction of public and institutional buildings far outweighs that relating to domestic architecture, it is highly fortuitous that Hooke's diary and a number of extremely informative letters relating to an individual building (Ragley Hall) survive. It is a pity therefore that scholarship on Hooke's domestic architecture has never progressed further than studies of individual houses, for his work in the field is substantially better documented than that of many of the better known

architects of the day.[2] To rectify this situation the following discussion of Hooke's domestic patronage will be underpinned by a thorough examination of the evidence for his involvement in each commission. In the case of some houses, Hooke's authorship will be confirmed and new information will be provided to suggest that he was a more prolific designer of houses than previously believed.[3] Ultimately, from the following discussion, a more secure and coherent picture of his domestic architectural career will emerge.

CITY CONTACTS

Hooke's first domestic architectural commissions are amongst his earliest designs for buildings and, as one might expect, take the form of small-scale projects. As yet, no evidence has come to light to suggest that Hooke obtained any private domestic commissions in the period before he started to keep a diary. Thus one can take the designs he gave to Sir William Hooker in early 1673 as his first in the field.[4] The location of this house is unclear and no designs survive to show what it may have looked like. Hooker was

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[2] Notable research untaken on individual buildings includes Bridget Cherry's summary of the designing of Walter Yonge's house in Devon in a more general article on Devon country houses, subsequently shown to be factually incorrect by Bridget Clarke; Cherry, 1988: 91-135; Clarke, 1998:1-11; Howard Colvin and Hentie Louw's articles establishing Hooke's authorship of Ramsbury Manor; Colvin 1975: 194-195 Louw, 1987: 45-49; Peter Leach's two articles on Ragley Hall in which the extent of Hooke' involvement in the design was underplayed; Leach, 1971: 230-233; Leach, 1979: 265-268; and Alison Stoesser's brief summary of the building of Montagu House, unfortunately accompanied by unconvincing stylistic comparisons with specific contemporary Dutch buildings; Stoesser, 2006: 165-180.

[3] As discussed in the introduction there has been a tendency in recent literature on Hooke's domestic architectural career to attribute new designs to him. These have not always been entirely convincing. For example in 2004 Worsley suggested, on stylistic grounds, that Hooke was responsible for the designs of Petworth House in Sussex, Kiveton Park in Yorkshire, Snitterfield Hall in Warwickshire, the office wing at Easton Neston in Northamptonshire, and Wrest Park in Bedfordshire; Worsley, 2004a: 11-20. There is no documentary evidence for Hooke's involvement in any of these projects.

[4] Prior to keeping a diary, Hooke had designed the stables of Somerset House for Queen Catherine of Braganza as well as the Monument and the College of Physicians (see Chapters 3 and 4 respectively). The evidence for his authorship of the Somerset House stables comes from a drawing in Hooke's hand, in his drawing collection in the British Library, of the building as executed; B.L. Sloane, 5238, 89; see Worsley, 2004b: 89; and *HKW*, 5: 258.

a member of the Grocers Company and a City Alderman who would become Lord Mayor of London later in 1673.[5] Hooke recorded that he 'contrived his [Hooker's] house' on 14 February 1673 with the bricklayer John Fitch in attendance.[6] The references also seem to suggest that the house was to be built on Fish Street Hill in the City.[7] Given that so few entries in Hooke's diary refer to the house in question it seems likely that the designs were for a smaller London house typical of those owned by merchants and City officials in this period.[8] What renders Hooker's house relevant to the present discussion is that Hooke had obtained the commission through his position as Surveyor to the City of London. Hooke had been an associate of Hooker's since October 1666 and encountered him on an almost weekly basis. Hooker sat on the City's highest governing body, the Court of Aldermen as well as the City Lands Committee, both of which Hooke attended in his capacity as surveyor.[9] In fact, Hooke's official position within the upper tiers of City bureaucracy gave him professional access to a network of dignitaries whose patronage he enjoyed throughout the 1670s. These figures seem to have trusted Hooke to design their houses as a result of credibility gained in his employment in the City of London and the City Church Office.

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[5] Woodhead, 1965: 92.

[6] *Diary*: 28.

[7] *Diary*: 28. As Colvin demonstrates, Hooke's diary entry for 6 November 1672 shows that Hooker had a house on Fish Street Hill: 'Sir W Hookers house, Fish Street Hill' (*Diary*: 12); and again on 13 February 1673: 'at Sir. William Hookers, fishstreet hill'; *Diary*: 28. Colvin, 2008: 535. However these references come before Hooke recorded designing a house for Hooker and they seem to refer to an existing house. Hooker was from East Greenwich in London and was buried in the parish church of St Alphage, where his memorial plaque still survives; Stow, 1720: 148. He also owned property adjacent to the church of St Clement Danes on the Strand, the boundary of which the City Surveyors were requested to survey in June 1668; C.L.R.O. Repertory, 72: fol. 190r. The house that Hooke designed for him in 1673 could have been at one of these locations.

[8] See relevant articles by Galinou and Goodison in Galinou, 2004: 25-41, 42-54; and Summerson, 2003: 49-68.

[9] Evidence from the Repertory of the Court of Aldermen, the Minutes of the City Land Committee and his diary shows that Hooke attended numerous meeting of the court in the presence of Hooker. Direct collaboration between the two men occurred in June 1668 when Hooke and Hooker drew up a report together on the subject of a disputed wall in the parish of St Stephen Walbrook; C.L.R.O. Repertory, 72: fol. 189r.

For example, another of Hooke's early domestic designs was produced for a figure associated with City bureaucracy, this time Sir William Jones, a London lawyer and, from 1675, the Attorney-General.[10] Evidence shows that Jones was consulted over legal matters by the City Church Office where Hooke, as we shall see, was employed as an assistant to Wren. In November 1673, Hooke acted as an intermediary between the Office and Jones, when Jones's legal council was required regarding the coal tax used to pay for the churches.[11] Hooke was approached by Jones about the commission at around this time and on 20 September 1673 he visited Jones 'about new house'.[12] In December that year, Hooke drew the designs for the house, which were perhaps for a replacement for Jones's existing London home in Southampton Square.[13] Jones was to become an important figure in Hooke's domestic architectural career, and he would eventually commission one of Hooke's most significant houses, Ramsbury Manor in Wiltshire, built from 1682-1686 (Fig. 14).

That Hooke could meet a figure with the capital to build a house on Ramsbury's scale was reliant on contacts made – and a reputation constructed – in the world of post-fire City administration. Hooke's authorship of Ramsbury was not established until 1975, when Howard Colvin discovered references to the house in the unpublished section of Hooke's

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[10] For Jones see *ODNB*, 30: 660-661.

[11] The City Church Office paid Jones two pounds 'for his councell & his opinion about borrowing upon credit of the Cole Money & allowance of interest for the same'; this payment was 'Delivered to him by me Robert Hooke'; G.L. 25543. Hooke, in his diary, records giving Jones '40sh. For councell' on 8 November 1673; *Diary*: 69.

[12] *Diary*: 61.

[13] On 2 December 1673 Hooke records that he 'Drew designs for Sir W. Jones'; *Diary*: 72. For Jones's Bloomsbury house see *ODNB*, 30: 661. In 1680 Hooke recorded in his diary supervising work on chimneys and sash windows for Jones on a house in Bloomsbury. On 3 September 1680 Hooke recorded that he was 'at Bloomsberry Sir W. Jones sashes'; *Diary*: 453. On 30 September 1680 he went 'to Sir W. Jones, at his chamber, then at his house about windows'; *Diary*: 455. Finally, he was 'at Sir W. Jones about chimneys' on 10 November 1680; *Diary*: 457.

diary and was able to place the design firmly in Hooke's hands.[14] Hentie Louw has subsequently discovered major archival evidence for Hooke's involvement in the design and has been able to formulate a chronology of the building work.[15] I wish to add to this research with some further discoveries. The first concerns a previously overlooked reference in Hooke's diary in which Jones asked for Hooke's advice regarding a country house long before Ramsbury was built. On 24 November 1673 Hooke recorded that he had 'dind at Sir W Jones. Saw his Survey of Country house. proferd him 3 guinnys for fee he refused upon account I designed in house &c.'[16] The 'account' that Hooke drew up 'in house' must relate to the small London house Jones commissioned earlier that year. The identity of the 'Country house' mentioned is not so easy to establish. That Hooke asked for a fee for looking at a survey of it suggests that it was not yet built and that Jones was obtaining Hooke's advice. It is unlikely that this reference relates to an early scheme for Ramsbury as that site was owned by the Earl of Pembroke until 1676, when he sold to his brother, Sir Richard Powell, who subsequently sold it to Jones later that year.[17] The reference may relate to a project built on lands which Jones owned in Berkshire or Norfolk.[18] Nevertheless, the reference demonstrates that as early as 1673 Jones saw Hooke as an appropriate person to consult about designs for a country house. Hooke had another meeting with Jones at the end of 1681 which, given the timescale for the building of

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[14] Colvin, 1975: 194-95. The references in the diary leave no doubt as to the authorship of the house as they contain an account of Hooke's visit to Ramsbury in August 1682. The relevant sections have since been published in Henderson, 2007.

[15] Louw discovered documents relating to Sir William Jones and Ramsbury amongst the Townshend papers in Raynham Hall, Norfolk; Louw, 1987: 45-49.

[16] *Diary*: 71.

[17] There is a reference to this sale amongst Sir Harry Verney's papers, published in *HMC, Seventh Report*: 467; see also Louw, 1987: 47. For information on the original Ramsbury Manor (built in the 1560s) before Jones bought the land see *VCH, Wiltshire*, 1983, 12: 20-21. A drawing is also reproduced there showing the original house. Louw found evidence to suggest that Jones originally renovated this existing house before commissioning Hooke to design a completely new building in its place; Hussey, 1961b: 1528; Louw, 1987: 47.

[18] Jones had bought the manor of Sindlesham in Berkshire in 1675; *VCH, Berkshire*, 1924, 3: 253; as well as the Manors of Avington and Anvilles in Berkshire in 1673; *VCH, Berkshire*, 1924, 4: 160.

Ramsbury provided by Louw, must surely relate to the Wiltshire home.[19] Louw points out that Jones took full ownership of Ramsbury in 1681, and a document entitled 'Valluation of the Designe for the new house at Ramsbury' amongst Jones's papers appears to date from this year.[20] It seems plausible that Hooke drew the designs for Ramsbury some time in late 1681 or more likely the first half of 1682, but with so many gaps in his diary around that time it is impossible to be sure. What is clear from the diary is that building work had begun on the house when Hooke himself visited, leaving London on 7 August 1682 and returning four days later.[21] Jones had died in May 1682 and the construction of the house was overseen by his son-in-law. It was not finished until 1686 when the final payments to workmen were made.[22] However, most of the fabric must have been complete in 1683 when an inscription was placed to that effect on one of the rainwaterheads.[23]

Despite the definitive nature of Louw's conclusions he acknowledged that no design drawings for Ramsbury were known to exist. However, there is a possibility that a drawing recently acquired by Worcester College, Oxford, may be a preliminary design for the house. The drawing, of a seven-bay house with a cupola, is in Hooke's hand (Fig. 15).[24] Its association with Ramsbury comes from an endorsement on the verso, in a roughly contemporary hand that does not belong to Hooke, reading 'Jones'. The inscription is also in a different ink from the drawing and the possibility that it refers to an incorrect

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[19] Louw, 1987: 47.
[20] Louw, 1987: 47.
[21] Hooke travelled via Maidenhead and spent the night of 7 August 1682 in Reading. It was on this trip that he visited Donnington Castle; Henderson, 2007: 154. See Chapter 1.
[22] The workmen named in accounts for the house include two of Hooke's regular craftsmen, Roger Davies and the carpenter Joseph Avis. Davies and Avis are documented as having been paid by Jones's estate; Louw, 1987: 47.
[23] Louw, 1987: 47.
[24] The slightly haphazard application of a grey wash and the free hand sketching out of the details such as the weather vane are typical of his drawings, as is the extensive marking out of the drawing with compass points. For information on the drawing and Geraghty's original attribution of it to Hooke see Hugh Pagan, 2004: 54-56.

attribution to Inigo Jones should not be dismissed. However, if the drawing was for Sir William Jones it seems more plausible that it was for Ramsbury, given the size of the building depicted, rather than being connected with the designs Hooke made for Jones in 1673. That the draughtsmanship is in a more confident hand than many of Hooke's early drawings also points to a later date. The design does not resemble Ramsbury, which was two bays wider with less ornament, but this need not be a problem. Although its provenance is unknown the drawing's detachment from the Hooke volume in the British Library and its highly finished nature suggest that it was a design that Hooke submitted to a patron who rejected it in favour of a different design.[25] Indeed, the accompanying pencil sketches suggest that Hooke worked through aspects of the design with the patron after first presenting him the drawing. The design that was eventually chosen for Ramsbury was a quintessentially late seventeenth-century country house (Fig. 14). Nine bays wide, brick faced, with a pitched roof, dormer windows and a pediment above the entrance, Ramsbury followed the basic double pile model established after the Restoration by houses such as Roger Pratt's Clarendon House in London (Fig. 16).[26]

Another contact Hooke made through his position as assistant in the City Church Office was the wealthy Devon landowner Sir Walter Yonge.[27] Hooke designed a house for Yonge in 1677, which was begun but not completed. Significantly, he had been first approached about the house by Yonge's friend and fellow Devon landowner John

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[25] The provenance of the volume of Hooke drawings in the Sloane collection of the British Library is also unclear. However, given that the volume contains numerous unconnected architectural drawings by Hooke, as well as a number of drawings not related to architecture, it would seem likely that it originally came from his lodgings in Gresham College rather than from an architectural patron. For evidence that Sloane acquired material directly from Hooke's private collection see Poole, 2006: 379-385.

[26] For discussions of typical contemporary large house designs see Summerson, 1993: 136-141; and Harris, 1985: 15-30.

[27] For Yonge see *ODNB*, 60: 819-820.

Pollexfen.[28] Pollexfen owned a town house next to the church of St Stephen Walbrook in the City, and seems to have represented the parish during a number of dealings with Hooke, who oversaw the rebuilding of the church.[29] Hooke recorded in his diary on 1 July 1673 that he had been 'at Walbrook with Mr. Pollexfen'.[30] The next month Hooke was with 'Dr. Wren at St. Steevens. Mr Pollexfen referd his busnisse'.[31] Pollexfen and Hooke first discussed 'Sir Walter Yonge's House' on 2 February 1677 and Hooke produced drawings which he then discussed with Yonge in person on 10 February 1677.[32] The possibility of making a model of the house was also raised.[33] The building surveyor and frequent Hooke collaborator John Scarborough was also involved at this early stage and he may have visited Devon later in the month.[34] Later in the year, after Yonge and Hooke had exchanged a series of letters, Hooke decided to send two of his workmen – the joiner Roger Davies and the carpenter Roger Bates – to the West Country to inspect the work.[35]

It has been suggested that the house Hooke designed for Yonge was Escot House in Devon, which was owned by Yonge and subsequently illustrated in *Vitruvius Britannicus*.[36] However, in 1998 Bridget Clarke found conclusive evidence that the carpenter and friend

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[28] For Pollexfen see *ODNB*, 44: 766.
[29] Pollexfen had lent the parish £50 towards the rebuilding; Cherry, 1988: 111. Coincidently, John Pollexfen's house in Walbrook is the best documented smaller London house from the period and is the subject of a detailed study by Cherry; Cherry, 1993: 89-106.
[30] *Diary*: 49.
[31] *Diary*: 56.
[32] *Diary*: 272, 273.
[33] On 14 February 1677 Hooke met Yonge in the Vulture Tavern on Cornhill where they 'Discoursed of module'; *Diary*: 274.
[34] Batten, 1936-1937: 109. Yonge wrote Hooke a letter 'about Scarborough' which the architect received on 19 March 1677; *Diary*: 280. Hooke records that Scarborough was in London on 16 February 1677, 25 February 1677, and regularly from 4 March 1677 onwards and it seems unlikely that the surveyor could get to Devon and back in such a short space of time; *Diary*: 274-277.
[35] *Diary*: 315; see below.
[36] Cherry, 1988: 109-112. In the same article Cherry also attributes Pollexfen's country house in Wembury, Devon to Hooke on the grounds that it was extremely similar to Escot stylistically.

of John Locke's, William Taylor, designed Escot for Yonge in the 1680s.[37] As Clarke observes, Yonge only bought the land at Escot in 1680, thus proving that Hooke's 1677 designs were not related to this later house.[38] The location of the house that Hooke designed for Yonge is difficult to establish. The eighteenth-century Devon historian Richard Polwhele, making use of the testimony of Yonge's grandson, claimed that prior to 1680 Yonge's recently deceased father had been overseeing construction on a house at Mohuns Ottery in the nearby parish of Luppit.[39] However, Hooke's diary makes reference exclusively to Sir Walter Yonge and contains no mention of his father or the house at Mohuns Ottery.[40] Yonge owned land at Colyton, which was very close to Escot, and it remains a possibility that the 1677 house was to be located here.[41] However, the fact that Yonge saw the need to build the nearby Escot five years later suggests that Hooke's designs were probably not finished.

Thus far we have seen that Hooke's employment in the City could furnish him with domestic architectural commissions. It led to encounters with City merchants and officials with the money and inclination to build medium to large-scale houses. In the case of Sir Walter Yonge it provided contact with an affluent country landowner. These commissions suggest that Hooke's employment in the City was another factor in the recognition of his abilities as an architect. Indeed, as Chapter 3 will show, the City required their surveyors to be well versed in architectural design. But ultimately, whilst his City employment required Hooke to possess and implement architectural knowledge, it did not provide him with it. As

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[37] Clarke, 1998: 5-8; see also Colvin, 2008: 1030-1031.
[38] Clarke, 1998: 5. Polwhele provides a transcription of the deeds of the sale of Escot to Yonge by Elizabeth and Margaret Alford on 10 March 1680; Polwhele, 1797-1806: 271.
[39] Polwhele, 1797-1806: 271.
[40] This is hardly surprising as Yonge's father had died in 1670; *ODNB*, 60: 819.
[41] *ODNB*, 60: 820.

Chapter 1 demonstrated, Hooke's credibility as an architect came from knowledge acquired during his education and employment at Gresham College and the Royal Society.

ROYAL SOCIETY CONTACTS

Michael Hunter's meticulous studies of the social construction of the early Royal Society have revealed that, contrary to Thomas Sprat's assertion that it was open to men of all backgrounds, the Society was primarily made up of wealthy landowners.[42] It was through this extended social network that Hooke, the Society's curator, met a large number of his architectural patrons. For example, one of Hooke's earliest clients was Sir Henry Slingsby, a founding member of the Society and a close friend of Evelyn's. Slingsby had been appointed Master of the Mint in 1662 and was extremely wealthy. In 1670 he had acquired, through marriage, a large plot of land at Borough Green in Cambridgeshire.[43] He soon made plans to build a new house and Evelyn rode with him to Borough Green in 1670 to determine the site.[44] It could well have been Evelyn who suggested to Slingsby that he engage Hooke to produce the design for the house, which the architect subsequently did on 21 September 1673.[45] Hooke gave Slingsby the draught the next day but makes no reference in his diary to the project following this. The explanation is clear. In 1677

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[42] Hunter observes that the Society's early membership was overwhelmingly dominated by the professional and landed classes and that it was closely connected with the court at Whitehall; Hunter, 1981: 70-71; see also Hunter, 1994: 25-34. Even Sprat conceded that 'the farr greater Number are Gentlemen, free and unconfin'd'; Sprat, 1667: 67.

[43] *ODNB*, 50: 940-941. A small study of Borough Green, compiled in the 1930s, overlooks Hooke's involvement in the project, as does Downes when he discusses the project with regards to Evelyn's involvement; Palmer, 1939: 29; Downes, 1968: 35.

[44] 19 July 1670; Evelyn, 1955, 3: 553. Evelyn and Slingsby concluded that a 'spot of rising ground adorn'd with venerable woods, a dry and sweete prospect East and West, and fit for a parke' was the best location for the new building.

[45] Given that Evelyn actively promoted Hooke's architectural services a few years later this seems the most likely situation (see below).

Slingsby fell from grace, accused of embezzlement at the Mint, and it was revealed during the inquest that he had inherited considerable debts when he acquired Borough Green.[46] Thus the new house was never built. Nonetheless, the Borough Green project is interesting as Evelyn's description of the Borough Green land and Slingsby's perceived wealth at the time suggests that the house was to have been a considerable size. It probably therefore presented Hooke with his first opportunity to develop ideas on a large scale in his domestic architecture. Borough Green also demonstrates that opportunities for building houses could come from the social milieu of the Royal Society. Evelyn's involvement in the Borough Green project further strengthens the case for the Society's role in the commission.

Evelyn also facilitated work for Hooke in 1676. His friend Margaret Godolphin and her husband Sidney had obtained a warrant to renovate their house in Whitehall, or as Evelyn described it 'rather an apartment which had all the conveniences of an house'.[47] On 15 July 1676 Hooke, 'with Mr. Evelin', 'viewd Lodging and advisd' and he returned to the property a number of times the following week with the carpenter Matthew Bates, who presumably had the contract for the work.[48] As discussed in the first chapter, it was in connection with this project that Evelyn wrote his defence of the Royal Society, after Godolphin had expressed doubts about Hooke following the publication of Shadwell's satire on the group, *The Virtuoso*.

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[46] Palmer, 1939: 29.

[47] *Diary*: 242. Evelyn, 1955, 4: 98. See Harris, 2002: 257. Harris presupposes that Hooke received this work through Wren, who as Royal Surveyor was required to approve any work to houses in Whitehall. This would not have been the case as Hooke did not occupy a formal position within the Office of Works and the project would not have fallen under the remit of the City Church Office. Instead, Hooke's diary makes it clear that he had been approached informally by Evelyn to supervise the repairs,

[48] Hooke records meeting Evelyn and Bates in Whitehall on 18 July 1676 and again on 20 July when they 'agreed the matter'; *Diary*: 243. The last reference to the work comes in 27 July 1676 when Hooke, Evelyn and Bates again met on site; *Diary*: 244.

An equally important figure in Hooke's domestic architectural career was his long-term friend Robert Boyle, whose aristocratic background gave Hooke access to wealthy landowners amongst Boyle's family friends. Boyle was present, for example, at a number of meetings in 1676 between his cousin Lady Burlington and Hooke about the gardens at Londesborough House in East Yorkshire (Fig. 17).[49] A large house of the 1580s already stood on the site, which lies in the Yorkshire Wolds, east of Beverley, and Hooke was initially approached to design the garden layout only.[50] In August 1676 he gave Lady Burlington 'directions about Garden in Yorkshire' and two months later he received ten guineas for the designs.[51] Hooke then met with a Mr Mann of York, whom he would meet a number of times in the following months to discuss the project.[52] The estate accounts from the period feature a number of receipts from Lord Burlington made to Mann 'upon his account for my building at Londesburgh' and other receipts for building work are signed by him.[53] This evidence suggests that he was acting as the chief contractor, overseeing the various building projects on the estate and following Hooke's instructions from London.

By November 1676 Hooke had finalised the design that was built the following year.[54] Regular payments were recorded in the estate accounts throughout 1677, including a payment 'for the Leveling of the Great walke up to the house'.[55] Londesborough probably represented Hooke's first attempt at garden design, and it is interesting to note that he was

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[49] *Diary*: 247-253. For information on Lady Burlington and her husband, the first Earl of Burlington, see Barnard, 1995: 167-201.
[50] For general information on Londesborough, see Neave, 1980: 70. Neave's primary concern is the alterations to the garden made by the third Earl of Burlington in the 1730s. However, he includes a summary of Hooke's involvement with the house and gardens in the 1670s.
[51] *Diary*: 247, 252.
[52] Thomas Mann was a local architect who was paid to oversee rebuilding work on the iron cross that once stood on Pavement in York. Mann was also a keen amateur mathematician and was on the periphery of Royal Society circles in the 1670s; see Malden, 1985: 43-59; and the relevant entry in Linstrum, 1978: 381.
[53] Chatsworth, Box P; Chatsworth, Box S (ii).
[54] *Diary*: 254, 260
[55] Chatsworth, 287.

apparently seen as someone who could quickly adapt his knowledge to other forms of design.[56] Londesborough is a difficult site, with the house sitting in a depression in the land surrounded by the landscape of the Yorkshire Wolds. It would have been some feat to arrange a formal garden on such terrain without having visited the site, yet Hooke's apparent lack of experience in garden designing does not seem to have counted against him. Lady Burlington met with Hooke in December and told him that 'she was much pleased with diagonal descents', perhaps a reference to the sloping at the east end of the terrace walks that are visible in engravings of the garden and which survive today (Fig. 17).[57]

It seems that Hooke was then approached to design the two wings either side of the older house that were added in around 1680, along with various outbuildings. In early 1677 Lady Burlington approached Hooke 'about the front of her house', which is probably a reference to the extensions to Londesborough, but she does not appear in his diary again until March 1678, a year later.[58] Surviving images of Londesborough, including a topographical view by Kip and Knyff, show that the south-facing extension clearly had a large door in the middle of its façade, suggesting that this was the new entrance to the house (Fig. 17). The reference in Hooke's diary to the 'front' of the house would suggest that he was responsible for the design of the extensions. Hooke also produced designs for 'Porters Lodges': possibly the two blocks containing offices and stables at the north entrance to the park, visible in Kip and Knyff's engraving (Fig. 17) and partially surviving today. The estate accounts refer to these blocks as lodges in 1679 when final payments

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[56] Hooke seems to have designed the gardens at Montagu House, of which no image survives. However, according to Hooke there was to be a 'semicircular higher tarris and fountaine with semicircular steps'; *Diary*: 226. He also designed a garden in Bloomsbury for Lady Harvey which he 'set out' on 13 June 1677; *Diary*: 295. These are the only other recorded examples of Hooke's employment as a garden designer.

[57] *Diary*: 260.

[58] *Diary*: 277.

were made 'upon the Artikals for the building up of the Porter Lodg'.[59] The almshouses that Burlington built in the village of Londesborough have also been attributed to Hooke.[60] They can be seen in the lower left hand corner of the Kip and Knyff image and survive today, albeit in an altered form (Fig. 17). However, the estate accounts show that brickwork and carpentry had commenced on the almshouses by June 1677 and Hooke does not mention them in his diary; hence his authorship seems unlikely.[61]

Boyle also solicited Hooke's help in 1677 on the designs for his sister's house in Chiswick.[62] On 20 January 1677 Hooke went 'to Mr Boyle he commissioned me to treat about the house' and two months later: 'to Mr Boyle and Lady Ranelaugh about building the back part of her house'.[63] The house in question was Chiswick House, which the Ranelaughs acquired in 1676.[64] Hooke records accompanying with Lady Ranelaugh 'to chesswick... Directed kitchen, Great stairs, railes, Gates, floors, doors &c.'[65] Kip and Knyff's image of Chiswick in 1698 shows that there had been late seventeenth-century additions, in the form of pedimented gables to the back of the original Jacobean house, and it seems likely that these were Hooke's work (Fig. 18). The roughly contemporary stable block was, it seems, added by Burlington, who became the owner of the house in 1682.[66] Lady Ranelaugh's husband, Sir Richard Jones, also employed Hooke in 1677 to oversee the sale and completion of a house in St James Square. Jones, who was also a member of the

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[59] Chatsworth, 287.
[60] Neave, 1980: 70.
[61] Chatsworth, Box I(v), 6.
[62] For information on Chiswick House in the 1670s see Harris, 1994: 52; although the Ranelaughs' occupancy and Hooke's involvement in the house are both absent from his account.
[63] 17 March 1677; *Diary*: 279. 19 March 1677; *Diary*: 280.
[64] Richard Hewlings informs me that the only evidence for the Ranelaughs' residency at Chiswick, beyond Hooke's diary, is the appearance of name Ranelaugh in a list of churchwardens' rates and accounts for the nearby St. Nicholas' parish church. Here Lady Ranelaugh's husband is named as the inhabitant of Chiswick from this date until March 1681.
[65] 16 May 1677; *Diary*: 290.
[66] Harris, 1994: 52.

Royal Society, was in negotiations with a speculative builder called John Angier over 7 St James Square.[67] However, these negotiations had stalled with neither side being able to agree on a price for the lease of the house.[68] Hooke had been involved with the building of the house next door and it seems he was asked to step in and 'treat with Angier about his house and to know his demands'.[69] This he did, and on 5 November 1677 he went 'To Lord Ranalaugh agreed with Angier for his house for £1000 now, 1 £1600 at 6 months, £500 at 6, £500 at 6 £500 at 6'; Hooke also took charge of completing the house and oversaw the building of a staircase.[70] During the mid 1670s, therefore, Hooke was involved with at least three separate architectural projects for Boyle's family and at one stage the possibility of his designing a house for Boyle himself was discussed. Hooke records in his diary in November 1676 that he had 'Promisd to designe him [Boyle] a house'.[71]

Boyle's role in Hooke's architectural career has until now been overlooked. In fact, one could read Boyle and his family's architectural patronage of Hooke within a general picture of servitude to Boyle on Hooke's part throughout his life. The nature of Hooke and Boyle's relationship formed an important component of the debate between Shapin and Feingold discussed in Chapter 1 and it requires further consideration here. Shapin proposes that the servile position Hooke held under Boyle at Oxford 'continued intact' in their subsequent London-based acquaintanceship.[72] This took the form of a continuing and

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[67] Angier was a carpenter who had worked at Whitehall Palace and Somerset House for the Office of Works; *HKW*, 5: 255, 270. For speculative building in London at the end of the seventeenth century see Summerson, 2003: 21-35; and McKeller, 1999: 38-56.

[68] Hooke recorded in his diary Angier's stubbornness over the price of the lease adding that Angier had 'brake off and would doe noe more, but what he had given in his bill'; *Diary*: 324.

[69] *Diary*: 279.

[70] *Diary*: 326.

[71] *Diary*: 257. Boyle lived in Lady Ranelaugh's other house on Pall Mall where Hooke oversaw the furnishing of a laboratory in 1676; see Shapin, 1988: 380.

[72] Shapin, 1989a: 264. Hooke's status as Boyle's employee is also discussed in Bennett, 1980: 34.

informal patronage within which, perhaps, we can locate Boyle's encouragement of Hooke as a domestic architect throughout the 1670s. Once again however Feingold resolutely denies Shapin's conclusions. He claims that there was nothing in the historical record to suggest Hooke's servility to Boyle either at Oxford or beyond.[73] Certainly there are problems with reading Hooke's relationship with Boyle in this way during the period covered by his diary.[74] That Hooke held Boyle in nothing but the highest esteem throughout 1670s is apparent from the diary, but to develop this from a position based on respect to one founded on obedience is to overstate the case. The considerable body of evidence suggesting that Boyle persuaded various members of his family and friends to engage Hooke in an architectural capacity on their property does not necessarily suggest a relationship of servility. Instead, Boyle's promotion of Hooke as an architect should be evaluated in light of their mutual interest in architecture. As discussed in Chapter 1, Boyle sometimes lent Hooke architectural publications. He was involved in Hooke's ongoing quest to acquire architectural knowledge and was therefore aware of Hooke's credentials as an architect. Boyle knew that Hooke possessed a significant amount of architectural knowledge and was thus able to trust him to provide appropriate designs for his family's

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[73] Feingold, 2006: 203-207. Feingold suggests that Hooke's employment with Boyle was that of a junior scholar to a senior one. It is, however, a bold claim to read the 'thanks' the Royal Society gave to Boyle for 'dispensing with him [Hooke] for their use' upon Hooke's appointment as curator of the Society, as not denoting a position of servility on Hooke's part to Boyle prior to this appointment. Did such a loose and informal structure exist in the contemporary academic and scientific workplace to allow for Feingold's reading of Hooke and Boyle's relationship at Oxford as being one of informality whereby Hooke assisted Boyle with experiments as an equal with no financial reimbursement? Hooke did need to take out employment to facilitate his study at Oxford, and John Aubrey claimed that his initial position as a chorister at Christ Church gave him 'a pretty good maintenance'; Aubrey, 1898: 410. It is easier to visualise a model in which Hooke was employed by Boyle at Oxford (in a cordial but the nonetheless servile capacity) but then upon his appointment as curator of the Royal Society, and subsequently as Gresham Professor of Geometry, entered into a non-servile relationship with Boyle and the wider contemporary scientific establishment. Certainly the career of Henry Hunt is analogous with such a reading. Hunt was firstly a technician employed by Hooke, but upon his appointment to the curatorship of the Royal Society became a person of substantial means; Shapin, 1989a: 268.

[74] Feingold questions the importance placed on Hooke's observance of personal titles in his diary in Shapin's account. He also questions Shapin's claim that Boyle's sustained absence from Hooke's lodgings in Gresham College is suggestive of servility on Hooke's part; Feingold, 2006: 205. See Chapter 3 for a discussion of Wren's place in this debate.

homes. Therefore Boyle's facilitation of Hooke's domestic commissions should be viewed in the same way as the promotion of Hooke's architectural services by other Royal Society figures, such as Evelyn. It does not suggest a relationship of servility and further problematises any notion of obedience on Hooke's part to Boyle in general. Hooke's status as both a gentleman scientific practitioner and an *Architectus Ingenio* was secure by the 1670s and Boyle's support of his architectural career reflects this position.

Furthermore, Boyle's influence went beyond setting up contacts with his own family. It was the Boyles who introduced Hooke to Edward Conway, Earl of Conway, the owner of Ragley Hall in Warwickshire. Many of Hooke's earliest meetings with Conway, who was also a member of the Royal Society, took place at the home of Lady Ranelaugh, including the first time that he heard that Conway desired his assistance.[75] Ragley was extensively altered in the later half of the eighteenth century, first by Gibbs in 1750 and then by Wyatt in 1780 although a topographical view of the house from the 1690s survives (Fig. 5).[76] A large 15 bay house, Ragley's chief characteristics can be seen in the plan of the building produced by Gibbs in 1750 before his re-ordering of the interior (Fig. 19).[77] The corner pavilions and its deep entrance hall – both characteristics of large French houses in the period – were unprecedented in England at the time and still striking today despite subsequent alterations and redecoration.[78] With such continental features, Ragley is evidently the product of an architect with a knowledge of contemporary European design. As discussed in the preceding chapter, Hooke had access to such information. His full

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[75] *ODNB*, 13: 45-46. *Diary*: 343, 344. The editors of the 1935 edition of Hooke's diary made a mistake in transcribing the entry for 12 January 1678. It should read 'Lord Coway desird me to look on his module' rather than 'Lord Cowan desird me to look on his module'. This confirms it is related to Ragley.
[76] Oswald, 1958b: 1006-1009.
[77] The Gibbs drawing survives in the British Library and is reproduced in Oswald, 1958b: figure 8.
[78] For French influence on Ragley see Girouard, 1978: 126-136. For French planning in English houses in general in this period see Jackson-Stops, 1970: 261-266; and Jackson-Stops, 1992: 56-65.

authorship of Ragley is however debated. In 1979 Peter Leach suggested that Hooke only acted in an advisory capacity on Conway's house and that the fundamentals of the design lay in the hands of a Warwickshire carpenter named William Hurlburt.[79] Leach's argument rests on the fact that in January 1678 Hooke was approached by Conway, through Lord Ranalaugh, to 'look on his module' and presumably make suggestions.[80] At this stage Hooke seemed to be acting in the role of advisor only, for he received a drawing from Conway in February and gave it back days later.[81] There is no reason to doubt that this early design was by Hurlbert. Leach makes a convincing case for the carpenter's involvement in the project, at the very least in the role of a contractor on site.

Hooke's dealings with Ragley and its patron did not end in early 1679 however. On 5 July 1679 Hooke met with Conway and once again the two discussed designs for the house. Hooke's diary entries do not make it clear whether the drawings in question were produced by him or Hurlbert, although he received the considerable sum of ten gold guineas for his troubles.[82] This large payment seems too much for advice alone and it is likely that Hooke was already altering Hurlburt's designs, and coming up with his own, at this early stage. Following these meetings, Hooke wrote to Conway, expressing his reservations about the present state of the design.[83] The letter, dated 15 November 1679, reveals that Hooke had doubts about the arrangement of the entrance steps leading up to the

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[79] Leach, 1979: 267; Colvin, 2008: 549. Hurlburt designed a stable block for Conway at Portmore in Ireland see Colvin, 2008: 549; and Loeber, 1981: 60-61. In 1982 Colvin attributed Tredegar House in Monmouthshire to Hurlburt on the basis of a stylistic similarity to Ragley; Colvin, 1982: 6-7. If, as I will argue, Ragley was extensively redesigned by Hooke in the early 1680s one could just as easily name Hooke as the architect of Tredegar. With no documentary evidence either from Hooke's diary or elsewhere it is impossible to pursue such a claim.

[80] *Diary*: 340.

[81] *Diary*: 343, 344.

[82] *Diary*: 416. Iliffe, 1995: 296.

[83] The letter – along with two others relating to Ragley – survives in the Public Record Office and is transcribed and published in Batten, 1936-1937: 99-100.

house, which he proposed to replace with an entrance at basement level.[84] Crucially, Hooke reveals in this letter that building work had not yet begun and that he had it in mind to 'consider afresh the whole Designe, and to vary the module itself'.[85] In 1680 he visited the site, via a brief stay in Oxford to view the Sheldonian Theatre.[86] The trip to the country demonstrates how important Ragley was to Hooke, for few of his country houses outside of London required his personal supervision.[87] He recorded the details of the trip in his diary and the relevant entries speak of his resolve to finalise the design of the house once and for all. He also tried to bring allies in the form of Davies and Bates, neither of whom made it to Ragley. Davies was 'seized with ague' on the way while Bates 'laggd and [had] not followed directions' only to turn up 'Rattled' in London two weeks after Hooke's return.[88] Alone, Hooke arrived at Ragley on 23 June 1680 and the next day set about viewing 'the country round'.[89] Lord Conway returned on 25 June and introduced Hooke to his household, including William Hurlburt. The following day Hooke viewed the model and 'shewd many faults, made a great many alterations'.[90] He also viewed 'the situation and ground about': a reference that suggests building work had not yet begun. He returned home thirty guineas richer and having 'spent most of my time in considering all matters'.[91]

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[84] Both Hooke's preliminary drawing (see below) and the executed building had entrance stairs to the piano nobile, suggesting that Conway ultimately did not accept this suggestion or that Hooke changed his mind later in the design process.

[85] Batten, 1936-1937: 100.

[86] *Diary*: 446-447; see Chapter 1. For Hooke's visit to Ragley see Espinasse, 1956: 101-102; and Inwood, 2002: 303-305.

[87] *Diary*: 446. From what evidence exists it seems that Hooke made only two other visits outside of London to view country houses built to his designs; Ramsbury Manor in Wiltshire in August 1682 and Shenfield Place in Essex in 1689 where he designed a small house for a 'Mr Vaughan'; Hooke, 1935b: 126. Shenfield Place survives today, although is extensively altered; Royal Commission on Historical Monuments, 1921, 2: 214.

[88] *Diary*: 446, 447, 449.

[89] *Diary*: 447.

[90] *Diary*: 447. For the Ragley model see Iliffe, 296: 296-297.

[91] *Diary*: 447.

It is clear from these diary entries and those that follow that Hooke made significant alterations to the design of the house and submitted a number of drawings, as he had suggested he would do the preceding year.[92] On 5 July he 'contrived house for Lord Conway' and three days later 'Wrote letter and sent Draughts' to Ragley.[93] Conway replied on 16 July 1680, and on 20 July Hooke 'Wrote and sent letter and Designe of 3 floors to Lord Conway'. Happily this letter survives and it reveals that Conway's reply to Hooke outlined a number of doubts that the patron had with Hooke's revised scheme. These included the cost of the works, which Hooke assures him would 'not be £100 difference [...] at most between the way of the module and this propounded by me'. Hooke also gives his reasons for altering the design of the entrance hall to allow for more light and to distance it from the service areas.[94] As the hall, as built, was large, rose to two stories high, and was not 'open to the passages of Stairs Parlor etc.', it seems that Conway followed Hooke's advice in this case. Hooke also claims that the entrance hall proposed in the model was 'covered by a half pace' or step, again not present in the final design for the house.

Crucially this letter suggests that the corner pavilions, such an important feature of the final design, were Hooke's idea.[95] He informs Conway that his alterations to the design would result in '8 great apartments all of convenient access' and seems to have felt that ten apartments may have been possible:

> every of which have free access to the great staircase, hall chapel, Library Great parlor Little parlor entrance etc without at all intermingling or running through one another and yet in the 2nd story you may goe round the house through each of them.[96]

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[92] In the letter dated 15 November 1679, see above.
[93] *Diary*: 448.
[94] Batten, 1936-1937: 100.
[95] Colvin claims that the letters suggest Hurlburt was responsible for the corner pavilions; Colvin, 2008: 549. For the significance of the pavilions in the history of country house design see Girouard, 1978: 135-136.
[96] Batten, 1936-1937: 102.

This arrangement would not have been possible without the use of the corner pavilions, which indeed created eight small apartments – four on the ground floor, four on the first floor – as can be seen on the 1750 plan of the house (Fig. 19). Corner pavilions also feature in the preliminary drawing for Ragley that survives amongst Hooke's papers in the British Library (Fig. 20).[97] This drawing is in Hooke's hand and is very close to the house as built, with the corner pavilions, three floors, plus an attic; the dimensions of the house depicted also match Ragley exactly.[98] It seems likely that it was produced around the same time as the 20 July letter, given the presence of the pavilions. Hooke's final letter to Conway, sent on 17 August 1680, reads as if Conway had accepted the advice set out in Hooke's previous letter. In it Hooke suggested that he alter the model itself to make his new designs easier to follow.[99]

To conclude, it seems that Hooke made significant alterations to the design of Ragley, and that much of the house as built can be attributed to him. However, Leach is right to point out that the picture is complicated, and some elements of Hurlburt's original scheme probably did survive in the final design. But to suggest, as Leach does, that 'there is no reason to suppose that Hooke had anything to do with the Ragley pavilions' is to ignore the evidence of Hooke's second letter to Conway.[100] These features, at the very least, came from the mind of Hooke rather than Hurlburt. Ragley was a major commission for a large

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[97] The drawing is amongst Hooke's papers in the B.L. Sloane, 5238, 60. It is published in *WS*, 5: plate xxviii.
[98] The drawing has Hooke's characteristically haphazard application of grey wash and free hand detail. The scale bar is also figured in his handwriting. It was Leach who first suggested the drawing was for Ragley; Leach, 1979: 265.
[99] Batten, 1936-1937: 103.
[100] Leach, 1979: 267. While it seems that Hooke's advice over the arrangement of the entrance stairs leading up to the house was not followed, Leach's supposition that most of Hooke's suggestions were not adopted appears incongruous after a close analysis of Hooke's letters to Conway in conjunction with an examination of the final design for the house.

house and it is indicative of the contacts Hooke could make through the Royal Society, with Boyle as the conduit in this case. The alterations made to the Ragley model represent some of Hooke's bolder forays into domestic architectural design. With its corner pavilions, Ragley seems to have been inspired by Hooke's considerable collection of French architectural treatises.[101] As Girouard shows, the plan of Ragley is similar to that of the French château Vaux-le-Vicomte (1657-1661), engravings of which were common in England in the 1670s.[102] On this design therefore Hooke was able to deploy his architectural knowledge to a specific design, despite the presence of Hurlburt.

Hooke's other major domestic commission, Montagu House was also unique in England at the time, resembling a French *hôtel* rather than the typical English aristocratic town house of the period (Fig. 3).[103] The patron was Ralph Montagu, later the first Duke of Montagu and the English ambassador to Paris throughout the 1670s.[104] Significantly, the commission for Montagu House also came from within the Royal Society, albeit from an unlikely source. On 31 July 1674, in the first diary reference relating to Montagu House, Hooke mentions that he had seen the first Astronomer Royal John Flamstead who 'spoke

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[101] For attempts to find direct source material for Ragley, see Girouard, 1978: 135-136; and Stoesser-Johnston, 1997: 60-62.

[102] Girouard, 1978: 126, 135-136. The plan of Vaux-le-Vicomte was illustrated in Jean Marot's *L'Architecture Française* (1670), which Hooke owned, see Stoessar, 2006: 175.

[103] There is surprisingly little recent literature on Montagu House, despite its size and its importance in Hooke's career. Apart from brief discussions of the building in Hooke biographies and general architectural histories of the period, there is a 2006 article concentrating on the house by Stoesser, and some research by Tessa Murdoch, as part of her work on Montagu's other house Boughton, in Northamptonshire; Murdoch, 1992: 33-34. It has been suggested that Hooke was the architect of Boughton (designed in 1686) on account of the presence of Roger Davies's name in the accounts for the building work, not to mention Hooke and Montagu's previous acquaintance; Worsley, 2004a: 13-14. However the date of the design places it outside the period covered by Hooke's diary, and there is no other evidence for the attribution. Montagu House would become the home of the first British museum in 1753 and as a result there is some discussion of the building in histories of the museum, see Mordaunt Crook, 1972: 54-61.

[104] For biographical information about Montagu see *ODNB*, 38: 760-763. There is also a short biography of him: Metzger, 1987.

about R Montacues House'[105] He then met with Montagu for the first time the next month and began to produce designs for the house. Why it was Flamstead that first approached Hooke is unclear as no evidence survives of a connection between Flamstead and Montagu. Perhaps it is indicative of the social networks that existed in and around the Royal Society that a man with a relatively humble background such as Flamstead could be so well connected.[106]

The original Montagu House, built to Hooke's designs between 1674 and 1680, is not an easy building to study. Although the evidence for Hooke's authorship of the original house is beyond doubt - references to Montagu House in his diary are extremely regular throughout this period and include entries wherein Hooke recorded designing both the interior and exterior - confusion surrounds the supposed rebuilding of the house following a fire in 1686.[107] As the only reliable images that survive of Montagu's Bloomsbury mansion date from after this rebuilding, it is vital to establish the details of the fire and the nature of the subsequent building work. In fact, as the following discussion will demonstrate, the importance of the fire has been overstated and Hooke's authorship of the design shown in post-fire images of the house can be secured. This is significant as architectural historians have until now had to rely on an inaccurate depiction in William Morgan's 1682 map of the city to analyse the pre-fire design of the house (Fig. 21).[108]

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[105] *Diary*: 115. Hooke had been at Westminster school at the same time as Montagu in the late 1640s, but there is no evidence of them knowing each other. *ODNB*, 38: 760. Indeed, Hooke's diary entries that detail his initial meetings with Montagu suggest that the two had never met.

[106] For Flamsteed's background see the relevant article by Bennett in Willmoth, 1997: 17-30.

[107] A chronology of the designing and building of the house, taken from the relevant entries in Hooke's diary, can be found in Batten, 1936-1937: 93-96. Further discussion of the building and designing of the house can be found in Pearce, 1986: 114-116. Additionally, I discuss many of these references below.

[108] Downes and Stossar both suggest that the Morgan image of Montagu House is an accurate pre-fire depiction of the building; Stossar, 2006: 168; Downes, 1966: 58. Although this does depict the house before the 1686 fire its accuracy can be questioned. Most architectural drawings in the map are far from realistic (for

The fire broke out on the night of 19 January 1686, during a period when Montagu had leased the house to the Earl of Devonshire while in France.[109] According to the parliamentary chronicler Narcissus Luttrell, the rebuilding work commenced on the house in March the following year.[110] Hooke's diary does not cover these years and as yet no other documentary evidence has been found to suggest he was involved in the post-fire rebuilding. To make matters worse, Colen Campbell, in the first volume of *Vitruvius Britannicus*, names the architect of Montagu House not as Hooke but as a little known Frenchman called 'Pouget'. While Campbell's engraving depicts the post-1687 house, his accompanying text claims that 'the architecture' of the house built during the 1670s was 'conducted by Monsieur Pouget'.[111] This confusing – not to mention factually incorrect – reference has been taken to mean that Pouget designed and oversaw the rebuilding in 1687. It has also been suggested that Pouget was brought over to England by Montagu to oversee this rebuilding work.[112] Despite the best efforts of Colvin and Murdoch, the identity and position of Pouget remain a mystery, as does the extent to which the rebuilt house can be attributed to him.[113]

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example, the map's depictions of Bethlem Hospital, the Royal Exchange and nearby Southampton House are all approximations of the buildings' designs), and the image of the house makes it look bizarrely tall. It is, one suspects, an approximation of the mansion. As discussed below, an image of the garden front survives which seems to pre-date the fire. From this image it would seem that Morgan's depiction of the pre-fire house is indeed inaccurate.

[109] This information comes from John Bramston's autobiography; Bramston, 1845: 220.

[110] On 20 March 1687 Luttrell records that 'The Lord Mountague is beginning to rebuild his great house in Bloomsbury, some time since burnt down'; Luttrell, 1857, 1: 397.

[111] Campbell, 1715-25: 4.

[112] Murdoch, 1992: 33.

[113] Colvin, 2008: 826-827; Murdoch, 1992; 33. Stoesser-Johnson (and others) claim that Pouget was the French architect Pierre Puget, but as Stoesser-Johnson admits there is no evidence for Puget ever visiting England let alone overseeing the rebuilding of Montagu House; Stoesser-Johnson, 1997: 59. Additionally, Colvin suggests that he could have been an architect called François Puget from Marseilles (1651-1707), but again there is no evidence of him visiting London; Colvin, 2008: 826.

There are, in fact, conflicting reports of the nature of the 1686 fire that call into question how much rebuilding actually took place. Evelyn records in his diary entry for 19 January 1686 that 'this night, was burnt to the Ground my Lord Montagues Palace in Bloomsberry'.[114] Luttrell adds that the fire 'in a short time consumed the greatest part of that stately fabrick: the losse is computed to be above £60,000'.[115] Another contemporary account puts Montagu's losses at nearer £40,000 besides £6,000 in plate.[116] The only eye-witness account of the event, that of Lady Russell, Montagu's sister in law, who lived in the adjacent Southampton House, is ambiguous. In a letter of 22 January 1686 to her confidant, Dr Fitzwilliam, Lady Russell told of how Montagu House was 'consumed' by five o'clock and at one stage she feared for the safety of her own house.[117] Far more revealing – and hitherto unnoticed by historians – is another letter that Lady Russell wrote to Fitzwilliam just over a year later, in February 1687, a month before rebuilding work on the house began. In this she reports that Montagu's young son was living in Montagu House, inhabitable despite the fire of the year before. The boy, who had been sick some months before, was 'at Montagu House: though now very well he is not suffered to go further than the next room'.[118] As the side wings of the house contained offices and stables, this reference can be taken as evidence that at least some of the main block of the house was standing and inhabitable. This would hardly have been possible if, as Evelyn suggests, the house had been burnt to the ground in January 1686. Perhaps the fire of that year was less devastating than Evelyn reports. Sir John Bramston's account of the fire adds that on the

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[114] Evelyn, 1955, 4: 497.
[115] Lutterell, 1857: 369.
[116] This letter, part of the correspondence of John Ellis, reveals that the fire was started 'by the Steward's airing some hangings &c. in expection of my Lord Montague's return home, and sending afterwards a woman to see that the fire-pans with charcoal were removed, which she told him she had done though she never came there'; Ellis, 1827, 4: 89. Pearce, 1986: 115.
[117] Russell, 1773: 325. Pearce, 1986: 115.
[118] Russell, 1773: 356.

fateful night, Edward Scowen, Montagu's steward 'attended the fier, and, as they sayd, secured it'.[119] Furthermore, evidence from the *London Gazette* suggests that furniture and fittings may have survived the blaze. An advert in the newspaper placed by Scowen on 25 January 1686 offers a reward of £10 for the return of 33 Van Dycks that went missing 'when Montague-house was on Fire'.[120] Scowen also reported that 'there being at the same time lost several other Pictures in Little in water colours, Plate, Rich wearing Apparel, and several pieces of Sattin uncut, and other Goods of all sorts'.[121] Again, a generous reward awaited those who returned the property to Scowen's lodgings across the road from Montagu House. Considerable looting must have been possible on the night of the fire and, judging by Scowen's plea, thieves escaped with a considerable quantity of bounty. Combined, this evidence strongly suggests that the 1686 fire damaged, but did not destroy, the house. The 1687 rebuilding might therefore have taken the form of repair work only.

The likelihood of this being the case is strengthened by a drawing amongst Hooke's papers in the British Library (Fig. 22).[122] The drawing is in Hooke's hand and shows a 17-bay house, astylar except for a pedimented loggia in the middle three bays on the first storey.[123] The drawing is extremely close in design to the courtyard front of the post-1687 Montagu House (Fig. 3). It has the same corner wings, the same square-domed French roof above the central three bays, the same number of storeys, and the same number and rhythm of bays. The pink wash also reveals that it was a design for a house faced with brick, as

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[119] Bramston, 1845: 220. Scowen would be heavily involved in the rebuilding of the house and Hooke' diary contains numerous references to him over the course of the work; see Batten, 1936-1937: 96.
[120] London Gazette, 2107, 25 January 1685 – 28 January 1685.
[121] London Gazette, 2107, 25 January 1685 – 28 January 1685. For Montagu's collection of paintings see Murdoch, 1992: 34-73.
[122] B.L. Sloane, 5238, 56. The drawing is reproduced in Batten, 1936-1937: plate xxxviii(b).
[123] The drawing bears his characteristic shading of windows with grey wash, free hand detailing. Furthermore, the salmon pink wash is consistent with a number of Hooke's drawings, including an elevation of Bethlem Hospital also in the British Library; B.L. Sloane, 5238, 55.

Montagu House itself was. It must have been produced for the Bloomsbury mansion, and its existence points to two possibilities. Firstly, that Hooke himself designed and rebuilt Montagu House in 1687, the drawing being a preliminary design prepared for the rebuilding. The second and more likely scenario, given that the drawing belongs to a collection predominantly made up of Hooke designs from the 1670s, is that the drawing was produced for the first house, built by Hooke in 1674-1680.[124] This would mean that either the house had been burnt to the ground in 1686 and was rebuilt to Hooke's original designs or that it was only damaged in the fire and the subsequent repair work did not fundamentally affect the design. In light of Lady Russell's letter of February 1687 the latter seems more likely. Evidence for this being the most likely occurrence comes in the form of an engraving of the garden front of the house which, Hentie Louw suggests, pre-dates the fire (Fig. 23).[125] As this shows a building identical to that depicted in post-fire images (Fig. 3), it would seem to confirm that the house was repaired in 1687 to the original design.

One can therefore treat the surviving images of Montagu House as a depiction of a house built to Hooke's designs. The possibility of Pouget having any architectural influence on the house can now be confidently discounted. Instead it seems plausible that he was employed to supervise the repairs and the internal redecoration in 1687.[126] The image of Montagu House that appears in so many eighteenth-century prints and drawings can therefore be considered Hooke's design. This is significant as it is one of Hooke's most interesting designs. It will be discussed in detail below as it represents considerable

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[124] The Hooke volume in the British Library contains drawings for architectural projects dating almost exclusively from the late 1660s and 1670s. These include the Somerset House stables, Bethlem Hospital, the College of Physicians, and Ragley Hall.

[125] Louw and Crayford, 1998: 111-112. I am indebted to Hentie Louw for this information.

[126] Colvin, 2008: 286. It is still unclear how much repair work was necessary, although one can establish from images of the post-1687 house that Hooke's innovative sash windows either survived the fire or were replaced like-for-like (Fig. 3); see Louw and Crayford, 1998: 110-112.

evidence of patrons' influence on domestic architectural designs in the period as well as further proof of Hooke's willingness to apply his knowledge of European architecture to a design. However, the significance of Hooke's appointment as the architect of the house must not be ignored. Montagu House was a major commission for one of London's wealthiest individuals. Beyond demonstrating the contacts that the Royal Society could provide Hooke, the acquisition of such an important commission also shows how well regarded he was in the domestic architectural scene.

The commission for Montagu House led to Hooke obtaining further opportunities for domestic architectural employment. It seems from Hooke's diary that it was Montagu who recommended Hooke to the Earl of Oxford, who needed an architect to design his house in the Privy Garden in Whitehall. On 25 March 1676 Montagu 'promised the building for Lord Oxford' and later that month agreed the terms of Hooke's contract on behalf of Oxford who subsequently confirmed he would 'Stand to the bargain made by me and Montacue'.[127] Hooke then discussed the proposed building with Wren, who, strangely, 'seemd displeasd and advised against it'.[128] Yet over the course of the next month Hooke submitted draughts to Oxford and the two agreed the contracts for John Fitch and his workmen.[129] Much of Hooke's contact with Oxford came through 'Madam Kirk', who was either the wife of the housekeeper of Whitehall, George Kirke, or a relation of Oxford's brother-in-law, Percy Kirke.[130] Being in London, Hooke was able to visit the site regularly and he seems to have treated the commission as a high priority, which is unsurprising given

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[127] *Diary*: 222, 223. Espinasse, 1956: 98.
[128] *Diary*: 222. Wren was required, as Royal Surveyor, to approve any development that took place within the confines of Whitehall and, therefore, felt professional overlooked; see *HKW*, 5: 25.
[129] *Diary*: 223, 224.
[130] *SL*, 13: 238. Espinasse, 1956: 98.

the calibre of the patron. It is unfortunate that no image survives of this house, as it was destroyed in 1688.[131] The housing on the Privy Garden was on a small scale and it is unlikely that the project amounted to a major piece of architectural design. The same could be said for a house Hooke designed for another prominent Royal Society member, Sir Robert Southwell.[132] Colvin has discovered documentary evidence to suggest that Hooke was paid by Southwell in relation to a house in Spring Gardens in London in 1684.[133] Again this house was probably a small building, like many of Hooke's London based commissions.

To conclude, it tended to be the social opportunities afforded by the Royal Society that led to Hooke's success as an architect of large residential buildings and he seems to have been reliant on the extended social network of the Royal Society to secure patronage. Again, I want to stress that this should not be viewed as a coincidence. The Society was predominantly composed of wealthy landowners who knew of Hooke's architectural credibility. His patrons saw him occasionally discussing architecture in Royal Society meetings as well as collecting and acquiring architectural knowledge in the more informal spaces of the group. They would also have been aware of the Society's treatment of architecture as an intellectual subject analogous to scientific knowledge. As curator of the Society, Hooke was eminently credible as a producer of architectural knowledge and

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[131] The house was demolished after the King declared that Lord Melfort, the Scottish Secretary, be given permission to build a large house in the Privy Garden on the site of Oxford's house, despite the Earl's protests; *SL*, 13: 240.

[132] Southwell was a diplomat and a friend of Robert Boyle and was an active member of the Society from 1662 onwards; see *ODNB*, 51: 718-721.

[133] There is a reference to a payment of 5 guineas, made to Hooke on 17 June 1685 in Thomas Thorpe's 1837 *Catalogue of Southwell MSS*; Colvin, 2008: 536. As the sum is not large and the house was built by the speculative builder Richard Frith, this suggests that Hooke was employed in an advisory capacity (see below). Southwell also commissioned Hooke to design a series of waterworks, including sluice gates and possibly a mill, in late 1692; 9 December 1692; Hooke, 1935b: 195.

therefore design. Equally, patrons such as Conway and Montagu must have known that Hooke possessed knowledge of contemporary European architectural design which he could, in turn, apply to the design of their houses.

ARCHITECTURAL PRACTICE

Evidence from Hooke's domestic architectural career also sheds light on how architects in the period were expected to behave in relation to their patrons. Hooke's diary provides the most complete account of the day-to-day processes of late seventeenth-century house designing and building. Combined with the chance survival of Hooke's three letters to Lord Conway regarding the design of Ragley, the diary reveals much about relationships between patrons and architects in the period. It also sheds light on the varying levels of control and delegation that an architect would expect to exert over the execution of his designs. From the diary and the letters a picture of Hooke's performance as a domestic architect emerges. It is one that fits a model of practice established in the contemporary discourse on architecture, particularly Pratt's writings relating to domestic architecture. Ultimately, it shows that no matter how knowledgeable Evelyn's *Architectus Ingenio* was, he still had to follow a set of unofficial rules in late seventeenth-century house building. Hooke may have been the paradigmatic architectural agent in the Royal Society, but outside of that world he was no different from any other architect in how he was expected to behave.

Firstly, it is important to stress that a purely design-consultative element was present throughout Hooke's domestic architectural career.[134] For example, on 24 November 1673, when Sir William Jones approached Hooke to show him 'his Survey of Country house', the diary implies that Hooke was being asked for advice on an existing design rather than being commissioned to produce one himself.[135] Likewise, Hooke's involvement with the house for Sidney Godolphin seems to have been on a consultative level only. Evelyn approached him to supervise repair works, and there appears to have been little or no design element to the project.[136] Hooke was also consulted over the construction of smaller housing in the west end of London. The last third of the seventeenth century saw a great explosion in house building west of the City and Hooke was involved in the design of number of speculatively built properties.[137] Much of this work was in an advisory capacity and for a number of houses Hooke was asked to oversee the final completion and sale of the property. As we have seen, he was employed in this role by Sir Richard Jones, Lord Ranelaugh as well as by John Harvey, the treasurer of the household to Queen Catherine of Braganza, for a property in St James Square.[138] This consultancy work eventually led to design work and Harvey employed Hooke to design a house next to the Royal Exchange in the City and seven houses on the Strand, no doubt to be sold speculatively.[139] When it came

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[134] In a 2006 article, Louw observes (independently from my findings) that Hooke and, more conspicuously, Wren occupied roles that were often seen as consultative; Louw, 2006: 183-184.
[135] *Diary*: 71.
[136] As discussed above on 15 July 1676 Hooke recorded in his diary that he had 'advisd' Evelyn about the house; *Diary*: 242.
[137] For the rise of speculative building in London see Summerson, 2003: 21-35; and McKeller, 1999: 38-56.
[138] Hooke recorded in his diary that he had been involved in the negotiation of the sale of the lease of 6 St James Square from the mason – and in this instance speculative builder – Abraham Story to Harvey. On 15 March 1677 Hooke claimed that Harvey had given him 'full power to agree for Storys house to the value of £5150 all things being done' and two days later Hooke had 'Agreed with Story for £5000 for house completed. He would bring me paper with a blank to fill. Met Mr Harvey and told him, he liked it well'; *Diary*: 279-280. The sale was rather protracted in its nature and the diary references relating to the house are too numerous to mention here. See Inwood, 2002: 251.
[139] Hooke oversaw the demolition and rebuilding of Harvey's town house in 1677; *Diary*: 278-357. On 18 September 1677 Hooke recorded that he had 'Made Mr Harveys draught of 7 houses' and later that year

to a house such as Ragley, however, Hooke expected to exert a certain amount of influence over the design itself. Thus when Conway approached him to look over the designs he had obtained from Hurlburt, Hooke quickly informed his client that he wished to make significant alterations to the design.

Leaving aside examples of consultative employment, what were the services that Hooke provided for his clients when it came to designing and building houses? In fact, he carried out a series of operations for his patrons that correspond to those outlined in various writings by Roger Pratt, particularly his 1666 'Rules for the Guidance of Architects'.[140] I am not suggesting here that Hooke directly followed the advice of Pratt and other authors. Instead, I want to identify norms in architectural practice in the period that architects such as Hooke were aware of and seem to have followed. For example, following the initial contact between Hooke and his patrons, he would provide them with a series of drawings and, for larger houses, a wooden model.[141] Pratt also writes that an architect must be able to design 'in regard of the person, time, place, expense or any other circumstances proposed to him' and Hooke seems to have taken the initial process of conceiving a house extremely seriously.[142] Pratt warns that 'to determine anything without due premeditation, is rashness' and that 'to wittingly omit to do that at the first, which at the last we shall be forced to... is the extremity of folly'.[143] Therefore, to prevent the onerous task of re-draughting designs or having to placate an unsatisfied patron after construction had begun, Hooke consulted his

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mentioned that they were being built on the Strand; *Diary*: 313, 331. A drawing in Hooke's hand amongst his papers in the British Museum, depicting a row of terraced houses, could well relate to this project; B.L. Sloane, 5238, 54.

[140] Pratt, 1928: 83-91.

[141] Hooke produced a model for Montagu House in 1674; *Diary*: 128, 134. As discussed above, Hooke was employed in 1679 to make alterations to a model of Ragley Hall. For a brief discussion of Hooke and architectural models see Iliffe, 1995: 292-299.

[142] Pratt, 1928: 83.

[143] Pratt, 1928: 83.

clients extensively on the design of a house. One tactic he employed was to take a patron to view various houses in London to gain an idea of just what it was that they required from their architect. In February 1677, when Hooke was producing the designs for Sir Walter Younge's house, he took his patron on a small tour of the city to see 'Lord Barclays house' in Piccadilly, designed by Hugh May in 1665, and his own Montagu House.[144] Existing houses also served as models for the designer to use to convince an unsure patron. In his letter to Conway of 15 November 1679, Hooke claimed that his arrangement of the stairs leading up to the entrance to the house, 'somew[ha]t of the nature of the Great Stairs at Somerset House', was the best way for Conway to proceed.[145]

Visits to other houses were as much for Hooke's benefit as that of his patrons. When Hooke started to become involved in designing terraced houses in London – rather than just overseeing the administrative aspects of their construction – he spent an afternoon with the mason Abraham Story viewing various properties in St James Square, presumably to familiarise himself with the most recent designs.[146] Here Hooke evidently identified a gap in his architectural knowledge and sought to remedy the situation. It is also another instance of Hooke collecting contemporary, as well as ancient, architectural information. As discussed in Chapter 1, Pratt stipulates that the best architect was someone 'versed in the best authors of Architecture: viz. Palladio, Scamozzi, Serlio': all modern rather than

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[144] *Diary*: 274. For Berkeley House see Colvin, 1995: 647; and Downes, 1966: 6.
[145] Batten, 1936-1937: 100.
[146] *Diary*: 269. The houses they viewed were: 20 St James Square (belonging to Sir Allen Apsley, treasurer of the household to the Duke of York, see *SL*, 24: 164); 6 St James Square (built by Storey and sold to John Harvey in 1677, see above); 4 St James Square (belonging to the speculative builder Nicholas Barbon, see *SL*, 24: 89); St Albans House (also in St James Square belonging Earl of St Albans, the freeholder of the square, see *SL*, 24: 187); and either 15 or 19 St James Square (both belonging to the speculative builder Richard Frith, see *SL*, 24: 142, 161).

ancient writers.[147] When it came to the practice of architectural design, Hooke's collection of contemporary architectural prints and texts was just as valuable as his numerous copies of Vitruvius.[148] Patrons wanted a designer with modern as well as ancient architectural credentials, and the general current of client satisfaction that runs through Hooke's diary is evidence that he was thought of in this way. As we shall see, Montagu House showcased Hooke's knowledge of contemporary architecture, and it is significant that Montagu was so pleased with Hooke's final design that he 'Borrowd it to show Portugall Embassador'.[149] However, not all initial designs were so well received. In 1675 Sir Richard Edgecombe and his wife liked Hooke's first design for their house but wished to 'have it a little altered'; thus Hooke drew up a second draught two days later which was then accepted.[150]

As Hooke's diary reveals, patrons had to be continually consulted with regards to the design of their houses. Although he possessed the correct architectural knowledge, Hooke does not seem to have expected complete freedom in the design process. For example, in the case of larger houses, numerous drawings – of both general layouts and specific details – had to be provided until the patron was content. One of Hooke's letters to Lord Conway reveals that the designs of the layout of a house preceded more detailed drawings of architectural details. The letter is dated 20 July 1680 and, as Hooke's diary

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[147] Pratt, 1928: 60.
[148] See Chapter 1 and Geraghty, 2004: 113.
[149] *Diary*: 149. Espinasse, 1956: 98.
[150] *Diary*: 172. Hooke designed a house for Edgecombe in July 1675. On 27 July 1675 Hooke records that 'Sir R Edgecombe desired designe of house' and he submitted designs late that month; *Diary*: 171-177. The location of the house is unclear. It could have been connected to Edgecombe's existing sixteenth-century country seat Mount Edgecombe in Cornwall as suggested by Espinasse; Espinasse, 1956: 99. Some alterations to the building took place in the late seventeenth century, and it is possibility that these were Hooke's work. However, Hooke's diary entries seem to suggest that the designs were for a house rather than for alterations to an existing building. Therefore, it seems more likely, therefore, that the commission was for a London house. I am indebted to Paul Holden for information regarding Mount Edgecombe.

makes clear, was originally sent with an accompanying drawing.[151] In it Hooke explains his various plans for the layout of the rooms, the length of the hall and the location of a vestibule, adding that he hoped Conway 'will by these Sketches understand the Designe of the whole in generall soe as thereby to see which is consonant or not, with your Lordship's Intentions'.[152] Hooke then admitted that:

> Door windows chimneys ornaments etc. are here omitted, being obvious enough, but when I shall have the Honour to know your Lordship's further pleasure concerning these, either compleat Draughts of every part, or a small module of the whole shall be provided.[153]

Likewise, in the case of Montagu House, Hooke brought the design to Montagu for approval one stage at a time and his diary reveals the extent to which a patron was consulted over a major house such as this. In fact, the house was designed over the course of a year. Hooke first produced a design of the house in September 1674, and left it with Montagu at the end of the month.[154] He then began the process of building a model, but as this was not finished until spring the next year numerous changes to the design were made in the meantime.[155] For example, on 10 December 1674 Montagu 'approved great Rome [Room]' and five days later agreed on an overall design for the model which he 'Orderd all hast to be made'.[156] However, on 5 February 1675 Hooke 'drew draught for Montacue',

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[151] Batten, 1936-1937: 102; on that day Hooke recorded that he 'Wrote and sent letter and Designe of 3 floors to Lord Conway'; *Diary*: 449.
[152] Batten, 1936-1937: 102.
[153] Batten, 1936-1937: 102.
[154] On 24 September 1674 Hooke recorded that he had been 'At Mr. Mountacues. left with him my designe'; *Diary*: 122. As discussed in Chapter 3 it is possible that Hooke paid Edward Pearce to produce presentation drawings of Montagu House around this time.
[155] It was agreed that a model should be made on 17 October 1674 when Hooke recorded that he had been 'At Mr. Montacues [...] agreed module'; *Diary*: 127. It was built by Roger Davis and on 17 March 1675 Hooke noted that 'Davys men brought in Module', suggesting that it was a large object that required a number of people to carry it; *Diary*: 153.
[156] *Diary*: 134, 135.

and later that month 'Drew Mr. Mountacues last designe'.[157] Although this was the design that was shown to the Portuguese ambassador, it was also changed later in the month when Hooke re-designed the front elevation. On 13 March 1675 he 'Completed Mr. Mountacues front', which he approved a few days later.[158] Following this, Hooke set about drawing up the contracts for the workmen and laying the foundations.[159] However, Hooke still continued to finalise the design, and on 20 June 1675 he claimed he had 'finished Montacue draughts'.[160] Even during the building work Hooke continued to consult Montagu and seek his approval for minor changes to the design. Six months after work began Hooke met Montagu and 'discoursed with him about levelling court [and] sinking garden', while on 24 May 1676 the two had 'Much discourse [...] about high roof'.[161] On 24 July 1676 Hooke and Montagu 'Discoursd about Portico and cupelos, agreed about chimney pieces', and the following year Montagu wanted the design changed.[162] On 23 July 1677 he told Hooke that he 'desird his stairs to be on walls', and as a result Hooke 'Drew stair for Mr Montacue' the following month.[163]

Thus the house was a product of slow process of consultation between patron and architect in which Hooke brought designs to Montagu, who subsequently approved them when he was happy, occasionally asking Hooke to re-design specific details. This must have led to Montagu influencing the general layout of the house, even if the specifics of the

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[157] *Diary*: 145. 16 February 1675; *Diary*: 147.
[158] *Diary*: 152. On 16 March 1675 Hooke recorded that he had been 'At Mr. Montacues. Shewd him front of house which he liked'; *Diary*: 153. It is unclear where the preliminary elevation of Montagu House in Hooke's drawing collection in the British library belongs in this chronology.
[159] On 22 March 1675 Montagu agreed a contract for the brickwork with John Fitch; *Diary*: 154. Hooke recorded drawing the contract up on 24 March 1675; *Diary*: 154. On 22 May 1675 Hooke was at the site and 'Measurd out Ground to a square', this suggests he was setting out the foundations of the house and its courtyard; *Diary*: 162. He 'set out' the front of the house on 29 June 1675; *Diary*: 166.
[160] *Diary*: 165.
[161] 17 January 1676; *Diary*: 212. *Diary*: 234.
[162] *Diary*: 244.
[163] *Diary*: 303. 30 August 1677; *Diary*: 309.

design were Hooke's work. The final building was a product of both Hooke's knowledge of contemporary architectural design and the patron's wishes. However, in the case of Montagu House, and probably other houses as well, these two factors complemented each other. The best evidence for this comes in the form of the executed building as Montagu's experiences in Paris left their mark on the plan and general appearance of the house. As Stoesser demonstrates, Montagu House was clearly influenced by contemporary French domestic architecture, in particular images from Jean Marot's 1670 *L'Architecture Française* (known as *Grand Marot*) and *Recueil de Plans, Profils et Elevations du Plusieurs Palais, Chasteaux, Eglises. Sepultures, Grotes et Hostels Bâtis dans Paris* (the *Petit Marot*), produced from 1654 to 1660.[164] However, Stoessar's use of the inaccurate image of the house from William Morgan's map of the city (Fig. 21) leads her to prioritise unconvincing comparisons with contemporary Dutch architecture over any French influence.[165] Now it has been proved that later, more accurate images of the house show Hooke's original design, the argument for these specific sources is no longer sustainable. Instead the strong resemblance between Montagu House and contemporary Parisian town houses needs further examination in light of the amount of consultation Hooke had with his patron. Montagu's influence did not lead in the direction of specific visual sources but instead had a bearing on the general conception of the house.

Montagu had been the English ambassador in Paris in the early 1670s, but his first contact with France came earlier. In 1662 Charles II appointed him as a special envoy to the court of Louis XIV in an attempt to broker a treaty of commerce between England and

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[164] Stoesser, 2006: 168.

[165] Stoesser, 2006: 168-170. In particular Stoesser sees a likeness between the image on the Morgan map and an unexecuted design for Amsterdam Town Hall by Philips Vingboons.

France.[166] During this visit to Paris he was the guest of Charles's influential sister Henriette Anne, the Duchess of Orleans.[167] She lived, with her husband Philippe, Duke of Orleans and brother to Louis XIV, in the Palais Royal in the centre of Paris; a vast *hôtel* built by Cardinal Richelieu and designed by Jacques Lemercier in 1633 (Fig. 24).[168] As the Duchess's guest, Montagu would also have visited numerous Parisian houses. These included the huge Palais du Luxembourg, designed in 1615 by Salomon de Brosse and by 1662 owned by the Duchess's aunt-in-law, the Duchess of Montpensier (Fig. 25).[169] He would also have seen numerous smaller houses in the French capital including de Brosse's 1613 Hôtel de Bouillon, François Mansart's 1635 Hôtel de la Vrillère (Fig. 26), Louis Le Vau's 1642 Hôtel Tambonneau (Fig. 27).[170] All these houses were characteristic French *hôtels*, arranged around a courtyard, with large screen walls separating them from the street. This format was the primary mode of housing for wealthy Parisians, and there is significant contrast between them and the large houses of London's elite. Such houses were not arranged around courtyards, and were more open to the street, with no imposing screen wall. Typical examples were Pratt's Clarendon House, owned by the Earl of Clarendon (Fig. 16) and Southampton House, the neighbouring property to Montagu House, and home to the Duke of Bedford (Fig. 28).[171]

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[166] Metzger, 1987: 23. *ODNB*, 38: 760.
[167] See Hartmann, 1934: 68, 243; and *ODNB*, 26: 406-408.
[168] See Blunt, 1993: 117.
[169] Coope, 1972: 134; and Blunt, 1993: 101-102.
[170] Blunt, 1993: 119, 124-125, 138.
[171] For Clarendon House see Downes, 1966: 57. For Southampton House see Worsley, 1996: 63-73. As Stoesser highlights, Montagu bought the land for the house from Lady Russell, the daughter-in-law of the Duke of Bedford. The deed of sale states that the Montagu's new house should not exceed the size and grandeur of Southampton house and, as Stoesser shows, Lady Russell's husband was present when Hooke set out the foundations of Montagu House on 21 May 1675 presumably to enforce this rule; Stoesser, 2006: 167.

Montagu would therefore have become familiar with an urban landscape of domestic architecture that was significantly different from London. Evidently this had impressed him. On Montagu's return to Paris as Ambassador Extraordinary, a post to which he was appointed to on 1 January 1669, he notes in a letter to the Earl of Arlington that 'everything' in Paris was 'handsomer but dearer than in England'.[172] Montagu returned to London in May 1672 and remained there for the next four years.[173] He returned to Paris, again as ambassador-extraordinary, in September 1676.[174] His presence in the capital allowed him to exert influence on the design of his house and insure that it was 'handsomer', than its surrounding estates.[175] Indeed, Montagu House closely resembles the sort of Parisian *hôtel* with which Montagu would have been familiar. With its domed roof above the entrance and Mansard roofs atop the corner pavilions either side, in silhouette Montagu House was a clear homage to the Parisian *hôtels* that Montagu had visited in Paris. The detailing of the house followed suit with *oeil-de-boeuf* windows, tall slender chimneys, and brick facing with quoins on the angles (Fig. 3). Evelyn, after visiting Montagu House for the first time, made special mention in his diary of 'the French manner' in which the house was built.[176]

The gateway to the house was perhaps the best example of this. Once again its inspiration must have come from Montagu's time in the French capital and it was so unusual in England that it warranted an individual plate, separate from the rest of the house,

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[172] The letter is dated 3 May 1669 and is published in *HMC*, 1849: 422. See Metzger, 1987: 25.
[173] *ODNB*, 38: 760.
[174] *ODNB*, 38: 761.
[175] Ironically, Montagu House also turned out to be 'dearer' than most English houses as well; see below.
[176] Evelyn also gave a description of the interior of the house, which was of course damaged in the subsequent fire. In particular Verio's frescos which adorned the great staircase of the house, Evelyn felt, 'exceedes anything he has yet don, both for designe, Colouring & exuberance of Invention, comparable certainly to the greatest of the old Masters'; 7 May 1676; Evelyn, 1955, 4: 90. Pearce, 1986: 114; Inwood, 2002: 278-279.

in *Vitruvius Britannicus* (Fig. 29). A huge, solid screen of masonry separated the courtyard of the house from the street. In its centre rose a cupola with an ogee dome and an entrance portico flanked by paired Ionic columns almost identical to the entrance portico of Hooke's College of Physicians, designed in the same year (Fig. 6). Either side of the screen were large pavilions topped with French ogee roofs, or 'turrets' as Hooke referred to them in his diary.[177] The overall effect was to completely close off the courtyard from the surrounding city, and images that survive of Great Russell Street at the time show just how imposing a barrier this screen was (Fig. 30). Similarly closed off from the surrounding town, French *hôtels* featured imposing screens and large, elaborate gates. Contemporary English observers were unfamiliar with such an arrangement and it provoked criticism. Evelyn, for example, thought the screen wall was 'unproportionale to the rest, to hide the Court from being overlook'd by neighbours'.[178] Thus the general arrangement of Montagu House was influenced by Parisian *hôtel* architecture, presumably inspired by its patron's experiences in the French capital. His guiding influence over the lay-out and general arrangement of the house, apparent in Hooke's diary, is also evident in the executed building.

However, Montagu's influence clearly did not extend to specific sources; these would have been Hooke's responsibility. Luckily for his patron, Hooke possessed the appropriate knowledge, as Stoessar highlighted. Yet, as Chapter 1 demonstrates, Montagu encouraged Hooke to further his knowledge by suggesting that he accompanied Montagu to Paris. Overall, the designing of Montagu House is testimony to Hooke's perceived credibility and competency in handling contemporary architectural design. He was seen as someone who possessed the appropriate forms of knowledge to turn Montagu's ideas into

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[177] 26 November 1678; *Diary*: 386.
[178] 10 October 1683; Evelyn, 1955, 4: 345.

reality. Here the role the Royal Society played in securing the commission for Montagu is important. It was often through the Society as a social forum that Hooke had acquired his knowledge of French architecture – Boyle, for example, had lent him French architectural treatises. But it was also through the Society that Montagu met Hooke, albeit through the conduit of Flamsteed. A member of the Society was expected to possess appropriate and accurate forms of architectural knowledge, both ancient and modern, and could be approached by patrons with specific desires and needs. However, those needs also shaped the design; Hooke would not have been able to apply his knowledge without the influence of his patron.

It was not just in matters relating to design that Hooke had to follow the unofficial rules of house building in the period. As well as paying attention to patrons' wishes, an architect was expected to look ahead to the execution of the design. Hooke therefore needed to display credibility in practical as well as aesthetic matters. In a letter to Conway, he reminded his client of his considerable experience in matters of building, advising in a postscript that construction should begin in March to avoid the mortar freezing in winter, 'As I have found twice in the building of St Paules and in a staircase at Mountacue house and severall other places'.[179] Here Hooke complies with Pratt's specification of competency in architectural practice by demonstrating his ability 'to know the best manner of working in all kinds of materials' and 'close against all injuries either of time, or weather'.[180] More significantly though, Hooke emphasised his credibility in these matters. He used his knowledge and experience to impress upon a patron just how trustworthy he was in practical building matters. A similar mode of good practice was to be financially stringent

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[179] Batten, 1936-1937: 102. See Chapter 1 for Hooke's regular attendance at the building site of St. Paul's.
[180] Pratt, 1928: 84-85.

from the outset. Pratt advised the architect to 'Somewhat nearly to calculate the expense of any designed building; wherein yet that he may not err'.[181] Hooke seemed to be aware of such methods, and very early in the construction of Montagu House he 'agreed the whole building for £2300' with Montagu.[182] Again, in his letter to Lord Conway dated 20 July 1680 he claimed that his alterations to the house would reduce by £100 the overall cost that had previously been estimated.[183]

Following the submission of drawings, subsequent consultation and financial negotiation, the extent to which Hooke was then involved in the execution of his designs depended on the commission in question and, importantly, on its geographical location. For Montagu House, a very large development close to the centre of London, Hooke was able to oversee personally the implementation of his designs as well as keep close control of all aspects of the construction. Thus his diary reveals that he was on site every week to supervise work.[184] Smaller projects in the capital, such as the Earl of Oxford's house in the Privy Garden, also received Hooke's continuing attention. Hooke visited that site a number of times to give his workmen orders and ensure work was being carried out to his

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[181] Pratt, 1928: 84.

[182] *Diary*: 224. Hooke's attempts to keep Montagu House on budget failed. This was mainly due to Montagu's demands to increase various aspects of the design or add new features. For example, in July 1675, when brickwork had begun on site, he ordered Hooke to increase the size of the stables (19 July 1675; *Diary*: 170), then, in September that year decided he wanted a 'balcony and a turret'; 30 September 1675; *Diary*: 183. A year later Hooke finally persuaded him to 'allow me to leave out turret' which was apparently destined to adorn one of the wings of the house (12 September 1676; *Diary*: 249), although in July 1676 Montagu was still quizzing Hooke about the possibility of having 'cupolos'; 24 July 1676; *Diary*: 244. By October 1676 Montagu House was way over budget and Hooke had to start exercising restraint. On 2 October 1676 he 'Bid Hayward [a carpenter] doe Mr Montacue door as he saw fit soe he raisd not the price'; *Diary*: 252. However, his efforts were in vain. Hooke recorded numerous instances in his diary of Montagu owing money to workmen. These included Fitch whose outstanding bills by 1677 had reached £800; 6 December 1677; *Diary*: 333. Hooke himself had trouble extracting money owed to him by Montagu. On 5 August 1682, long after building work had finished, Hooke noted in his diary that he was owed £50 for his services to the ambassador; Henderson, 2007: 154.

[183] Batten, 1936-1937: 101.

[184] See Batten, 1936-1937: 93-94.

satisfaction.[185] Pratt advised architects to choose workmen with care, and to try to 'procure such persons who have been the most versed, and who have the esteem of the most honest and sufficient men who in their dealings will have regard not more to their gains, than to their reputation'.[186] For London-based commissions, Hooke tended to use workmen who were known to him and came from his small group of trusted contractors. Thus John Fitch acted as contractor in charge at Montagu House, and the familiar figures of John Hayward (carpenter), John Scarborough (measuring surveyor), and Roger Davies (joiner) all subsequently worked on the Bloomsbury mansion.[187] Both Fitch and Scarborough also worked on Lord Oxford's house in the Privy Garden.[188]

Houses outside the capital had to be treated differently. Hooke himself revealed in a letter to Conway that his London life was far too busy for multiple trips into the countryside. Writing in 1680 he admitted that 'My vocassions will not permit my absence [from the city]'.[189] Unlike other architects, Hooke had to attend weekly meetings of the Royal Society and had numerous other engagements in the City.[190] In the decade between 1672 and 1682 Hooke managed only two trips out of London to visit the sites of his houses. Unsurprisingly, these visits were to Ragley and Ramsbury, his two largest county designs. Instead, control of the building of country houses had to be delegated to others and Pratt advised his readers to find contractors 'in the most convenient places, whereby much will

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[185] 17 April 1676 - 3 May 1676; *Diary*: 227-229.
[186] Pratt, 1928: 84.
[187] 10 December 1674; *Diary*: 134. 23 May 1676; *Diary*: 234. 22 December 1676; *Diary*: 263. 27 February 1677; *Diary*: 276. See Batten, 1936-1937: 96.
[188] 24 April 1676; *Diary*: 228. 1 May 1676; *Diary*: 229.
[189] Batten, 1936-1937: 103.
[190] For a general discussion of levels of control in late seventeenth-century and early eighteenth-century domestic architectural practice see Wilson and Mackley, 2000: 147-148.

be saved us in the price of carriages'.[191] This was often the responsibility of patrons who would arrange for a local figure to oversee the work and negotiate contracts; two examples in the case of Hooke's domestic architecture were Thomas Mann at Londesborough and William Hurlburt at Ragley. At Londesborough Mann acted as agent and contractor in charge, negotiating workman's contracts and bills and ensuring Hooke's designs were carried out correctly.[192] In this regard, Hooke and his patrons followed the advice given to architects by Henry Wotton, who suggested that a 'Superintendent' or 'Officinator' be employed to oversee the execution of the more practical aspects of house building.[193] Unlike Wotton, however, Pratt felt that it was 'the part of a good Architect not only to see his building truly laid out, and prosecuted by the Bricklayer, but also by the Carpenter etc.'.[194] As discussed above, Hooke was able to follow such advice in his London commissions. When it came to country houses, however, he was continually anxious about the faithful execution of his designs, and he does not seem to have been entirely happy with the delegation of the building process to a superintendent. In one of his letters to Conway, he wrote in frustration that discussions over how best to proceed with the design and building of the house were 'somewhat more Difficult at this Distance'.[195] Thus Hooke either sent trusted associates to check up on the building work, or ensured that representatives from the site visited him in London to hear his wishes first hand. In September 1677, for example, Roger Davies and Roger Bates were both dispatched to Devon to view the site for Sir Walter Yonge's house. Hooke recorded briefing them the

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[191] Pratt, 1928: 84.
[192] Londesborough accounts reveal that Man was paid for overseeing the building work to the house; Chatsworth, Box P, Chatsworth, Box S (ii).
[193] Wotton, 1624: 21. See Chapter 1 for a discussion of Wotton and the figure of the architect.
[194] Pratt, 1928: 83. Given that Pratt was writing about forty years after Wotton, perhaps there was a conscious shift in perceived correct architectural practice during the century.
[195] Batten, 1936-1937: 100.

previous week having 'Discoursd with Bates and Davys about going to Sir W Young on Wednesday next'.[196]

In the same letter to Conway in which he revealed his inability to abandon his London commitments, Hooke suggested that his client send his servant to the capital instead. The letter was written on 17 August 1680, a month after Hooke's visit to the site, and he records sending it in his diary.[197] At this stage the building work at Ragley had not yet begun and Hooke was still trying to resolve design issues; he evidently did not trust William Hurlburt's ability to follow his wishes and the letter is evidence of the amount of control Hooke felt that he should ideally have over a building project, even one so far away. 'I humbly conceive' wrote Hooke '[that] it will be much better for Dispatch to send Leonard up with the old module and in a fortnight or thereabout he may Returne with it back againe completed and Rectifyed'.[198] Conway's servant, Leonard, was a German mechanical technician who was in the employment of the physician and friend of the Conways, Francis Mercury van Helmont.[199] He had impressed Hooke during the architect's visit to Ragley the previous month. Hooke noted in his diary that Leonard was 'ingenious', and the German had evidently made a far greater impression on him than Hurlburt, 'a Carpenter but a pap'.[200] He was someone to be trusted and following his return to Ragley, Leonard could accurately relay Hooke's wishes so that it 'will be very easy for Mr Holbert or anyone else your Lordship shall imploy to proceed with the whole work

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[196] 23 September 1677; *Diary*: 315.
[197] 17 August 1680; *Diary*: 450.
[198] Batten, 1936-1937: 103.
[199] For information about van Helmont and the Conways see *ODNB*, 26: 265. A laboratory was eventually built for van Helmont at Ragley, but it is unclear whether Hooke was involved; see Shapin, 1988: 378.
[200] 25 June 1680; *Diary*: 447. The use of the word 'pap' is surely a derogatory reference to the fact that Hurlburt was Irish and therefore probably a Catholic, i.e. a papist

without much if any further Direction'.[201] Hooke's distrust of Hurlburt's abilities becomes apparent further in the letter when he adds:

> In the meantime Mr Holbert cannot well doe amiss if he proceeds in carrying up the front and Rear Walls and all the cross-walls for those apartments which are little if at all altered but only in Doorways and leave the crosse walls that are to be under the Hall and Staircase till Leonard Returne to be carried up...[202]

Interestingly, Hooke seems to have regarded Leonard, a technician with a background in mathematics, as more trustworthy than a master carpenter with presumably years of experience in practical building. Although his attitude to Hurlburt may have been partly motivated by professional jealousy, the conscious distinction between the two practitioners is in line with theoretical concerns raised in Chapter 1. Leonard's position within scientific circles rendered him more credible in Hooke's eyes than Hurlburt.

Overall, Hooke's dealings with Conway, as revealed by his diary and the two surviving letters, are consistent with his overall performance as a domestic architect in the 1670s and 1680s. They follow a similar pattern to that displayed at Montagu House and other projects. After Hooke's position within various intellectual circles in London had facilitated a commission he then followed an informal set of rules, outlined in contemporary architectural writings on how an architect should behave, and with which services a patron should be provided. Hooke's competence in this regard left him with plenty of commissions, and it is notable that his patrons introduced him to other people in need of an appropriate designer for their houses. Although nearly all of Hooke's domestic patronage can be traced back to the social forum of the Royal Society, architectural

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[201] Batten, 1936-1937: 103.
[202] Batten, 1936-1937: 103. Inwood, 2002: 305.

commissions were self-perpetuating and Hooke's careful observance of contemporary perceived good architectural practice left him in demand as a designer of residential buildings. He was someone whom patrons could approach, through whichever social forum, and call upon for the required knowledge for designing houses. He was indeed 'much made use of in Designing Buildings'.[203]

However, Hooke's performance as a domestic architect – whilst exemplary in terms of contemporary writing about house building – began to stray from the paradigmatic behaviour of Evelyn's *Architectus Ingenio*. The collector and producer of architectural knowledge who existed in the Royal Society still had to obey the rules of contemporary architectural practice. Indeed, Aubrey's claim that Hooke was 'much made use of' suggests a lack of independence on Hooke's part in the domestic architectural process: he was the facilitator of patrons' wishes rather than the producer of architectural knowledge. Hooke's consultation with his patrons over the design of the house as well as the influence of local craftsmen on the design and building process – as was the case with Ragley Hall – meant that the application of his architectural knowledge to his domestic buildings was not an unchecked process. Instead, Hooke had no control over the external practices of architecture and was not able to escape them in his private career. The interface between the Royal Society and architecture, as personified by Hooke, was more complex in practice than Society members conceived it in theory. In other areas of architectural practice that complexity was only to increase, as the next chapter will show.

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[203] Aubrey, 1898: 411.

CHAPTER 3

THE LIMITS OF COLLABORATION: HOOKE AND WREN IN THE INSTITUTIONAL ARCHITECTURAL SPHERE

This chapter will address the designing of those building projects now seen as the products of some degree of informal architectural collaboration between Hooke and Wren: The Royal Observatory, Greenwich (Fig. 31), the Monument to the Great Fire of London (Fig. 2), and the City of London Churches. These buildings were constructed in London following the Great Fire and all were what one might term institutional, having been commissioned by organisations and groups of people rather than private individuals. The institutional nature of these so-called collaborative building projects is not without significance and it is perhaps the complex nature of institutional architectural commissions that has led to confusion over the roles of those employed by these organisations. In fact, a lengthy examination of the sources, including new analysis of relevant drawings, reveals that the picture is less opaque than previously supposed. For each of these institutional architectural commissions the person employed to design the buildings did just that, whilst those appointed to advise or administer did not involve themselves in the designing process. Ultimately, this chapter will demonstrate that as City Surveyor, Hooke was responsible for the design of the Monument while Wren operated in purely advisory role, external to City bureaucracy, as befitting his position as Royal Surveyor. In turn, the designs of Greenwich Royal Observatory, built under the control of the Board of Ordnance,

and the City Churches, which were administered by a specially created office, can all be confidently attributed to Wren alone as it was he who was given sole responsibility for their design. Instead, Hooke's role was limited to surveying and administrative duties.

I also want to show in this chapter that while architecture was seen as an intellectual subject worthy of Royal Society members the professional architectural climate prevented the sort of informal collaboration possible in the experimental philosophical sphere. One must remember that, unlike seventeenth-century England's relatively new domain of institutionalised science, the mechanisms by which architectural practice operated in the country had evolved from a tradition stretching far back into the medieval period.[1] Although the credibility of members of the early Royal Society to operate as architects was never questioned, they still had to function within established and formal chains of command. These, I argue, were at their strongest within institutional architecture, and were exerted with the most control over matters of architectural design.

The notion that Wren and Hooke were informal architectural partners has been a prominent trait of recent writing on both men. Historians, Lisa Jardine in particular, have assumed that their friendship was able to sidestep the official channels of City and Court bureaucracy and operate on a model more familiar in the informal sphere of experimental philosophy.[2] Hence the now popular notion that Hooke and Wren 'co-designed' a number of buildings. In the case of the Monument and the Royal Observatory, it is now generally

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[1] For example, see Colvin, 2008: 22-24. For the institutionalisation of late seventeenth-century science see Hunter, 1989: 1-41.

[2] As discussed in the introduction to this thesis, Jardine's biographies of both men emphasise the collaborative nature of the professional relationship to such an extent that she argues they formed a proto-architectural firm; Jardine, 2002: 294-306; Jardine, 2003a: 150-151. As I show in this chapter, such a reading is an exaggeration. For convincing evidence of Wren and Hooke collaborating on natural philosophical matters see Bennett, 1975a: 32-61.

accepted that responsibility for the designs lay in the hands of both Hooke and Wren.[3] In addition to their co-authorship, the now standard reading of the Monument is that Hooke and Wren covertly concealed a zenith telescope within the shaft of the column. Additionally, as both Hooke and Wren were employed in the City Church Office at Whitehall, it has been argued that many of the churches were either conceived by the pair working together or that some of the designs were delegated by Wren to his friend. The enduring popularity of this collaborative model is understandable: Hooke and Wren are two of the late seventeenth century's most popular historical figures and both were privately commissioned architects employed to design prominent public buildings. This misreading of their professional relationship is ultimately dependant on an equally problematic account of their friendship. That Hooke and Wren were close friends is undeniable, but the recent tendency to portray Hooke first and foremost as 'Sir Christopher Wren's close friend' is unhelpful.[4] Notably, it has led to Wren being portrayed as Isaac Newton's antithesis in terms of influence on Hooke's career; the great friend and ally in contrast to the great enemy and rival. Indeed a recent monograph on Hooke presented portraits of Wren and Newton as the first images in the book, side-by-side, in a Manichaean diptych of best friend and bitter enemy.[5] Yet whereas Hooke and Newton were clearly intellectual rivals, such unequivocally positive summaries of Hooke and Wren's relationship fail to realise that

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[3] See Willmoth, 1993: 183; Jardine, 2002: preface, 307-321; Cooper, 2003: 198-205; and Stevenson, 2005: 49-52.

[4] Jardine, 2003a: 1.

[5] Cooper, 2003: 5. It would be possible to read Cooper's use of these two images as together forming an iconographic replacement for a portrait of Hooke, none of which survive. Together Wren and Newton represent the dichotomy that is central to the popular perception of Hooke's personality. Thus the figure of Wren symbolises all that Hooke achieved whereas the figure of Newton stands for all Hooke's personal and intellectual failings. Such Manichaeanism between Wren and Newton has entered popular depictions of Hooke's life and legacy. For example in 2007 a theatre production based on the life of Hooke proclaimed, as part of its publicity, that 'Christopher Wren loved him... Isaac Newton loathed him...'; Nicholas, 2007.

seventeenth-century friendships, intellectual or otherwise, were socially constructed and socially constrained in a way that is unfamiliar today.[6]

Instead, Wren and Hooke's friendship was, in the socio-scientific domain, a more formalised union, typical amongst Royal Society philosophers and by no means the dominant masculine relationship in either of their lives.[7] This is apparent from Hooke's diary, which reveals that his relationship with Wren and the rest of his social superiors and equals was, as Shapin has observed, hierarchical in its nature.[8] In his diary Hooke consistently refers to Wren as 'Dr Wren' until his knighthood in 1673, after which Hooke, almost without fail, styles him as 'Sir Chr. Wren'.[9] It is also possible that Hooke's relationship with Wren was somewhat deferential, although less so than his friendship with the aristocratic Robert Boyle.[10] As Shapin observed, Wren, unlike Boyle, did visit Hooke's lodgings, but the two would tend to meet at Wren's house or at a tavern.[11] These are certainly the locations of their architectural conversations discussed in Chapter 1. Conversely, evidence from Hooke's diary suggests that Wren rarely frequented the coffee houses where so much of Hooke's social life took place.[12] Rather than Wren, the people that we may term Hooke's closest male friends seem to have been his regular coffee house companions who, unlike Wren, did frequent his lodgings regularly and invited Hooke to

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[6] For recent discussions of male friendships in seventeenth-century England see Bray and Rey, 1999: 65-84; Foyster, 1999: 125-128; and Shepard, 2003: 93-126.
[7] For a good discussion of Hooke's social life in general see Espinasse, 1956: 106-140.
[8] Shapin, 1989a: 262. For an opposing view see Feingold, 2006: 204-205.
[9] Hooke noted the occasion of 'Dr Wren's' knighthood in his Diary on 14 November 1673 and when he next referred to him in the document did so as 'Sir Ch: Wren'; *Diary*: 69. Shapin, 1989a: 262.
[10] See Chapter 2.
[11] Shapin, 1989a: 258. I do not accept Feingold's recent suggestion that Boyle's absence from Hooke's lodgings was simply a result of the inappropriate size of his Gresham rooms, as Hooke entertained numerous guests, of either similar or lower social status as himself in them on a regular basis; Feingold, 2006: 206-207.
[12] Shapin shows that Wren attended meetings of Hooke's various clubs in coffee houses; Shapin, 1989a: 259. However Hooke rarely records Wren's present in coffee houses in the evening, when Hooke tended to frequent them.

their homes for purely social engagements. Principal amongst these was Theodore Haak, the German émigré and Royal Society member, whose relationship with Hooke seems to have operated on a more informal footing than that of Hooke and Wren. Hence Hooke refers to just 'Haak' in his diary. Furthermore, their union was conducted in a less professional atmosphere with leisure pursuits a key ingredient in the friendship. Hooke would regularly record meeting Haak, often with other close male friends, for games of chess in one of their lodgings.[13] By contrast, it is rare for Hooke to mention Wren's name in such a leisure-related context.[14] Although Hooke frequently collaborated with Wren on various experimental philosophical projects – as he did with numerous other Royal Society members – the two were not the inseparable friends that recent biographers have claimed they were.[15] This must be kept in mind during an examination of their professional conduct working for various institutional bodies following the great fire.

The model by which Wren and Hooke collaborated on a number of institutional architectural designs is further problematised by the administrative location of architectural design in organisations such as the City of London, the City Church Office and the Board of Ordnance. By the late seventeenth century, following the orders of commissioning bodies, design was increasingly seen as separate from other tasks such as measuring and

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[13] References in the diary to Hooke socialising with Haak are far too numerous to list, but a good summary of the close nature of their friendship can be found in Espinasse, 1956: 120-121. Other prominent figures in his diary, whose similar social standing seems to have facilitated an equally balanced relationship with Hooke include John Aubrey, the physicians Daniel Whistler and George Ent (see Chapter 4), the Royal Society treasurer Abraham Hill, the clerk of the Mercers' Company John Godfrey and the linguist Francis Lodwick, see Espinasse, 1956: 118-120, 124-125, 126; and Inwood, 2002: 154-155.

[14] On the vary rare occasions when Hooke does record Wren participating in leisure-related pursuits they tend to take the form of more formal, public activities such as trips to the theatre. For example on 20 June 1674 Hooke accompanied Wren and John Hoskins to see a performance of *The Tempest*; *Diary*: 108. Inwood, 2002: 194.

[15] Jardine, 2002: 21-22; Jardine, 2003a: 14-15.

setting out foundations and administering building works.[16] In this model those individuals appointed to administer rather than design would not stray from the limits set out by the authority in question. This revised scenario clearly leaves little room for the types of informal collaboration more common in the Royal Society and instead furthers our understanding of the varied nature of architectural practice in the period.

GREENWICH ROYAL OBSERVATORY

The separation of design from administration is evident from the first example I want to discuss in this chapter: Greenwich Royal Observatory. During the last century architectural historians have consistently stated that Wren and Hooke were both involved in the design of the Observatory, with the main evidence for Hooke's involvement lying, somewhat unfortunately, in the perceived naivety of the design (Fig. 31). Summerson presumed that Wren could not be solely responsible for a building deemed to be so aesthetically retrogressive and therefore must have 'delegated' responsibility to his friend.[17] In fact, the design history of the building, when extracted from Hooke's diary and other sources, shows this to be incorrect; the Observatory was designed and built on substantially formal footings.

The origins of Greenwich Royal Observatory stem from the quest to find an accurate procedure for establishing a vessel's longitudinal position at sea, and the building

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[16] For a discussion of administration in general in this period see Brewer, 1989: 69-79; and Marshall, 1996: 18-41. For a general consideration of the performance of early Royal Society members in administrative positions see Aylmer, 2002: 213.
[17] Summerson, 1993: 237.

was proposed by a Royal Commission set up on 15 December 1674 for these purposes.[18] The Commission, which was initially appointed in response to a claim by a French astronomer that he had indeed found a method of computing the longitude, consisted of the President of the Royal Society and principal officer of the Navy Board, Lord Brounker, Col. Silius Titus, a Gentleman of the King's Bedchamber and other prominent Royal Society members: Seth Ward, Sir Charles Scarburgh, Sir Jonas Moore, Dr John Pell, Sir Robert Moray, Sir Samuel Moreland, John Flamsteed, Hooke, Wren, and several other 'ingenious gentlemen'.[19] The group reported back to the King on 4 March 1675 in a meeting that Hooke, much to his annoyance, had missed.[20] Despite Hooke's absence the members in attendance persuaded the King to take two steps to ensure that the method of calculating the longitude was first discovered in Britain. Firstly, as outlined in a warrant issued that day, Flamsteed was to be appointed Astronomer Royal or 'Our Astronomical Observator'.[21] Secondly, an observatory was to be built somewhere in the capital and again a royal warrant was issued on 22 June 1675. In later writings Flamsteed revealed that a debate had taken place amongst the members of the commission as to the location of the building. The proposed sites included Hyde Park and Chelsea College and Flamsteed himself went 'to view the ruins of this latter and judged it might serve the turn: and better because it was near the Court'.[22] He also revealed that Sir Jonas Moore 'rather inclined to

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[18] For summaries of the origins and building of the Observatory see Howse, 1997: 19-40; Willmoth, 1993: 159-195; Bold, 2000: 19-24; and Jardine, 2002: 307-315.

[19] Hooke's diary reveals that the core of this commission had met informally in April 1674 in Titus's house to discuss the longitude; 16 April 1674; *Diary*: 97; see Howse, 1997: 23. In one of Wren's letters to Dr Fell regarding Tom Tower he claimed that 'Wee... built an Observatory at Greenwich', this letter is reproduced in Carŏe, 1923: 31-32. The 'we' in question almost certainly refers to this group rather than just Wren and Hooke as claimed by Espinasse and Jardine; Espinasse, 1956: 93; Jardine, 2002: 315.

[20] Hooke blamed Titus for not telling him about the meeting and called Titus 'a dog' in his diary on 3 March 1675; *Diary*: 150.

[21] A copy of the warrant can be found amongst Flamsteed's papers in the Observatory archive; R.G.O. 1/40, fol. 60r. It contains no mention of the observatory. See Forbes, 1975: 19; and Willmoth, 1993: 177.

[22] Baily, 1835: 39.

Hyde Park, but Sir Christopher Wren mentioning Greenwich Hill, it was resolved on'.[23] Interestingly, the commission followed Wren's advice on the location; presumably as Royal Surveyor he was deemed the most experienced member of the group when it came to building matters.

Once the site had been chosen the project was handed over to the Board of Ordnance and its surveyor-general, Sir Jonas Moore. As Willmoth has shown, this was because of the clear practical links between the calculating of the longitude and military logistics, responsibility for which lay with the Board.[24] It also gave the Observatory financial security as the warrant ordering the building of the Observatory made clear the structure was to be paid for by money raised from the sale of 690 barrels of old and decayed gunpowder from Portsmouth dockyard and from the Board's headquarters in the Tower of London.[25] Hence the board of Ordnance was to have financial control of the project as well as pay Flamsteed's salary.[26] Both royal warrants concerning the longitude were issued to Sir Thomas Chicheley, Master-General of the Ordance, who in turn delegated responsibility of the project to Moore, as outlined in his response to the second warrant: 'Sr. Jonas Moore. Knt. & Edward Sherburn Esq. [are to] appoint & give their Directions to such Artificers & Workmen as they think fitt for carrying on & finishing the said Observatory'.[27]

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[23] Baily, 1835: 39. For the possibility of the Observatory being built at Chelsea see Willmoth, 1993: 170-171. For the Chelsea College site in general see Dean, 1950: 29-34.
[24] Willmoth, 1993: 182-183.
[25] R.G.O. 1/40, fol. 61r. See Howse, 1997: 32.
[26] R.G.O. 1/40, fol. 61r.
[27] A copy of this order from Sir Thomas Chichley to 'my loving Friends David Walter Esq. Lieut-Generll of his Maties Ordinance [and] to my loving Friends the rest of the Principall officers of the Same' dated July 16 1675 can also be found amongst Flamsteed's papers in the Observatory archive; R.G.O. 1/40 fol. 61v. As Willmoth has shown, historians of the Observatory have been strangely reluctant to acknowledge Moore's leading role in the project, giving Flamsteed much of the credit instead. An examination of the evidence in the

If Moore had overall responsibility for the project, what were Wren and Hooke's roles as set out in the royal warrant of 22 June 1675? The document makes specific reference to Wren, noting his position as Royal Surveyor, but not to Hooke:

> Whereas in Order to the finding out of the Longitude of Places for perfecting Navigation & Astronomy we have resolv'd to build a small Observatory within our Park at Greenwich upon the highest Ground at or near the Place where the Castle stood with Lodging Rooms For Our Astronomicall Observator & Assistant. Our Will & Pleasure is that according to such Plot and design as shall be given you by Our trusty & Well beloved Sr Christopher Wren Knight Our Surveyor General of the Place and Scite of the said Observatory. You cause the same to be fenced in, built, & finish'd with all convenient speed, by such Artificers & Workmen as you shall appoint thereto & that you give Orders unto Our Treasurer of the Ordinance for the Paying of such Materialls & Workmen as shall be used & employ'd therein out of such Monys as shall come to the hands For old & decay'd Powder, which hath or shall be sold by Our Order of the first of January last. Provided that the whole sum so to be expended & payd shall not exceed five hundred Pounds, & Our Pleasure is that all Our Officers & Servants belonging to Our Said Park be assisting to those that you shall appoint For the doeing hereof: And For so doing this shall be to you & to all others whom it may Concern a sufficient Warrant, given at Our Court at Whitehall the 22nd Day of June 1675 in the Yeare of Our Reign.[28]

Wren, therefore, was ordered directly by the King to provide a design for the Observatory. Hooke's diary, however, reveals that he received his orders from Moore, who, as we have seen, had been given the power to delegate responsibilities by Chicheley. On 22 June 1675, the day the warrant was issued, Hooke went to see Wren who informed Hooke that he was 'to direct Observatory in Greenwich park for Sir J. More'.[29] As becomes apparent in the

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Observatory's archive shows that Moore had been given official responsibility for the building work rather than Flamsteed; Willmoth, 1993: 176-180. For further discussion of Moore's central role in the project see Shiqiao, 2007: 19-20.

[28] R.G.O. 1/40, fol. 61v. Howse, 1997: 42; Bold, 2000: 21.

[29] *Diary*: 165. Jardine, 2002: 310.

diary, this involved measuring out the location of the proposed foundations of the building and Hooke duly 'set out' the Observatory on 28 July 1675.[30]

It seems likely that Hooke had been given this task due to his experience, gained through his City Surveyorship, in setting out plans of buildings on site. However, it soon became clear that once the difficult task of laying out the foundations had been completed, others would oversee the day-to-day running of the building project. Thus Flamsteed records that he moved to Greenwich in July 1675 in order 'to have an eye upon the workmen'.[31] Hooke's expertise it seems was no longer needed and it fell to another member of the Commission to see the Warrant's orders through to completion. At no point in his diary does Hooke refer to his involvement in the production of the design of the Observatory. Indeed his diary suggests that he did not even see the final elevations for the building until May 1676, nearly a year after he had set out the foundations, when he visited Moore who showed him 'the front of Greenwich Observatory'.[32] The formal limits laid out by the Royal Warrant, and Moore's subsequent delegation of the work for the building, restricted Hooke to the role of setting out the site only.[33] At no point is there any suggestion of the disobedience on the part of Wren and Hooke, which would have been required for the two to have co-designed the building. Therefore the design of the observatory, with all its perceived faults, can be confidently attributed to Wren.

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[30] *Diary*: 171. Bold, 2000: 21; Jardine, 2002: 310. This should not be taken as evidence that Hooke designed the building, as suggested in Willmoth, 1993: 183.
[31] Baily, 1835: 39. Willmoth, 1993: 184.
[32] 3 May 1676; *Diary*: 229. This reference has been used to suggest Moore was responsible for the design of the Observatory, which in light of the preceding discussion would be incorrect; Espinasse, 1956: 93. Alternatively it could refer to an engraving of the building commissioned by Moore before it was completed; Willmoth, 1993: 184.
[33] As Willmoth observes, these formal limits ensured that Moore had the final say over any decision made with regards to the Observatory; Willmoth, 1993: 184.

It is significant that Hooke was appointed by Moore to survey the ground of the observatory whereas Wren was chosen to design the building. Even though both men had proven experience in both surveying and architectural design and could have easily surveyed the foundations and designed the Observatory singlehandedly, it was decided that these responsibilities should be separated. As the first chapter demonstrated, surveying and architectural design were seen by the Royal Society as like intellectual subjects, akin to each other in involving applied-mathematical processes. However, here in the world of institutional design they became separated by formal delegation of responsibility. Furthermore, as the example of the City Churches will show later in this chapter, the task of measuring and surveying the site was viewed as a more administrative task than the process of architectural design by large institutions responsible for major architectural projects. As we have seen, the Royal Society would not have epistemologically prioritised architectural design over surveying as both were applied mathematical pursuits. Therefore, the partial separation of the tasks of surveying and architectural design in the institutional architectural sphere highlights the dangers of allowing the norms of experimental philosophical epistemologies to excessively permeate discussions of professional architectural practice.[34] In the case of the conception of Greenwich Royal Observatory, despite the building's extensive links to the Royal Society, the processes of measuring the site and architectural design were kept separate by formal administrative control. This was a system which also prevented any informal collaboration between Hooke and Wren over the design of the building. Where the Monument was concerned a similar situation arose with, if anything, even more control imposed over the limits of Hooke and Wren's individual responsibilities.

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[34] This separation was not uniformly in place across institutions and, as demonstrated below, the surveyors of the City of London were expected to produce architectural designs as well as land and property surveys.

THE MONUMENT TO THE GREAT FIRE OF LONDON

The origins of the design of the Monument remain something of an enigma to architectural history. The archival sources, kept by the City of London, have thus far not yielded the definitive account of the designing of the column despite extensive research by historians such as Thomas Reddaway, John Moore, Jardine, and Cooper.[35] Thus a general consensus has been reached that the Monument was a joint design by Wren and Hooke. One dissenting voice is represented by Moore who, in a 2005 review of Cooper, criticises him for misattributing elements of the Monument to Hooke, when, as Moore sees it, much evidence exists for Wren's sole authorship of the design. Moore claims that Cooper's main mistake was to fail to provide a substantial analysis of the surviving set of drawings for the Monument, split between the British Library and All Souls College, Oxford.[36] The following discussion will provide such an analysis. It is therefore ironic that a detailed study of the drawings and a lengthy comparison of them with the surviving documentary sources demonstrates that Hooke was indeed responsible for the design of the Monument, albeit in a more complicated and subtle way than that suggested by Moore. The drawings are in a variety of hands – including Wren's – as will be explained below. In his review, Moore fails to understand Wren's role in the designing of the Monument because, like others before him, he did not consider the nature of Wren's official involvement with the project as Royal Surveyor. As the following will demonstrate, it was first and foremost

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[35] Reddaway, 1940: 216; Moore, 1998: 498-533; Jardine, 2002: 315-321; Cooper, 2003: 198-205; Stevenson, 2005: 43-73.

[36] According to Moore: 'if his [Cooper's] goal was to recast the authorship of the Monument, he should have proceeded by means other than unsubstantiated authorial fiat; having studied the extant original drawings with a connoisseur's discerning eye, he should instead have established a detailed case both for subtracting those drawings (or some subset thereof) from Wren and for assigning them to Hooke'; Moore, 2005.

designed and built by Hooke, in his capacity as City Surveyor. However, the various stages of the design were ratified, as was normal procedure, by Wren in his own capacity as Royal Surveyor. The design of the column was, of course, influenced by Wren's advice, but the final details of the design were down to Hooke alone. Thus I will describe a scenario whereby the Monument was designed, approved, and built by office-holders rather than informal collaborators. There is no contemporary evidence to suggest that either Wren or Hooke were working outside of their formal remits as Royal Surveyor and City Surveyor respectively.

The long-running attribution of the Monument to Wren originates with *Parentalia* and a somewhat erroneous claim by John Evelyn in 1697 that the Monument was Wren's work.[37] *Parentalia*'s promotion of Wren as the architect of the Monument is contrary to the evidence of the City of London records but is understandable given the almost hagiographical treatment of Wren in the text.[38] Why the Evelyn text should claim Wren was the author of the design is more difficult to establish. As a friend of Hooke and Wren's he should have known that Wren's involvement in the project was advisory and furthermore another friend of the pair, John Aubrey, was clear in his attribution of the column to Hooke.[39] Instead, to understand Hooke and Wren's individual responsibilities when it came to designing and building the Monument one has to establish the nature of their post-fire surveyorships. As Cooper demonstrates, Wren and Hooke were both consulted by the King and the City immediately after the fire, and were appointed to

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[37] Evelyn called for a medal to be made of the column, which he believed was designed by Wren; Evelyn, 1697: 162.
[38] See Bennett, 1973: 142.
[39] Aubrey, 1898: 411. Espinasse, 1956: 96.

official positions soon after.[40] Wren was appointed Surveyor of the King's Works in 1669 having previously been one of 'His Majesty's Commissioners for Rebuilding' appointed immediately after the Fire.[41] In Hooke's case, following the Royal Society's initial forwarding of his services (discussed in Chapter 1) he was appointed by the City to be one of their surveyors on 13 March 1667.[42]

Despite the fact that the post of City Surveyor had been in existence before the Fire, the extraordinary circumstances of the rebuilding required a codification of the duties and, in particular, the conduct expected of its incumbents.[43] The 1667 Rebuilding of London Act had granted the two senior bodies of the City – the Court of Aldermen and the Common Council – the power to appoint one or more surveyors and had decreed that the persons chosen must swear an oath.[44] On the day that Hooke was appointed, he and his fellow surveyor Peter Mills had to swear the following:

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[40] Cooper, 2003: 115-117.

[41] Reddaway, 1940: 58; Cooper, 2003: 116. In the immediate aftermath of the Fire, these commissioners were to meet with the City Surveyors and make general plans for the rebuilding, including drawing up street plans and discussing the 'manner forme and highth of Buildings in this City the Scantlings of Timber removeing of Conduits and Churches and Altera[ti]on of the Streetes'; cited in Reddaway, 1940: 56. As Reddaway shows, there is very little evidence for the exact duties of the King's commissioners in the period immediately after the Fire. *Parentalia*'s suggestion that Wren was appointed '*Surveyor-General* and *principal Architect* for rebuilding *the whole city*' is, as Reddaway points out, entirely untrue. That would have required an arbitrary exercise of the King's power over the City; Reddaway, 1940: 55n. It was not until the Rebuilding Acts that Wren's role in the rebuilding became codified. As set out below, the Acts strongly regulated Wren's influence on the City. Prior to his appointment as Royal Surveyor, Wren had briefly been deputy to John Denham as Surveyor of the King's Works. For the circumstances of Wren's appointment as Royal Surveyor see *HKW*, 5: 15-18; Jardine, 2002: 162-163.

[42] Cooper, 2003: 132-133. Prior to his appointment Hooke had been one of the City's designated representatives in the immediate aftermath of the fire. He had also, like Wren and Evelyn, prepared a plan for the rebuilding of the city based on contemporary European town plans. While none of the plans were executed, Wren's and Evelyn's survive. The possibility that Hooke's plan is represented in a contemporary Dutch print is discussed in Cooper, 2003: 112-113.

[43] Cooper suggests that the post of City Surveyor changed in nature after the fire, hence the tendency in official City documents to address the surveyors as 'the Surveyors of New Buildings' rather than of the City; Cooper, 2003: 237n.

[44] 19 Charles II, c. ii. See Cooper, 2003: 129-131.

> You shall Sweare that you shall well and duly see that y^e^ Rules and Scantlings sett downe and pr[e]scribed in an Act of this Pr[esen]t Parliament for building within the Citty of London and Libtyes thereof bee well and truly Observed and that in all other things you shall truly & Impartially Execute the place or office of Surveyor or Sup[er]visor within the said Citty and Libtyes as by the same Act of Parl[iamen]t is directed intended according to the best of youre skill, knowledge and Power soe help you God.[45]

The fact that the surveyors' conduct was the subject of an official oath is important. It was rare in this period for a surveyor to have to swear to their good conduct; Wren did not have to carry out such an act upon his appointment as Royal Surveyor.[46] Instead the City Surveyorship was a regulated position and its incumbents were expected to behave according to the limits set out in the oath. This seems to have been particularly important given the extraordinary circumstances behind the 1667 appointments.

The Monument itself was also conceived in the 1667 Rebuilding Act, which proposed that:

> the better to preserve the memory of this dreadful visitation; Be it further enacted that a Columne or Pillar or Brase or Stone be erected on or as neare unto the place where the said Fire soe unhappily began as Conveniently as may be[47]

The Act also stipulated that 'the Mayor and Court of Aldermen in that behalfe be directed' to oversee the construction of the column.[48] We do not hear of the project again until 1671, when on 26 January it was recorded in the Repertory of the Court of Aldermen that the City Surveyor, Hooke, had produced a 'draught [...] of the Pillar to bee erected in memory of

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[45] C.L.R.O. Repertory, 72: fol. 80v. Cooper, 2003: 133. The third surveyor Edward Jerman had been in place before the Rebuilding Act and did not swear this oath.
[46] There were documents outlining what was expected of the Royal Surveyor's conduct, including a patent issued by the treasury ordering financial stringency; see *HKW*, 5: 6-7, 21. For late seventeenth-century oath taking, particularly in relation to Royal Society figures see Hunter, 1997: 153-156.
[47] 19 Charles II, c. ii. *WS*, 5: 45; Cooper, 2003: 198; Stevenson, 2005: 45.
[48] 19 Charles II, c. ii.

the Late dismall ffire', which was 'well liked and approved'.[49] As City Surveyor, Hooke was directly answerable to the Court of Aldermen and it was entirely appropriate that the Court should turn to their officer to procure a design. Furthermore, that the City Surveyors were expected to be appropriate designers of buildings is apparent from the 1667 Act which had decreed that the City 'shall and may at their Will and Pleasure elect, nominate and appoint one or more discreet and intelligent Person or Persons in the Art of Building to be the Surveyors or Supervisors'.[50] It seems that by stipulating that the Surveyor or Surveyors be skilled in the 'Art of Building', Parliament intended the holders of the position to be capable of producing architectural designs for public buildings in the City. This became apparent early in the rebuilding when the City ordered its surveyors to produce and execute a variety of architectural designs, most notably the new Royal Exchange. Although the rebuilding of the Exchange was administered through a separate Joint Committee answerable to the Common Council of the City and the Committee for Gresham Affairs, Hooke, together with his fellow City Surveyors, Peter Mills and Edward Jerman, viewed the site, prepared estimates and oversaw building work.[51] However, the Joint Committee also decided that Jerman, because he was 'the most able known artist that the city now hath', should design the new building rather than one of the more recently appointed surveyors.[52] That Jerman was seen by the City as a competent 'known artist' who could be called upon to produce adequate architectural designs is also suggested by his authorship of

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[49] C.L.R.O. Repertory, 76, fol. 58r. Cooper, 2003: 200.
[50] 19 Charles II, c. ii. See Cooper, 2003: 127-128.
[51] Prior to his appointment as City Surveyor, Hooke had prepared a report on the condition of the Royal Exchange and what was required for the rebuilding. Here Hooke was acting in the capacity of a representative of Gresham College; Cooper, 2003: 119-120. For a detailed account of the rebuilding of the Royal Exchange see relevant essays by Saunders and Colvin in Saunders, 1997: 121-137.
[52] This extract from the Mercers' Company Gresham Repertories is quoted in full in Saunders, 1997: 129.

the designs of the rebuilt homes of various City Companies in the late 1660s.[53] Later in the rebuilding the other Surveyors were trusted with the responsibility of design. Following Jerman's retirement, his replacement, John Oliver, also came to be seen as a capable designer of buildings. Oliver prepared designs, under orders from the City, for the Skinner's Hall and possibly the Mercers' Hall and Chapel.[54] However, when it came to acquiring designs for City buildings throughout the 1670s, it was to Hooke that the committees tended to go.

Returning to the Court's deliberations on 16 January 1671 regarding the Monument, it seems that Hooke had by then become, in the City's eyes, a 'known artist' and at no point did the Court of Aldermen question his ability to produce appropriate designs for the column. When they had approved Hooke's 'draught', the Court then requested that he and John Oliver 'estimate and certifye unto this court the charge of the Said Pillar'.[55] The only evidence that Wren was involved at this stage comes from *Parentalia* which states that 'prior to 1671 [Wren] made a Design of a Pillar' and that in 1671 he 'began the building of the great Fluted Column of Portland Stone and of the Dorick Order (commonly call'd the Monument of London in Memory of the burning, and rebuilding of the City)'.[56] Such claims contradict the considerably more reliable account presented by the City's records,

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[53] For Jerman's involvement in the designs for various post-fire City buildings, including the new halls for the Draper's, Fishmonger's, Haberdasher's, Mercer's (see below), Wax Chandler's, and Weaver's companies see Colvin, 2008: 574- 575.

[54] For Oliver's architectural designs see Colvin, 2008: 758-759. It is unclear whether the executed design of the Mercer's Hall and Chapel was the work of Oliver, who oversaw the building work, or his predecessor Jerman; Colvin, 2008: 575, 758. What is apparent is that Hooke, as City Surveyor, designed the wooden screen at the Mercers' Hall; see Batten, 1936-1937: 90-91.

[55] C.L.R.O. Repertory, 76, fol. 58r. Cooper, 2003: 200

[56] Wren, 1750: 321. The 'Design of a Pillar' that *Parentalia* refers to is almost certainly the drawing of the Monument in All Souls Library. As Geraghty shows, this drawing was amongst those inherited by Wren's son, the author of *Parentalia*, upon his father's death; Geraghty, 2007: 7. As discussed below this drawing can be confidently attributed to Hooke. Therefore *Parentalia*'s claim that Wren was responsible for this design can be discounted.

which do not mention Wren's involvement with the project at this stage. To return to Hooke's 'draught', it is a possibility that it was the well-known drawing of the Monument, in his hand, now in All Souls Library, Oxford that incorporated flames running up the sides of the column shaft (Fig. 32).[57] However the fact that the All Souls drawing does not show the column as executed suggests that it was a design that was abandoned in favour of another drawing that Hooke submitted to the Court of Aldermen on the 16 January 1671. It must be presumed that a drawing showing the final design for the column was lost at some point by the City as no drawing of the column as executed survives in Hooke's hand.[58] Nonetheless, the similarity of the surviving All Souls drawing to the final design indicates that it was prepared sometime in early 1671. This drawing demands further investigation, in particular the inscription it bears, in Wren's hand: 'With His M^{ties} Approbation Chr. Wren'. If the All Souls drawing is datable to early 1671 then, leaving aside the references in *Parentalia*, this signature represents Wren's first reliably documented involvement in the project.

Confusingly, this signature has been wrongly interpreted as evidence that Wren was responsible for the design of the Monument at this stage with Hooke's proven draughtsmanship counting for little in establishing who was ultimately responsible for the building's appearance.[59] Despite the fact that the absence of Hooke's diary in early 1671 makes it difficult to establish why a drawing in his hand would carry Wren's signature, an

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[57] A.S. 2, 71. For a discussion of Hooke's authorship of this drawing see Geraghty, 2007: 259. As Geraghty shows, the hand matches many of Hooke's drawings in his drawing collection in the British Library; B.L. Sloane, 5238. This drawing is incorrectly attributed to Wren and wrongly dated to 1675 in Moore, 1998: 517.
[58] The only surviving drawing of the column as executed is the elevation in the hand of Edward Woodroofe in the British Library; B.L. Sloane, 5238, 78. However, as I argue below, this must have been executed in 1675 to accompany Wren's report to the City regarding the Monument's termination and does not represent a final drawing of the column before construction began in 1671.
[59] *WS*, 5: 45. Moore, 1998: 517; Jardine, 2002: 316.

examination of the Court of Aldermen's relationship with Wren in the early 1670s reveals that a standardised model of ratification existed whereby the Royal Surveyor would be expected to sign, on behalf of the King, the designs for all major building projects in the City. This seems to have been expected by Parliament, for despite the fact that the Monument was not specifically mentioned in the Additional Act of Parliament for the Rebuilding of the City, passed in 1670, that document does include provision for the Royal Surveyor to approve a number of major City building projects.[60] Consequently, City records demonstrate that the Court of Aldermen regularly sought the King's approval, through Wren, for a variety of schemes. For example on 26 April 1670 the Court ordered the two City Surveyors, Hooke and Oliver, to ensure that a drawing they had prepared showing the plot of the Fleet Canal be presented 'to his Ma^{tie}: for his Royall approbacon according to the said Act'.[61] This would have involved sending the drawing to Wren to be signed on behalf of the King. In another example, this time involving the widening of a plot of land in the churchyard of St Lawrence Jewry adjacent to the Guildhall, the court desired 'Dr Wren Surveyor Genall [General] of his Ma^{tyes} workes to represent the same to his Majesty and to obteyne his Majestyes approbacon thereof'.[62] Wren was also expected to approve and sign reports made by Hooke and Oliver relating to important public works, as

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[60] 22 Charles II, c. 11. These included the channel of Bridewell Dock and all public markets.

[61] C.L.R.O. Repertory, 75, fol. 168r. Wren was also requested by the City Lands Committee to prepare a report on the Fleet Canal and frequently liaised with the committee over this project. For a comprehensive account of the repair of the Fleet Canal and Wren's involvement in it see Reddaway, 1940: 200-221. As Reddaway observes, Wren's responsibilities concerning the Fleet Canal project were considerably more extensive than for any other rebuilding project, and he was certainly involved in the designing of the scheme. However, special provision had been made in the second Act of Parliament for the Royal Surveyor's involvement in the Fleet Canal; Reddaway, 1940: 216. This set out a higher level of engagement in the project than would have been normal for City building projects and should not be taken as evidence that Wren was able to informally influence the designs for any building scheme in the City. In the case of the Fleet Canal, the City also sought the advice of Jonas Moore, in his capacity as Surveyor of the Ordnance; see Willmoth, 1993: 138.

[62] A series of entries in 1671 in the Repertory of the Court of Aldermen reveal that Hooke, as City Surveyor responsible for that part of the City, with Wren's (and therefore the King's) approval, reconceived the north east corner of St Lawrence's churchyard; C.L.R.O. Repertory, 74, fol. 173r.

he did in the case of the construction of Bridewell Dock in June 1670 when their report was 'p[r]sented to his Ma[ty] and upon his Royall approbacon to be staked & sett out accordingly'.[63] Therefore the presence of Wren's signature guaranteeing the King's approval on the All Souls drawing is entirely consistent with City policy in the early 1670s and is in no way suggestive of his agency in the design of the Monument at this early stage. It represents his approval, on behalf of the King, of Hooke's design. Furthermore, it was not only the City of London that sought Wren's advice, in his capacity as Royal Surveyor, on major building projects. Other institutions did likewise and in one instance Hooke was also involved. In 1674 the College of Physicians, having appointed Hooke as the architect of their new home four years earlier, asked Wren to attend a meeting alongside Hooke to offer his advice on the best location for their new anatomy theatre.[64] Hooke then recorded in his diary attending, with Wren, a meeting on site to make a decision.[65] At no point is it suggested that College wanted a design from Wren.[66] Instead, as Colvin shows, the Royal Surveyor in this period was expected to dispense advice on any major building project in London, if his services were requested.[67]

To return to the Monument, the provenance of the All Souls drawing complements this hypothesis, given its survival amongst a collection of drawings that was in Wren's

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[63] C.L.R.O. Repertory, 74, fol. 244r.
[64] The College's annals record that on 13 May 1764 a group of the physicians should meet 'Christopher Wren, the Royal Surveyor, and Mr. Hooke in the College, to see which site was most suitable for the building of the Theatre, and it was made known that whatever pleased most of them should be confirmed'; R.C.P. 2298, 168.
[65] On 15 May 1674 Hooke recorded that he went 'with Sir Christopher to Colledge'; *Diary*: 103.
[66] Jardine has claimed that this diary entry represents proof that Wren was involved in the design of the College; Jardine, 2002: 541n. As Chapter 4 will show archival evidence from the College of Physicians indicates that Wren was initially consulted by the College and then occasionally asked for his advice. Wren was not paid for producing designs and nor does Hooke's diary suggest that he influenced Hooke's designs for the college in any way.
[67] After a royal proclamation of August 1661, restraining building in London, Wren was inundated with requests from builders to approve their projects; *HKW*, 5: 25.

possession upon his death.[68] Furthermore, the fact that it is in Hooke's hand but represents an unexecuted design explains its presence in the All Souls collection. If it depicted the design as executed, one would expect it to have entered the City's records, as the probable drawing of the final design – in Hooke's hand with Wren's added signature – presumably did. One must assume that Wren signed the surviving All Souls drawing but was then presented, by Hooke, with another drawing, this time showing the final elevation. Wren probably retained the All Souls drawing when it became apparent that Hooke had changed the design, removing the flames running up the shaft of the column and adding fluting in their place.

Finally Wren, in his 1675 report concerning the ornament at the top of the Monument (discussed below), recorded that a wooden model had been made in 1671 on his orders and, like Hooke's design in the All Souls drawing and presumably like the design that the City eventual approved, had a phoenix atop the column.[69] It seems strange that Wren would commission a model of the City Surveyor's design. However, a document dating from 1667 outlining the responsibilities of the Royal Surveyor refers to the practice carried out by the incumbent, whereby a model of any 'work of considerable importance' was made so that the project in question could be shown 'to his Majesty for his more full satisfaction'.[70] Therefore it was standard practice for Wren to prepare and present models rather than drawings to the King and he evidently made no exception for Hooke's design of the Monument.

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[68] For the provenance of the Wren drawings at All Souls see Geraghty, 2007: 7.
[69] *WS*, 5: 47. Perhaps it is for this reason that the All Souls elevation remained amongst Wren's papers; to aid Wren's Office in the manufacture of a model.
[70] This document is cited and discussed in *HKW*, 5: 21.

In February 1671, after approving Hooke's presumably lost drawing of the final design of the column, the Court of Aldermen recommended that 'the Comittee for public building [...] promote the building of the said Pillar with all convenient expedicon according to the said Draught'.[71] The 'Committee for public building' was a subcommittee of the City Lands Committee, which oversaw the day-to-day rebuilding of the city.[72] Just before the building of the Monument had been delegated to it, the City Lands Committee had taken control over all public building works in the city. On 31 January 1671 it ordered 'that noe further buildings shall bee undertaken upon the public account without notice or speciall order of this Committee'.[73] It was therefore quite natural that the Monument should be delegated to them. The City Lands Committee was also the City Surveyors' main point of contact with the City and the group features regularly in Hooke's diary for these years.[74] Like the Court of Aldermen, the City Lands Committee had the authority to issue orders to Hooke and Oliver and it quickly gave the two the task of constructing the column. The masonry shaft of the column was built between 1671 and 1675 with the first payment to the master mason Joshua Marshall occurring on 8 April 1671, having been ordered, presumably by Hooke or Oliver, on 20 March 1671.[75] The first reference to the Monument in the records of the City Lands Committee on 9 October 1672 reveals that the pedestal had been built by that date as they ordered Hooke to place scaffolding around it so that carving could

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[71] C.L.R.O. Repertory, 76, fol. 72v. Cooper, 2003: 200.
[72] For information on the City Lands Committee see Reddaway, 1940: 159; and Cooper, 2003: 143, 165.
[73] C.L.R.O. Orders, 2, fol. 5r. The records of the City Lands Committee are in the form of orders that the Committee issued, which were taken, almost verbatim, from the rough minutes of the Committee meetings (previously known as the Journal of the City Lands Committee). These minutes survive in today: C.L.R.O. City Lands Committee Minutes (Rough).
[74] In February 1671 Hooke and Oliver were ordered to attend every meeting of the City Lands Committee, on Wednesday afternoons, without fail; see Cooper, 2003: 165.
[75] The accounts for the building of the Monument are currently in the Guildhall Library; London, G.L. 184/4, fol. 41v. These payments are also recorded in the minutes of the City Lands Committee, and many are mentioned in Hooke's diary (see below). Marshall was paid regularly throughout the first half of the 1670s and his widow received the remainder of what was owed to him for the masonry of the Monument after his death in 1678 (see below). For information about Marshall see Knoop and Jones, 1935: 35.

begin.[76] The structure as executed was a 200 foot, fluted Doric column (Fig. 2), with a spiral staircase running up the interior of the shaft and an underground chamber beneath. Although the design clearly located the Monument within a tradition of major classical memorial columns in Europe, this primary function been overlooked in recent scholarship in favour of its secondary function as a zenith telescope, most notably by Jardine. Her analysis of the Monument rests on the assumption that Hooke and Wren co-designed the column informally and were able to concoct and covertly introduce the telescopic function together. Consequently, she sees the Monument as a building conceived within the informal landscape of the Royal Society. Yet, as I have demonstrated, the design of the Monument was generated in what might be termed a controlled environment; it was a product of the committees of the City of London, and their officer, the City Surveyor.

The Monument's detachment from the domain of the Royal Society and the more bureaucratic genesis of its design brings back into focus its relationship with a very similar classical column built in Paris in the 1570s.[77] The fluted Doric Colonne Astrologique was built by Jean Bullant to the orders of Catherine de Médici and, like the Monument, doubled as a zenith telescope with a clear site line running vertically from the chamber in the base of the column up to the iron sphere that surmounted it (Fig. 33).[78] Conceptually, the Paris column is very similar to the Monument, and Hooke must have borrowed the idea of the classical column with the concealed zenith telescope from this source. The presence of small flaming torches adorning the sides of the French column and mirrored in Hooke's

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[76] C.L.R.O. Orders, 2, fol. 37v. See Chapter 1.

[77] Only Moore, in his 1998 article on the Monument noted the importance of the Paris column. Moore, however, assumed that Wren was solely responsible for the Monument and he drew a link between Wren's visit to Paris in the 1660s and the design of the London column; Moore, 1998: 501.

[78] The Colonne Astrologique survives today and is all that remains of Catherine de Médici's Hôtel de la Reine (later renamed the Hôtel de Soissons); Blunt, 1993: 79.

original design further suggests this. This thesis has already explored the large amount of printed material relating to French architecture owned by Hooke and it is possible he owned an image of the column or was made aware of it through an associate.[79] His borrowing of the French idea makes the Monument's dual function less novel. Rather than the unique product of a collaboration between two extraordinary minds the design of the Monument should be viewed in more prosaic terms; a borrowed idea executed by a City Surveyor under orders from the City hierarchy.

The Monument was built between 1671 and 1675 under Hooke's constant surveillance. As he was paid a salary by the City, Hooke did not receive direct payments for his work on the column. However, his diary reveals that he visited the site frequently and ordered most of the payments for the workmen.[80] When Hooke does not record ordering payments one must assume that his fellow City Surveyor John Oliver did instead.[81] After he had designed the column, Hooke spent time commissioning the various sculptures that would adorn the pedestal. A preliminary design for the statues around the east face of the base of the column, in Hooke's hand, survives in the British Library (Fig. 34).[82] Beyond the

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[79] The Hôtel de la Reine had been engraved by Israel Silvestre in the 1650s, and Hooke recorded buying prints by Silvestre a number of times throughout the 1670s; Geraghty, 2004: 116. However, the Silvestre images only show the top of the column and do not contain any details of its internal structure; see Thompson, 1984: 176-177. Perhaps Hooke knew of the column through an associate. This could feasibly have been Wren, although Hooke knew plenty of other people who had been to Paris and, as Chapter 1 demonstrates, he used a variety of associates to acquire architectural information.

[80] Hooke's diary frequently corresponds with City records, with Hooke ordering payments a few days before they were made. For example on 21 October 1673 Hooke gave the sculptor Caius Gabriel Cibber a 'certificate' which resulted in a payment of £100 to Cibber on 25 October; *Diary*: 66; G.L. 184/4, fol. 41v. *WS*, 5: 50. This and other payments to Cibber were for carving the sculpture around the base of the column; see Ward-Jackson, 2003: 262-265. Again in April 1674 Hooke agreed payments to the master mason Joshua Marshall which appear in the City records later that month; *Diary*: 96; G.L. 184/4, fol. 41v. *WS*, 5: 50.

[81] For Oliver's involvement in the building of the Monument see below.

[82] B.L. Sloane, 5238, 72; reproduced in *WS*, 5: Plate xxvi. That this drawing survives amongst Hooke's personal papers and that it is not signed by Wren on behalf of the King suggests that it was not submitted to the City. It bears a reasonably close resemblance to the carving as executed and possibly represents a final design. The drawing is incorrectly attributed to Wren in Moore, 1998: 506.

scaffolding reference mentioned above, the first mention of the carving in the City records comes in June 1673 when the sculptor Caius Gabriel Cibber was paid for 'for carving the Hieroglifick Figures' on the base of the Monument.[83] Hooke's drawing must therefore predate this payment. Cibber was paid seven more times by the City with the last payment dated 9 September 1675. These payments covered his carved relief panel of Charles II coming to the assistance of the City as well as the griffins and arms of the City that sat on top of the pedestal.

By August 1674 Hooke was able to note in his diary that the masonry of the column had reached 'in height 250 steps' – the Monument as executed has 345 steps – and the following year the City's attention turned to the ornament that would provide the termination for the column.[84] Again a similar administrative process was followed. This time, however, the City Lands Committee decided to request formally that Wren, as Royal Surveyor, submit a report with advice to the City for their surveyors to peruse. Their motives for doing this were to ascertain Wren and, crucially, the King's opinions before they approached them with final designs for approval. Indeed the Committee's request, issued on 14 July 1675, reveals that Wren was to form an intermediary between the City and the King, whose opinions were sought equally:

> It is ordered that Sir Christopher Wren Kt., Surveyor Genall of his Majesty's Works, be attended with the Request of this Comittee that he would be pleased to signifye in writing under his hand, upon or before this day sennight, what sort of Finishing upon the top of the new erected Obelisq in Memoriall of the Fire most approved by his Majesty, and the materialls dimen[si]ons and an Estimate if the charges if each

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[83] G.L. 184/4, fol. 41v. *WS*, 5: 50. For information on Cibber's sculptures on the Monument see Ward-Jackson, 2003: 262-265; and Stevenson, 2005: 52-60.
[84] 7 August 1674; *Diary*: 116.

> particuler thereof and of the Balcony and Rails to be made neer unto the top thereof for the better direceon of this Compleating of the said worke...[85]

Wren then submitted his report, accompanied by a number of drawings. Both the report and the drawings were prepared without Hooke's input. Indeed the first mention of them in Hooke's diary comes in the entry for 27 July 1675, the day they were submitted to the Committee when he recorded that he had been 'With Sir Ch. Wren about Report of Monument'.[86] Fortunately the report and the drawings survive and they reveal the formal nature of Wren's correspondence with the City.[87] In the report Wren records that he had consulted the King and that between them they had concluded that 'a large ball of metal guilt would be the most agreeable, in regard it would give an Ornament to the towne at a great distance'.[88] This solution is shown in an accompanying drawing, in the hand of Wren's draughtsman Edward Woodroofe, showing the column as executed but with a hypothetical gilded ball atop (Fig. 35).[89] This drawing survives amongst Hooke's drawings in the British Library and has been used in recent scholarship as evidence that Wren designed the main shaft of the column, as it depicts it as executed in the hand of his draughtsman.[90] This scenario would assign this Woodroofe drawing to 1671, when the shaft was designed. However, the drawing was undoubtedly produced in 1675 to accompany a set of smaller drawings also submitted with Wren's report. In the text, Wren tells the committee that had discussed other possibilities with the King including a statue and a phoenix. These possibilities are represented by smaller detailed drawings, either in

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[85] C.L.R.O. Orders, 3, fol. 47. *WS*, 5: 46. Sennight; an archaic word for a week, or seven nights (and days). Moore, 1998: 516-517.
[86] *Diary*: 171.
[87] The report was transcribed from the original by Elmes in 1823, a copy can be found in *WS*, 5: 46-47. It is discussed in Moore, 1998: 516-522; Cooper, 2005: 202-203; and Stevenson, 2005: 55-57.
[88] *WS*, 5: 47. Moore, 1998: 517; Stevenson, 2005: 57.
[89] B.L. Sloane, 5238, 78. For the attribution of this drawing to Woodroofe see Geraghty, 2001: 479.
[90] Cooper, 2003: 200; Downes, 1982: 66.

Wren's or Woodroofe's hand, which were crucially drawn to the same scale as the Woodroofe elevation of the whole column, allowing the City to see each contingent atop the already constructed shaft.[91] Of these drawings, one depicts an alternative design for a gilded ball in Woodroofe's hand (Fig. 36), a second shows a design for a statue of Augusta in Wren's hand (Fig. 37), and the third and final drawing is of an urn, carrying the City's arms, also in Wren's hand (Fig. 38).[92] A drawing of a phoenix was not submitted with the report as this possibility had been ventured in Hooke's original designs for the column prepared in 1671, and the model Wren had commissioned of that design. In the report Wren also advised the Committee that although a phoenix was 'the ornanment of the wooden Modell of the Pillar' he could not recommend this scheme as 'it will be costly, not easily understood at that highth, and worse understood at a distance and lastly dangerous by reason of the sayle, the spread winges will carry in the winde'.[93]

Wren then weighed up the merits of a statue, adding that it was not that his Majestie disliked a Statue' for it would carry 'much dignitie with it; and that which would be more valuable in the eyes of Forreiners and Strangers'.[94] As the City had requested, Wren estimated that the cost of a brass statue, 12 feet high, would come to about £1,000; he also noted that a 15 foot statue might be more appropriate but more expensive. However, his final advice to the City was that the gilded ball option would be the most 'acceptable of any thing inferior to a Statue, by reason of the good appearance at distance, and because one

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[91] As is apparent from the original document in the British Library, the drawing of the gilded ball in Woodroofe's hand accompanying the column elevation was executed on a separate piece of paper and subsequently attached to the main elevation.

[92] These three drawings are all located amongst the Sloane manuscripts in the British Library, B.L. Sloane, 5238, 70, 71 and 77. They are reproduced in *WS*, 5: Plate xxxvii. I am indebted to Anthony Geraghty for help identifying the draughtsmanship of these drawings. For a discussion of Wren's drawing of a statue of Augusta see Stevenson, 2005: 56-57.

[93] *WS*, 5: 47. Moore, 1998: 517.

[94] *WS*, 5: 47. Moore, 1998: 517.

may goe up into it, and upon occasion use it for fireworks'.[95] Perhaps Wren's recognition of the advantages of having access into and through the ball was acknowledgement of the Monument's borrowing of the form and dual function from the Colonne Astrologique in Paris, the large urn of which was built of iron bars, allowing for visual access through the column. Crucially, the tone and content of Wren's report is advisory throughout. Ultimately the City Lands Committee had jurisdiction over the final design and Wren made it very clear that if they had other ideas he would happily approve of them and sign them. In particular, if a statue was 'more acceptable to the City', Wren was prepared to 'most readilye present the same to his Majestie'.[96] Just as the report was advisory the drawings accompanying it were illustrative: they were created to aid the City in its deliberations. They should not be treated as evidence of Wren's authorship of the termination. Instead they were intended to give the City an idea of what Wren and the King thought would be best. Initially the City followed Wren's advice and the day after the Committee had heard the report, Hooke recorded in his diary that he had 'Received orders about the Ball and Railes about the Column'.[97] The journal of the Committee that day recorded that:

> After several debates, It was at length resolved and is accordingly ordered that a ball having been approved of by his Majesty should be placed upon the top of the new Cullumne... in order thereunto that Mr Robert Hook be desired forthwith to treat with the Cityes founder, and such Workmen as he shall Judge to be honest and able, for making a globe of wood covered with Copper, double gilt and lined with brasse, of nine foot diameter... And he is desired also to use the same care in discoursing and treating with the City smith and others concerning the Balcony Raile, which is to be placed neer the top of the said Pillar.[98]

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[95] *WS*, 5: 47.
[96] *WS*, 5: 47.
[97] 28 July 1675; *Diary*: 171.
[98] C.L.R.O. Orders, 3, ff. 50-51. *WS*, 5: 47. Moore, 1998: 520; Stevenson, 2005: 57.

Hooke's diary over the next few months records his negotiations with various London metal-workers over the contract for a gilded ball.[99] At one point he spoke to Wren about it, meeting him at Whitehall to discuss 'the Ball of the Columb'.[100] This was presumably for more advice, and it is perhaps significant that the two met in Wren's office, suggesting a certain formality to the meeting.

Hooke and the City Lands Committee were still working on the idea of a ball on 8 September when he recorded that he was 'given power to agree for Ball and Balcony'.[101] However, a mere three days later their plans had changed. On 11 September 1675 Hooke visited Wren to collect the drawing depicting a hypothetical urn that had been shown to the City the previous month with Wren's report (Fig. 38).[102] It seems that at some point Hooke

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[99] On 1 August 1675 Hooke met with a brazier named Wilks who offered the copper for the ball 'at about £2 per pound'; *Diary*: 172. Three days later he talked with the coppersmith Robert Bird whom Hooke had employed at the College of Physicians, he 'demanded 2sh. per lb for ball'; *Diary*: 173. The same day Hooke noted that another smith called Gubber 'would doe ball for 1sh.6d per lb'; *Diary*: 173.

[100] 3 August 1675; *Diary*: 172.

[101] By 'power to agree' Hooke was referring to the ability to negotiate final contracts with workmen; *Diary*: 179.

[102] Hooke's diary entry for 11 September 1675 has been misinterpreted in the past, for example in Moore, 1998: 520. In the entry he records that he had been 'To Sir Chr. Wrens. Received Draught of Urne'; this has been taken as evidence that he was picking up a design by Wren, the construction of which he would oversee. However such an interpretation is contradicted by the fact that over the course of the next few weeks Hooke records making designs for the urn himself and receiving royal approbation for them. Instead the entry for the 11 September could suggest that Hooke was picking up his own designs that Wren had been showing to the King for approval. Again further evidence from the diary would seem to suggest otherwise, as Hooke makes no reference in entries prior to the 11 September entry to preparing designs for an urn or giving them to Wren for approval. Instead the entry must refer to Wren's drawing of a hypothetical urn that was shown to the City with his report on 27 July 1675. Hooke was no doubt collecting it as a guide for when he came to make his own design, as to what exactly what the King might agree. This reading of the diary reference is reinforced by the fact that the day after Wren submitted his report to the City Hooke records in his diary that he had collected the two drawings 'of Pillar Ball [this word was incorrectly transcribed in 1935 by Robinson and Adams as 'Hall'] and Statue' but crucially not that of the urn; 28 July 1675; *Diary*: 171. That Hooke already had Wren's other two drawings of hypothetical terminations for the column makes it more than likely that it was the third drawing, that of the urn, that he collected on 11 September 1675. Yet more evidence for this scenario comes in the form of the provenance of the drawings and the report. While Wren had evidently kept the text of the report – it was found in a private collection in 1823 – it seems likely that Hooke was in possession of all the accompanying drawings (including that of the urn) at the time of his death as they were separate from the report in the early eighteenth century when they were deposited in the British Museum by Hans Sloane, either amongst Hooke's drawing collection or on loose sheets. For evidence of Sloane's acquisition of books from Hooke's private library after Hooke's death see Poole, 2006: 379-385.

had changed his mind and was now investigating the possibility of an urn, hence his desire to see the relevant illustration that had accompanied the report. The same day that Hooke collected the drawing he also talked 'about Urn' with the alderman Sir William Turner who 'approvd well of it if the King liked it'.[103] This suggests that Hooke had not yet told the Committee as a whole that his preference was now for an urn. Indeed, it is apparent that he wanted to establish prices before approaching the City with the new idea and it seems that Hooke turned to an urn for financial reasons. On 21 September 1675 he recorded in his diary that a coppersmith named Cole would produce the urn 'after Rate of 18d per pound for plaine, and 2sh.6d. for chaced work', a better offer than he could find for the ball, which suggests that the City wanted Hooke to be financially stringent in his dealings over the building of the Monument.[104] Hooke then presented his new idea to the City Lands Committee on 22 September proposing that a 'Figure of an Urne [was] most proper to be placed upon the Top of the new Cullumne on Fishstreet Hill'.[105] Crucially, he declared that an urn 'had been seen and approved of by his Majesty' but that he was currently 'undertaking to procure a testimony under Sir Christopher Wren's hand of his Majesty's approbacon thereof'.[106] As Hooke had yet to finalise the design of the urn, his assurance to the Committee that the King was content with the change of plan must refer to his possession of Wren's suggested design. Certainly he did not record in his diary that he had any contact with the King himself.[107]

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[103] 11 September 1675; *Diary*: 180.
[104] 21 September 1675; *Diary*: 181. For a detailed discussion of the City's financial situation during the rebuilding see Reddaway, 1940: 171-199.
[105] C.L.R.O. Orders, 3, fol. 54r. Moore, 1998: 520.
[106] C.L.R.O. Orders, 3, fol. 54r.
[107] Although Hooke had, throughout the 1670s, reasonably frequent contact with the King over the patent for his spring balanced watch, at no point in his diary does he ever record meeting with Charles II to discuss business relating to the rebuilding work in the City. Instead, all contact in that respect was mediated through Wren.

Hooke then recorded designing the urn in the next few weeks. He 'drew' it on 1 October 1675 and the next day took the drawing to a carpenter named Bullock who made a wooden model of Hooke's final design.[108] Fortunately a preliminary drawing by Hooke for the urn survives, previously misidentified as a design associated with one of the City Churches (Fig. 39).[109] The drawing, which survives amongst the Royal Society's papers, is in Hooke's hand and depicts an urn approximately seven feet across – too large to adorn any City Church. Instead, the dimensions are far closer to those of the final termination of the Monument. Crucially, the drawing shows an urn with a vertical hollow core allowing a clear sight line through it, further evidence of an association with the Monument and its internal zenith telescope rather than with a City Church. This drawing is also notable as it depicts an object very different from the urn as suggested by Wren. As the final structure more closely resembled Wren's hypothetical suggestion it is possible that Hooke drew this preliminary design before he had collected the Royal Surveyor's drawing on 11 September 1675. Hooke then oversaw the founding and construction of the urn as well as the iron balcony that surrounded it.[110] On 25 January 1676 he saw the completed product at the

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[108] *Diary*: 184.

[109] The drawing is reproduced by Jardine but misinterpreted as a design for a decorative urn associated with a City Church; Jardine, 2003a: between 85-87.

[110] See Iliffe, 1995: 303. The Committee first mentioned the balcony and railing on 14 July 1675 when they requested that Wren prepared his report (see above). In the report, Wren recommended that the balcony 'must be made of substantial well-forged worke, there being noe need, at that distance, of filed worke and I suppose (for I cannot exactly guess the weight), it may be well performed and Fixed, according to a good designe, for fourscore and tenne poundes, including painting'; *WS*, 5: 47. The next day Hooke noted in his diary that he had attended 'Guildhall Committee Received orders about the Ball and Railes about the Column'; *Diary*: 171. The City Lands Committee the same day ordered Hooke 'to use the same care [as with the gilded ball] in discoursing and treating with the City smith and others concerning the Balcony Raile, which is to be placed neer the top of the said Pillar'; C.L.R.O. Orders, 3, ff. 50-51. On 27 August 1675 Hooke met with the 'Lord Mayor who gave [him] directions to agree with brasiers for Ball and Balcony'; *Diary*: 177. On 20 September 1675 he talked to the City's own blacksmith Thomas Hodgkins and agreed with him 'for balcony; *Diary*: 181. On 6 October he 'delivered in 2 Contracts' to the Committee; C.L.R.O. Orders, 3, fol. 60r; *WS*, 5: 48. However on 20 October 1675 Hooke attended the 'Committee of City Land... Hodgkins work to deer'; *Diary*: 189. That day the City records claimed that 'Upon reading the two Contracts and some debate thereupon, Mr Hodgkins was called in and Ordered to for bear proceeding upon the said Balcony, and forthwith to bring in two or three barrs thereof to Mr [John] Man, and Sir Richard Forde, Sr Richard Piggott and Mr [Thomas] Heatly [all Aldermen of the City of London and members of the City Lands Committee, see

workshop of the coppersmith Robert Bird, whose contract to found the urn had been agreed by Hooke and the City on 28 September 1675.[111] He then recorded weighing the urn and as a result the Committee felt that 'some extra work [would be] required for setting up the Urne on the Column' due to the structure's considerable weight.[112] This was presumably the iron frame that the Committee then ordered to be built in May 1676 to secure the urn.[113] Once again they desired Wren's advice on this structure as well as his approval on behalf of the King and on 3 May 1676 the Committee:

> ordered that Mr Hooke and Mr Oliver, Surveyors of new buildings doe attend upon Sr Xpofer Wren Kt, Surveyor to his Majesty's Works, to have his direcon and the King's approbacon concerning the Copper and Iron Worke allready done and to be done, about the Urne appointed to be sett upon the Top of the public Cullumne on new Fishstreet Hill.[114]

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relevant entries in Woodhead, 1965] at the request of this Committee did agree to meet tomorrow morning and to consider of and discourse with such persons as they thinke Fitt concerning the said Contracts'; C.L.R.O. Orders, 3, fol. 60r. The next day, 27 October 1675, Hooke was 'At Guildhall' and claimed in his diary 'Piggot a Dog. Oliver and Hogkins the like'; *Diary*: 190. It seems that Piggot had, without Hooke's knowledge, negotiated with a smith called William French for on 10 November it was recorded in the Committee orders that 'Sir R. Forde and Sir R. Piggott and Mr Heatly did deliver in A Contract made with one William French the tenor... It is Agreed this eighth of November 1675. between the Com[mittee] of City Lands and Mr William French of London, Blacksmith, that he shall make a Ballcony of good stuffe and Substantiall Iron, Workmenlike according to the Modell Agreed upon by Mr Hooke the City Surveyor on the piramides standing by Fishstreet Hill betwixt this and the eighth of January next [...] This was read and approved but "as there is no such model" it is referred to the said Sir R Ford, Sir R Piggot and Mr Heatly, who are desired to take Mr Oliver to their assistance, "to perfect the said agreement and transact the particulars thereof with Mr French" Hodgkin's account if to be audited'; C.L.R.O. Orders, 3, ff. 63-64. *WS*, 5: 48. Hooke's diary suggests that he felt his official duties as surveyor had been bypassed by Piggot, apparently with his fellow surveyor John Oliver's help.

[111] Hooke had worked with Bird on numerous City Churches and later that year Bird would make the golden ball that sat atop the anatomy theatre of the College of Physicians. On 28 September 1675 Hooke recorded in his diary that he had 'Agreed with Bird Urn at 19d. per pound for plain work'; *Diary*: 183. Despite Hooke's claim on 20 November 1675 that Bird had 'bungled' the urn it was half finished by 16 December 1675 and complete the next month; *Diary*: 195, 210. See Iliffe, 1995: 301-303; and Moore, 1998: 532n.

[112] *Diary*: 214. *WS*, 5: 48.

[113] After Hooke had reported the weight of the urn to the Committee he visited the 'Piller at Fish Street Hill' on 5 April 1676 and while he was 'At top of it' he 'saw Balcony, directed about setting the urne'; *Diary*: 224. Two days later he met the Committee and 'Gave a draught and report of iron frame for urn'; 7 April 1676; *Diary*: 225.

[114] C.L.R.O. Orders, 3, fol. 96. *WS*, 5: 48.

The finished article was then placed on the column in July 1676.[115] As is obvious from the executed structure Hooke's design was similar in spirit to Wren's initial idea for the urn, but significantly different in its detailing (Fig. 2).

Wren's involvement with the Monument did not end there and the City contacted him on a number of further occasions, mainly to approve of and sign on behalf of the King the completed work. On 14 June 1676 the Committee asked Wren to view, with Hooke and Oliver, Cibber's completed stone carvings around the base of the Monument and to approve the overall value of the work.[116] In October 1676 after Hooke, Oliver and the City's quantity surveyors had drawn up the final bill for the master mason Joshua Marshall, Wren was asked by the Committee to view and sign the final paperwork.[117] After Marshall's death in April 1678 Wren was again asked to join Hooke and Oliver in overseeing that the payments to his widow were correct.[118]

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[115] On 14 July 1676 the Committee ordered the surveyors 'doe take care for the speedy putting up of the said Urne and collouring it with a Copper collour'; C.L.R.O. City Lands Committee Minutes (Rough), 3, fol. 59r. Hooke also recorded this order in his diary; *Diary*: 242.

[116] The Orders of City Lands Committee record that 'Sir Chr Wren [was] desired with the Surveyors of new buildings to view the worke done by Mr Gabriell Cibber at and about the Cullumne and certifye their opinions concerning the value thereof'; C.L.R.O. Orders, 3, fol. 103r. *WS*, 5: 48.

[117] On 18 October 1676 the Committee requested that 'Sir Chr Wren to be attended with a copy of [Marshall's] Contract and be pleased to inspect and view the worke and measures and quality and report'; C.L.R.O. Orders, 3, fol. 132r. *WS*, 5: 49.

[118] Hooke records that Marshall died on the 6 April 1678; *Diary*: 352. However it was not until 9 December 1678 that the Committee discussed the outstanding payments owed to him. On that day 'Katherine Marshall, widow, relict and Executrix of Joshua Marshall, deceased,' had appeared before the Committee and produced 'several Bills of work and materialls, by him done and provided, at the Cullumn erected on Fish Hill. The Committee then 'ordered and desired that Sr Xopher Wren Kt. Etc together with Mr Hooke and Mr Oliver, the City Surveyors, attended by Mr Leybourn [William Leybourn, a quantity surveyor occasionally employed by the City in that capacity; see Cooper, 2003: 208], do forthwith Consider of the said Bills, and worke therein menconed to be done, and satisfy themselves of the Quantity, Quality and Rates of the same and Report'; C.L.R.O. Orders, 3, fol. 216. *WS*, 5: 49. Following this, Hooke examined Marshall's account on 14 December 1678; *Diary*: 388. He then re-measured the stonework at the column on 16 December 1678; *Diary*: 388. He drew up the outstanding bills on 17 December 1678; *Diary*: 389. Finally, he visited Wren at Whitehall to discuss the accounts with him and to obtain his approval; 7 and 11 January 1679; *Diary*: 392-393. Hooke's report on the stonework survives in Oxford, Bodleian Library, Rawlinson MS B363, 6; see Cooper, 203: 205. Contemporary with these events, Marshall's death provoked a considerable argument between Katherine Marshall and Wren over unpaid bills for the City Churches, the details of which Hooke recorded in his diary; *Diary*: 393.

One figure whose involvement has yet to be discussed fully is John Oliver, Hooke's fellow City Surveyor. In fact the City regularly gave Oliver orders, like those given to Hooke, to oversee various tasks associated with the building of the Monument. Often Oliver would be jointly included with Hooke in the City's directions, as in May 1676 when the Committee ordered both Hooke and Oliver to obtain Wren's approval of the copper and ironwork around the urn.[119] In fact, much of the finishing of this work was overseen not by Hooke, but by Oliver, who on 5 July 1676 informed 'the Committee that one Mr Bowers [a copper smith], who had begun the ornamental worke about the Urne, is unwilling to proceed till he has some assurance what and when he will be paid'.[120] Oliver was then ordered to 'see the flames of the Urne be forthwith made, guilded, and sett up'. Another duty given to Oliver was to make and install '2 good substantiall doors for the [...] Columne', a request that no doubt arose because of the increasing number of suicides that had taken place from the top of the previously open Monument.[121] Overall, Oliver's involvement in the construction demonstrates that responsibility for the project lay with the City Surveyors only. In fact, he seems to have had far more day-to-day contact with the Monument than Wren ever had.

Once the urn and the balcony were complete, the final task left to the Committee and its surveyors was to complete the inscriptions on the Monument, including the long inscription that would adorn the north side of the pedestal. Although the conception of this

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[119] C.L.R.O. Orders, 3, fol. 97. *WS*, 5: 48.
[120] C.L.R.O. Orders, 3, fol. 107. *WS*, 5: 49.
[121] C.L.R.O. Orders, 3, fol. 125. *WS*, 5: 49. Hooke recorded the first suicide from the Monument on the 24 April 1676 noting that a 'Pick pocket broke his neck from Fish Street Hill piller'; *Diary*: 228. Inwood, 2002: 219.

inscription and its controversial history have been examined by recent authors, for the purposes of this chapter the involvement of Hooke, Wren and others needs to be established.[122] The Committee had ordered Hooke to gain Wren's advice on appointing 'such persons as they think most Fitting to make an Inscripcon for the said Collumne' in July 1675 when they accepted Hooke's plan for an urn.[123] It seems that in the case of the inscription the City wanted Hooke to consult a variety of authorities beyond Wren. Subsequently Hooke went to various acquaintances whose opinions he must have judged worthy of such a task. For example in March 1676 he discussed the inscription with the mathematician and Royal Society member John Pell, and later that year with the Society's former secretary and treasurer Abraham Hill.[124] Eventually Hooke turned to Wren and Thomas Gale, the Master of St Paul's school and previously the Regius Professor of Greek at Cambridge, to establish the wording.[125] Over the course of two days in October 1677 Hooke, Gale, Wren and various members of the Court of Aldermen discussed the inscription and by the end of their deliberations were ready to send Hooke to talk to masons about carving the lettering. [126] The Lord Mayor approved their plans ten days later. Although Wren and Hooke's opinions were sought by the Committee and Hooke had overall administrative control, it was Gale who seems to have had the most influence over the inscription, as demonstrated by the Court of Alderman's gift to him of a piece of plate

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[122] For complete transcriptions and translations of the Monument's three inscriptions see Welch, 1893: 29-33; see also relevant discussion in Moore, 1998: 505-511.
[123] C.L.R.O. Orders, 3, ff. 50-51.
[124] 27 March 1676; *Diary*: 223. 17 November 1676; *Diary*: 257.
[125] Hooke first recorded consulting Gale on 17 October 1677; *Diary*: 321. For information on Gale see *ODNB*, 21: 303-305.
[126] On 18 October 1677 Hooke recorded that he had been 'To Dr Gales about Inscription. To Court of Alderman. Attended all day on that affair' having spent the previous day with Wren and Gale 'till 10 at night' discussing the wording; *Diary*: 321. Hooke then talked to Wren again on 20 October and visited the mason Joshua Marshall on 22 October; *Diary*: 322. *Parentalia* records an unexecuted draught of the inscription purportedly by Wren but it would seem more likely that this was devised by Gale; Wren, 1750: 323.

'as a loving remembrance' in gratitude for his work.[127] Hooke recorded, in his diary, collecting the finished inscription from Gale to give to the carvers in summer the next year.[128] Where the wording of the inscription was concerned, the City and Hooke were far more ready to obtain advice and outside help, eventually delegating the work to Gale. This should not come as a surprise. As City Surveyor, Hooke's duties were clear and his position was dependant upon his expertise in matters relating to surveying, building and architectural design; they did not require a detailed knowledge of classical Latin memorial inscriptions. The inscription was therefore the only part of the Monument that was not under the control of the City Surveyors, and even then it was delegated to Gale rather than Wren.

In fact Wren's overall involvement in the designing and building of the Monument has been misunderstood, a scenario that presumably has its origins in the eulogising pages of *Parentalia*. Instead the City Surveyors, and in particular Hooke, can be credited with the design. Although in 1697 John Evelyn seemed under the impression that Wren had been responsible, the majority of contemporary references to the Monument name Hooke as its architect. As mentioned above, Aubrey lists the Monument amongst Hooke's 'designs in architecture' while Hooke himself made reference to his designs for the foundations of the structure in a lecture to the Royal Society in 1689.[129] Furthermore, when Wren briefly discusses the column in 'Tract 3' he does not claim credit for the design as Hooke does in his lecture.[130] Instead, Wren's input was limited to that of ratifier and formal advisor only.

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[127] *WS*, 5: 51.
[128] 1 August 1678; *Diary*: 369. Eventually the inscription would be carved by the mason Thomas Knight; see Knoop and Jones, 1935: 31.
[129] Aubrey, 1898: 411. R.S.J.B. 1689, 7: 219. Inwood, 2002: 140.
[130] Soo, 1998: 168.

Whilst Wren's advice was broadly followed and his influence and guidance shaped the design, the finished structure consisted overwhelmingly of Hooke's original ideas.

THE CITY CHURCH OFFICE

Throughout his period of employment with the City of London Hooke was also a salaried member of the City Church Office in Whitehall, which was headed by Wren. The workings of this office in the 1670s and 1680s are well documented but have again been misunderstood by recent architectural historians, in particular Paul Jeffery in his 1996 monograph on the subject.[131] As well as Wren and Hooke, a large number of other employees worked in the office. Recently Geraghty has done much to clarify our understanding of these figures and the nature of their involvement in the day-to-day running of the office.[132] However, Hooke's responsibilities when it came to designing and building the churches have yet to be disentangled from Wren's. As with the Monument, common consensus remains that they were in some way joint designers in the office and that authorship of the churches can be apportioned between the two.[133] Again I believe this to be a problematic notion and one that overlooks a significant body of surviving evidence.

The City Church Office was, unlike the committees of the City of London, a recently created administrative body; it had been devised by a Commission appointed in the 1670 Rebuilding Act consisting of the Archbishop of Canterbury, the Bishop of London,

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[131] Jeffery, 1996. Jeffery's claims are repeated in Jardine, 2002: 294-306.
[132] Geraghty, 1999a; Geraghty, 1999b: 240-245; Geraghty, 2000: 1-14; Geraghty, 2001: 474-479.
[133] Jeffery, 1996: 93. See below.

and the Mayor of London.[134] Given that so many of the parish churches of the City had been either destroyed or seriously damaged, whoever was chosen to oversee their rebuilding faced an enormous administrative task. In May 1670, the month after the Act was passed, the Commission chose Wren to 'direct and order the dimensions, formes, and Modells of the said Churches'; in other words to establish the overall plan, lay-out and design of them.[135] Wren was also to head up an office based in Whitehall that would collectively administer the rebuilding work. The Commissioners also appointed two assistants to Wren, whose responsibilities were for 'surveighs, Contracts, Accompts and Propositions'.[136] The men chosen were Hooke and Woodroofe. As the Commissioners made clear, Hooke and Woodroofe's roles in the office were to oversee all aspects of the execution of Wren's designs; their positions were administrative and did not include responsibility over designs. The office itself was in Scotland Yard in Whitehall, probably in the building occupied by the Office of Works, also headed up by Wren.[137] Wren's own house was adjacent to this building, and Hooke's diary reveals that a certain amount of City Church business took place in these more informal surroundings.[138] As Hooke visited the Whitehall office and Wren's house frequently – often on a Tuesday – exactly what happened in the Office, and specifically what he did on these visits, needs careful examination beginning with design responsibilities.

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[134] 22 Charles II, c. 11. As Jeffery shows the Act did not actually name this group as Commissioners but they soon became known by that title; Jeffery, 1996: 26. The Commissioners met regularly to check on the progress of the churches and Hooke's diary suggests that he sporadically attended these meetings; 19 April 1675; *Diary*: 159; 14 June 1676; *Diary*: 237; 20 September 1676; *Diary*: 250. In August 1678 Hooke also had to get the Lord Mayor's approval for £1500 to be distributed amongst various workmen for the churches; 31 August 1678; *Diary*: 374. As Geraghty shows, Hooke's presence at these meetings is also recorded in the Commissioners' Order Book (G.L. 25540); Geraghty, 1999a: 24n.

[135] G.L. 25540, 1, ff. 1-2. For an examination of the circumstances behind Wren's appointment to this role see Geraghty, 1999a: 19.

[136] G.L. 25540, 1, fol. 2. See Geraghty, 1999a: 24.

[137] For further information on the location of the City Church Office see Geraghty, 1999a: 42.

[138] See for example; 9 September 1673; *Diary*: 59; 27 June 1674; *Diary*: 109; 8 August 1674; *Diary*: 116; 19 September 1674; *Diary*: 122.

As Colvin demonstrates, many of the designs of the furnishings and small details of the churches were drawn up on site.[139] However, the overall plans and designs of the churches originated from the Office, which would issue sets of drawings to contractors. Much recent literature on the City Churches has concentrated on the possibility that Hooke was responsible for the design of a number of these overall schemes for the churches. Jeffery in particular has suggested that Wren tended to delegate design responsibility to Hooke when he was too busy and that now 'we may be reasonably sure that what he did not do was done by Hooke'.[140] Beyond the surviving drawings, he points to a record of the first meeting of the Church Commissioners on 13 June 1670. In this meeting the Commissioners declared, following the Act, that:

> Dr Christopher Wren, Surveyor General of his Majesty's Works, Mr. Robert Hooke and Mr Edward Woodroofe are hereby required to repair forthwith the aforesaid churches and take an account of the extent of the parishes, the sites of the churches, the state and conditions of the ruins and accordingly prepare fit models and draughts to be presented for his Majesty's approbation[141]

As Jeffery correctly observes, this order is a more detailed and more specific instruction as to how the churches should be rebuilt than that set out by the Act of Parliament. However, it is less specific than the orders issued by the Church Commissioners in May 1670, cited above, which had crucially given Wren sole responsibility over 'the dimensions [and] formes' of the churches.[142] Instead, the record of the Commissioners' meeting in June 1670 would seem to represent an order to Hooke and Woodroofe to aid Wren in the production

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[139] Colvin, 1999: 195-196. Colvin establishes this with reference to St. Mary Aldermary, which was administered differently to the other City Churches as it was paid for by a private benefaction, rather than from the Coal Money.
[140] Jeffery, 1996: 36-37. See the relevant review by Geraghty, 1997: 336-337.
[141] G.L. 25540, 1, fol. 3. Jeffery, 1996: 31.
[142] G.L. 25540, 1: ff. 1-2.

of drawings and possibly the building of wooden models of his designs.[143] As set out below, there is evidence that both assistants spent time in the Office preparing drawings for Wren in this manner. It is incorrect to see this document as proof that Hooke and Woodroofe were given responsibility for the designing of the churches, as that task had already been allocated to Wren by the Commissioners in their previous, more detailed orders.

Jeffery then claims (seemingly without evidence), that an informal system, delegating responsibility for the designs of the churches on geographical lines, was in place in the office. This, he suggests, was drawn up roughly along the lines of the City administration's loose division of the post-fire city into three areas, each allocated to one of the three surveyors (including Hooke), for the purposes of surveying the damage caused and allocating plots for re-building.[144] In the case of the City Church Office, Jeffery concludes, Hooke took the churches in the east of the City (his area of responsibility as City Surveyor), Wren the west, with Woodroofe adopting responsibility for the designs of those churches in between.[145] Given that the City Church Office was administratively separate from the City of London it seems strange that they should have chosen to do this. Furthermore, Jeffery admits that 'there is now no documentary evidence of this decision and few indications remain to suggest how it was implemented'.[146] Instead, he claims that as the majority of churches first built by the Office were located in the north and eastern parts of the City, some form of geographical division must have taken place. It seemed

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[143] There are no surviving wooden models of the City Churches, although there is no reason to assume that none were made; see Geraghty, 1999a: 7-8.
[144] As City Surveyor Hooke had responsibility for the East of the City, although as Cooper has shown this division was not strictly adhered to; Cooper, 1997: 169.
[145] Jeffery, 1996: 36. See Geraghty, 1997: 336.
[146] Jeffery, 1996: 36.

logical to Jeffery that Hooke must have had responsibility for the east of the City as that was where he lived and that Wren had the west because that was where St. Paul's Cathedral was located.[147] As such a system cannot be substantiated and would in fact contradict the orders of the Church Commissioners it should therefore be rejected.

The only evidence to suggest Hooke was responsible for design in the office comes from two sources. Firstly, it has long been argued that a number of the churches bear the characteristic hallmarks of Hooke's Dutch influenced, architectural design and can therefore be attributed to him on stylistic grounds.[148] While there are perhaps some superficial similarities between Hooke's privately designed buildings and a few of the churches, such an appraisal would again seem to contradict the orders issued by the Commissioners. Furthermore, Chapter 1 demonstrated that Wren was an equally avid collector of architectural information as Hooke was, and there is no reason why Wren could not be responsible for the resemblance of some of the churches to contemporary Dutch architecture. More convincing evidence can be gleaned from surviving drawings of the churches, a number of which are in Hooke's hand. However, in a telling illustration of the pitfalls associated with relying too heavily on this method of historical research the number of Hooke's drawings for the City Church Office has been misrepresented as a result of an incorrect attribution of a drawing to him. Summerson's suggestion in 1953 that Hooke was responsible for an elevation for St Edmund the King Lombard Street in All Souls (Fig. 40) has led to a number of other drawings in the same hand, associated with various City

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[147] According to Jeffery, Hooke and Wren both took over Woodroofe's area as he was too busy with his responsibilities as Surveyor to St. Paul's Cathedral and Westminster Abbey. Fortunately, we are told that Woodroofe 'was not a man of ideas', and therefore unsuited to architectural design in the first place; Jeffery, 1996: 37.

[148] For example see Summerson, 1993: 192; Jeffery, 1996: 81-87, 93-97.

Churches, also being attributed to Hooke.[149] These include a (probable) further elevation of St Edmund the King (Fig. 41); another elevation of an unidentified church in the Fielding Papers in Warwickshire County Record Office (Fig. 42); an elevation of an unidentified church at All Souls (Fig. 43); and two drawings (a plan and an elevation) for St Clement Danes, currently held in the USA (Fig. 44).[150] These attributions have, in part, led to the assumption that Hooke was responsible for the designs of these and possibly other churches.

In fact, as recent scholarship has shown, the St Edmund the King elevation in All Souls – attributed to Hooke by Summerson – was made by Edward Pearce, a master mason whose drawings survive for various other churches.[151] Consequently, the drawings listed above can now be said to be by Pearce as well. Following the reattribution of these drawings it becomes more difficult to find drawings of City Churches in Hooke's hand. The following are the only examples that can be comfortably said to be by Hooke. Firstly there

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[149] A.S. 2, 44. Summerson, 1993: 237.

[150] W.C.R.O, Feilding, CR 2017/B1/2; W.C.R.O. Feilding, CR 2017/B1/1; A.S. 1, 60 (reproduced in Geraghty, 2007: 87). The two drawings of St Clement Danes are held by the Cherokee Ranch and Castle Foundation, Sedalia, Colorado but are reproduced by Summerson, 1970: figs. 12 and 13.

[151] Pearce's hand is similar to that of Hooke's (their use of grey wash and free hand sketching of details is very alike) and a number of his drawings have been wrongly attributed. Most notably a design for Lowther Castle in Carlisle County Record Office, wrongly attributed to Hooke in Colvin, Mordaunt Crook, Friedman, 1980: 23-24. It is in fact by Pearce; Colvin, 2008: 793. Also in Pearce's hand are a number of elevations of ceremonial gates; reproduced in Stevenson, 2006: 35-74. Pearce's name does not appear in the City Church accounts, however as Geraghty has shown, small-scale drawings of details in Pearce's hand survive; Geraghty, 2007: 103. The large-scale elevations of St Edmund the King in Pearce's hand are anomalies, probably owing to the fact that a parish dispute led to the design being brought before the Privy Council. Certainly the presence of Wren's signature guaranteeing royal approbation would link the drawing to this Privy Council hearing as no other drawing for the city churches carries such an inscription; Geraghty, 2007: 86. In addition to Pearce's work on the churches a number of entries in Hooke's diary suggest that he worked as a draughtsman in an informal capacity for Hooke. On 13 September 1674 Pearce visited Hooke's lodgings and the two of them 'Compleated Designe', Hooke then paid Pearce 10 shillings for 'house view' on 16 September and 'brought home draught' from Pearce's on 18 September; *Diary*: 121. Judging by Hooke's reference to a 'house view' and the informal nature of the exchanges (they took place at Hooke and Pearce's private homes rather than in the City Church Office), it would seem that these 'draughts' were presentation drawings for a private domestic commission possibly Montagu House, the design of which Hooke was working on during that period.

are a series of elevations for St Benet Thames Street, currently split between All Souls and a private collection in the USA (Fig. 45).[152] Here the draughtsmanship closely resembles that of a number of confirmed Hooke drawings in the British Library.[153] Another single drawing in Hooke's hand exists in Sir John Soane's Museum, showing a preliminary design for the steeple of St. Benet Gracechurch (Fig. 46).[154] Finally, a further set of drawings for St James Piccadilly may be tentatively attributed to Hooke as the draughtsmanship is similar to his and in no way resembles any other known draughtsman in the City Church Office (Fig. 47).[155] However, a case can be made for the unique nature of these drawings, as St James Piccadilly was not strictly built by City Church office, and was instead privately commissioned.[156]

Despite the paucity of surviving drawing for the churches in Hooke's hand it is still claimed that designing constituted an important part of Hooke's work in the office. Indeed it is tempting to suggest from the set of drawings for St Bennet Thames Street and the preliminary elevation of the steeple of St Benet Gracechurch, that Hooke was therefore responsible for the design of these churches. However such an assumption would contradict evidence from Hooke's diary as well as the records from the office. In fact there is not a single piece of evidence, beyond these drawings, which suggests that he was employed as designer of churches in the office. Furthermore, it is highly dubious that these drawings

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[152] Two of the drawings are at All Souls: A.S. 1, 63. and A.S. 1, 59. Geraghty, 2007: 99, 100. The remaining six are currently held by Cherokee Ranch and Castle Foundation, Sedalia, Colorado although five are reproduced in Summerson, 1970: figs. 10, 11a, 34, 11c, 23. The final drawing can be found in Harris, 1971: 227. See Geraghty, 1999a: 122-125, 194-195.

[153] The Hooke drawings they are closest to in terms of technique are an elevation for the stables at Somerset House, London; B.L. Sloane, 5238, 89. As well as an elevation for Ragley Hall, Warwickshire; B.L. Sloane, 5238, 60; see Chapter 2.

[154] Sir John Soane Museum Drawing Collection, 111, 2. This drawing is discussed in Jeffery, 1996: 132. I am indebted to Gordon Higgott, who confirmed Hooke's authorship of this drawing.

[155] These drawings are all held in All Souls Library: A.S. 2, 44; A.S. 2, 68; A.S. 1. 74; A.S. 1, 73; A.S. 4, 78; A.S. 4, 79. All are reproduced in Geraghty, 2007: 93-95.

[156] Geraghty, 2007: 93; *SL*, 29: 31-55.

represent proof of Hooke's agency in church design. After all, the presence of surviving drawings by Woodroofe and other office draughtsmen such as Thomas Laine have not led to any claims by historians that they were in some way responsible for the designs of the churches in question.[157] That Hooke should be the subject of so much speculation surrounding the designs of the City Churches is entirely due to the fact that he was the only other figure below Wren in the office that pursued a significant, separate career in private architecture, until the arrival of Nicholas Hawksmoor in 1684.[158] Instead, the St Benet Thames Street and St Benet Gracechurch drawings probably represent evidence that Hooke was very occasionally used as a draughtsman in the office. Significantly, the St Benet Thames Street drawings have been dated, by Geraghty, to immediately after Edward Woodroofe's death and it may have been the case that Hooke, as Wren's only other assistant, was standing in for Woodroofe as draughtsman in the office for a temporary period until the appointment of Laine.[159] This would explain their uniqueness as an almost complete set of church drawings in Hooke's hand. One should not assume however that these drawings represent his own designs. If he was standing in for Woodroofe, then Hooke would have been expected to produce drawings of Wren's designs. However, instead of draughtsmanship, it seems that the majority of Hooke's duties lay elsewhere. This is hardly

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[157] As mentioned above, it was assumed by Jeffery that Woodroofe did not possess sufficient artistic imagination to design churches. However, Woodroofe had been employed as Surveyor to Westminster Abbey since 1662 and had probably overseen restoration work to the Abbey church in the 1660s; see Geraghty, 2001: 474. As demonstrated above an appointment to the position of an official surveyor to a large institution in this period normally required a degree of competency in architectural design even if the opportunity to use that skill did not arise.

[158] For Hawksmoor's role in the Office in the 1690s see Geraghty, 2000: 1-14.

[159] As Geraghty shows, there is one drawing of the church in Woodroofe's hand, drawn before his death in 1675, whilst the rest are all in Hooke's hand and probably date to summer 1677 when the Commissioners allocated money to the rebuilding (the drawings were given to the master-mason in November 1677); Geraghty, 2007: 99. This suggests that Hooke drew the St Benet, Thames Street drawings whilst acting as a temporary draughtsman until Laine arrived in July 1677 (Laine first appears in the City Church Office records in this month); Geraghty, 1999b: 241.

surprising as he was by no means as accomplished a draughtsman as figures such as Woodroofe and Laine.

Although Hooke's diary does not cover the first two years of the church rebuilding, it can be assumed that Hooke was initially involved in the surveying of the plots of land on which the churches sat. After all, one of responsibilities the Commissioners gave to Wren's assistants was for 'Surveighs', and Hooke already had considerable experience as a surveyor through his work for the City. Indeed Hooke was still sporadically surveying the sites of churches in the period covered by his diary. For example on 16 July 1673 Hooke, with Wren, conducted a 'view' of the site for St Mary Magdalen, Old Fish Street while on 1 March 1675 he made another 'view', this time for St Martin's Ludgate.[160] Hooke also spent a lot of time overseeing building work, and one can assume that his numerous visits to churches on a day-to-day basis in the 1670s were for general appraisals of the situation on site.[161] Another key duty of Hooke's was to liaise with parishes. This normally took the form of a meeting on site with churchwardens and other representatives and lunch in a tavern. For example on 4 March 1673 Hooke, with Wren, met the parishioners of St Stephen Walbrook in a tavern on Fish Street Hill to discuss the state of affairs at the church, while throughout early 1675 he regularly met with parish representatives of St. Martin's Ludgate to discuss the demolition of the old church's tower.[162] In addition to these

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[160] *Diary*: 51, 150. 'View' was Hooke's standard way of referring to a building survey in his diary; see Cooper, 2003: 151.

[161] Hooke's visits to various City Churches, recorded in his diary, are too numerous to list and a significant number of churches received his attention in person over the course of the years covered by his diary. Perhaps of special mention are the series of visits to St Martin's Ludgate in spring 1675, where Hooke oversaw the dismantling of the old tower of the church; see below and 8 March 1675; *Diary*: 151; 17 March 1675; *Diary*: 153. Jeffery, 1996: 265.

[162] *Diary*: 32, 143-145.

instances there are numerous other examples, in his diary, of Hooke working on site with parish members to ensure that Wren's designs were being appropriately carried out.

As Hooke was often paid a small gratuity from the parish on these occasions, the accounts of the individual churches also document his frequent presence on site, surveying, measuring or liaising with church representatives. For example on 2 January 1674 the parish accounts of St Bartholomew-by-the-Exchange record that Hooke was given 2 shillings for 'the Surveying of the Steple', whereas the churchwardens' accounts of St George Botolph Lane document a small payment to Hooke on 15 September 1676 after 'he came to look upon the old Foundation of the Church'.[163] Importantly, the parish records also contain references to Hooke's fellow assistants Edward Woodroofe and John Oliver carrying out similar duties on site with the parishes, often in the company of Hooke and Wren. Thus the churchwarden's accounts for St Clement's Eastcheap document a visit from 'the Doctor [Wren] and Mr. Woodrufe and Mr. Hooke, the three Surveyors' on 11 August 1672, while a parish meeting took place at St. Benet Fink in 1672 'with Mr. Hooke and Mr. Woodroofe' who were given six shillings for their troubles.[164] Woodroofe's replacement, Oliver, was also paid a gratuity for his visits to parishes: for instance he was given seven shillings by the parish of St.Michael's Queenhith 'about setting out the Steeple' as well as an unspecified amount for attending seven meetings with the parishioners of St. Andrew's, Wardrobe in 1692.[165] These references demonstrate that Hooke's duties, with the exception of draughtsmanship, tended to match those of his fellow assistants in the office.

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[163] *WS*, 19: 10, 20. Significant sections of the parish records of the churches are published in the Wren Society.
[164] *WS*, 19: 16, 9.
[165] *WS*, 19: 6, 42.

Additionally, they further highlight the perceived administrative nature of surveying in institutional architectural practice in this period.

The majority of Hooke's time both in the City Church Office and on site was spent dealing with contractors. He frequently recorded in his diary that he had signed various workmen's bills during visits to the office, often having established previously if the work had been satisfactorily completed.[166] For example in July 1677 he visited St Stephen's Coleman Street with Wren to view and discuss the mason Joshua Marshall's work and a month later in the office 'Passd Mr Marshalls bill for Coleman Street'.[167] In another diary entry Hooke noted that he had 'Passd Whitings [Thomas Whiting, master joiner] and also Lathums [Jasper Latham, Master Mason] last bill' and that 'Sir Christopher would have them past and allowed without abatement, would warrant the particulars and that they were reasonable'.[168] Further evidence for Hooke's involvement in the signing of contractor's bills comes from the City Church Office records where numerous contracts carry Hooke's signature as confirmation of work completed.[169] Hooke would also oversee the drawing up of workmen's contracts. To give two examples, on 9 April 1677 he agreed the master mason Christopher Kempster's contract about 'Garlick hill church [St James Garlickhythe]', whilst a year earlier had 'Agreed with [Joshua] Marshall about St. Brides [Fleet Street] church tower'.[170] Hooke was also heavily involved in the auditing of the

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[166] Contractors working on the City Churches were on the whole employed 'by measure', therefore their bills required approving and signing by a representative of the office; see Geraghty, 1999a: 56-57; Colvin, 2008: 18-19.
[167] 14 July 1677; *Diary*: 301; 16 August 1677; *Diary*: 306.
[168] 3 May 1677; *Diary*: 288; 29 April 1676; *Diary*: 229.
[169] Instances of Hooke signing contracts are too numerous to list but can all be found in the City Church contract books; G.L. 25542. See Geraghty, 1999a: 57-59.
[170] *Diary*: 284.

office's accounts and on one occasion he and Wren 'Stayd to make up accounts till night'.[171]

Thus Hooke's employment in the City Church Office consisted of carrying out administrative tasks. Far from being Wren's unofficial 'partner' and architectural collaborator, Hooke was the equal to his fellow assistant Woodroofe in the office, as a comparison between the two demonstrates. As Geraghty had shown, Woodroofe's duties, like those of Hooke, included contracting with craftsmen, passing bills and making site visits.[172] Unlike Hooke, Woodroofe was also employed as a major draughtsman in the office and a large number of drawings for City Churches survive in his hand. This is hardly surprising as he was Wren's principal draughtsman for St Paul's Cathedral and an extremely accomplished architectural draughtsman in general.[173] However over the four years in which Woodroofe worked in the office, Hooke's salary was almost identical to his, and it likewise matched Woodroofe's successor, John Oliver, for the rest of the duration of Hooke's employment under Wren.[174] It seems likely therefore that Hooke made up for not being involved in the production of drawings for the churches by carrying a greater proportion of other administrative duties than his fellow assistant. Woodroofe's replacement, Oliver, does not seem to have been employed as a draughtsman either, as Thomas Laine was employed as the main Office draughtsman from 1677, thus taking over

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[171] 9 September 1673; *Diary*: 59.
[172] Geraghty, 2001: 475. As Geraghty shows, much of the evidence for Woodroofe's daily duties also comes from Hooke's diary.
[173] For background on Woodroofe and the attribution of drawings to him see Geraghty, 2001: 474-479.
[174] Hooke's salary is outlined in G.L. 25548, fol. 11. For a comparison of Hooke and Woodroofe's salaries see Geraghty, 1999a: 41. Oliver's salary is outlined in G.L. 25541, 4, ff. 3-5; see Geraghty, 1999a: 35. I can find no evidence, either in Hooke's diary or in the official records of the City Church Office, to warrant Jardine's claim that Wren paid Hooke additional sums of money during the 1670s; Jardine, 2003a: 152.

Woodroofe's drawing responsibilities.[175] Instead, one must assume that Oliver, like Hooke, spent much of his time on site, carrying out similar duties. Hooke himself seems to have considered his position in the office to be equal to that of Woodroofe and Oliver rather than Wren. This becomes apparent when for a few weeks in 1675 Hooke believed that Wren was giving Woodroofe preferential treatment, thus contravening the orders of the Commission in 1670. In May 1675 Hooke noted in his diary that Woodroofe was 'in favor' and ten days later suspected that Woodroofe was receiving a larger salary with 'Sir Ch. Wren unwilling to let me have any money though Woodroofe had £50'.[176] Hooke's suspicions that Wren was giving Woodroofe preferential treatment were in fact unfounded as he received his £50 a month later.[177] It is clear that he considered himself the equal of Woodroofe in the office, a position the Commissioners had envisaged in 1670. Furthermore he carefully ensured that he and Woodroofe were treated equally.

In the case of the City Church Office, evidence from both Hooke's diary and the office's official records shows that Hooke, like Woodroofe, did not transgress from the responsibilities allocated to him as Wren's assistant. These were clearly defined as administrative; the responsibility for designing the churches lay in Wren's hands. As was the case with Greenwich Royal Observatory, to attribute church designs to Hooke on the basis of stylistic comparison would be to ignore documentary proof that Wren was responsible. Instead the evidence is entirely consistent with the modus operandi established

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[175] For Thomas Laine's appointment see Geraghty, 1999b: 240-241. Presumably it was decided that the number of drawings produced by the office necessitated the creation of a further position. That Hooke's set of drawings for St Benet Thames Street and the elevation of the steeple of St Benet Gracechurch both seem to date to before Laine's appointment suggests that the burden on Woodroofe was so great that Wren decided to remove the responsibility of drawing from his assistants after Woodroofe's death and instead delegate it to figures such as Laine.

[176] 15 May 1675; *Diary*: 162; 25 May 1675; *Diary*: 161. Hooke's suspicions arose from the fact that Woodroofe was paid £50 a month earlier than Hooke; see Geraghty, 1999a: 41.

[177] See Geraghty, 1999a: 41.

in the Commissioners' initial orders. In this respect Hooke's employment in the City Church Office resembles his experience working for other institutional bodies. Although the Board of Ordnance, the City of London and the City Church Commissioners followed different models of administrative practice, one thing is clear, agency in architectural design under their command could not be an informal, collaborative phenomenon. Instead, institutional buildings in this period were designed and administered by office-holders, who did not stray from the limits of that office.[178] Collaboration between Hooke and Wren, a common feature of the early Royal Society, did not exist in architectural design as far as the institutional sphere was concerned.

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[178] In this respect institutional architectural designing and administering bears a close resemble to other bureaucratic phenomena which were administered along fairly standardised lines. For example, as the economic historian Michael Braddick has convincingly shown using examples of provincial tax officers in the late seventeenth-century, holding office was a process that was carried out 'with reference not just to the formal limits of office but to a wider social role and was asserted through the reproduction of relatively standardised performances'; Braddick, 2000: 75-77. Just as Braddick's early modern officer-holders 'wore their "magistrates hat" when attending to state business' so Hooke and Wren performed their duties within institutions in a relatively standardised way, behaving as their office's dictated.

CHAPTER 4

EXPERIMENTAL PHILOSOPHICAL ARCHITECTURE:

HOOKE'S COLLEGE OF PHYSICIANS

Thus far, this thesis has concentrated on the socio-cultural premises by which the interface between architecture and the early Royal Society operated. It has been predominantly concerned with the processes of architectural design and building, how Royal Society members carried out those out, and how those processes were determined by the Society and other external factors. This chapter will take a specific architectural project and examine it in depth. Crucially, the project in question – Hooke's College of Physicians and specifically its anatomy theatre (Fig. 4) – was commissioned by an organisation with close links to the Royal Society. In fact, few if any of Hooke or Wren's architectural commissions could be said to have such close links with the Society's programme of experimental science.[1] However, as this building is very under-researched, this chapter will also shed light on the nature of Hooke's involvement with its design and construction.[2]

In his discussion of Hooke's architecture, Summerson proposes that the anatomy theatre at the College of Physicians should be understood as the product of a scientific

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[1] This fact is briefly acknowledged by Hentie Louw who notes in a general discussion of Hooke's architecture that the theatre 'benefited from Hooke's own experience as an experimental scientist and lecturer and it is, not surprisingly, the closest he came to designing an architectural "instrument"'; Louw, 2006: 198.

[2] Beyond brief discussion of the College of Physicians in the general literature on Hooke's career, there exists only one specific study of the building: a short 1916 article which mistakenly attributes the design to Wren; Stratton, 1916: 68-72. Very brief summaries of its design and construction can be found in Clark, 1964: 328-333; and for a brief discussion of design within the context of anatomy theatres in general see Brockbank, 1968: 371-384.

mind. The conical lantern of the anatomy theatre was, in Summerson's words, 'an empirical invention more strange than beautiful'.[3] Despite the brevity of Summerson's account of Hooke's contribution to British architecture and his overall dismissal of Hooke's architectural designs as 'mechanical and insensitive', his deployment of the language of science – 'empirical,' 'mechanical' – to describe buildings such as the anatomy theatre is noteworthy. He is right to see the design of the anatomy theatre as 'scientific', but for the wrong reasons. Instead of identifying a formal resemblance between the theatre's design and experimental science brought about by a scientific cast of mind, I will make the claim that Hooke's patrons allowed him to bring experimental philosophical theory to bear directly and deliberately on the architecture of the theatre. As Adrian Forty has straightforwardly asserted: 'There is no reason why scientific knowledge should be applied to buildings, or anything else, unless it is someone's interest to do so'.[4] However, in the case of the College, unequivocal interest in applying contemporary science to architecture existed, primarily because of the close links between the Royal Society and the College of Physicians. In particular, a small group of physicians – who were all members of the Society – oversaw the rebuilding work and liaised closely with Hooke throughout the designing and building. This chapter will explore the ways in which contemporary scientific methodology could be deliberately applied to an architectural design to aid the facilitation of scientific practice, and in this case performance, through architecture.[5] I will argue that, in the late seventeenth century, if architecture was to achieve such facilitation it had to overcome the basic premises of experiencing architectural spaces that predominated in the period.

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[3] Summerson, 1993: 238.
[4] Forty, 1983: 61. Forty was here referring to modern hospitals and the unlikelihood that their architecture was influenced by contemporary medical thought. Stevenson, 2000: 4.
[5] For a discussion of the facilitation of science through architecture in the early modern and modern periods see Galison and Thompson, 1999: 1-28; and with specific reference to European spaces of anatomical presentation; Schwarte, 2005: 75-102.

THE COLLEGE OF PHYSICIANS

The College of Physicians of London was founded in 1518.[6] By 1666 it had evolved into a group of about thirty fellows whose primary responsibilities were to ensure high standards in medical practice throughout the capital and to promote research into cures and treatments. As a group they also held regular anatomy lectures, the nature of which will be outlined below. The College had always resided in the City and had previously been based in Knightrider Street and in Amen Corner. The College buildings destroyed by the Great Fire had only been built in the 1650s to the designs of John Webb and from a benefaction from the most famous of their alumni, William Harvey.[7] Prior to 1666 the group had primarily been concerned with arguments over medical jurisdiction in the capital. Although election to the College nominally represented membership of London's medical elite, other groups, such as the Barber-Surgeons Company and the Society of the Apothecaries, also tried to exercise control over medical practitioners, with the results that relations between the institutions were often fraught with tension.[8] The Fire came as a particularly heavy blow for the physicians, who were still reeling from the defeat of their new charter in Parliament (brought about by the Apothecaries and Surgeons' opposition) and who had only just seen off the threat of a new society, the Chemical Physicians, in an acrimonious pamphlet war during the 1665 plague crisis.[9]

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[6] For an overview of the College's early history and homes see Clark, 1964.
[7] On the Harvey's library and repository in the previous College see Newman, 1969: 299-307; and Bold, 1989: 165-166. No visual record of the Amen Corner building survive but extant drawings in Webb's hand show what was probably the final design; Harris and Tait, 1979: 35.
[8] For a detailed account of the College's struggles with these other groups see Cook, 1986: 133-182. Although the Barber-Surgeons opposed the College's new charter the relationship between these two organisations was not universally hostile. In fact a number of the physicians, such as Christopher Terne and Charles Scarburgh, both of whom are discussed below, were members of both the College and the Barber-Surgeons Company. As Cook demonstrates, the College's opposition to the Society of the Apothecaries and the Chemical Physicians was considerably more explicit.
[9] Cook, 1986: 153-160.

Another organisation with which the College had to contend was the Royal Society. Although the new Society had an epistemological programme considerably broader than the medical and physiological interests of the College, it was granted privileges in its 1662 charter that had previously been the preserve of only specialist medical organisations. In particular the charter allocated the right to conduct human anatomy, thus legally equating the Royal Society with the existing medical companies:

> they [the Royal Society] and their successors from time to time may and shall have full power and authority from time to time, and at such seasonable times, according to their discretion, to require, take, and receive the bodies of such persons as have suffered death by the hand of the executioner, and to anatomize them, in such ample form and manner, and to all intents and purposes, as the College of Physicians and the Corporation of Surgeons or our City of London have used or enjoyed, or may be able and have power to use or enjoy, the same bodies.[10]

The 'Corporation of Surgeons' was undoubtedly the Barber-Surgeons' Company which, along with the College of Physicians, was the only other organisation in London to be legally granted the right to conduct anatomy prior to 1662.[11] The fact that the charter also allocated this right to the Royal Society demonstrated the aspirations of the new organisation in the field of medical research and investigation. This, of course, was an area in which the College of Physicians claimed jurisdiction and as a result there was initial opposition within the group to the Royal Society, as Harold Cook demonstrates.[12]

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[10] The Royal Society's first charter, in Latin, is published in Weld, 1848, 2: 491; it is translated online at Royal Society.org. See Frank, 1997: 87-98. The charter's stipulation that anatomy could only take place at 'seasonal times' refers to a general consensus that the dissection of freshly deceased human bodies could only take place in colder months to avoid faster decomposition. For information on the practicalities of anatomical demonstrations in London see Sawday, 1995: 54-66. For anatomical demonstrations that took place in Royal Society meetings see below; Frank, 1997: 90-95; and Booth, 2005: 116-118, 121-127.

[11] Sawday, 1995: 56.

[12] Cook, 1986: 162-163. Much of this opposition arose from a distrust of experimental science on behalf of a number of the College's senior physicians; see Cook, 1990: 418-421.

Any animosity that might have existed between the two groups did not last long, because large numbers of physicians joined the Royal Society in its early years. Many of these individuals were founding members, including Charles Scarburgh, George Ent and Francis Glisson, all three of whom held influential positions on the College's ruling comitia by 1666.[13] Indeed, Glisson was president of the College from 1667 to 1669 and was succeeded by Ent, who held the senior position in the organisation until 1675.[14] The fact that the re-building of the College took place under presidents who had been founding members of the Society is of considerable significance. Other College physicians who had been members of the Society from its inception or had joined early in its existence included Timothy Clarke, Thomas Coxe, Walter Charleton, Jonathan Goddard, Christopher Merrett, William Petty, and Thomas Willis.[15] Of the physicians named in the early membership lists of the Royal Society, Clarke, Ent, Goddard and Petty were also nominated to the Society's first council.[16]

Younger physicians such as Petty and Willis had attended Oxford University with Boyle, Wren, and Hooke, and their presence at the genesis of the experimental philosophical group was to be expected. However, the reason for the equal prominence of older physicians in the Society's origins was in part due to the history of

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[13] Munk, 1878: 253, 224, 219. For detailed examinations of the role physicians played in the founding of the Royal Society see Gillespie, 1947: 210-225; Hall, 1975: 421-452; and Frank, 1980: 45-63. For an opposing view, that the relationship between the College and the Royal Society has been overstressed see Booth, 2005: 111. Although Booth is right to advise caution in stressing the influence of the Royal Society in the published work of College physicians such as Walter Charleton, she does not discuss evidence from sources such as Hooke's diary which shows a high level of interaction between physicians and Royal Society members in the 1670s. Additionally she does not take into account the simple fact that the College of Physicians directly employed Hooke – as prominent a member of the Royal Society as could be – to design their new buildings following the Great Fire.

[14] Munk, 1878: 218, 223. Glisson had in turn succeeded Edward Alson as president. Alston was a physician who held, according to Cook, considerable reservations about the Royal Society's claims to the carrying out of medical research; Cook, 1986: 163. Alston was deposed dramatically when he revealed to the College's ruling comitia that he had, in negotiations over the re-building of the College, signed a lease on an unsuitable piece of land in Cannon Street in the City. This led to Alston's disgrace and his retirement from College affairs, leaving no physician hostile to the Society on the comitia; see Clark, 1965: 328-329; and Cook, 1986: 162-163.

[15] Munk, 1878: 258, 247, 390, 240, 315, 270, 338.

[16] Birch, 1757, 1: 4.

experimental learning in the College prior to 1660. This tradition was relatively separate from the Oxford based groups to which Hooke and his associates belonged to and could claim credibility from William Harvey instead. Although Harvey's complete adherence to experimental method is a matter for debate, his belief that observational medical research was to be prioritised over the authority of ancient texts is explicit in his writings.[17] Ent, Glisson and Scarburgh were acquaintances of Harvey and saw themselves as the inheritors of this observational tradition.[18] Scarburgh had been Harvey's closest confidant, whilst Ent, to whom Harvey had left the task of dispersing his library within the College, had edited, prefaced, and published Harvey's *De Generatione* in 1651.[19] Ent had also produced an impassioned defence of the Harvey's theory of circulation and of observational medical research in general entitled *Apologia Pro Circulatione Sanguinis*, published in 1641.[20] Glisson's own anatomical work on the liver, *Anatomia Hepatis* (1654), was an observation-based examination of the organ in the traditions of Harvey and, along with Ent and Scarburgh, he had attempted to turn the College into a Baconian research club during the Interregnum, when many of the more conservative Royalist members of the College had kept a low profile.[21] Additionally, the surviving manuscripts of Glisson's anatomy lectures at Cambridge, when he was the Regius Professor of medicine at the university, also feature numerous observational discoveries consolidating Harvey's model of the circulatory system and confirming that the liver was not the manufacturer of the blood that it had once been held to be.[22]

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[17] For a detailed discussion of Harvey's observational method see Frank, 1980: 16-20; and Wear, 1983: 223-249. For discussion of recent literature on Harvey and experimental method see Johns, 1999: 1128-1131.
[18] See Frank, 1980: 22-25; and Hunter, 2003: 219.
[19] *ODNB*, 18: 466; and Frank, 1979: 99.
[20] See Brown, 1977: 30.
[21] Munk, 1878: 220. The Baconian nature of the College of Physicians, and its links to Civil War politics, is discussed at length by Webster; Webster, 1967: 410. For an appraisal of this work see Hunter, 2003: 218-219.
[22] These lectures are discussed in Frank, 1997: 83-84.

Other physicians joined the Society throughout the 1660s, most notably Daniel Whistler, who, as well as being a qualified physician, had been Hooke's predecessor as Gresham Professor of Geometry from 1648 to 1656.[23] Collectively, these physicians saw themselves as integral participants in the Royal Society's epistemological programme. This is apparent from the contents of a letter written in 1668 by Clarke to Henry Oldenburg, which outlines the experimental credentials of the Society's physicians:

> Bacon and Gilbert produced great specimens of the true philosophy; and our physicians (Harvey, Glisson, Ent, Wharton, Willis and others) have made known nothing that was not thoroughly demonstrated; nor by excessive haste, did they yield green fruit.[24]

Additionally, Goddard, in a 1670 text, recommends that a young physician should 'apply his study to Natural Philosophy, such as is more real and solid in this Age, by many happy Experimental Discoveries in Nature'.[25]

The Royal Society, for its part, was eager to pursue links with the College, and it was even suggested that the two institutions could share a home after the fire.[26] This proposal was eventually rejected, perhaps because the College's educational and professional mandate necessitated – unlike the Society's – a set of specialised buildings.

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[23] *ODNB*, 58: 489.

[24] Oldenburg, 1967, 4: 362. For Oldenburg and Clarke's correspondence see Hall, 1971: 117-118, 123-24. The presence in Clarke's list of Thomas Wharton, who was another senior College physician, is odd given his apparent opposition to the Royal Society. In 1673 he penned a lengthy attack on the Society claiming its experimental practices were ruinous to 'our old and settled and approved practice of physick' and even named Boyle as being particularly culpable; cited in Hunter, 1981: 138. However, he had been another acquaintance of Harvey and perhaps when Clarke wrote this letter in 1668 Wharton had not disclosed these feelings about experimental philosophy.

[25] Goddard, 1670: 13.

[26] Cook, 1986: 165. In 1660, during the founding of the Society the minutes record that it had 'been suggested [...] that the college of physicians would afford convenient accommodation for the assemblies of the society, upon supposition, that it were granted and accepted of, it was thought reasonable, that any of the fellows of the said college, if they should desire it, be admitted likewise as supernumeraries, upon condition of submitting to the laws of the society, both as to the payment on their admission and the weekly allowance, and the particular works or tasks, that shou'd be allotted to them'; Birch, 1757, 1: 5.

However, the physicians remained valued members of the Royal Society. Sprat, in his *History of the Royal Society*, praises those physicians who, despite being committed to furthering medical research, 'have also with great zeal, and ability, promoted this *universal inspection*, into all *Natural knowledge*'.[27] Sprat also lauds the College, claiming that 'ever since its first foundation, for the space of a hundred and fifty years, [the College] has given the world a succession of the most eminent Physicians of Europe'.[28] Members of the Royal Society who were not physicians held the College in high esteem; to them it was an organisation whose philosophical credentials matched those of their own society. After the Fire those same Royal Society members saw the need for the rebuilt College to match the aspirations of its physicians. Evelyn, whilst drawing up plans for the rebuilding of the city in 1666, wrote that 'the College of Physicians would be in one of the best parts of the town, encircled with a handsome piazza for the dwelling of those learned persons'.[29] When the College was eventually built Evelyn expressed his displeasure at its location. He notes in his diary 'Tis pitty this Colledge is built so near new-gate Prison and in so obscure an hole'.[30] On his plan for the rebuilding he carefully marked the College in a prominent position, west of St. Paul's cathedral on one of the main thoroughfares of his imagined city (Fig. 48). Even in the immediate aftermath of the fire Royal Society members were thinking about the College's new home. It was a crucial part of their plans for the rebuilt London and they envisaged a grand set of buildings in appropriate surroundings.

The actual re-building of the College and its anatomy theatre was overseen by a group of physicians, many of whom had strong links to the Royal Society. Once the

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[27] Sprat, 1667: 130.
[28] Sprat, 1667: 130.
[29] Evelyn, 1995: 343. This quote is from Evelyn's *London Redivivum* (published in Evelyn, 1995: 335-345), a short text he wrote immediately after the fire outlining his proposals for the new city. See also Van Eck, 2003: 79-86.
[30] Evelyn, 1955, 4: 307.

Warwick Lane site had been decided upon, the College's comitia appointed a committee to oversee the building works and find an architect for the work.[31] Established on 8 February 1670, the committee comprised President Glisson, Clarke, Coxe, Ent, Scarburgh, Samuel Collins junior, John Micklethwaite, Nathan Paget, Henry Stanley, and William Staines (or Stanes).[32] As we have seen, Glisson, Clarke, Coxe, Ent, and Scarburgh were all founding members of the Royal Society whilst the rest of the committee had played no part in the scepticism towards experimental philosophy that had been present in the College in the early 1660s. The committee was instructed 'to take care of everything that was necessary for the building of the new house and go to the Royal Surveyor, or any others whom they should chose' and to 'come to terms with carpenters, masons and others at their discretion'.[33] Members of the committee would have known Wren personally and it is significant that the College treasurer's book from the period names Scarburgh as the intermediary between Wren and the physicians, who gave £21 to Wren in March 1670 for his troubles.[34] It is suggested in *Parentalia* that Wren had been Scarburgh's assistant briefly when the physician was the anatomical lecturer at the Barber-Surgeons Hall in 1649 and although this has since been questioned it is nonetheless apparent that the two had known each other since the 1640s.[35] Their acquaintanceship must have been renewed during the weekly meetings of the Royal Society during the 1660s, and it is not surprising that it was Scarburgh who negotiated with Wren on behalf of the physicians.

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[31] The Physicians had bought the land from the Dean and Chapter of St. Paul's in December 1669, as is revealed by the College's Annals; R.C.P. 2298, 150; see Clark, 1964: 330.
[32] R.C.P. 2298, 151. For biographical material relating to these physicians see relevant entries in Munk, 1878. There is a very brief summary of the building work, taken from the College annals in Gunther, 1920-1961, 7: 395-396.
[33] R.C.P. 2298, 151.
[34] On 22 March 1670 the College Treasurer gave the money to 'the Beadle for Sr. Ch: Scarburgh by him presented to Dr Wren for the Colledg'; R.C.P. 2077, 20. Although Wren's involvement in the College was assumed by a number of authors including Jardine, these references to him in the College's archive have escaped scholarly attention.
[35] For a discussion of the *Parentalia* reference and Wren's acquaintanceship with Scarburgh in the 1640s see Bennett, 1976: 59-63.

Wren, however, did not become the architect of the College of Physicians, and the College soon began negotiations with Hooke instead.[36] In a College comitia on 22 December 1670 the committee was 'authorized to agree with workmen for the building [...] and all things concerning it, and that they intreat Mr. Hook the Surveyor his assistance in it and management of it in such a way as shall bee agreed upon by the said committee'.[37] The College then voted a payment of twenty guineas for Hooke's 'care and pains'.[38] That the physicians went to Wren and then to Hooke is demonstrative of the close links between the committee charged with rebuilding the College and the Royal Society. At the very least it reveals the lack of opposition to the Society amongst the College authorities at the beginning of the 1670s. As is apparent from Hooke's diary, he counted Scarburgh, Ent and Glisson amongst his friends and they and other physicians formed an important part of his social life. As Espinasse observes, Hooke 'was on very intimate terms with Ent,' and this close friendship extended to the periods before and after the rebuilding.[39] Therefore the physicians' choice of Hooke as the architect for their new buildings, although significant, is not surprising. The College and its rebuilding committee, with all its links to experimental philosophy, had appointed one of the Royal Society's most prominent members to design their new home. They had also appointed someone entirely qualified in this regard; Hooke had been the City

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[36] Wren's dealings with the College did not end in early 1670. As outlined in Chapter 3, the College sought Wren's advice on best location for the anatomy theatre in 1674. Additionally, a series of letters that survive in the British Library reveal that the College approached Wren again sixteen years later in 1686 and asked him to supervise some repairs to the College's library which involved moving one of the chimneys and temporarily taking down the wainscot in the great dining room above; B.L. Sloane, 3984, ff. 245v, 246r. The College also asked John Evelyn for his advice on the new library; Evelyn, 1955, 4: 307. Why the physicians did not approach Hooke, the original architect of the library, is unclear. There is certainly no suggestion from the surviving sources that the College was unhappy with Hooke's performance as their architect in the 1670s.

[37] R.C.P. 2298, 155.

[38] R.C.P. 2298, 155.

[39] For the physicians in Hooke's social life, and specifically Ent, see Espinasse, 1956: 128-129.

Surveyor since 1667 and, as discussed in Chapter 2, had undertaken a small number of private commissions prior to 1671.

The buildings that Hooke designed for the physicians were arranged around a quadrangle with the anatomy theatre on the east side (Fig. 49). The main College house was built on the opposite side with houses for the College chemist, beadle, and one of the fellows to either side. This courtyard arrangement echoed a French *hôtel*, with a *corps-de-logis* connected to a *cour d'honneur* by the two identical wings of the chemist, beadle and fellow's houses. The seven-bay College house, the first of these buildings to be erected, was begun in 1671 and completed in early 1675 (Fig. 50).[40] Two preliminary drawings, in Hooke's hand, which bear close resemblance to the executed building, survive (Figs. 51 and 52).[41] A large, classical, two-storey structure, the house was fashionably adorned with swags, consoles and pilasters; Ionic on the ground storey and Corinthian on the first (Fig. 50). At roof level a triangular pediment interrupted a series of dormer windows with alternating round and triangular pediments. A decorative lantern with an iron balcony rose above the house, offering views out over the city.[42] Inside, the building contained a large dining room, a library, kitchens and a large garret

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[40] Foundations were being dug by 16 January 1671 when the College made payments to labourers for that purpose; R.C.P. 2077, 22. Construction had begun by the 15 July 1671 when the College made its first payment of £100 to the master mason Abraham Story; R.C.P. 2077, 22. The College held their first comitia in the College House on 25 February 1675; R.C.P. 2298, 172.

[41] These two drawings are currently held in the British Library and the Feilding Papers in Warwick. The elevation in Warwick (Fig. 51), would appear to be the earlier of the two designs at it bears less resemblance to the executed building; W.C.R.O. Feilding, CR 2017/B1/4. It shows part of the façade of the house joined to what seems to be an early design for the fellow's house on the north side of the site. The presence of the fellow's house suggests that the drawing probably dates from after the comitia on 7 April 1671 when the physicians first mentioned to Hooke their plans for the buildings either side of the courtyard; R.C.P. 2298, 156. The second drawing in the British Library (Fig. 52) must be later; B.L. Sloane, 5238, 57; reproduced in *WS*, 5: plate xxxiii. Compared to the first design the Ionic columns and swags have been extended into the two outer bays either side of the house and a pediment has been added to the design. Although this pediment was only one bay wide and segmental, a closer examination of the drawing reveals that Hooke had roughly sketched a triangular, three bay pediment underneath. This would have been very similar to the pediment on the executed building.

[42] Colsoni, 1710: 15. See Stevenson, 2008: 222.

for drying herbs.[43] The houses either side, which had astylar three-storey facades complete with the alternating dormers on the roof, were begun in 1671 and 1672 and were again completed by 1675.[44] An unpublished watercolour among the Gough Maps in the Bodleian Library shows that the College house was faced in stone in contrast with the brick of the fellows' house (Fig. 4). The beadle and chemist's houses must have been likewise brick, thus maintaining symmetry across the court. The anatomy theatre was built above an octagonal, stone loggia which served as a gate for the College beyond. Its design and construction will be discussed in detail below.

Crucially the physicians with whom Hooke had the most contact throughout the building work were Royal Society members Ent, Scarburgh and, despite his absence from the rebuilding committee, Daniel Whistler.[45] It tended to be one of these three that Hooke contacted with regards to workmen's bills. For example, in the first entry in his diary relating to the College of Physicians on 6 April 1672 Hooke ordered £100 for the master-mason Joseph Lem from Ent.[46] That same day Micklethwaite, the treasurer of the College, recorded Lem's payment in the College accounts.[47] Hooke also negotiated with the physicians over the design of the buildings. In August 1674, for example, Scarburgh suggested to Hooke that an iron balcony be erected at the College, presumably the one on the lantern of the College house (Fig. 50), while on 19 August 1674 Hooke recorded in his diary that he had 'set out to a truth Sir Ch: Scarbor's new

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[43] A detailed account of the interior of the College's buildings can be found in the present-day College's archive; R.C.P. 2245, fol. 28v. See Knight, 1841: 26 for a lengthy description of the great dining room.
[44] In early 1671 Hooke was asked by the College's comitia to 'treat with persons concerning the fellow's house and front houses, and give an account thereof to this committee'; R.C.P. 2298, 156. By June that year it was decided that houses for the chemist and beadle would be built on the south side of the College, and in March the following year a comitia proposed that the fellow's house be built opposite; R.C.P. 2298, 158, 164.
[45] Whistler was appointed College Registrar in 1674, which may explain his constant involvement. He was also a close friend of Hooke's and therefore may have been acting informally; Espinasse, 1956: 128.
[46] Henderson, 2007: 137.
[47] R.C.P. 2077, 24.

whim of Iron Balcony'.[48] Crucially Hooke consulted the physicians extensively over the design of the theatre. He met Whistler in 1673 'about Theater'.[49] Scarburgh then paid Hooke £20 to produce a wooden model of the theatre.[50] The physicians were evidently impressed, and on 7 March 1674 Ent engaged Hooke to make another financial estimate of the theatre, which he did the next day. Later that year Hooke sought Scarburgh's approval for the final site of the theatre. On 7 August 1674 Hooke records that he had 'Propounded open theater. agreed to. Sr Cha. Scarborough pleasd'.[51] A few days later Hooke set out the theatre on site to Scarburgh's satisfaction.[52] As will be discussed below, Hooke was in constant consultation with the physicians over the moving of the proposed site of the theatre earlier that year. Therefore the College of Physicians was built by a group of Royal Society members, and designed by a Royal Society architect who consulted his patrons extensively throughout. Furthermore its anatomy theatre was built as a venue for lectures had much in common with presentations of scientific knowledge in the Society. It is to that subject I now turn.

THE CUTLERIAN ANATOMY THEATRE

It seems that the physicians always intended to build an anatomy theatre in their post-Fire complex of buildings. Whether their previous home on Amen Corner had an anatomy theatre is the subject of debate, as no images of the pre-fire buildings survive. There are a number of references to some form of theatre at the old College, including

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[48] *Diary*: 118. A smith named Parsons built the balcony and was subsequently paid £17 by the College in September 1674; R.C.P. 2077, 30.
[49] 7 April 1673; *Diary*: 38.
[50] 24 January 1674; *Diary*: 82. On the 14 April 1673 Hooke had commissioned a carpenter named Coffin to build the model (*Diary*: 39), and paid him 20 shillings on 25 April 1673; *Diary*: 41.
[51] It is unclear exactly what Hooke meant by 'open theater', in this entry; *Diary*: 116.
[52] *Diary*: 117.

two entries in Evelyn's diary.[53] A brief note in the College Annals also refers to the refurbishment of a theatre in 1641.[54] Regardless, after the Fire the physicians had several motives for building a new venue for anatomy lectures. Firstly, envy over the Barber-Surgeons' theatre existed within the College, as is apparent from a 1674 appeal to the members for funds for the rebuilding which compared the unfinished College, without an anatomy theatre, with 'the more magnificently rebuilt Theatre of the Surgeons'.[55] The appeal, which was composed by Whistler, demonstrates the envy the physicians felt when comparing their incomplete College with the Barber Surgeons Hall and its magnificent theatre.[56] More pressing than the need to outdo the Surgeons was the facilitation of the College's considerable lecture schedule, the nature of which needs to be considered here. The details of the College's main anatomy lectures are set out by Andrew Cunningham in his 1975 article on the different types of anatomy presentations that took place in seventeenth-century London.[57] The two main types provided by the College were the Lumleian lectures, founded in 1581 and the Gulstonian lectures, which were begun in 1632. The former were primarily an educational lecture series that were quite broad in their scope and to which young candidates for admission to the College

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[53] On 3 October 1662, Evelyn recorded that he had been 'invited to the College of Physicians, where Dr. Meret, a learned man and Library-keeper, showed me the library, theatre for anatomy, and divers natural curiosities'; Evelyn, 1955, 3: 338. Two years later, on 6 October 1664, he returned to hear 'the anniversary oration in praise of Dr. Harvey, in the Anatomy Theatre in the College of Physicians'; this is a reference to the College's annual Harveian Oration, which had been instated by Harvey to commemorate the College's past benefactors; Evelyn, 1955, 3: 379. For details of the Harveian Oration see Clark, 1964: 299.

[54] In 1641 a physician gave £100 'to adorn the Anatomical Theatre'. This is cited in an unpublished history of the College of Physicians in its archive; R.C.P. 2201, 59. A drawing in the Jones and Webb collection at the Royal Institute of British Architects for what looks like an anatomy theatre drawn in Webb's hand could represent this; reproduced in Harris, 1972: 13. Harris has demonstrated that most of the ratios between the different tiers in this drawing match those of Webb's final elevations for the main buildings.

[55] R.C.P. 2298, 170.

[56] The Surgeons' theatre, which is discussed below, had been damaged in the Fire and had been repaired under the supervision of Hooke – probably in his capacity as City Surveyor – in early 1673; see Espinasse, 1956: 95.

[57] Cunningham, 1975: 12-13.

had to attend.[58] By contrast the Gulstonian lectures specifically concentrated on organs or systems of the body, although they had been founded with the intention of focussing on different diseases.[59] Attendance at the Lumleian lectures seems to have been restricted to candidates and College members, whereas it is unclear exactly who could attend the Gulstonian lectures.

What is apparent, however, is that the College held some lectures in both their old home and their new theatre that non-members could attend. The evidence for this comes not from College sources but from the diaries of Royal Society members. On 24 March 1682 for example, Evelyn recorded in his diary that he had seen the physician Walter Charleton deliver a 'lecture upon the heart in the Anatomy Theatre at the College of Physicians'.[60] Hooke also attended 'Dr Charletons Lecture at Physicians Colledge' in the theatre he had designed on 8 March 1679.[61] As Booth has shown, these lectures, given by Charleton, were special presentations that were subsequently published.[62] The event that Hooke attended was one of a series of lectures by Charleton on the stomach; they were also the first to be held in the new theatre.[63] Evelyn witnessed one of a second series, this time concerning circulation and the heart.[64] Booth has extensively examined the contents of these lectures and although she concludes that

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[58] Cunningham, 1975: 12. As Cunningham shows the Lumleian lectures were originally a course of lectures that were 'closely stipulated, consisting mainly of surgical works, lectures being given twice a week over a period of six years; this fitted very well with the normal seven-year apprenticeship [for candidates]. Exactly how regularly these lectures actually took place is difficult to establish. However, using evidence relating to the lack of available human corpses in London, Sawday suggests that the College struggled to put on frequent anatomy lectures in its early years; Sawday, 1995: 55-57.

[59] For information on the Gulstonian lecture see Clark, 1964: 251.

[60] Evelyn, 1955, 4: 308. As noted above, Evelyn recorded attending the Harveian Oration in the College's Amen Corner home. Whilst this event was not an anatomy lecture it was held in the College's venue for anatomy in both the Amen corner and Warwick Lane sites; see Clark, 1964: 299. Evelyn's presence at a Harveian Oration suggests that non-members could be invited to this as well as lectures. For Evelyn's general interest in anatomy see Frank, 1997: 93.

[61] *Diary*: 402.

[62] The lecture that Hooke attended in 1679 was published in Charleton's 1680 *Inquiries into Human Nature*, whilst the 1682 lecture that Evelyn witnessed was included in *Three Anatomic Lectures* (1683); see Booth, 2005: 143-145, 227, 239-240.

[63] Booth, 2005: 227.

[64] Booth, 2005: 239-240.

Charleton was eclectic in his methods, she also notes that he was primarily concerned with highlighting anatomical discoveries to date.[65] Thus Charleton discussed recent anatomical discoveries and used them to build up a picture of the structure of the organs and systems in question. In this respect, whilst not being particularly experimental, or concerned with clinical or physiological practices, they were at least in line with the Royal Society's interests in collating observational, medical research. In this respect, the content would have been familiar to Hooke and Evelyn from the Society's own meetings.

A similar situation seems to have existed in the Barber-Surgeons' theatre, whereby the scientific elite could attend the company's lectures even if they were not members. For example, Hooke recorded on 8 March 1673 that he 'was at Chirurgions theatre wth Sr. Ch. Scarborough heard Dr. Needham Read of the head Dind there'.[66] The next year he was again 'at Dr. Needhams Lecture at the [Barber-Surgeons'] Theater'.[67] Walter Needham was anatomical lecturer at the Barber-Surgeons from 1673-1675 and a member of both the College of Physicians and the Royal Society.[68] The Barber Surgeon's theatre in Monkwell Street, built by Inigo Jones in the 1630s and the only building in the Surgeon's halls to survive the 1666 fire, was London's only other anatomy theatre (Fig. 53).[69] As opposed to Hooke's theatre we have a detailed account of a lecture in the Barber-Surgeons' theatre, courtesy of Samuel Pepys. Pepys, a Royal Society member and a future president of the group, visited Jones's theatre on 27 February 1663 and in a lengthy and well-known diary entry describes the proceedings

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[65] As Booth shows, Charleton's lectures on the stomach in particular were heavily reliant on the work of previously anatomists such as Glisson and Harvey; Booth, 2005: 145, 227.
[66] *Diary*: 33.
[67] As this diary entry comes before work on the College's theatre had begun, it must refer to the Barber-Surgeons' theatre; 9 May 1674; *Diary*: 102.
[68] For information relating to Needham see Munk, 1878: 472; and *ODNB*, 40: 335.
[69] For discussions of the Barber Surgeon's theatre see Harris and Tait, 1979: 9; Sawday, 1995: 76; Billing, 2004: 11-12; and Nunn, 2005: 4-6. The theatre was demolished in 1785; Colvin, 2008: 591.

of a late seventeenth-century London anatomy lecture.[70] His account is predominantly cited for the surprising social normativity of the occasion:

> I walked to the Surgeons hall, where we were led into the Theatre; and by and by came the Reader, Dr Terne [...] and all being settled he begun his lecture, this being the second upon the Kidnys, Ureters, and yard, which was very fine; and his discourse being ended, we walked into the hall; and there being great store of Company we had a fine dinner and good learned company.[71]

Christopher Terne was an anatomy lecturer at the Barber-Surgeons' theatre from 1663 to 1675 and a member of the Royal Society.[72] The Barber-Surgeons provided annual lectures on the practice of surgery and on the whole corpse, both of which were educational as well as compulsory for the surgeons and the apprentices. They also held annual lectures specifically on the muscles and the bones.[73] However, the Company also held a number of private anatomies, which were delivered by the senior anatomists. As the lectures Hooke and Pepys attended do not fit the description of the Company's annual lectures for benefit of the surgeons, it seems likely that they were private anatomies which non-members could attend, presumably with an invitation. While the subjects of these lectures were no doubt left to the choice of the anatomist in question, from Hooke and Pepys's accounts it seems they again concentrated on specific bodily parts and systems.

Both Hooke and Pepys stayed for lunch in the Barber Surgeons' theatre and food was also provided at Charleton's 1679 lectures.[74] The anatomy theatre was, therefore, a space for lectures, but also – through the existence of ancillary rooms – a

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[70] For Pepys's interest in anatomy see Frank, 1997: 95-96.
[71] The 'yard' was a common seventeenth-century word for the penis; Pepys, 1971, 4: 59. See Sawday, 1995: 77-78.
[72] *ODNB*, 54: 155; Frank, 1997: 88.
[73] Cunningham, 1975: 11.
[74] The College's accounts contain payments to cooks for the meals at these lectures; R.C.P. 2077, 56; see Booth, 2005: 137n.

venue for forms of entertainment. The presence of Evelyn, Hooke, and Pepys in the audience of these lectures suggests that they were located in a broader social geography that included other places in the city where socialising might accompany learned discussion, such as the coffee-house, the tavern, the private home and the Royal Society meeting. In this respect, the type of anatomy lecture that Hooke, Evelyn and Pepys attended were different from other forms of anatomical presentation in the capital. As Anita Guerrini has recently shown, using evidence from eighteenth-century London, anatomical demonstrations in the city could vary enormously.[75] Some, Guerrini notes, aspired to the realm of the polite conversational science, typical of the Royal Society and defined by Shapin in the *Social History of Truth*, whereas others were more popular and uncivil.[76] Although the lectures of Charleton, Scarburgh, Terne and Needham would still have involved an executed criminal and featured potentially unsavoury visual material, it is apparent from the accounts of Pepys and Hooke that these events were conducted under a veil of politeness. The lecture that Pepys witnessed was attended by 'good learned company', while the opening lines of Charleton's 1679 series reveal that, rhetorically at least, his lectures fell within the boundaries of polite, scientific discourse familiar to Royal Society members from their own meetings:

> *THIS* Place *is sacred to the study of God's Works, for the benefit of Mankind; the* Occasion *of this Assembly, rare, inaugural, and worthy of the greatest solemnity; the* Assembly *it self, frequent, and consisting (for the major part) of Men Noble, Wise, Learned and Curiose; and my* talent, *but a* mite.[77]

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[75] Guerrini, 2004: 219-220. Guerrini is right to suggest that anatomical demonstrations, due to their gruesome nature, do not fit neatly in Shapin's model of polite sciences. However, as Hooke and Pepys's accounts reveal, in the 1660s and 1670s a veneer of politeness was applied to the type of anatomy lectures that Royal Society members frequented (see above).
[76] See Shapin, 1994: 119-125. Additionally, Nunn has shown that earlier in the seventeenth century London's elite frequented anatomy lectures that were seen as part of a polite social calendar: these included Harvey's lectures at the College; Nunn, 2005: 35.
[77] Charleton, 1680: preface.

But it was not only the audience of the College's lectures that was '*Noble, Wise, Learned and Curiose*'; the lecturers were too. Frank has identified a number of anatomists lecturing in the surgeons' and the physician's theatres as well as in Royal Society meetings that might be termed 'Gentlemen Anatomists'. Lecturers such as Terne, Needham, and Scarburgh tended to be members of both the Royal Society and of one or both of the Surgeons' company and the College and were 'of a higher caliber' than most anatomists in the city.[78] Significantly, Frank suggests that their lectures in both medical organisations coincided with the improvement of the built facilities in the Surgeon's Hall and the College. Such an improvement, of course, involved the construction of purpose-built anatomy theatres, overseen, in the College's case, by 'gentlemen anatomists' such as Ent, Glisson and Scarburgh. Thus Charleton's inaugural lecture highlights the belief that the quality of the new buildings, particularly the anatomy theatre, was entirely appropriate given the calibre of its patrons:

> no Men are more likely to make such Discoveries by accurate Dissections, than some of the now flourishing *Fellows* of our Colledge are: so great are the Testimonies they have already given to the World of their unwearied *Diligence,* solid *Erudition,* and admirable *Sagacity* of Spirit. So that 'tis not easie for me to determine, whether these Gentlemen be more Worthy of Your Theatre, or Your Theatre more Worthy of them. But of this I am sure, that *such* a Theatre hath been most fitly conjoyn'd to *such* a Colledge: and I dare prophesie, they will mutually add more and more Honor each to the other.[79]

Thus the quality of the physicians, and their discoveries, was matched by their new anatomy theatre.

The content of the lectures that Evelyn, Hooke and Pepys recorded attending were also broadly similar. They tended to involve small-scale investigations of specific body parts and systems with an emphasis on new discoveries. Thus Pepys saw two

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[78] Frank, 1997: 88-89.
[79] Charleton, 1680: Epistle Dedicatory. Booth, 2005: 227.

lectures by Terne, one on the urinary system and the other on the heart and lungs, Evelyn saw a talk 'upon the heart', and Hooke witnessed Needham speak 'on the head'. Charleton's lectures – which both Hooke and Evelyn attended – contained some new discoveries made by the lecturer. However, as Booth has shown, they tended instead to summarise important recent anatomical discoveries made by other physicians.[80] Like Needham and Terne's however, they were not anatomies of the whole corpse for the benefit of the College's candidates and neither did they broach the subject of the practice of anatomical investigation, which seems to have been dealt with elsewhere in the College's lecture calendar. Instead they were concerned with specific body parts and systems and frequently fell into the category of 'medical anatomy', as defined by Cunningham, wherein specific diseases and potential remedies were also tackled.[81] The lectures that Royal Society members attended in the Barber-Surgeons' theatre also seem to have focussed on new discoveries and therefore should be viewed in the same bracket. Many of the texts of Needham, Scarburgh and Terne's lectures in Inigo Jones's theatre survive and have been used by Frank to show 'how conscious they were to introduce the new discoveries into their lectures and anatomical expositions'.[82] Again these were presentations on new discoveries made about specific aspects of the human corpse. Anatomical demonstrations that occurred in the Royal Society also followed this model. For example, Charleton conducted for the Society a series of anatomical presentations in 1664 on the brain.[83] Typically of Charleton, they took the form of responses to Thomas Willis' anatomical discoveries published in his *Cerebri*

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[80] Booth, 2005: 145-146. As discussed above, Booth highlights the somewhat eclectic nature of Charleton's anatomy lectures, but in general stresses their dependence on recent anatomical writings.
[81] Initially the College of Physicians planned to tackle specific diseases only in their Gulstonian lectures but they soon broadened their remit to include discoveries relating to bodily systems and functions; see Cunningham, 1975: 12-13.
[82] Frank, 1997: 89. For Needham specifically see Frank, 1980: 283.
[83] Birch, 1757, 1: 415. See extensive discussion of these presentations in Booth, 2005: 120-123.

Anatome.[84] Thus there was a similarity between the content of these lectures and the sort of presentations made in Royal Society meetings. Indeed, there was sometimes direct overlap between the two forums. For example, Bennett has shown that elements of Scarburgh's lectures on muscular action, delivered to the Barber-Surgeons in the 1640s, were presented by Wren to the Royal Society in 1665.[85] The Royal Society also had its own anatomy committee, which met at Ent's house; Hooke was a member, as were all of the Society's physicians.[86] Therefore Hooke and his fellow diarists were familiar with a specific type of anatomy lecture: one that resembled the sort of anatomical presentations that occurred, albeit rarely, in Royal Society meetings.

To conclude: of the different types of lectures that were to take place in the College's anatomy theatre, Hooke had experience of small-scale presentations of specific bodily systems, with reference to new discoveries, conducted in circumstances similar to Royal Society meetings. These lectures were not 'public' in the way that European anatomy lectures often were, but non-members of the college could attend, presumably by invitation only.[87] These audience members tended to belong to London's elite and again seemed to resemble the audiences at Royal Society meetings. Conversely, it is unlikely that he would have ever attended the College's other, more educationally orientated, lectures, as they were for candidates and members only. It seems likely that when Hooke designed the anatomy theatre he would have had the former type of lecture in mind, those being more familiar to him. Of course, the College's other lectures were an important part of the design brief, and the physicians with whom Hooke collaborated on the theatre would have had intimate knowledge of

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[84] Booth, 2005: 121.
[85] Bennett, 1976: 63-65.
[86] Birch, 1757, 1: 406.
[87] Literature on European public lectures in the Renaissance is extensive, in particular see Ferrari, 1987: 50-106; Carlino, 1999: 85-92; and Schwarte, 2005: 76-79.

these. But Hooke's experiences matter and need to be brought into consideration when discussing the design he eventually produced for the physicians.

Hooke first produced designs for the theatre in 1673, although he recorded discussing the proposed building as early as October 1672. This discussion centred on the substantial benefaction given to the project by Sir John Cutler, and is the first reference to the theatre in Hooke's diary. On 3 October 1672 Hooke was told that 'Sir J. Cutler would build the theater', while he was at Sir George Ent's house.[88] Oddly, the College Annals do not record Cutler's benefaction until May 1674, when Whistler reported it to a College comitia.[89] The fact that Cutler funded the theatre is in itself very significant.[90] As the benefactor of Hooke's Gresham College mechanical lecture, Cutler was already a patron associated with experimental philosophical projects. In the preface to Charleton's first lectures in the theatre the anatomist dedicated the publication to Cutler and compared the theatre to the mechanical lecture:

> Of this, the *Mechanic Lecture* You have founded in *Gresham* Colledge, for the promotion of *Manual* Trades; and Your *Anatomic Theatre,* are illustrious *Examples,* worthy the imitation of Good Kings, and the envy of Bad: being Both

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[88] *Diary*: 9.
[89] R.C.P. 2298, 168.
[90] The nature of Cutler's benefaction is difficult to establish, particularly given the fact that – unbeknown to the College – he may have envisaged it as a loan rather than an outright act of patronage. The College's accounts list the total given by Cutler as £1700, in five instalments from 1675 to 1680; R.C.P. 2077, 35-66. However, Hooke also recorded a number of instances when Cutler paid workmen directly without the money passing through the College as well as signing contracts for the work; 28 August 1675; *Diary*: 177; 6 February 1676; *Diary*: 216; 30 May 1676; *Diary*: 234. It seems therefore that the College handled Cutler's benefaction with a certain degree of informality. This may not have been the best approach, for after Cutler's death in 1693 the nature of his gift became the subject of much controversy and embarrassment to the College. Cutler's executors claimed that the merchant had recorded the entire benefaction as a loan in his papers; *ODNB*, 14: 843; Elmes, 1823: 452; Espinasse, 1956: 89. They subsequently demanded £7000 from the College who, after much deliberation, managed to bring the demands down to £2000. Where the sum of £7000 came from is unclear, as the bond made between Cutler and the College on 2 January 1680 was for £1700, exactly the amount the College treasurer recorded in his account book; R.C.P. 2000/118a. Interest alone can not account for the difference in the figures and it could be that many of the payments recorded in Hooke's diary but missing in the College treasurer's book were added to the bond by the executors. After this revelation the inscription on the theatre reading 'Omnis Cutleri Cadet Labor Amphiteatro', was removed by the physicians. However, the theatre's statue of Cutler by Arnold Quellin remained and can be seen in nineteenth-century photographs of the building. It is currently in the guildhall in London; see Esdaille and Toynbee, 1958: 35.

> so deeply founded upon *Wisdom,* that the Advantages they promise, are of Universal concernment to the present Age, and (if Men be not wanting to themselves) cannot but extend to all in Ages to come; rendering their Usefulness more and more Conspicuous, the lower they descend to Posterity.[91]

For Charleton it was in their provision of public utility, 'the advantages they promise', that made the theatre and the lecture comparable. The funding of the Gresham mechanical lectureship had been secured for Hooke by the Royal Society, which as an organisation continued to be linked with the lectures throughout the 1670s.[92] Therefore the anatomy theatre and the Society's drive for utility and public legitimacy were, to a certain extent, analogous. In the same way as Hooke's talk was intended to facilitate new mechanical processes and inventions by offering a space for their presentation, Charleton saw the theatre as a catalyst for the furthering of medical knowledge by providing the physicians of the College an appropriate venue to disseminate discoveries. He even went on to claim that the 'design' of the theatre aimed:

> at the incitement of even Philosophers, to make farther researches and discoveries of the infinite Goodness, Wisdom, and Power of God, discernable in all his Creatures, but more eminently in the admirable fabric of Man's Body.[93]

Crucially, when Hooke was designing the building in 1674, some of the physicians entertained the notion that their architect might one day read the mechanical lecture in the anatomy theatre. On 30 March 1674 Hooke claimed he had 'Dind at Dr. Whistler [...] he told me of Designe of Reading my Lecture in the theater'.[94] Although this never took place, it highlights the belief amongst the physicians that the two benefactions were linked and shared common aims.

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[91] Charleton, 1680: Epistle Dedicatory. Booth, 2005: 227.
[92] For a detailed account of the Cutlerian Lectureship see Hunter, 1989: 279-336.
[93] Charleton, 1680: Epistle Dedicatory.
[94] *Diary*: 94.

After he had heard of Cutler's intentions to fund the theatre, Hooke gave Whistler a financial estimate for it in December 1672.[95] Hooke met with Whistler to discuss the matter on 7 April 1673 and six days later he drew a design of the 'frount of Two Lower Storys of Theater'.[96] That he refers to two lower storeys perhaps suggests that the theatre was to be at least three storeys high in Hooke's initial designs rather than the two storeys built (Fig. 6). Hooke then produced, as we have seen, the wooden model of the design for Scarbrugh. Hooke staked out the site in April 1674, still two months before the College comitia was officially told of Cutler's intentions.[97] There is compelling evidence to suggest that, at this stage, Hooke did not intend the theatre to stand above the entrance of the College. Unfortunately, no drawings survive from this early period. However, a number of documentary sources suggest that in April 1674 Hooke had planned to build the theatre to the west side of the site, between the College house and London wall (Fig. 54). The College Annals and Hooke both record a meeting at the College on 15 May 1674, two days after Whistler had announced Cutler's benefaction to the College comitia. This meeting was attended by Glisson, Goddard, Whistler, Scarburgh, Hooke, and Wren, with whom Hooke had travelled to the College that day.[98] The four physicians were told by the College authorities to determine, with Hooke and Wren's help, 'which site was most suitable for the building of the Theatre'.[99] They all agreed that the College garden, behind the College house, would be the best location for the new structure. That Hooke and Wren recommended the garden site to the physicians suggests that Hooke's early designs for the theatre were for a free-standing structure on an open site. Hooke's diary entry for 13 April 1673 would seem to

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[95] 2 December 1672; *Diary*: 15.
[96] 13 April 1673; *Diary*: 39.
[97] 29 April 1674; *Diary*: 100.
[98] R.C.P. 2298, 168. *Diary*: 103. Wren's presence at this meeting suggests that the College wished to seek the approval of the Royal Surveyor for major building decisions (see Chapter 3). Jardine misinterprets this diary reference as evidence of Wren's involvement in the design of the theatre; Jardine, 2002: 541n.
[99] R.C.P. 2298, 168.

corroborate this claim; the garden site was larger than the eventual position chosen for the theatre and a three-story building would have been entirely feasible. It also seems likely that when Hooke staked out the theatre in April 1674 he did so in the garden.

Cutler soon intervened. He wanted the theatre built at the front of the College facing onto Warwick Lane. His reason for this was no doubt vanity. The theatre would carry his name and statue and the site on the street front would bring more publicity. The Annals claimed that the College 'willingly submitted the power of judgement to the will of so great a benefactor'.[100] Hooke's diary, however, reveals that the physicians did not give in so easily. Cutler first informed Hooke of his decision on 16 June 1674.[101] Three days later, Hooke went to see Ent, who, obviously flustered, would not resolve the matter until Dr. Whistler returned from the country.[102] There was obviously a considerable amount of debate over the next month, and it was not until 24 July that the physicians submitted to their benefactor. Hooke, however, 'set out' the theatre on 20 July, having 'agreed all' with Cutler and Whistler on 14 July.[103] This suggests that the decision may have been made the week before, although still a full month after Cutler first proposed the street front site. Once the physicians had made up their minds, work began within the month and foundations were dug by 31 July 1674 when Hooke requested payment for the labourers.[104] He must have finalised the design of the theatre, with the exception of the roof, by March the following year when he gave the master

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[100] R.C.P. 2298, 168.
[101] Hooke claimed that he had been 'at Sir. J. Cutlers. Spoke to him. He resolved Theater before'; *Diary*: 108.
[102] 19 June 1674; *Diary*: 108. Ent was then president of the College.
[103] *Diary*: 112, 113.
[104] Hooke recorded in his diary that he had been with 'Lem at the Colledge. Orderd digger money'; *Diary*: 115. The College accounts then detail a payment of £50 on 27 August 1674 to 'Mr. Lem toward the foundation of the theater'; R.C.P. 2077, 30. Hooke then 'set out' the theatre on 10 August 1674 and agreed Lem's contract for the brickwork of the building on the same day; *Diary*: 116.

mason William Hammond 'the ground plot of & upright of Theater'.[105]As the rest of the building was under construction the 'design of the theatre' Hooke drew on 6 January 1676 was most likely for the roof.[106] This could well be the surviving drawing of the theatre's dome and lantern, now in Warwickshire County Record Office (Fig. 55), which is accompanied by a plan of the roof truss, drawn to the same scale (Fig. 56).[107] The design is very similar to the executed building, except the ball atop the lantern, which is different. Therefore the design of the lantern was probably finalised in early 1676.

HOOKE'S DESIGN FOR THE THEATRE

The sixteenth-century French physician Charles Estienne observed that, in an anatomy theatre, every spectator should be able to see optimally and in the same way.[108] Hooke's design for the theatre attempted to achieve this and, to that end, the lantern was central to his plans. He took its basic form from an illustration of an ideal church design, with a domed roof and a pyramidal structure at its apex, in Serlio's fifth book of architecture (Fig. 57). Hooke also followed the Italian theorist's advice that 'anyone wanting more light could make an opening in the apex of the vault, covered by sheets of glass in a pyramid shape so that snow and ice would not gather there'.[109] Nearly 40 feet high and 20 feet wide at its base, Hooke's lantern was surprisingly large, as can be seen from photographs of the building taken in 1866 (Figs. 58 and 59). That it was also considerably higher than the surrounding housing is evident from a mid-nineteenth-

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[105] 29 March 1675; *Diary*: 155.
[106] *Diary*: 209.
[107] These drawings are amongst the Feilding papers in Warwick; W.C.R.O. Feilding, CR 2017/B1/5; W.C.R.O. Feilding, CR 2017/B3.
[108] Cited in Schwarte, 2005: 82.
[109] Serlio, 1996: 409. Hooke owned Serlio's treatise; see Geraghty, 2004: 114.

century panoramic photograph of the City (Fig. 60).[110] The windows, themselves ten feet high, were clearly designed to allow as much natural light as possible directly down onto the corpse without that light being obscured by snow and rain.

This form of lantern was very unusual in England at the time. However, close parallels with the structure can be found in Wren's unexecuted 1675 designs for the Commencement House project and Trinity College library, both in Cambridge. In his proposal for the Commencement or Senate House, a building that would essentially fulfil the same functions as Oxford's Sheldonian Theatre, Wren intended to top-light the adjacent library with a series of squat, glazed, pyramidal lanterns (Fig. 61).[111] These features are only shown in Wren's cross-section of the proposed design and are omitted in the accompanying elevation, yet they are clearly similar to Hooke's lantern and were conceived the year before Hooke drew the final design for the theatre's roof. Even more similar is a design of a proposed top-lit room in Wren's designs for Trinity College library. In a small pencil sketch on one of the site plans for the library Wren drew a cross-section of a building very similar in shape to the proposed library of the Senate House project (Fig. 62).[112] A tall conical lantern, bearing close resemblance to the finished lantern on Hooke's theatre, is clearly visible in the sketch; there is even a suggestion that Wren intended the top part of his lantern to be leaded above the glazing – indicated by a horizontal line across the top of the lantern – as was the case with Hooke's. A third surviving drawing also suggests that Wren was experimenting with the top-lighting of auditoria. In a pencil sketch for an unidentified theatre, Wren drew a conical structure above the first tiers of seating that could represent another attempt to

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[110] This photograph, the original print of which can be found in the *Sir Benjamin Stone Collection*, in Birmingham Central Library, it is reproduced and discussed in Stamp, 1984: 67. For the anatomy theatre's importance in the eighteenth century as a vantage point from which to view the City see Stevenson, 2008: 222.

[111] A.S. 1, 53. For a detailed discussion of this drawing see Geraghty, 2007:29.

[112] A.S. 4, 50. Geraghty, 2007: 30.

top-light an auditorium (Fig. 63).[113] Unlike the Cambridge projects it seems that Wren intended this structure to be housed in the roofing of the theatre rather than form a lantern above. It is clear from these drawings that Wren was, contemporaneously with Hooke, thinking about the best way to top-light rooms in which the visual experience of users was a key aspect of their function. Both architects devised similar solutions, although Hooke would be the only one to see through his idea in built form.[114]

Hooke's top-lit space can also be compared to an anatomy theatre at the university of Upsala, which had important links to the Royal Society and, crucially, was roughly contemporary with the London theatre (Fig. 64).[115] Although the theatre was built in 1620, its cupola, which provided top-lighting for the auditorium, was designed and built in 1662 by the professor of medicine at the university, Olaus Rudbeck. It is significant that Rudbeck, a figure with extensive links to English and continental experimental philosophy, chose to add a heavily fenestrated cupola to the university's anatomy theatre just a few years before Hooke designed the College's theatre.[116] Like Hooke, Rudbeck would have been acutely aware of the requirements of anatomy theatre design, being an anatomist himself.[117] However, unlike Hooke's theatre, Rudbeck's did not attempt to direct vertical light down onto the corpse, instead it flooded the large, wide cupola with sunlight from two rows of small rectangular windows (Fig. 65).

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[113] A.S. 4, 81. Leacroft, who suggested that this drawing showed a scheme for a theatre to be erected in the Great Hall of Whitehall Palace, guessed that the conical structure depicted was an air vent; Leacroft, 1988: 84-85. However, it could just as plausibly represent an attempt to top-light the space. For a summary of the various interpretations of this drawing offered by theatre historians see Geraghty, 2007: 253.

[114] For lighting in general in late seventeenth-century English architecture see Louw, 1990: 300-307.

[115] For information about the Upsala theatre see Schumacher, 2007: 22. I am indebted to Kristoffer Neville for bringing this building to my attention.

[116] For the lighting in Rudbeck's theatre see Fontoynont, 1999: 198-200. For Rudbeck's links with experimental philosophy in the rest of Europe see Eriksson, 1994: 46-47 Rudbeck and Hooke were not alone in experimenting with lighting in 'scientific' architecture, Claude Perrault's Observatory in Paris (1667-1683), also featured new forms of fenestration aimed at improving light in built space; see Louw, 2003: 19-46.

[117] For biographical information on Rudbeck and his anatomical interests see Eriksson, 1994: 1-12.

Whilst perhaps not as innovative as Hooke's design, Rudbeck's cupola demonstrates that other designers of anatomy theatres in the period were aware of the importance of allowing a large amount of light from above into these spaces. In Hooke's theatre, the occuli also contributed to the natural light in the room. As the photographs of the building show, these windows were positioned higher than the surrounding buildings and thus would have not been overshadowed by the housing on Warwick Lane. Having been forced to move the theatre's site from the College's garden to the street front, Hooke succeeded in elevating the structure so as to negate the surrounding buildings. The central panels of the occuli could be opened for ventilation and to admit more light, as is apparent in one of the two photographs of the structure (Fig. 59). A nineteenth-century engraving of the theatre also shows that the sills of these windows were diagonally slanted to allow sunlight into the centre of the auditorium (Fig. 66).

Another feature of Hooke's design that attempted to maximise spectators' vision was the tiered seating. Early modern anatomy theatres featured some of the steepest seating of any contemporary auditorium, and the College of Physicians was no exception.[118] Alison Stoessar-Johnson has plausibly suggested that Hooke based the design of his seating on that of Leiden's anatomy theatre, which was built in 1593 and demolished in the nineteenth century (Fig. 67).[119] Her suggestion that Hooke copied the Dutch theatre almost identically is an overstatement however. Hooke's theatre is almost a quarter larger again than Leiden's, which was only 9m by 9.80m. The stairs in Hooke's theatre only extend to two tiers and the structure was interrupted by a chair for the College president opposite the main entrance. At Leiden the stairs extend through all

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[118] For contemporary playhouse seating see Leacroft, 1988: 89-103.
[119] Stoesser-Johnston, 1997: 46. For information on Leiden's anatomy theatre see Rupp, 1990: 263-287; and Huisman, 2002: 4-15. For suggestions of further Dutch influences in the design of the anatomy theatre see Kuyper, 1980: 115-116.

six, uninterrupted tiers (Fig. 67). Finally, Leiden's theatre was circular, having been built into an apse of a disused church whereas Hooke's purpose-built theatre was, of course, octagonal. Nonetheless the two structures are similar and Leiden was probably in Hooke's mind. This is hardly surprising considering that several of the physicians who cooperated with Hooke on the project had undertaken part of their education at the Dutch university. Of the 1670 committee, Micklethwaite had been a medical student at Leiden in the 1630s, as had Nathan Paget.[120] Most significantly, Whistler, Hooke's constant collaborator on the project, had studied at Leiden in 1645.[121] The seating of both theatres was vertiginously steep. The recently built actual-size reconstruction of Leiden's theatre in the city's Museum Boerhaave shows how these wooden structures attempted to place the viewer almost vertically above the corpse (Fig. 68). This effect can also be observed in the late sixteenth-century theatre at Padua (Fig. 69), which served as a model for a number of later buildings, including Jones's theatre at the Barber-Surgeons' Hall.[122]

Hooke's design therefore attempted to maximise the amount of natural light in the auditorium and to locate the spectators' vision onto the corpse through a steep, high bank of seats. Unfortunately no contemporary account or images of the interior of the building exists to confirm the success of these aspects of the design. However, an early nineteenth-century description of the theatre pays close attention to the lantern and the seating, praising their effectiveness:

> [the theatre is] amphitheatrical in plan and is one of the best imagined for seeing, hearing and classification of students and Fellows and for the display of

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[120] Innes-Smith, 1932: 158, 176

[121] Stoessar-Johnson points out two of Hooke's coffee house associates and College members Sir William Petty and Dr. Theodore Diodati had studied there, although there is nothing in the diary to suggest either was involved in the building project; Innes-Smith, 1932: 247; and Stoessar-Johnston, 1997: 29

[122] For information about Padua see Brockbank, 1968: 374-375; and Bylebyl, 1979: 335-370.

> anatomical demonstrations upon a table in the middle of the arena, of any building of its size in existence. It is a perfect study of acoustical and optical architecture. The roof and forms are well adapted for the distribution of sound and the elevation and arrangement of the seats with the separate stairs for Fellows and Members so well designed. The effect of the lantern is everything that can be desired, affording light and ventilation and excluding rain in a very efficient manner.[123]

Despite the fact that its author believed that the theatre had been designed by Wren, this account is revealing. That the lantern still allowed copious natural light into the building in the heavily smoke-polluted London of the 1820s is telling; it suggests that in the late seventeenth century when visibility in the city would have better, although by no means perfect, the device would have been even more effective.[124] Additionally, the eighteenth-century, top-lit anatomy theatre built in Cambridge shows what the interior may have looked like (Fig. 70).[125] In the design of the theatre, Hooke tried to enhance the vision of spectators through directed their vision and angling light onto the subject being observed.

EXPERIMENTAL PHILOSOPHICAL ARCHITECTURE

In attempting, through the design of the anatomy theatre, to improve the vision of the users of the building, Hooke followed the principles employed in other facilitators of experimental science, namely instruments. As the first chapter demonstrated, architecture, like instrument making, was a component part of the Royal Society's epistemological programme as well as its utilitarian apparatus. Like an instrument, an architectural design could aid science and the presentation thereof. Interestingly,

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[123] Elmes, 1823: 451-452.
[124] Evelyn, in his 1661 text *Fumigfugium*, documents the City's considerable problems with smoke pollution. For information about this and smoke pollution in late seventeenth-century London in general see Jenner, 1995: 537-538.
[125] See Ellis, 1993: 189; and Willis and Willis Clark, 1988: 133-134.

Hooke's theatre employed similar techniques to instrument design. These were aimed at improving the human senses, particularly vision.

Like many early modern authors, Hooke believed that the senses were deficient in some way. In the preface to *Micrographia*, he expresses the notion, widely held amongst late seventeenth-century experimental philosophers, that the human senses were inadequate when it came to carrying out observation of natural phenomena. The senses, including that of vision, needed help: they were, according to Hooke, 'infirm'.[126] He notes that these infirmities:

> arise from a double cause, either from the *disproportion of the Object to the Organ*, whereby an infinite number of things can never enter into them, or else from *error in the Perception*, that many things, which come within their reach, are not received in a right manner.[127]

Hooke then suggests that it was through experimental philosophy and its attendant mechanical technologies – those '*artificial Instruments* and *methods*' – that 'we may *inlarge* their [the senses] power, and *secure* them in performing their particular duties'.[128] Although he sees the need to improve all the human faculties, Hooke identified vision as the one sense which had received the most help at the time of writing. This had been achieved by:

> supplying of their infirmities with *Instruments*, and, as it were, the adding of *artificial Organs* to the *natural*; this in one of them has been of late years accomplisht with prodigious benefit to all sorts of useful knowledge, by the invention of Optical Glasses. By the means of *Telescopes*, there is nothing so *far*

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[126] Hooke, 1665: preface. For a discussion of Hooke's writings on the deficiencies of vision in *Micrographia* see Sabra, 1981: 191-192; Stafford, 1991: 348-354; and Bennett, 2006: 65-68.
[127] Hooke, 1665: preface. For Hooke and scientific instruments in general see Bennett, 1980: 33-48; and Bennett, 2006: 63-104. As Bennett observes, Hooke claimed that the ultimate goal of scientific instrument-making was the improvement of the senses. He also saw instrument-making as an 'art', or an 'imitation or manipulation of nature', in the way that ship-building, navigation and, no doubt, architecture were; Bennett, 1980: 37.
[128] Hooke, 1665: preface.

> *distant* but may be represented to our view; and by the help of *Microscopes*, there is nothing so *small*, as to escape our inquiry; hence there is a new visible World discovered to the understanding.[129]

His text itself and in particular the detailed plates showing this 'new visible World', stood as testimony to the belief in the power of instruments to improve vision. Wren expresses similar sentiments in his inaugural speech as Professor of Astronomy at Gresham College, noting that 'the Perfection of Telescopes, and Microscopes, by which our sense is so infinitely advanc'd, seems to be the only Way to penetrate into the most hidden Parts of Nature'.[130] Ultimately, Hooke and Wren were following Descartes and Bacon, who had both called for the improvement of vision in natural philosophical investigation and its methods.[131]

As the design of the theatre relied on directed light, it can be compared to a number of instruments, conceived by Hooke and his contemporaries, that attempted to direct light onto specimens to improve human vision.[132] Although instruments were designed to make discoveries rather than exhibit them – as was the case with Hooke's theatre – they employed a similar principle of directed, enhanced vision, normally achieved through the appliance of light. The illustration of a compound microscope in *Micrographia*, represents an important example of this.[133] Hooke's image shows that the instrument directed the light of an oil flame through a lens onto the magnified subject (Fig. 71). A similar principle was behind an invention of Hooke's, the design for

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[129] Hooke, 1665: preface. For a discussion of this famous quote see Bennett, 2003: 64-66. As Stafford observes, Hooke himself admitted that it could be difficult to observe specimens under microscopes but that in theory the microscope could remove the deficiencies of vision once and for all; Stafford, 1991: 351.
[130] Wren, 1750: 204-205. Shiqiao, 2007: 30. For Wren's speech in general see Bennett, 1982: 27-28.
[131] For Cartesianism and optical improvement see Judovitz, 1993: 63-64; and Ribe, 1997: 42-61. For Descartes theories of vision see Jay, 1993b: 69-82.
[132] For information specifically about Hooke's optical instruments see Simpson, 1989: 33-61; and Bennett, 2003: 93-100. For Hooke's theories of light in general see Sabra, 1981: 191-192.
[133] As Bennett observes, the microscope illustrated in *Micrographia* was a commercial instrument that he bought from the London instrument maker Richard Reeve; Bennett, 2003: 93.

a Perspective Box that he displayed to the Royal Society in June 1671 (Fig. 72).[134] This instrument was designed to mimic the properties of the human eye and thus allow the user to record and test how the eye receives light. It did this by directing the user's vision through a conical box, with a concave glass and a 'very White' interior, 'to receive and reflect the Points of Light'.[135] Hooke advises the user to place the object being viewed in sunshine, 'because of the great Reflection of Light from such Objects'.[136] Thus with both of these instruments, vision was directed onto a well-lit object, in the manner of Hooke's anatomy theatre design.

It was not just by magnification, however, that instruments improved human vision. Other instruments demonstrated that the correction and training of vision did not require magnification. One such instrument was the perspectograph, which was designed by Wren in the 1660s and allowed users to draw accurately objects in correct single-point perspective (Fig. 73).[137] Like the theatre, such instruments used the directing of vision, often coupled with lighting, to achieve their aims. For example, another instrument intended to improve a subject's vision through scopic direction rather than magnification is Hooke's unusual 'drawing machine', which he conceived in 1694. The device, designed with explorers and navigators in mind, was a large box to be placed upon the head allowing the user more accurately to obtain 'Pictures, Draughts, or true Forms and Shapes of such Things as they are' (Fig. 74).[138] Hooke writes that the advantage of such an instrument was that 'any Person that can but use his Pen, and trace the Profile of what he sees ready drawn for him, shall be able to give us the true

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[134] This lecture, one in series given to the Royal Society on the properties of light, was published posthumously by Richard Waller; Hooke, 1705: 119-128.
[135] Hooke, 1705: 127.
[136] Hooke, 1705: 128.
[137] *Phil. Trans.* 1669, 4: 898-899. For a discussion of Wren's perspectograph see Bennett, 1982: 75.
[138] Derham, 1726: 292. See Inwood, 2002: 425.

Draught of whatever he sees before him'.[139] Crucially, however, when Hooke demonstrated the drawing machine in the Royal Society it was found that the instrument would not work without a sufficiently bright light source directed onto the object being viewed and drawn.[140] These examples show that the directing of vision and the provision of light was a basic premise for optical instrumentation in the early Royal Society.

The design of the anatomy theatre, with its well-directed light and vision, followed these same principles. Although these instruments were used as generators and demonstrators of knowledge rather than instruments of display and dissemination, we have already seen from Charleton's likening of the theatre to Hooke's mechanical lecture, that the presentation of scientific research needed to be facilitated as much as the discoveries themselves.[141] Furthermore, Charleton hoped that both the theatre and the lecture would inspire more discoveries. This, therefore, was an architectural design that attempted to facilitate the presentation of scientific discoveries through principles similar to those that had enabled the discoveries in the first place. To this end, Hooke utilised contemporary building technologies to improve the vision of the spectators in the theatre. Furthermore, there is evidence – from the nineteenth century at least – that the design worked.

However, Hooke's anatomy theatre was built at a time when the basic premise of such a building was being questioned. A number of sources from the late seventeenth century suggest that Hooke's contemporaries had difficulty seeing in anatomy theatres,

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[139] Derham, 1726: 295.
[140] R.S.J.B. 1694, 9: 264-272. Inwood, 2002: 425.
[141] Bennett has highlighted the importance of demonstration in Hooke's scientific instrument-making; Bennett, 2006: 67-68.

with their view of the material on display obscured. Significantly, these accounts come from within the scientific elite: the very audience Hooke might have had in mind when he designed his theatre. One of the chief critics of the anatomy lecture and, in particular, its theatrical location was College physician and prominent Royal Society member, William Petty. In a speech given at the College of Physicians in Dublin in 1676, Petty makes reference to Hooke's recently designed and only partially complete London theatre. Petty notes that:

> all the great Cittyes of Europe have their Colledge of Phisitians; and every Colledge hath its Theatre for Anatomy, and our Methropolise London is building the most August and Comodious Theatre that perhaps has ever been seen in Europe.[142]

Petty, with his links to Hooke and the Royal Society, clearly sees the new theatre as something of which London and its physicians could be proud. Yet in the next paragraph of his speech Petty questions the anatomy lecture – and its architectural surrounding – claiming that:

> the thorough knowledge of the fabrick of animals is not to be attained from the publick and promiscuous Demonstrations from a Theatre, nor from any wordy and tumultory discourses that can be made about it; but from curious and minute Disections[143]

Petty's preference for 'minute' procedures of dissection jars, I argue, with his description of Hooke's theatre as 'Comodious'. He goes on to note that the fault of the anatomy lecture lay in the act of 'looking at things at a great distance'.[144] This I suggest is more than just criticism of the anatomy lecture as a procedural tool in the presentation of experimental philosophical research. Instead Petty's term 'promiscuous' – meaning

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[142] Petty, 1967: 172. Petty's lecture is discussed by Cunningham, without any reference to its potential significance for the study of anatomy theatres; Cunningham, 1975: 13-14.
[143] Petty, 1967: 173.
[144] Petty, 1967: 173.

casual and indiscriminate in nature – is inherently spatial in its designation. This promiscuity of anatomical demonstrations was in part caused by their location: the theatre.

If we return to Pepys's account of his visit to the Barber-Surgeons' theatre, perhaps we can see the architectonics of this promiscuity at first hand. Although the diarist seemed to have enjoyed the morning lecture on the 'Kidnys, Ureters, and yard' he was far more impressed by a postprandial close-up viewing of the corpse:

> After dinner Dr. Scarborough took some of his friends, and I went along with them, to see the body alone; which we did; he was a lusty fellow, a seaman that was hanged for a robbery. I did touch the dead body with my bare hand; it felt cold, but methought it was a very unpleasant sight[145]

Read in terms of the architectural space Pepys was experiencing, this diary entry reveals much about seventeenth-century confrontations with corporeal subjects. In doing so it highlights the troubling spatial dynamic of the contemporary anatomy theatre. Pepys's visual and tactile encounter with the corpse, in the pit of the theatre, had a seemingly profound effect on him in a way that the morning spent in the stalls, listening to the anatomist read, had not. In the act of viewing the body at close proximity, Pepys was able to make a reference to a visual observation in his diary ('methought it was a very unpleasant sight'), something he had conspicuously omitted to do during his account of the lecture. Having approached the corpse directly and thus negated the spatial distance of the auditorium, Pepys and his companions were also able to observe the effects of execution on the body up-close, with all concluding 'that there is no pain at all in hanging'.[146]

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[145] Pepys, 1971, 4: 60. For discussion of the hanging that had to take place prior to an anatomy lecture see Sawday, 1995: 53-64; and Egmond, 2003: 92-128.
[146] Pepys, 1971, 4: 60.

Pepys then followed Scarborough and his party into an ancillary room to view the disembodied organs left over from the lecture:

> Thence we went into a private room, where I perceive they prepare the bodies, and there was the Kidnys, Ureters, yard, stones and semenary vessels upon which he read today. And Dr Scarborough, upon my desire and company's, did show very clearly the manner of the disease of the stone and the cutting and all other Questions that I could think of, and the manner of the seed, how it comes into the yard, and how the water into the bladder, through the three skinnes or coats[147]

In this entry the 'private' nature of a small preparatory room facilitated another direct observation of anatomical specimens, again free from the indiscriminating distance produced by the theatre's fixed seating. Pepys was able to communicate far more information in his diary from this 'private' viewing – significantly of specific body parts rather than a whole body – than he had during his account of the lecture. Of course in this instance he had a personal interest, having survived an operation to remove stones from his urinary tract in 1658.

Following these stimulating encounters Pepys returned to the hall for more 'good discourse' and then 'to the afternoon Lecture upon the heart and lungs &c'. Again Pepys omitted any details about the content of the talk or his reaction to the visual material on display.[148] Regardless of Pepys's somewhat amateur interest in anatomy these entries reveal much about the space of the contemporary anatomy theatre.[149] It is no coincidence that Pepys's attention was held not by what he witnessed from his seat during the lecture at the Barber-Surgeon's theatre but from what he saw directly in front

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[147] Pepys, 1971, 4: 60.
[148] Pepys, 1971, 4: 60.
[149] Pepys's interest in experimental science was, I think, more engaged than his biographers would have us believe. For example, he was made president of the Royal Society in 1684. For a discussion of Pepys, experimental philosophy, and his attendance at Royal Society meetings see Thrower, 2003: 3-13.

of the table and in a small ancillary room. Jones's theatre had a number of small rooms that were designed for the surgeons to carry out dissections and to conduct small private anatomies for small groups, just as Pepys had experienced.[150]

Hooke's theatre also had a small preparatory room adjacent to the auditorium, and an early eighteenth-century account of the building reveals that 'in the preparatory Room adjacent, are Thirteen Tables of the *Muscles* in a Human Body; to wit, before, behind, each side, and each *Muscle* in its proper Position.'[151] These tables were presumably specially preserved specimens, the type of which were increasingly seen by late seventeenth-century experimental philosophers as being more informative than anatomy lectures.[152] Hence in 1663 the physician Timothy Clarke told the Royal Society that he knew of a way to preserve human bodies so that 'there might be had in readiness for occasions an eye, hand, muscles, larynx etc'.[153] The Society's concern for the preserved 'readiness' of anatomical specimens perhaps betrays an anxiety about how imprecise viewing a freshly-deceased whole corpse could be. For example, Wren may have made some 'pasteboard' models of muscles in the 1660s.[154] Furthermore, the diarist John Ward also records that at the Barber-Surgeons' Halls:

> in the theatre there are skeletons, and one statue there is resembling the muscles. One skeleton there is over the table, to let down for inspection in time of dissection. Dr Scarborough had a wooden man, wherein the muscles, with all their motions, were represented; itt cost him ten pounds; hee brought itt to an anatomie one day, and itt was stolen from him; he declared in open hall that iff any man could help him to itt again hee would give him five pounds…[155]

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[150] It seems apparent given the plan of the theatre from surviving images that these small rooms were on the ground floor below the theatre, as Frank suggested; Frank, 1997: 88.
[151] Macky, 1722: 244. The muscle tables survive in the present College; see Davenport, McDonald, Moss-Gibbons, 2001: 115-116.
[152] See French, 1999: 269.
[153] Birch, 1757, 1: 374.
[154] Wren, 1750: 238. As Bennett observes, it is difficult to establish when Wren made the paste-boards, or even if he did in the first place; Bennett, 1976: 61-62.
[155] Ward, 1839: 9. See Frank, 1974: 59; and Bennett, 1976: 60.

Scarburgh's attachment to his wooden model, coupled with the fact that it was worth stealing in the first place, highlights the benefits such objects offered anatomical lecturers. Similar wooden models survive, such as a late seventeenth-century example currently held by the Wellcome institute (Fig. 75), although the description given by Ward indicates that Scarburgh's model, which was able to show 'motions', was more sophisticated than this surviving example.

To return to Hooke's theatre it is significant that it was in the small preparatory room that one could view the tables of muscles – what Petty might have deemed 'curious and minute Disections' – rather than in the main auditorium. A more intimate architectural space was deemed the appropriate setting for these more accurate representations of the human body. The movement away from anatomical demonstrations conducted on freshly deceased corpses to specially preserved, more accurate specimens, is also traced in a 1659 Dutch text by Louis de Bils that was very quickly translated into English, probably by Robert Boyle.[156] De Bils's pamphlet calls for 'the skill of a better way of anatomy of mans body' and relays recent events in Rotterdam where the States General 'Being also further incouraged by the convenient place for *an Anatomical Theater* in that house which was lately *the Court of the English Merchants in this City*' had subsequently decided against building a theatre. Instead, de Bils reports, the General had:

> at last resolved and begun to set up a *meerly new Anatomy of the body of Man,* by many dead Bodies dissected and embalmed *in an extraordinary manner,* in which bodies shall be shewn all the Veins, Arteries, Sinews and Fibres severed from one another, but remaining fast, both where they first arise, and where they end. Also the Heart, Liver, Lungs, and Entrals, Eyes and Brains shall remain manifest in the said Bodies.[157]

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[156] De Bils, 1659. The translation (credited to R.B. in the text) was dedicated to Samuel Hartlib and is attributed to Boyle in Fulton, 1931-33: 353.
[157] De Bils, 1659: 3.

The advantage of this new development, de Bils notes, was that:

> *Lectures* may be made upon them, *as well in Summer as Winter,* with discovery and demonstration of mistakes both of Ancient and Modern Anatomists, who in their dissections are hindred, by the spilling of blood, from seeing to the bottome of their work.[158]

Thus the problems associated with demonstrations of anatomy made on fresh corpses – namely that they were seasonally constrained and hindered by blood obscuring the view of the subject organs or systems – were negated. Now, de Bils claimed, 'these new Anatomies shall be completed *without spilling any blood at all*'.[159] Crucially, de Bils presents a narrative in which the idea of an anatomy theatre is conceptually superseded by preserved anatomical specimens. Again, the reasons stem mainly from the problems associated with viewing a corpse in a theatre. Instead, de Bils favours the more precise observations that could be made in close proximity to bodily specimens.

Despite architects' attempts to maximise spectators' vision in anatomy theatres, contemporaries expressed doubts. A possible explanation for the problems associated with the act of viewing corporeal specimens in an anatomy theatre, as articulated by Hooke's contemporaries, lies in the early modern experience of seeing in architectural space. This, I suggest, was an experience that resisted architectural attempts to enhance and train the vision of the users of architecture along the lines of contemporary scientific theory. Here I wish to return to the phenomenological narrative of architectural, technological change as described by Alberto Pérez-Gómez in 1985. To

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[158] Another potential problem with the amount of blood spilled in an anatomy lecture was squeamishness on the part of the audience or the lecturer. Anthony Wood recorded that Thomas Clayton, the Tomlins Lecturer at the University of Oxford in the 1640s 'never, as I have been informed, read a Lecture because he could not endure the sight of a bloody body'; Wood, 1792-1796, 2: 883. Wren in his 1663 letter to Brouncker, also expresses similar concerns with anatomy as a spectacle: 'Experiments in Anatomy (though of the most value for their use) are sordid and noysome'; Wren, 1750: 225.
[159] De Bils, 1659: 4.

recapitulate, Pérez-Gómez, following Husserl, postulates that a shift towards the rational – and ultimately the positivist – in the designing and using of architecture beginning in the late seventeenth century.[160] The catalysts of this shift were the writings of Descartes, Newton and Claude Perrault, with the latter specifically relating to architecture. According to Pérez-Gómez, this body of scientific writing led to the '"functionalization" of architectural theory as a whole', which in turn reduced 'architecture to a rational theory'.[161] Prior to this formative period in architectural theory, the designing of architecture had been sensitive to the mythical and poetic content of reality, 'the a priori of the world, which is the ultimate frame of reference for any true meaningful architecture'.[162] Although Pérez-Gómez stresses the importance of geometry and number in this shift from poetry and myth to the rational and the functional – in particular the movement from Euclidian to non-Euclidian geometry – his conclusions have implications for the application of other late seventeenth-century 'rational' scientific theories to architecture. As he puts it: 'the conceptual framework of the sciences is not compatible with reality'.[163]

The application of a scientific epistemological method, influenced by Cartesian and Baconian thought, to a specific architectural design at this key moment in Pérez-Gómez's architectural historical narrative, is not without significance. Hooke's design was based on the very principles that Pérez-Gómez and other architectural writers have seen as incompatible with the reality of being in architectural space.[164] In other words,

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[160] The most important influence in Pérez-Gómez's text is Husserl's 1936 critique of positivism, *The Crisis of European Science and Transcendental Philosophy*; translated in Husserl, 1970.
[161] Pérez-Gómez, 1983: 4. See also Louw, 2006: 194-195.
[162] Pérez-Gómez, 1983: 4.
[163] Pérez-Gómez, 1983: 6. This, and other statements by Pérez-Gómez, reflect his debt to Maurice Merleau-Ponty's critique of Cartesian science; see below.
[164] As my introduction makes clear, Pérez-Gómez never discusses Hooke or Wren in relation to these theories. However Hooke's design for the theatre, clearly influenced by contemporary scientific methodology, can easily be placed in his narrative alongside the architectural theory of Perrault and the

in the design of Hooke's theatre, 'reality [was] deemed equivalent to prosaic scientific theories'.[165] However, if Pérez-Gómez is right, that reality might not, in the seventeenth century at least, be compatible with those theories. Furthermore, are late seventeenth-century concerns over the ability of anatomy theatres to function as the apparatus of scientific practice reflective of a contemporary experience of architecture that still resisted attempts to shape that experience through 'prosaic scientific theories'? To answer this, let us return to Petty, who described the experience of viewing an anatomy lecture as 'promiscuous', and to Pepys, for whom the visual impact of anatomy was heightened at close quarters. These accounts suggest that the act of viewing in the anatomy theatre was a challenge for the early modern spectator. This was a challenge that was created by the physical distance between the audience member and the corpse and the 'promiscuous' nature of that distance. That the spectators in the anatomy theatre were unable to meet that challenge was a result of the very problem that Hooke was trying to address in his design: the infirmity of human vision.

It was in this period that vision was beginning to be prioritised over the other senses, particularly in scientific discourse. Critics such as David Michael Levin and Martin Jay have stressed an occularcentrism present in Western thinking since the seventeenth century.[166] This prioritising of vision was first articulated in Cartesian and Baconian scientific methods that stressed the focussing and enhancement of the sense of sight.[167] As discussed above, Hooke's thoughts on vision and its special place in his scientific method, as outlined in the preface to *Micrographia*, were those of Descartes

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epistemological programmes of Descartes and Newton. For a discussion of the incompatibility between Cartesian ideas and architectural space see Pallasmaa, 2007: 6-22.

[165] Pérez-Gómez, 1983: 6.

[166] This occularcentrism was first identified and critiqued in the early twentieth century by Merleau-Ponty and Jean-Paul Sartre; see Jay, 1993a: 143-185. See also Levin, 1993: 1-29; Levin, 1999: 29-59; and van de Vall, 2005: 37-42.

[167] Jay, 1988: 3-16. See also Ivins, 1973: 9.

and Bacon. Furthermore, the prioritisation of vision can be seen in the architecture of the theatre with its top-lighting and steep vertical seating. The scientific theory that Hooke, with his patrons' blessing, brought to bear on the theatre's design, was based on the prioritising of focussed, enhanced vision. However, it can also be suggested that users of architecture in this period did not allow their experience of architecture to be governed by a singular, focused and enhanced form of seeing in the way that contemporary natural philosophical discourse dictated.[168] As Klaus Amann and Karin Knorr-Cetina observe in relation to modern epistemologies of observational science: 'processes of seeing are subject to cultural and historical convention'.[169] Hooke's design was predicated upon a process of seeing that had only recently developed in scientific discourse, particularly in the writings of Descartes, Bacon and Hooke himself. Yet this visual mode may not have been the dominant visual experience in a period where rational science was not yet a world-view. In other words, the building was designed to facilitate a way of looking that early modern spectators could not hope to achieve.

The architectural theorist Juhani Pallasmaa's writings on the experience of architecture – particularly in his influential monograph *The Eyes of the Skin* – present an alternative mode of visual engagement with architecture that most accurately describes early modern resistance to the implementation of natural philosophical method to the contemporary space of the anatomy theatre. Like Pérez-Gómez, much of Pallasmaa's text is concerned with a critique of modern architectural design, a phenomenon he sees as dominated by the visual and therefore insensitive to the multi-sensory experience of

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[168] See below and Pallasmaa, 2007: 26-30.
[169] Amann and Knorr-Cetina follow the writings on vision of Ernst Gombrich in his 1960 *Art and Illusion* and, specifically relating to science, Thomas Kuhn in *The Structure of Scientific Revolutions* (1970). In turn, Amaan and Knorr-Cetina explore the ways in which modern scientists view evidence based on 'socially organised procedures of evidence fixation'; Knorr-Cetina and Amann, 1988: 134.

being in architecture.[170] He suggests that forms of architectural design which prioritise focussed, Cartesian vision will be at odds with a multisensory experience of architecture. However, specifically in the visual realm, Pallasmaa, identifies an alternative mode of seeing, common to all architectural experiences, which again challenges an architecture seeking to implement Cartesian scopic ideals. This alternative prioritises peripheral vision; the unfocused, undirected and unenhanced in the visual field that must, by its very nature, challenge the focussed, the directed and the enhanced. An under-theorised but vitally important phenomenon in the experiencing of architecture, the peripheral will deliberately suppress sharp focussed vision:

> The quality of an architectural reality seems to depend fundamentally on the nature of peripheral vision, which enfolds the subject in space.[...] The preconscious perceptual realm, which is experienced outside the sphere of focussed vision, seems to be just as important existentially as the focussed image.[171]

The peripheral therefore is a fundamental phenomenon of the experience of architecture. Could it be that the preconscious allowance of peripheral vision, inherent in the experiencing of architectural space, was the reason why anatomy theatres were not providing the focused, enhanced vision that architects hoped for? It is certainly tempting to see an analogy between Pallasmaa's stress on the peripheral in the experiencing of architecture and Petty's use of the word promiscuous to describe the experience of viewing an anatomy lecture in a theatre: both address an ill-defined and indistinct visual experience.

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[170] Pallasmaa's exploration of the experience of being in architectural space owes much to Merleau-Ponty's *Phenomenology of Perception* (1962) and *Visible and the Invisible* (1968). Pallasmaa uses Merleau-Ponty's definition of the flesh of the world and 'being in' reality as a basis for his exploration of the reality of architectural space. For other discussions of multi-sensory experience in architecture see Bloomer and Moore, 1977; and Bachelard, 1994.
[171] Pallasmaa, 2007: 13.

Furthermore, Pallasmaa locates the peripheral within a phenomenological opposition to rational science and its obsession with focused vision:

> Unconscious peripheral perception transforms retinal gestalt into spatial and bodily experiences. Peripheral vision integrates us with space, while focused vision pushes us out of the space, making us mere spectators.

The peripheral envelops the user of architecture within what Merleau-Ponty describes as the 'flesh of the world', the all-encompassing ontology of the world, outside of which no form of seeing or looking can exist.[172] Pallasmaa's model of peripheral vision is also historicised within his account. He criticises modern architecture for its 'poverty in the field of peripheral vision', which makes its users feel like outsiders, and stands in direct contrast to the 'emotional engagement of natural and historical settings'.[173] Hooke's design, standing on Pérez-Gómez's threshold between a sensitive architectural engagement with reality and the influence of the rational on architecture, likewise attempted to exclude the peripheral. Its unique top-lighting and vertical seating, influenced by contemporary natural philosophical method, stood in opposition to forms of seeing in architecture that were residual in the late seventeenth-century experience of the world.

Summerson is therefore right to call the anatomy theatre an empirical as well as a mechanical building, but perhaps his most telling criticism was that Hooke's architecture was 'insensitive'.[174] For Summerson, the anatomy theatre lacked the

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[172] Merleau-Ponty describes the flesh of the world as 'not matter, not mind, not substance. To designate it, we should need the old term "element" in the sense it was used to speak of water, air, earth and fire, that is, in the sense of a general thing, midway between the spatio-temporal individual and the idea, a sort of incarnate principle that brings a style of being wherever there is a fragment of being. The flesh is in this sense an "element" of being'; Merleau-Ponty, 1968: 139. As Merleau-Ponty suggests, the Cartesian subject is entirely incompatible with this world-view.

[173] Pallasmaa, 2007: 13.

[174] Summerson, 1993: 238. The word 'insensitive' features heavily in Summerson's writings on Hooke and Wren. For example, he uses it to describe some of the modelling on Wren's City church designs;

sensitivity possessed by many buildings contemporary with it. Summerson sees it, like many of Wren's buildings, as the product of a 'scientific mind' that was 'virtually unconscious of [...] emotional colour'.[175] In light of the first chapter this statement seems unsustainable: for Royal Society members the scientific mind was also an architectural one. However, the case of the anatomy theatre shows that an incompatibility between scientific methodology and built architectural space was a possibility, regardless of the epistemological inclusion of architecture as a discipline with the Society. An architectural design directly influenced by a scientific mode of vision was insensitive to the architectural reality of the late seventeenth century. The theatre was built to the Cartesian specifications of rational science and strove towards an experience of architecture that was not multi- but *mono*-sensory. Summerson was correct to call the design insensitive: it prioritised one human sense above all others.

To conclude, seventeenth-century use of architectural space, regardless of how well-read in contemporary scientific discourse a user might be, entailed a non-rational, non-positivist experience of architectural space. This was an experience in which promiscuous and peripheral ways of seeing operated. Pérez-Gómez sees the tension between the application of scientific methodologies and the late seventeenth-century experience of architecture as a product of the lingering importance of the mythical and poetical content of reality. Instead, accounts of anatomy lectures suggest that such tension was created by oppositional modes of seeing in contemporary architecture. The

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Summerson, 1949: 85. Furthermore, he also suggests that if Hooke had been responsible for any of the City church designs then it was likely to have been the 'less sensitive' ones; Summerson, 1993: 192.
[175] Summerson, 1949: 70.

opposition here was between conceptions of vision in an architect's design and the visual experience of the user of the executed building.[176]

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[176] For the argument that a phenomenological architectural theory would entail a dichotomy between design and experience see Dovey, 1993: 247-269.

CONCLUSION

The influence of late seventeenth-century science on the history of architecture was profound. As Pérez-Gómez states:

> An analysis of the architectural intentions of the seventeenth and eighteenth centuries in relation to the changing world-view ushered in by Galilean science and Newton's natural philosophy is necessary before we can understand the dilemmas still confronted by architects.[1]

Regardless of Pérez-Gómez's subsequent casting of that relation as negative, he was surely right to identify seismic shifts, still felt today, in the practices of architecture at precisely the time this thesis has been concerned with. Hooke, Wren and Evelyn, all contemporaries of Newton, were located at the epicentre of these movements. As Royal Society members and architectural practitioners they negotiated the complex interrelationship between architecture and science in both their writings and – in Wren's and Hooke's cases – their buildings. In doing so they were the agents of the change that would fundamentally shift the practices of architecture. This thesis has sought to explore this moment through a study of Hooke and the Royal Society. In doing so it has shown architecture's inclusion within the Royal Society's epistemological program but it has also highlighted the numerous external forces that shaped the interface between architecture and the Royal Society in practice.

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[1] Pérez-Gómez, 1983: 3.

The first chapter provided a new reading of the location of architecture as an intellectual subject within the Royal Society. Building upon the position established by Bennett in 1982 – that architecture was conceived of as a mathematical science – I explored other aspects of the Society's interest in the discipline. In particular I stressed architecture's place within the Society's remit and the members' ongoing recognition of its importance. I also highlighted the tendency of architectural discussion to manifest itself in the more informal spaces of the Society, rather than in its official corporate agenda. Although the published output of the Society contained more material relating to architecture than is immediately apparent, on the whole architectural knowledge was discussed and disseminated amongst individuals rather than by the group at large. Furthermore I demonstrated that such discussion tended to stress both utility and accuracy in the elucidation of architectural knowledge.

I then took up the issue of the socio-epistemological position of the architect in the Royal Society. Following Evelyn's concern to define properly the figure of the architect in his 1664 *Account of Architects and Architecture* I surmised that credibility as an architect, as defined by Royal Society members, was directly related to where one acquired a knowledge of architecture. For Evelyn, an architect had to possess knowledge that had come from the correct sources: from an education in mathematics followed by either a visit to continental Europe to view correct architectural design or a period collecting and studying books and texts that accurately depicted those designs. His own translation of Roland Fréart's *Parallel of Ancient Architecture with the Modern* accompanied by his own *Account* aimed to be one of those of texts. Furthermore Evelyn expresses the hope that these processes of knowledge acquisition could be institutionalised, in the form of an

academy, England's universities or possibly the Royal Society. Although Evelyn in this text presents a largely idealised prescriptive model of architectural agency and practice, aspects of this model can be observed at work in the architectural careers of Hooke and Wren. Hooke, in particular, can be seen through his diary collecting the appropriate forms of architectural knowledge. In many respects in his architectural career Hooke resembles the *Architectus Ingenio* species in Evelyn's system of architectural classification. Hooke was this paradigmatic architectural agent; he was credible through his knowledge of practical mathematics as well as his impressive collection of European architectural material.

The other three chapters of this thesis highlighted the workings of this paradigmatic architectural agent in practice. In the architectural sphere, Hooke was able to apply the knowledge acquired in the Royal Society and its milieu. Thus Chapter 2 took the example of Hooke's domestic architectural career and showed how epistemological credibility operated in the professional sphere. I stressed the importance of the Royal Society in securing domestic commissions for Hooke, and speculated that this was because Hooke's architectural credibility came partly from the organisation. However, I also showed that Hooke was subject to the unofficial conventions of contemporary architectural practice. Through Hooke's diary one can witness him following a set of norms in architectural practice that were also articulated in contemporary architectural writings. In particular he had to shape his designs around patrons' wishes, and nowhere is this more apparent than in his design for Montagu House. In this building the appliance of Hooke's knowledge of French architecture is apparent. This was knowledge that he may well have acquired through Royal Society sources. As I discussed in Chapter 1, Hooke borrowed French

architectural books from a number of Royal Society sources, including Robert Boyle. However, the experiences of his patron, Montagu, in Paris also influenced the final design. Although Hooke's credibility as an architect came from his experience and acquisition of the correct forms of knowledge – in the manner of Evelyn's paradigmatic architectural agent – in practice the application of that knowledge was constrained.

The third chapter of the thesis highlighted further limitations that were placed on the figure of the *Architectus Ingenio* in the institutional architectural sphere. This work explored Wren and Hooke's professional relationship and their respective involvement in three institutional building enterprises: Greenwich Royal Observatory, the Monument to the Great Fire of London and the City of London parish churches. I concluded that, in the institutional architectural sphere, Wren and Hooke were unable to transfer the close collaborative relationship that they had established in the context of the Royal Society. Furthermore, they showed no signs of ever wanting to. This was because of the regulated nature of institutional architectural practice in the period, which separated the process of design from administrative tasks. Collaboration on scientific ideas – the norm for Royal Society members – was not matched by collaboration on design in their employment in these organisations. Thus, the relationship between the practices of experimental philosophy and architecture can be overstressed and oversimplified. What applied for the Royal Society did not necessarily apply to the domain of architectural practice.

This thesis ended with an investigation of the collision between core Royal Society ideas and built architectural space. This discussion centred around a building project on which Hooke and his patrons shared common aims. The anatomy theatre of the College of

Physicians, unlike other buildings, was commissioned by a group of active Royal Society members who required an appropriately designed space to present medical research. As a result Hooke was able to directly apply experimental philosophical method to the design of the theatre.[2] Even here, however, in the most 'scientific' of late seventeenth-century built spaces, where the interface between architecture and science should have been constructed architecturally, problems existed. These problems, I argue, stemmed from an incompatibility between the early modern experience of architectural space and scientific methodology. They prevented an architectural facilitation of scientific performance and further problematised the functioning of the paradigmatic Royal Society architectural agent.

Although the first chapter presented a new reading of the interface between architecture and the Royal Society, and identified an architective paradigm present in Royal Society writings about architecture, the rest of this thesis has shown how complex that interface really was. Furthermore, it has shown that Hooke, in many ways the paradigmatic Royal Society architectural agent, the *Architectus Ingenio*, was not able to perform that role in practice without the influence of external forces in the architectural sphere, such as contemporary modes of practice and the unique nature of architectural spatial experience. Although Society members did not see architecture as a phenomenon 'outside' of the group's research spectrum, it had existed in practice long before institutionalised science and was subject to different administrative rules. Built architectural space – and the experience of that space – was also a constant: one that would not bend to the rules of experimental philosophy. Wren, at the end of his life, was famously derogatory about a

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[2] Despite the close collaboration between Hooke and physicians, the theatre's benefactor Sir John Cutler was still able to influence the final design, as evidenced by his insistence that the structure was built on the street front.

career in architecture: he described it as time spent 'in Rubbish'.[3] Although he was first and foremost lamenting the lack of financial rewards generated by an architectural career, Wren's metaphor suggests further frustration over the nature of that career. The elderly Wren seems to have felt that he had been constrained and consumed by metaphorical rubble throughout his time as an architect. Perhaps his frustration was down to the intransigence of architecture in the period. As a profession it involved an adherence to administrative bodies; as built space it was not always compatible with an architect's ideas. Interestingly, in the same source, Wren expressed his regret over not becoming a physician, an occupation that Chapter 4 showed to be institutionally very close to the Royal Society.[4] Unlike medicine, the practices of architecture were too established and detached from the aims and aspirations of the new scientific organisation.

Overall, I want to have stressed the complexity of the relationship between architecture and experimental philosophy – as represented by the early Royal Society – in the late seventeenth century. In their architectural writings, Royal Society members produced a coherent and impressively theorised model of architecture as a component part of their epistemological program. External to that, the nature of late seventeenth-century architecture prevented the complete transfer of that model into practice. Important as it was in the history of architecture, the interface between architecture and science in this period was never straightforward.

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[3] Cited in Bennett, 1973: 142. See also Hunter, 1995a: 45-46 and Jardine, 2002: 128.
[4] Bennett, 1973: 142.

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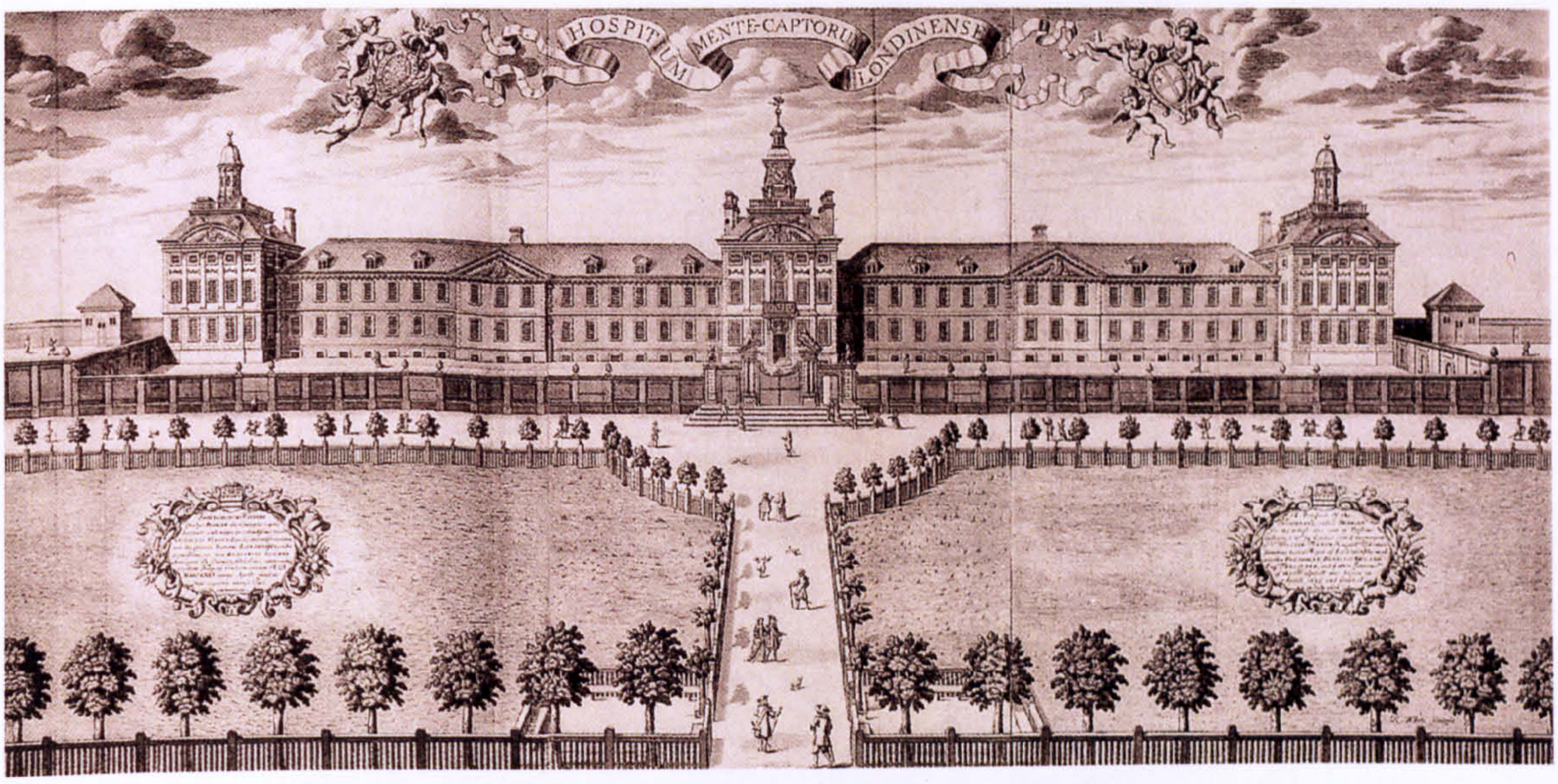
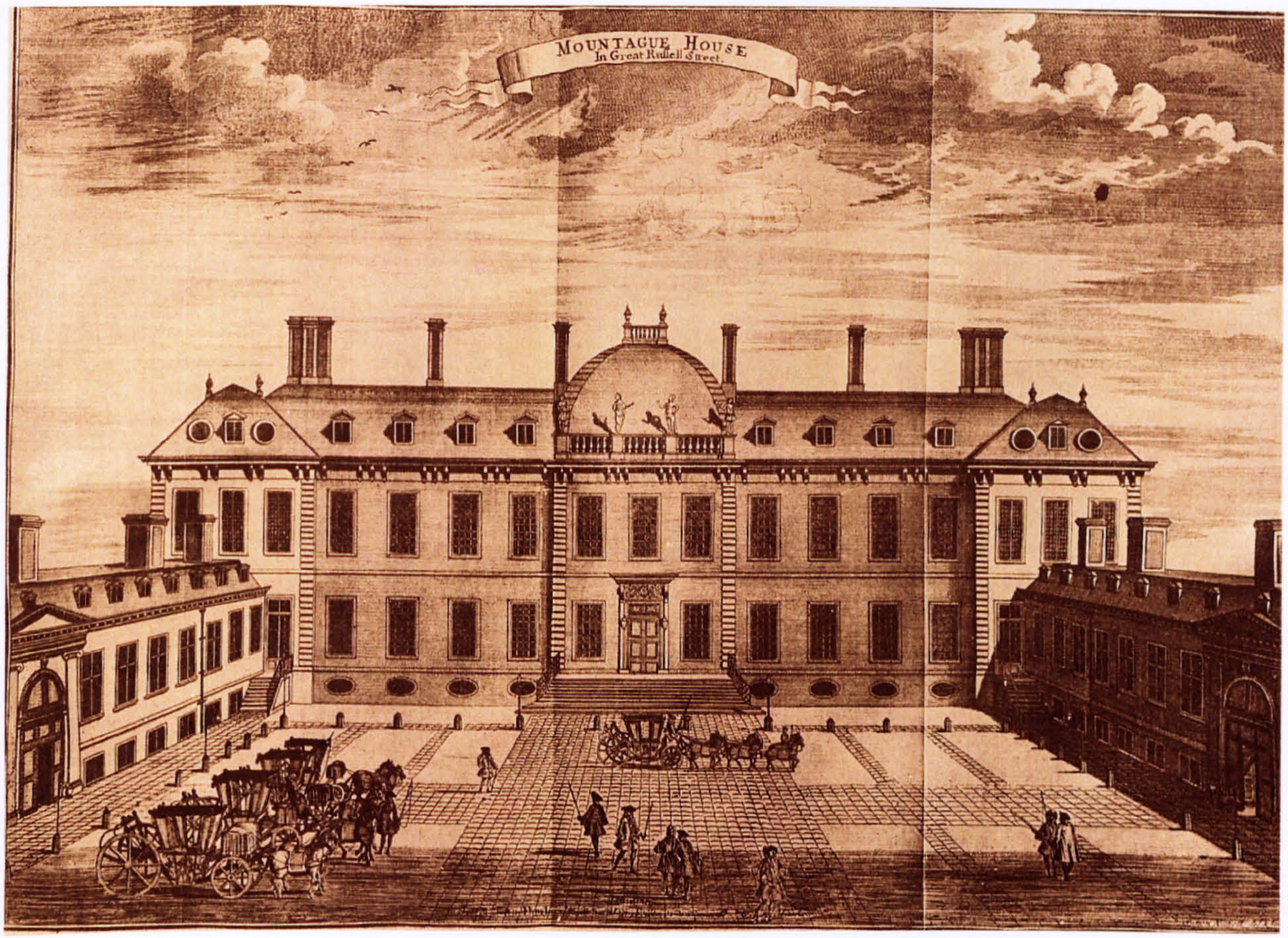


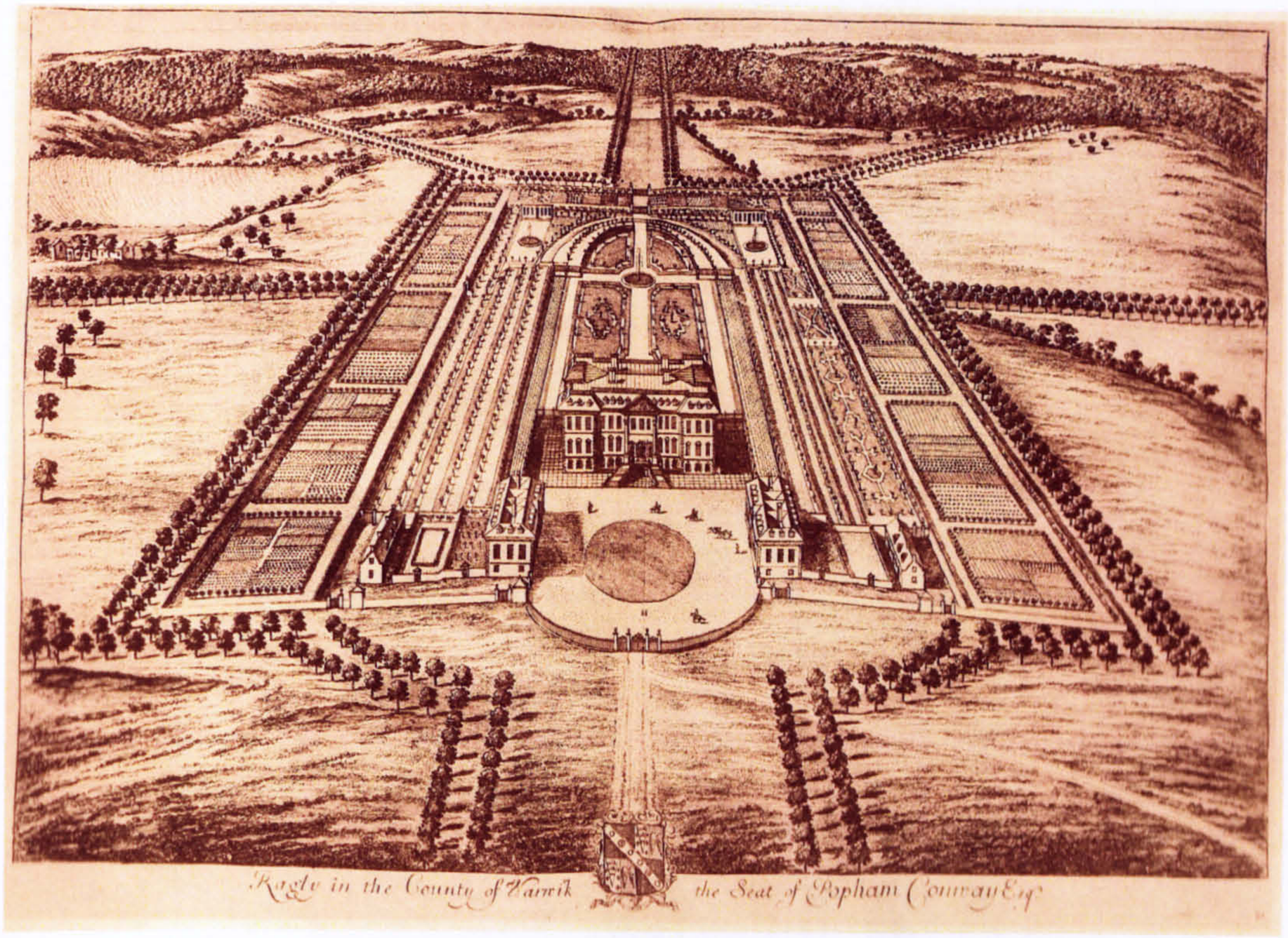
1. *Bethlem Hospital*, London: designed by Robert Hooke, built 1674-1676, demolished 1815, engraving by Robert White (1677).

2. *The Monument to the Great Fire of London*, London: designed by Robert Hooke, built 1671-1675, engraving by William Lodge, (*c.*1677).

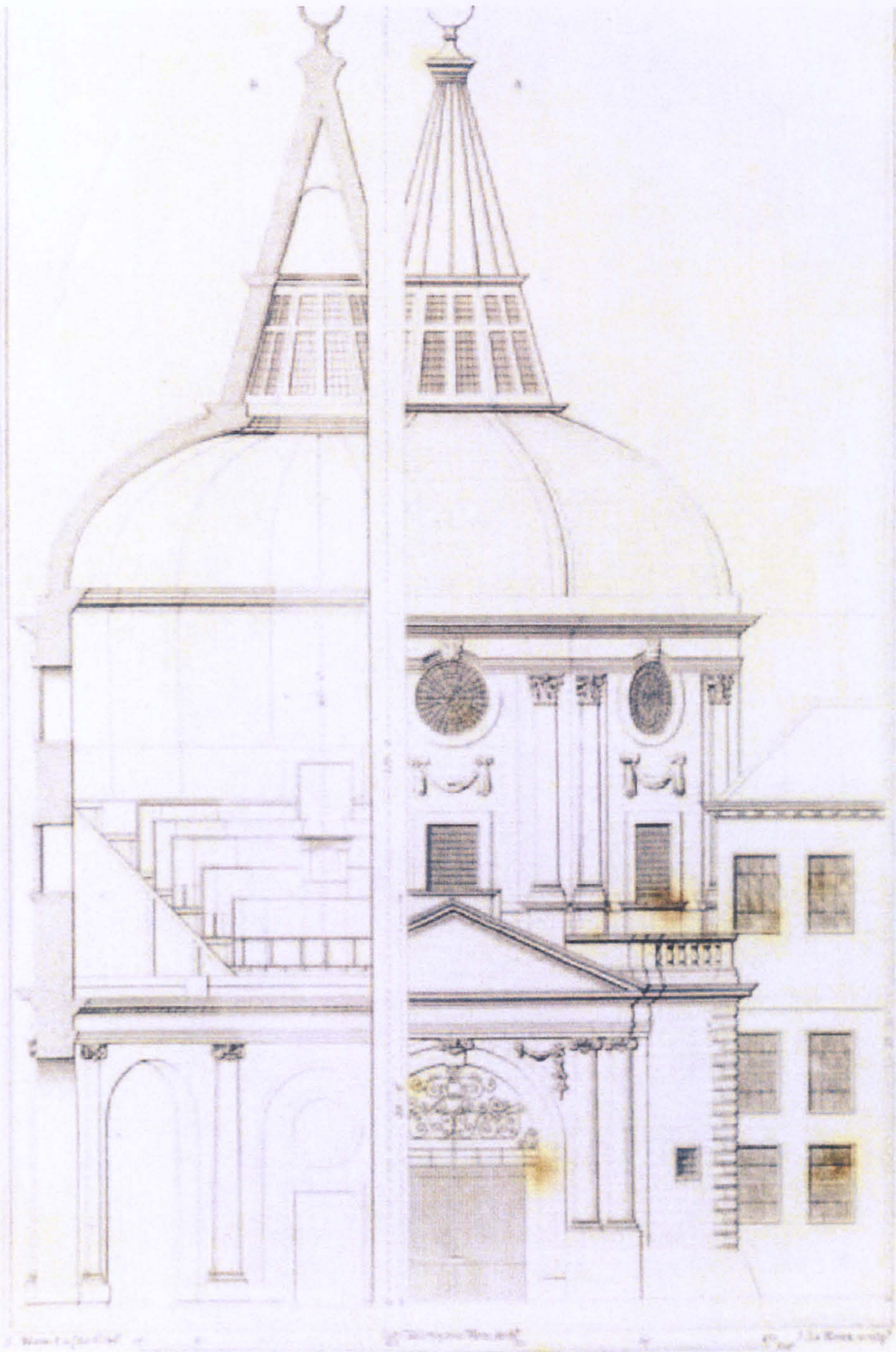


3. *Montagu House*, London: designed by Robert Hooke, built 1675-1679, demolished *c.* 1840, engraving of courtyard by Sutton Nichols, (1754).

4. *The College of Physicians*, London: designed by Robert Hooke, built 1671-1679, demolished 1866-1879, anonymous watercolour of the courtyard following the engraving by William Stukeley, (1723).

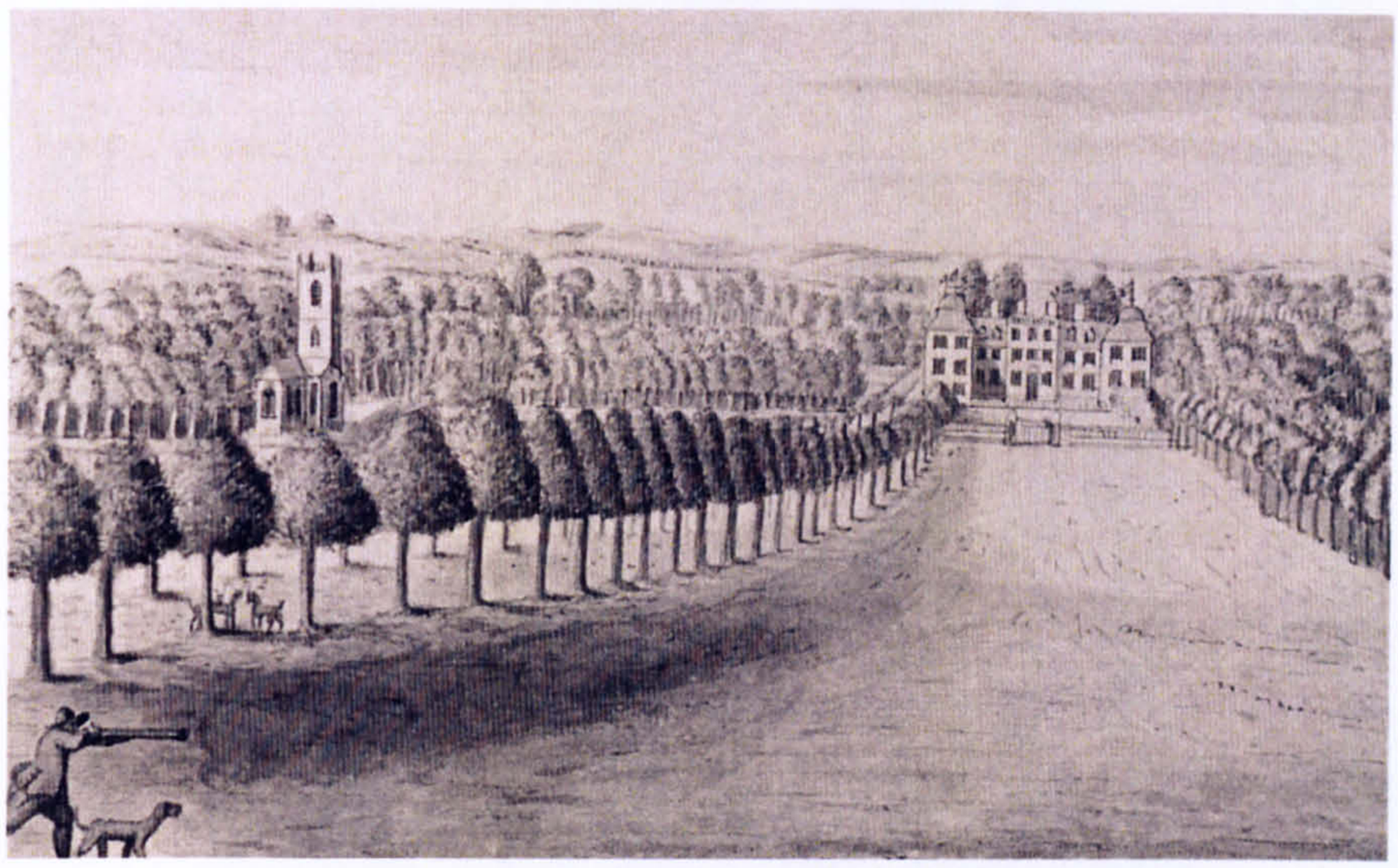


5. *Ragley Hall*, Warwickshire, designed by Robert Hooke, built *c*. 1680, engraving by Johannes Kip and Leonard Knyff, (1708).

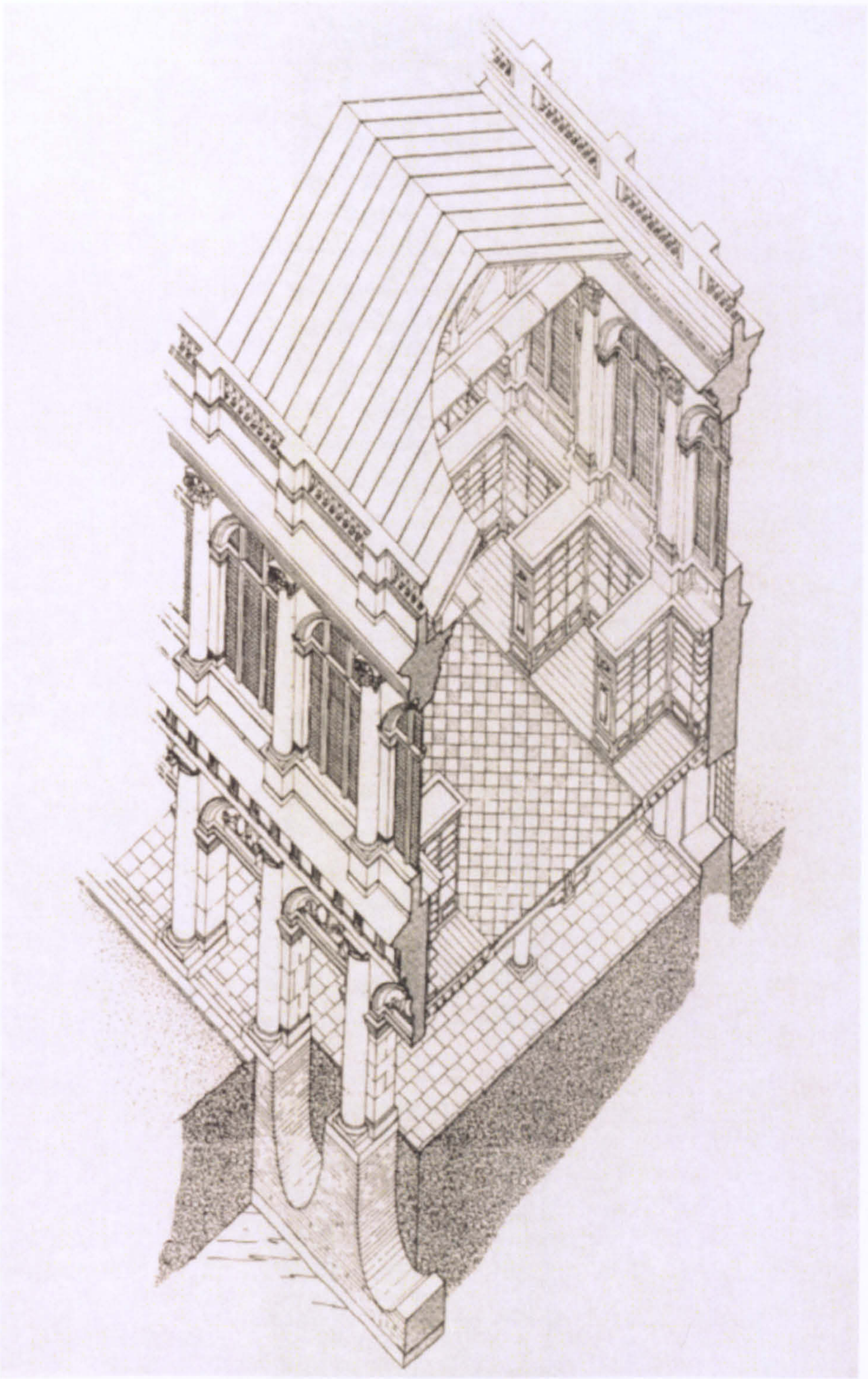


6. *The Cutlerian Anatomy Theatre of the College of Physicians,* London: designed by Robert Hooke, built 1674-1679, demolished 1866, engraving (1828).

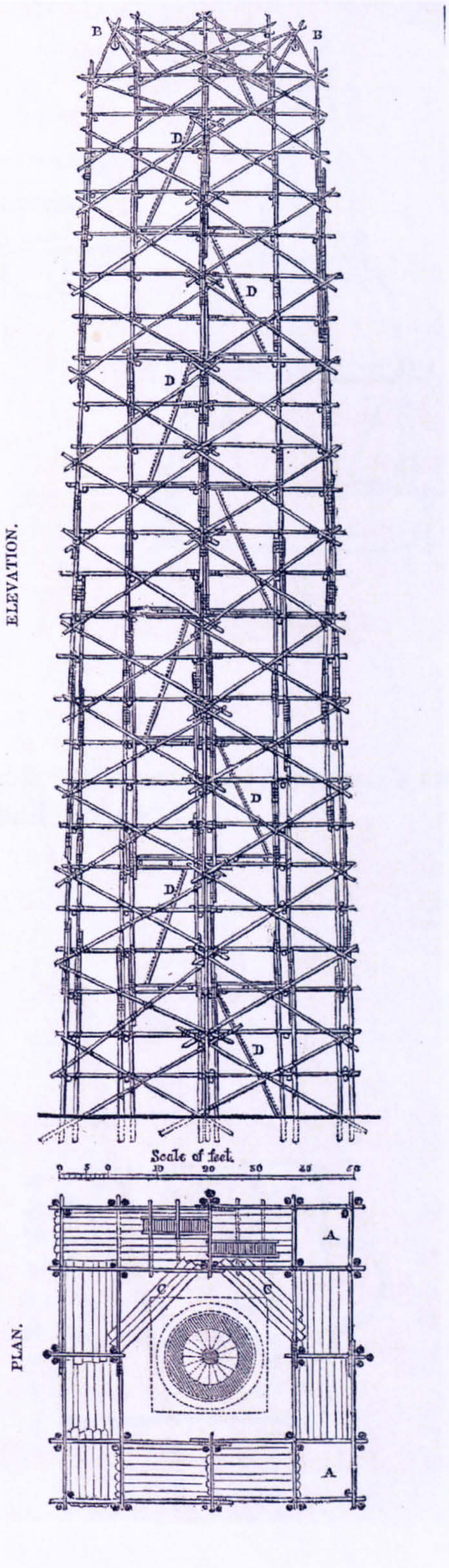
7. John Evelyn, *Frontispiece to Thomas Sprat's History of the Royal Society*, engraving by Wenceslas Hollar, (1667).



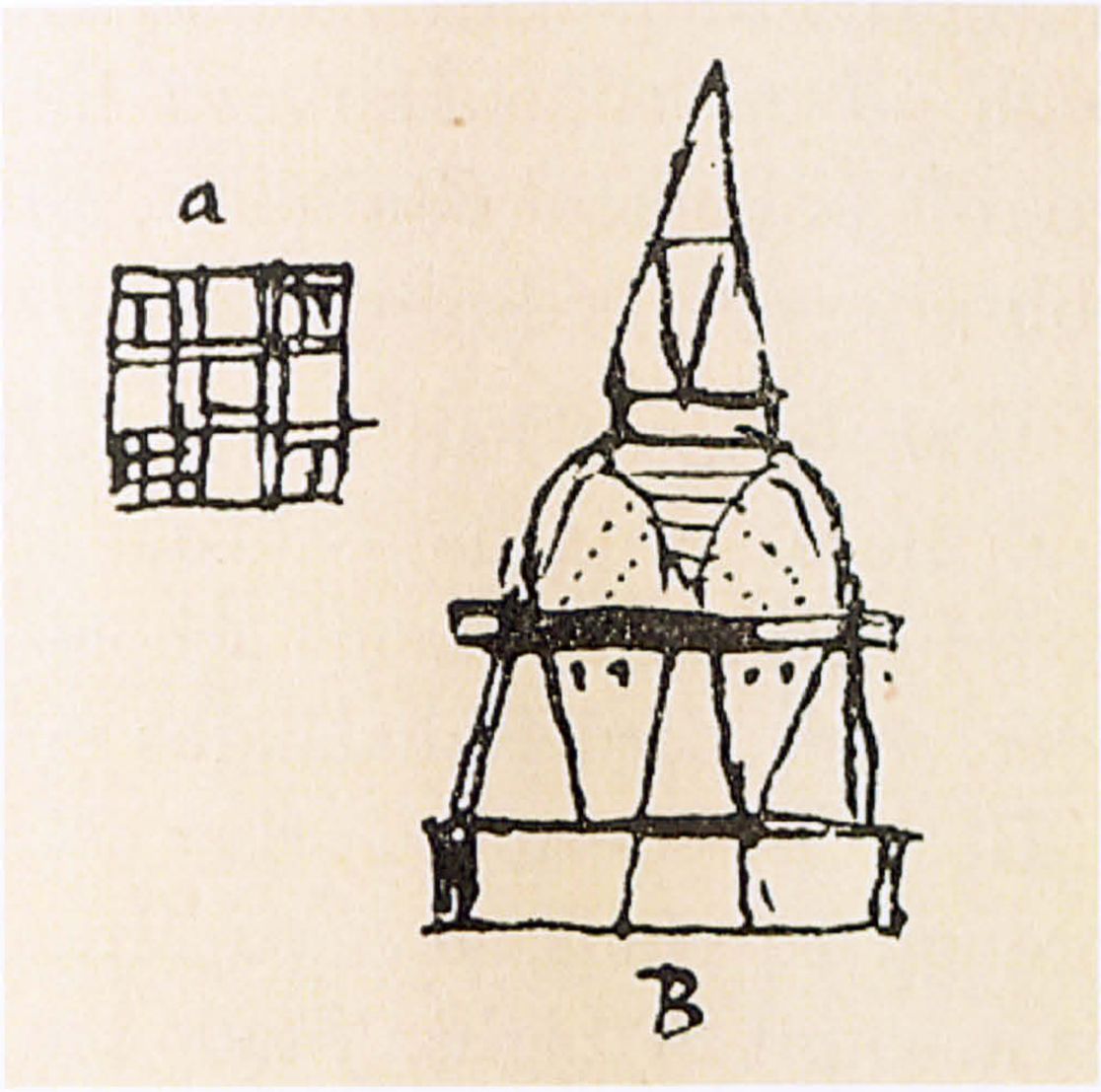
8. *Euston Hall*, Suffolk: built *c.* 1666, drawing by Edmund Prideaux, (*c.* 1735).



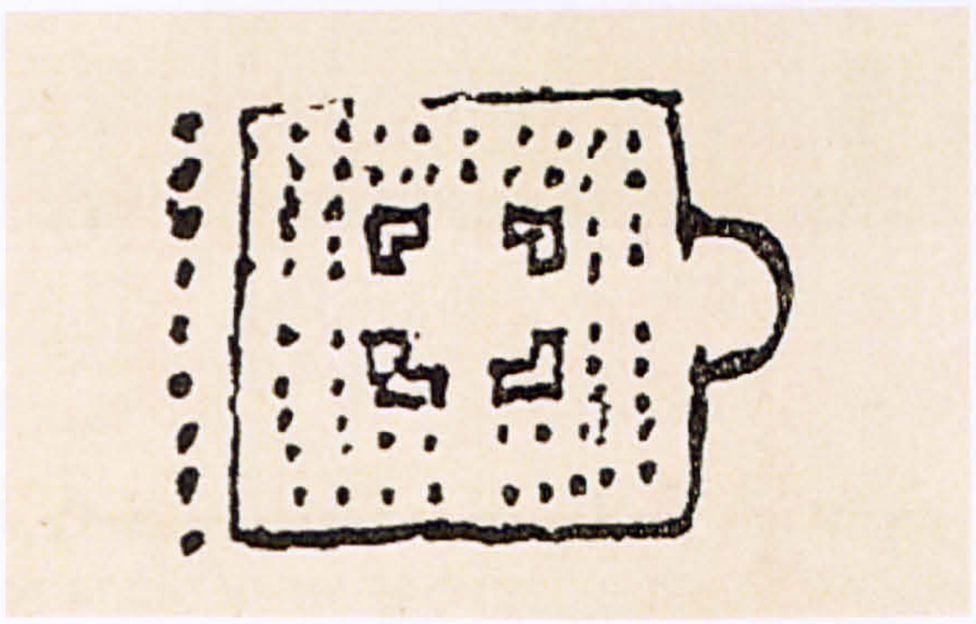
9. *Trinity College Library*, Cambridge: designed by Christopher Wren, built 1676-1684, axonometric drawing.



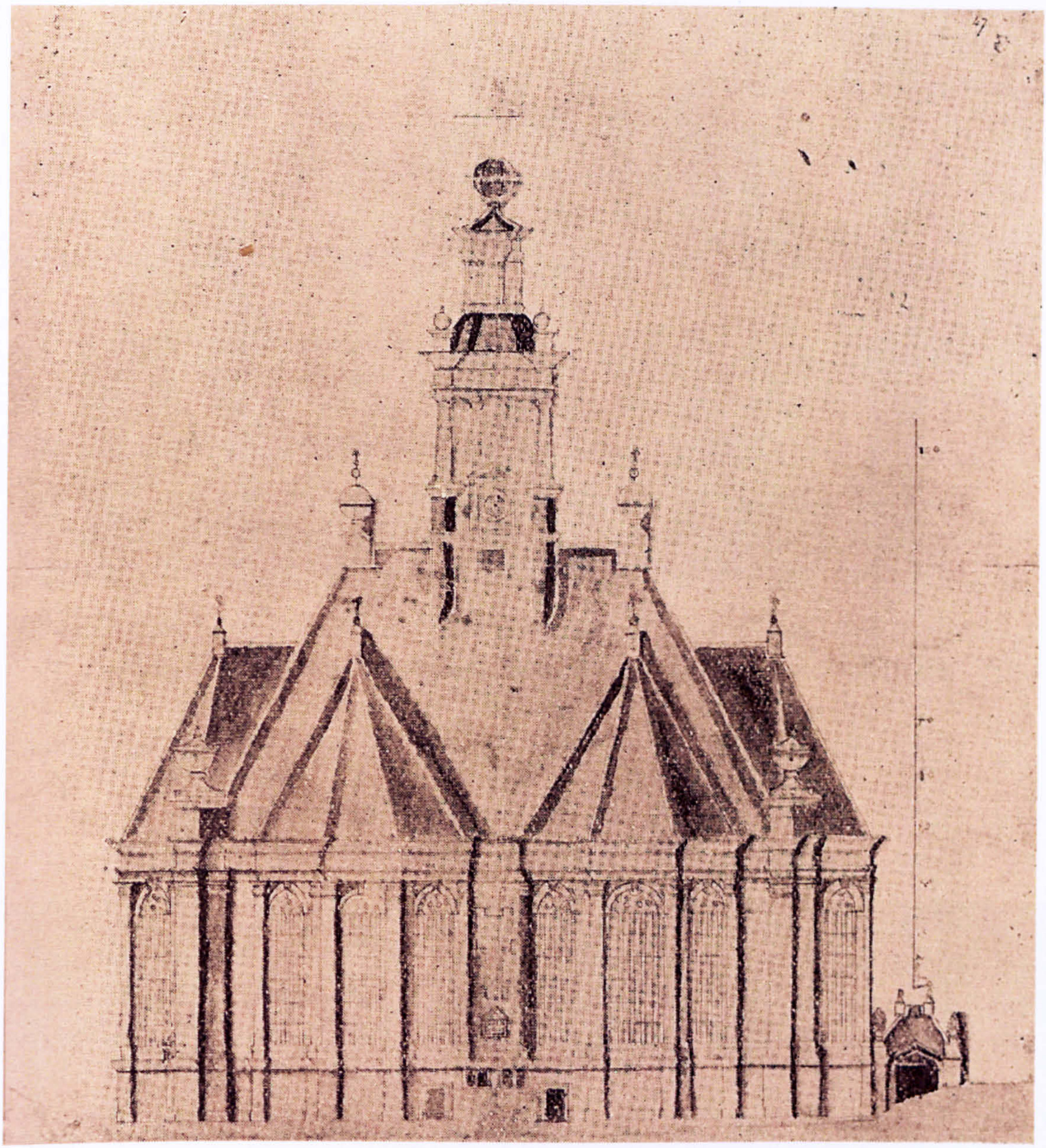
10. *The Scaffolding of the Monument*, probably designed by Robert Hooke, *c.* 1671, anonymous drawing, (1838).



11. Robert Hooke. *Hypothetical drawing of Porcenna's tomb*, plan and elevation, (1677), Guildhall Library.

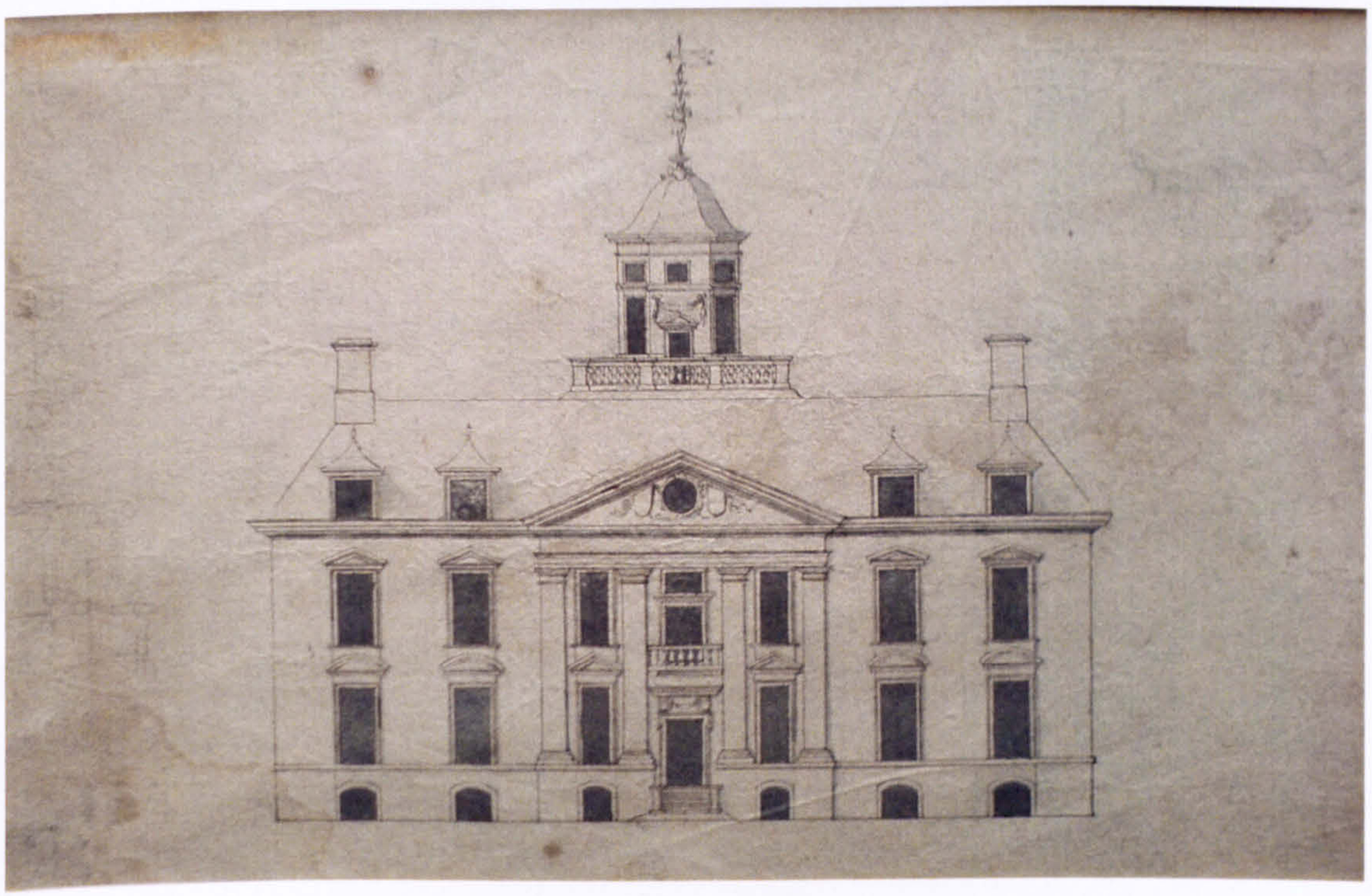


12. Robert Hooke. *Drawing of Hagia Sophia, Constantinople*, plan, (1677), Guildhall Library.

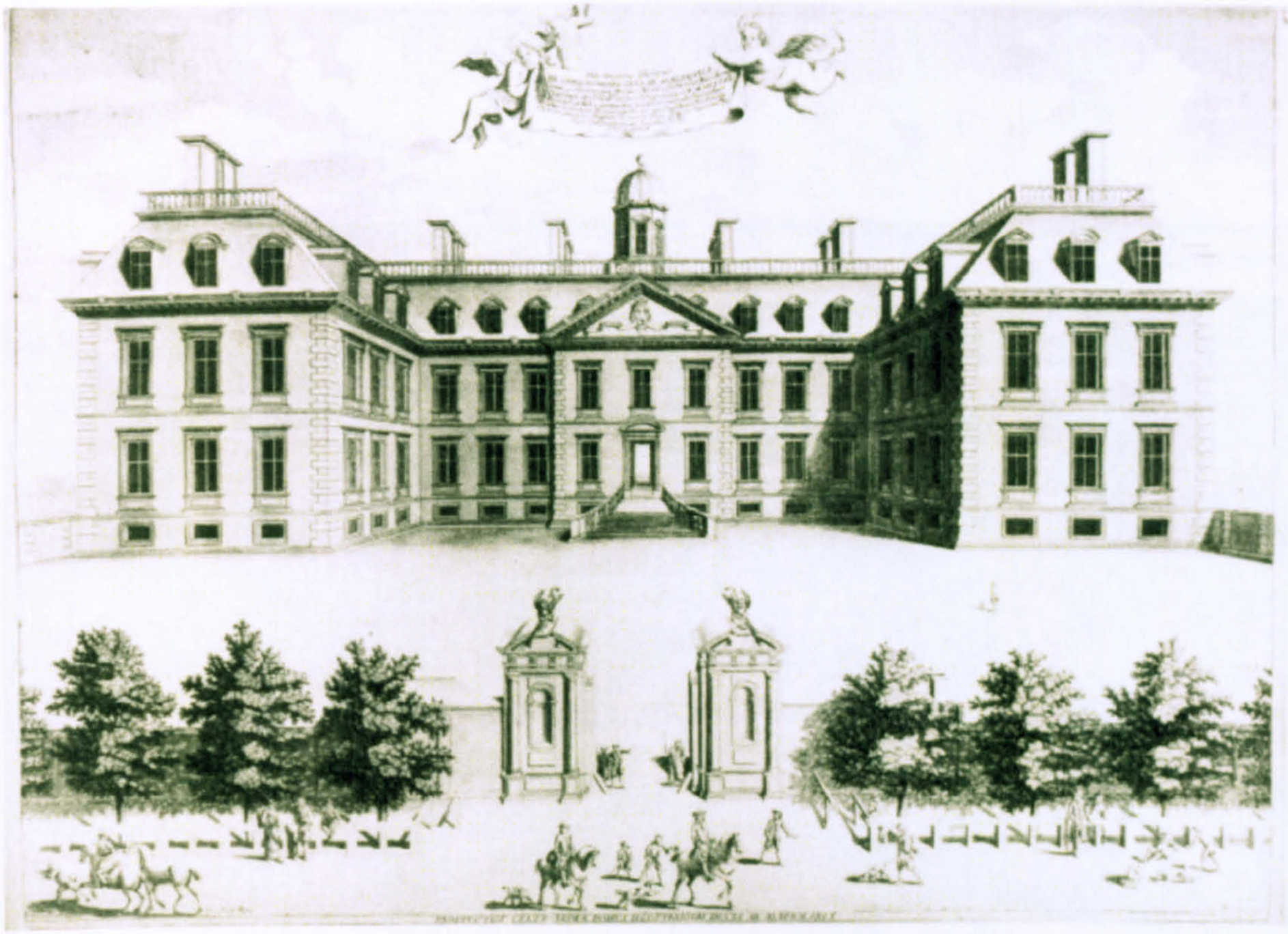


13. Robert Hooke, *Drawing of the Nieuwe Kerk, the Hague*, British Library, Sloane Collection.

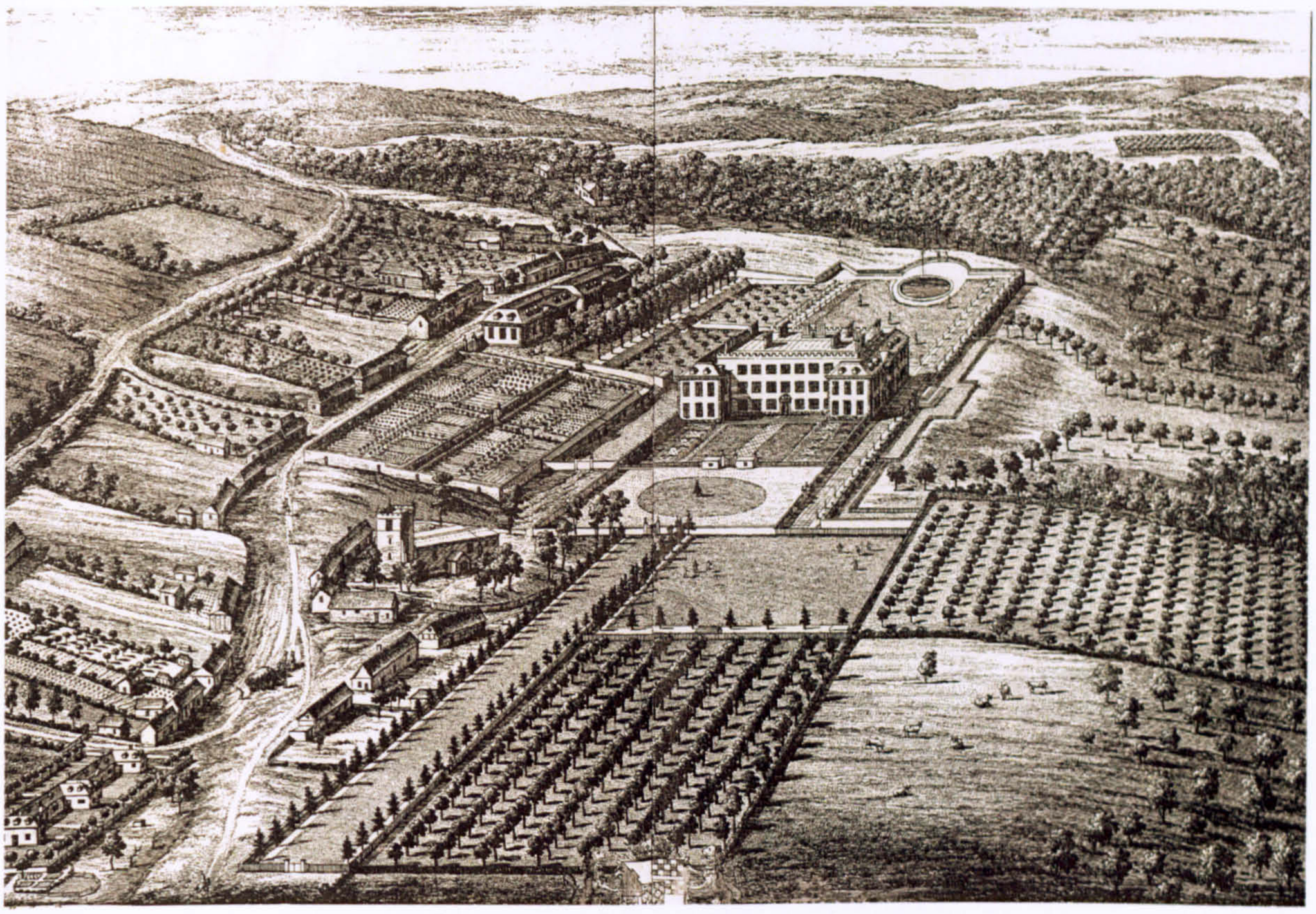
14. *Ramsbury Manor*, Wiltshire: designed by Robert Hooke, 1680-1683.



15. Robert Hooke. *Elevation of Country House, Possibly a Preliminary Drawing for Ramsbury Manor*, Worcester College Library.

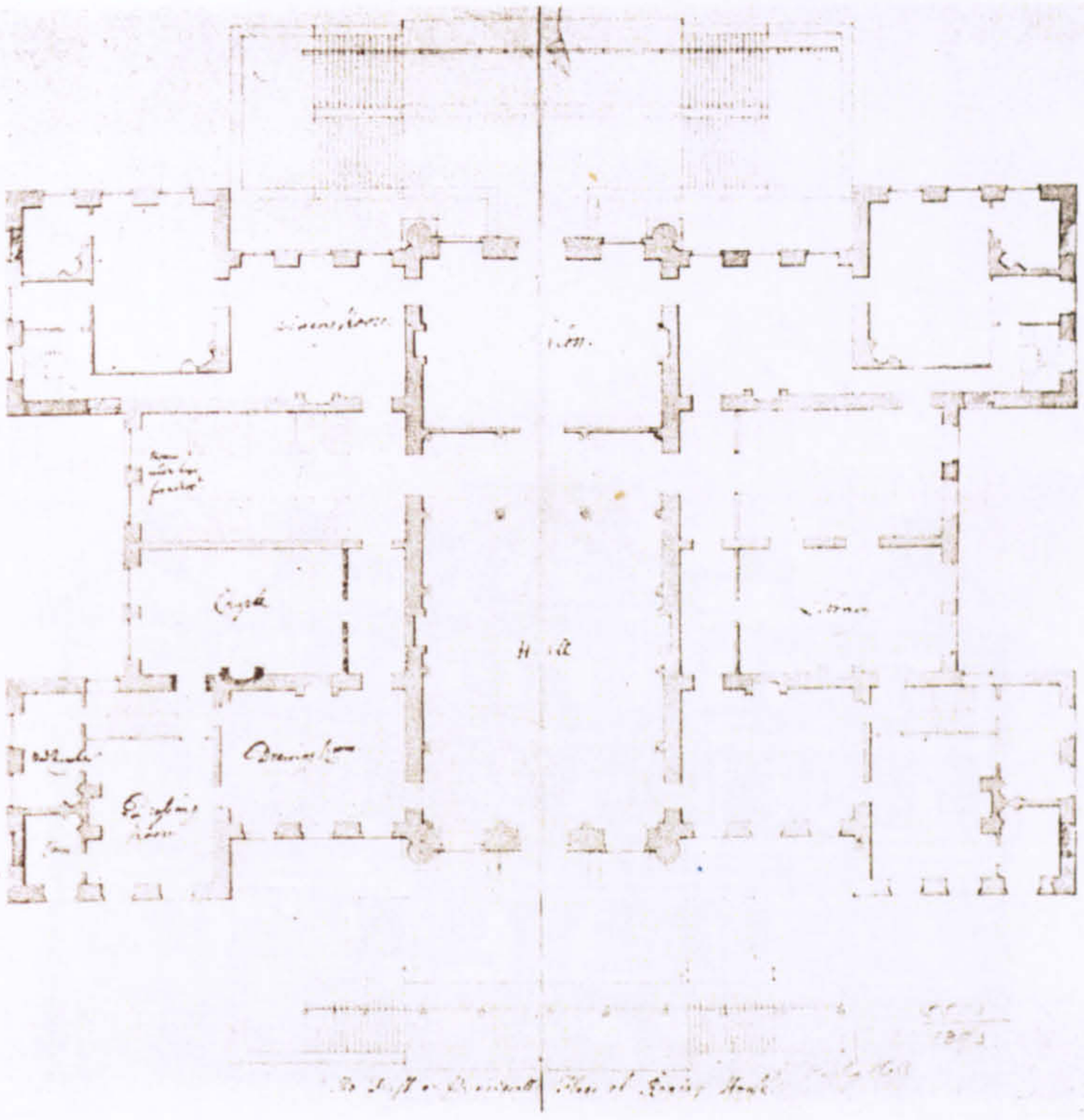


16. *Clarendon House*, London: designed by Roger Pratt 1664-1666, engraving by William Skillman, *c*. 1680.

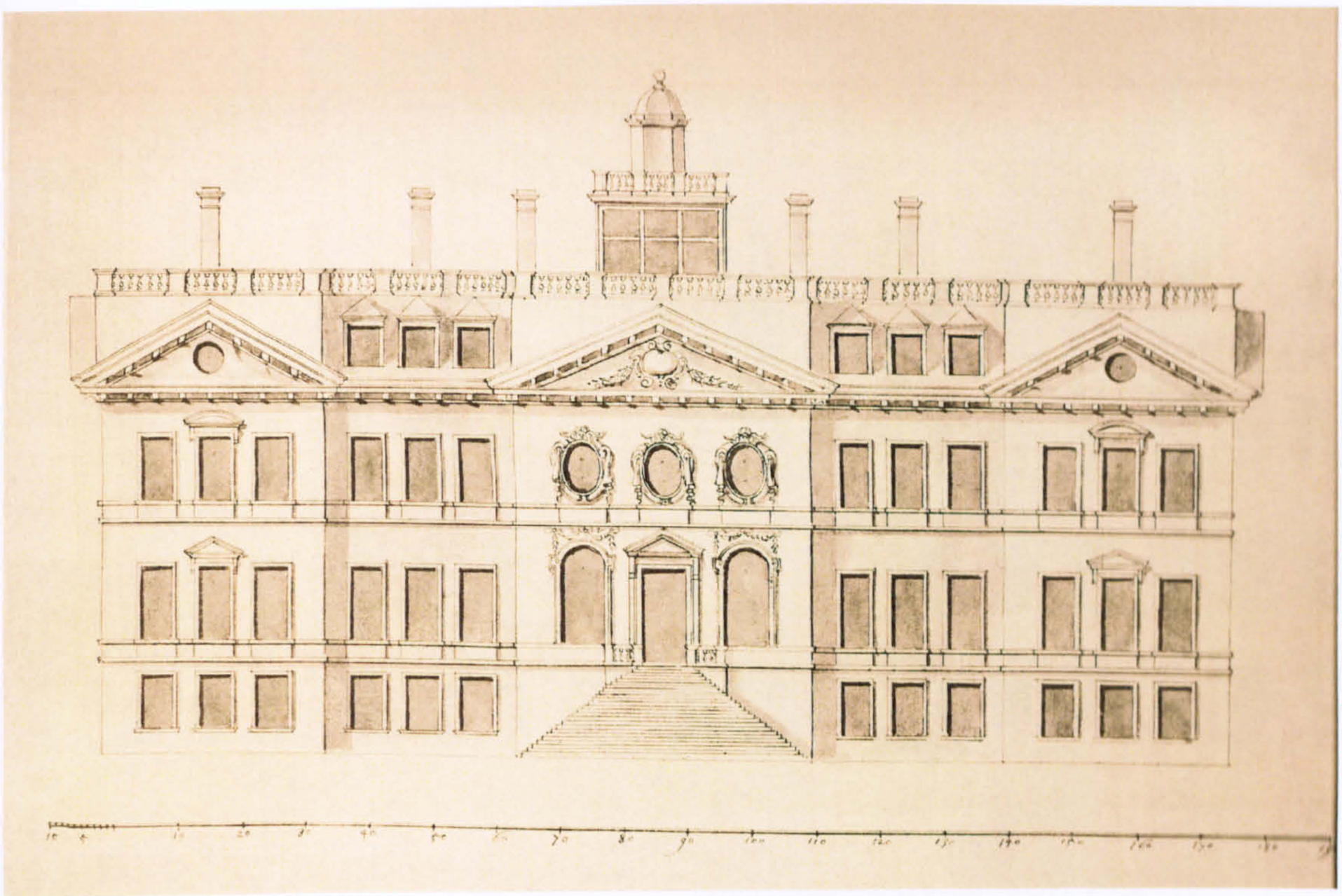


17. *Londesborough House*, Yorkshire: north and south wings and office and stable blocks designed by Robert Hooke, built c. 1680, engraving by Johannes Kip and Leonard Knyff, (1708).

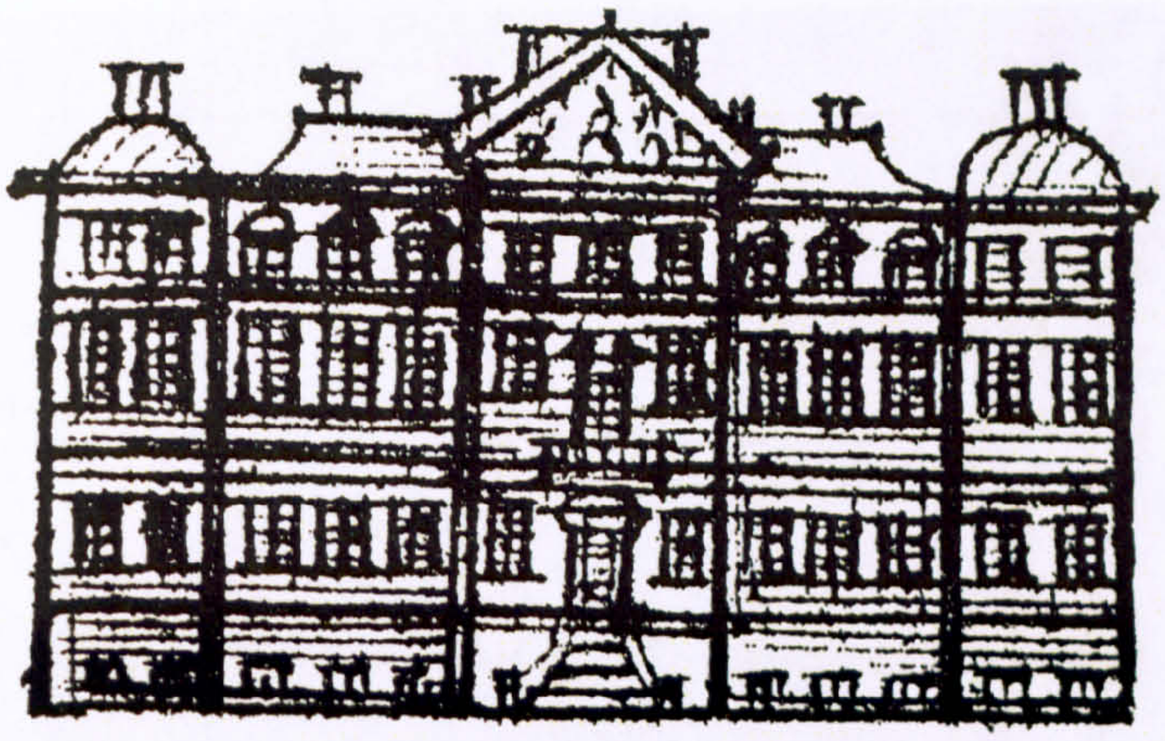
18. *Chiswick House*, London: early seventeenth-century house with additions by Robert Hooke 1677, engraving by Johannes Kip and Leonard Knyff, (1708).



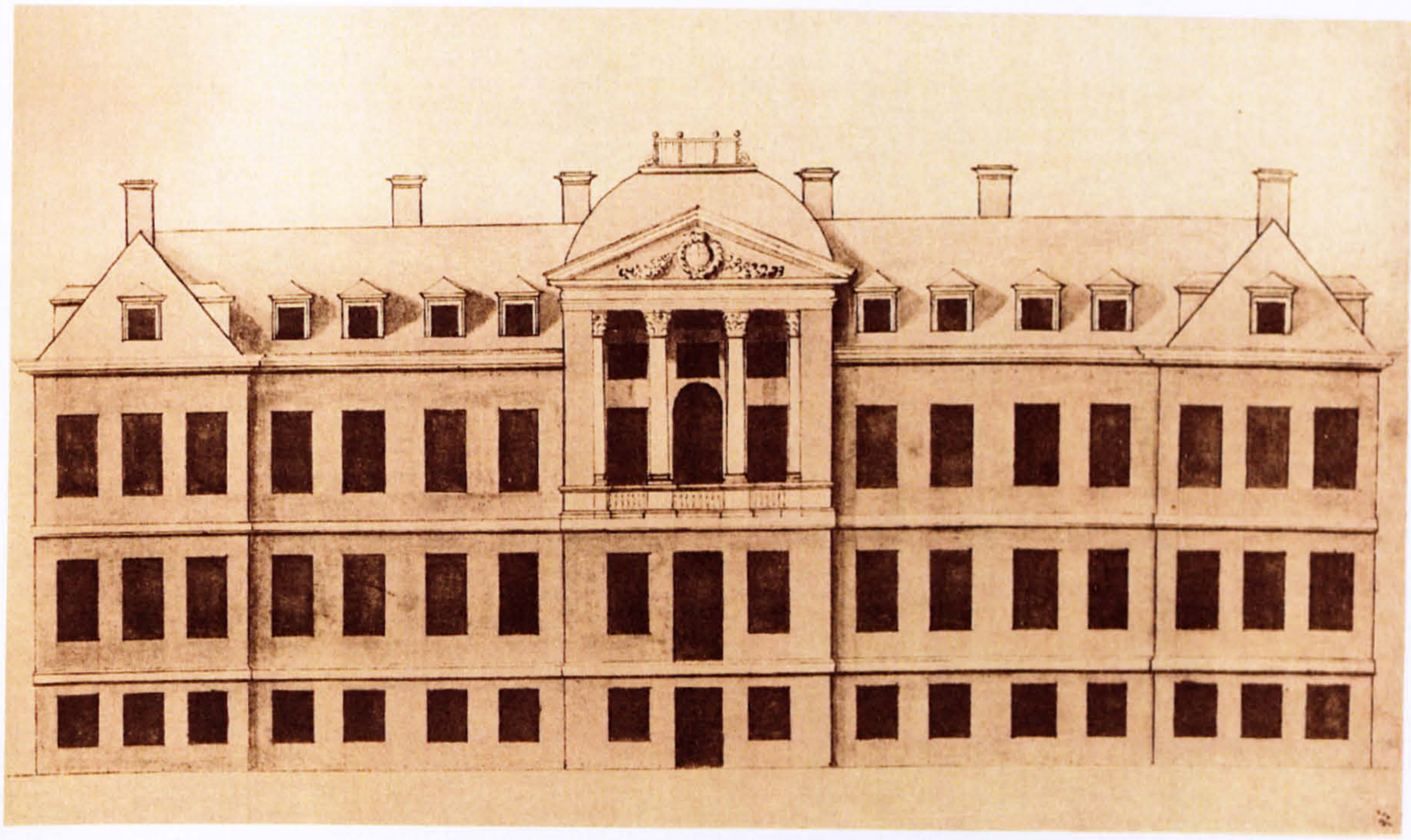
19. *Ground Plan of Ragley Hall*, Warwickshire, drawing probably by James Gibbs (*c.* 1750).



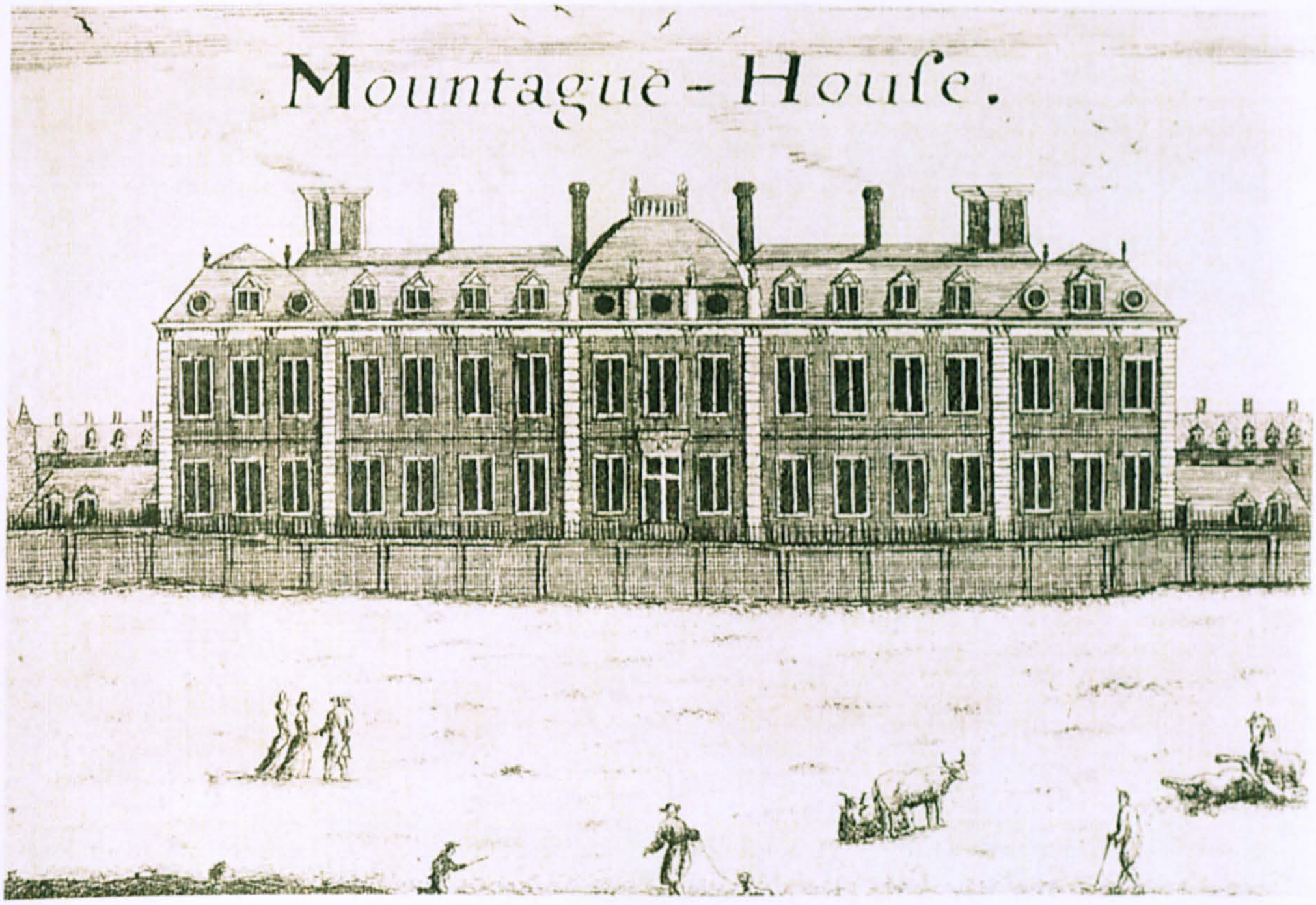
20. Robert Hooke. *Possible Preliminary Drawing for Ragley Hall*, *c.* 1680, British Library



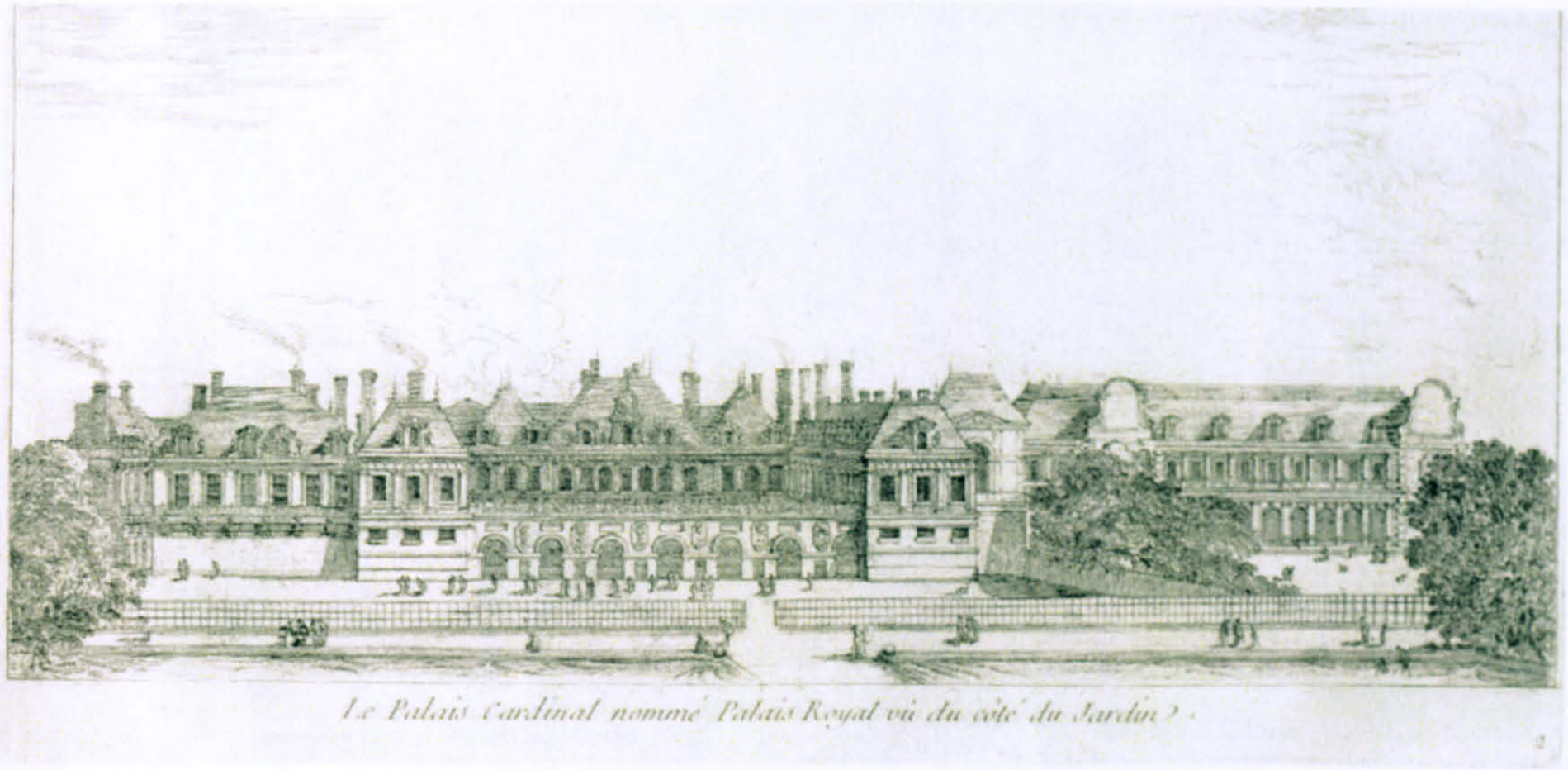
21. Montagu House, London; engraving by William Morgan (1682).



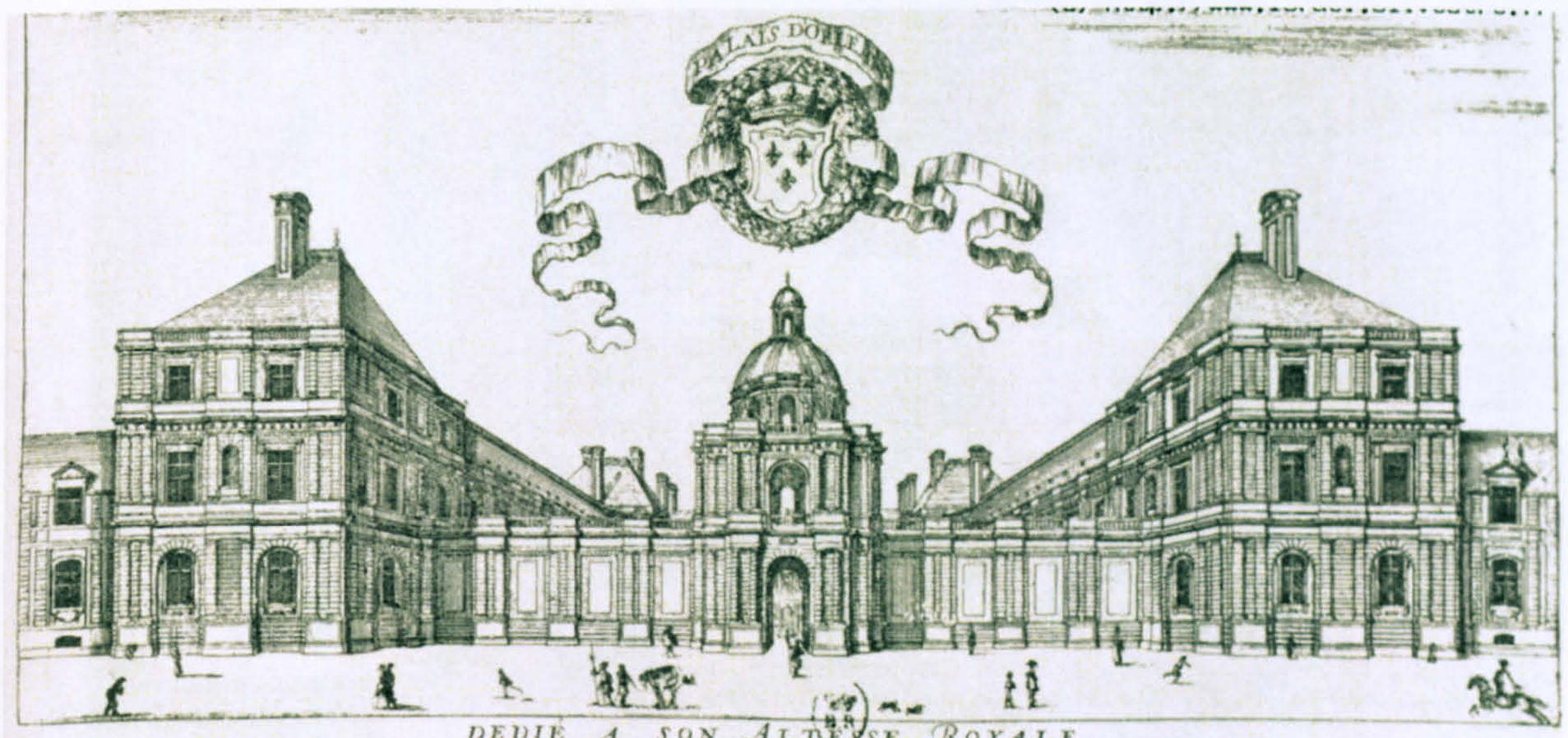
22. Robert Hooke, *Preliminary Drawing for Montagu House*, London, British Library.



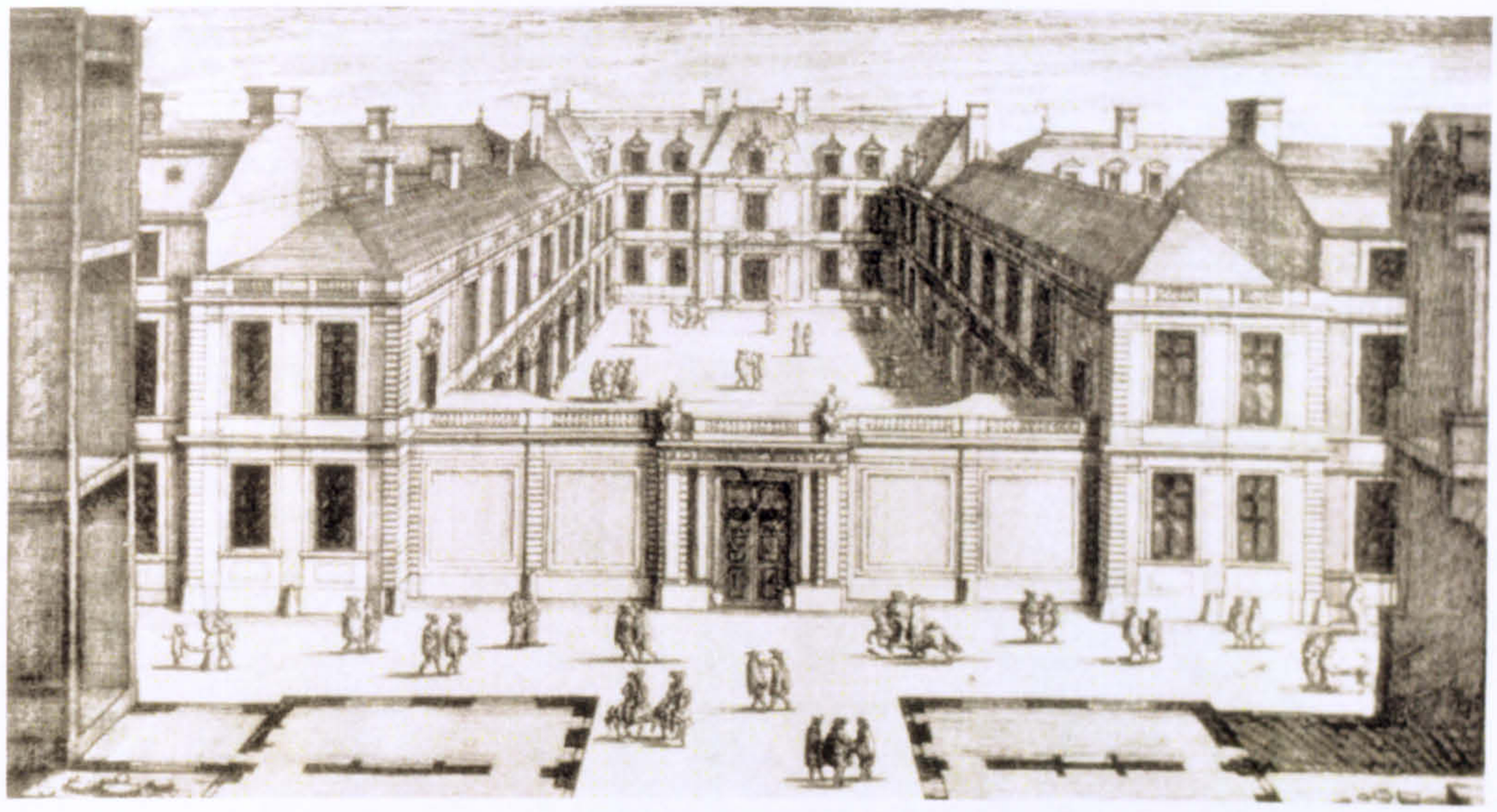
23. *Garden Front of Montagu House*, London, engraving probably by David Loggan, *c.* 1680.



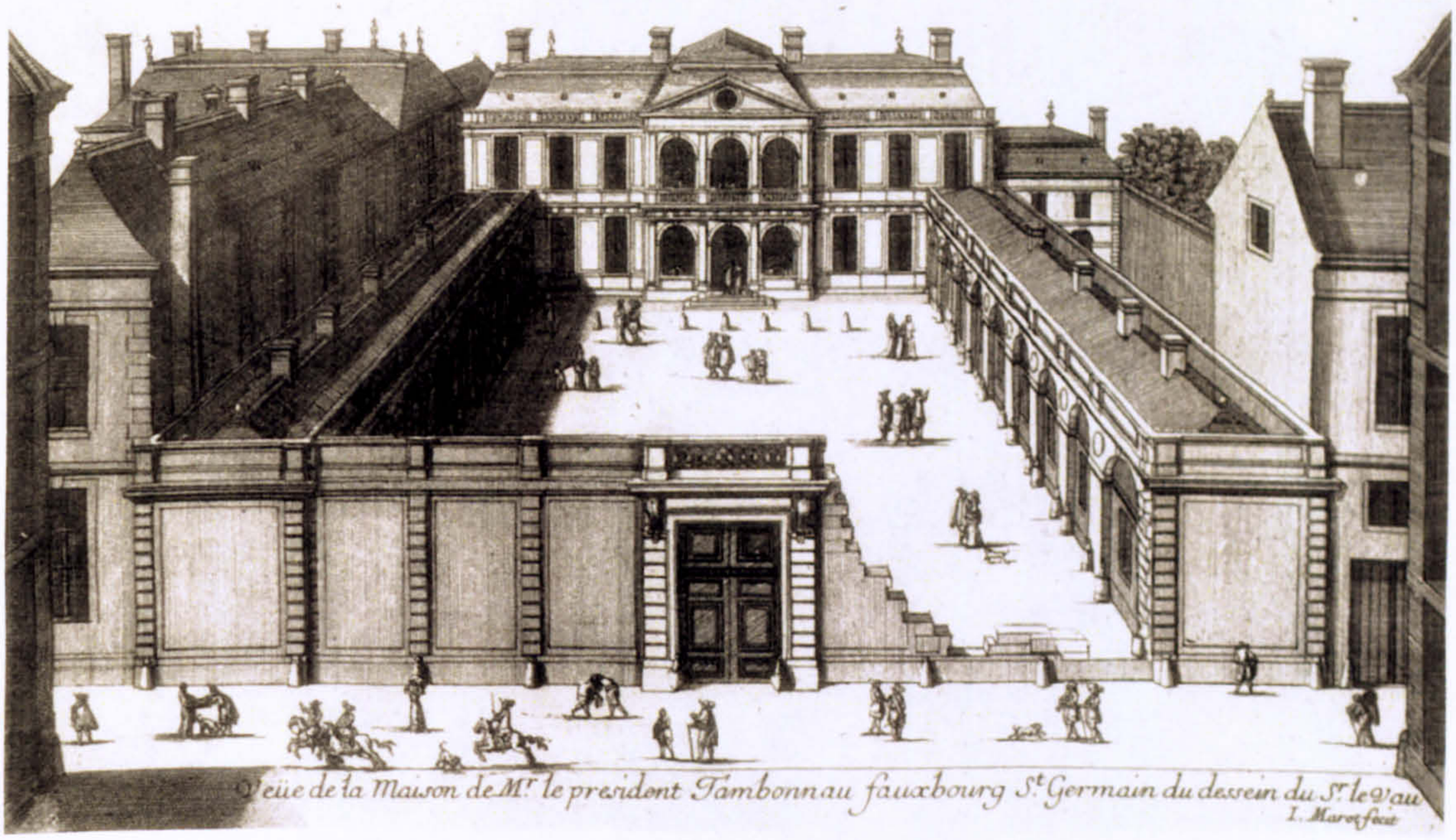
24. *Palais Royal*, Paris: designed by Jacques Lemercier, built 1633, engraving by Israel Silvestre (*c.* 1650).



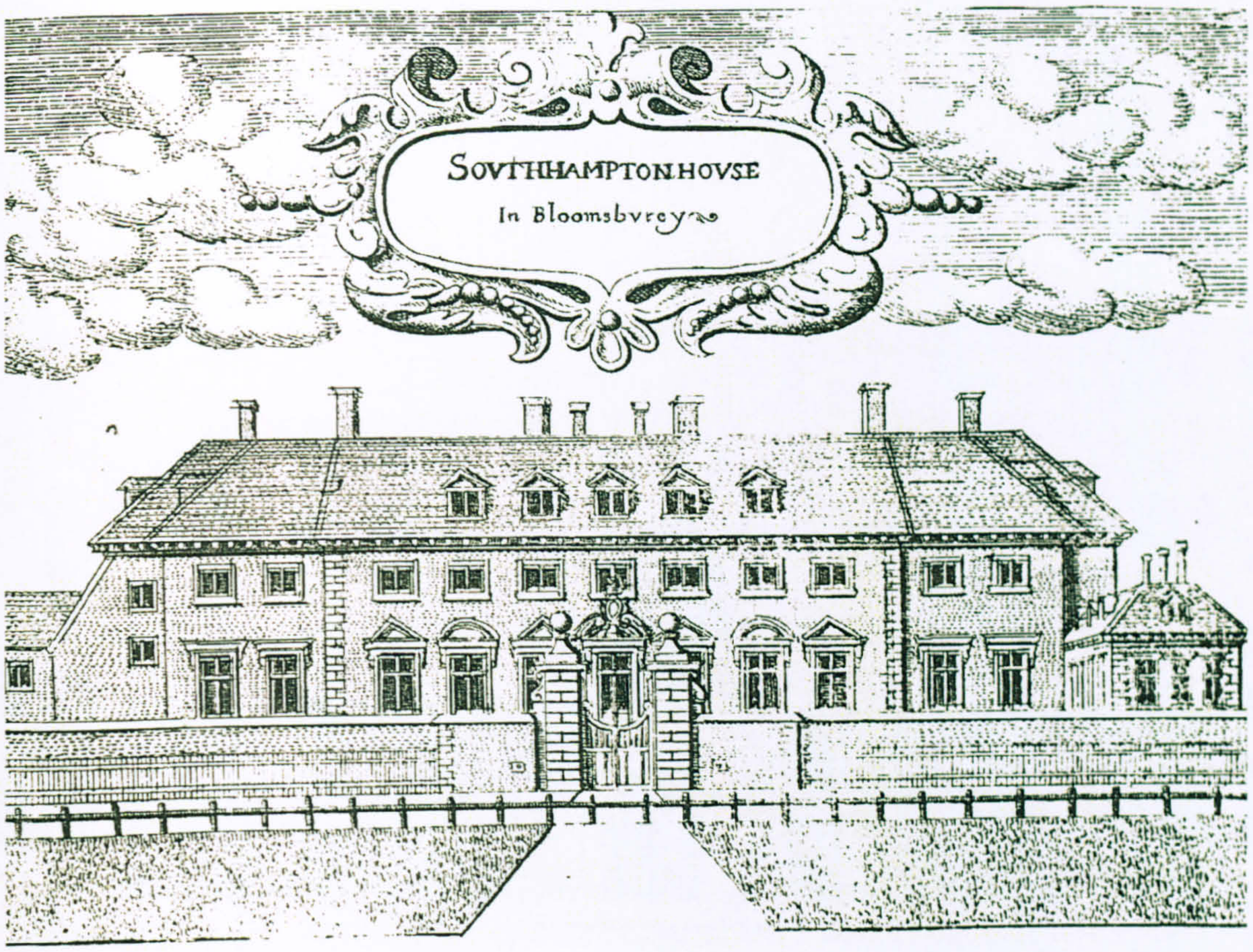
25. *Hôtel de Luxembourg*, Paris: designed by Salomon de Brosse, built 1615, engraving by Israel Silvestre (*c.* 1650).



26. *Hôtel de la Vrillère*, Paris: designed by François Mansart, 1635, engraving by Jean Marot (*c.* 1650).



27. *Hôtel Tambonneau*, Paris: designed by Louis Le Vau, 1642, engraving by Jean Marot (*c.* 1650).

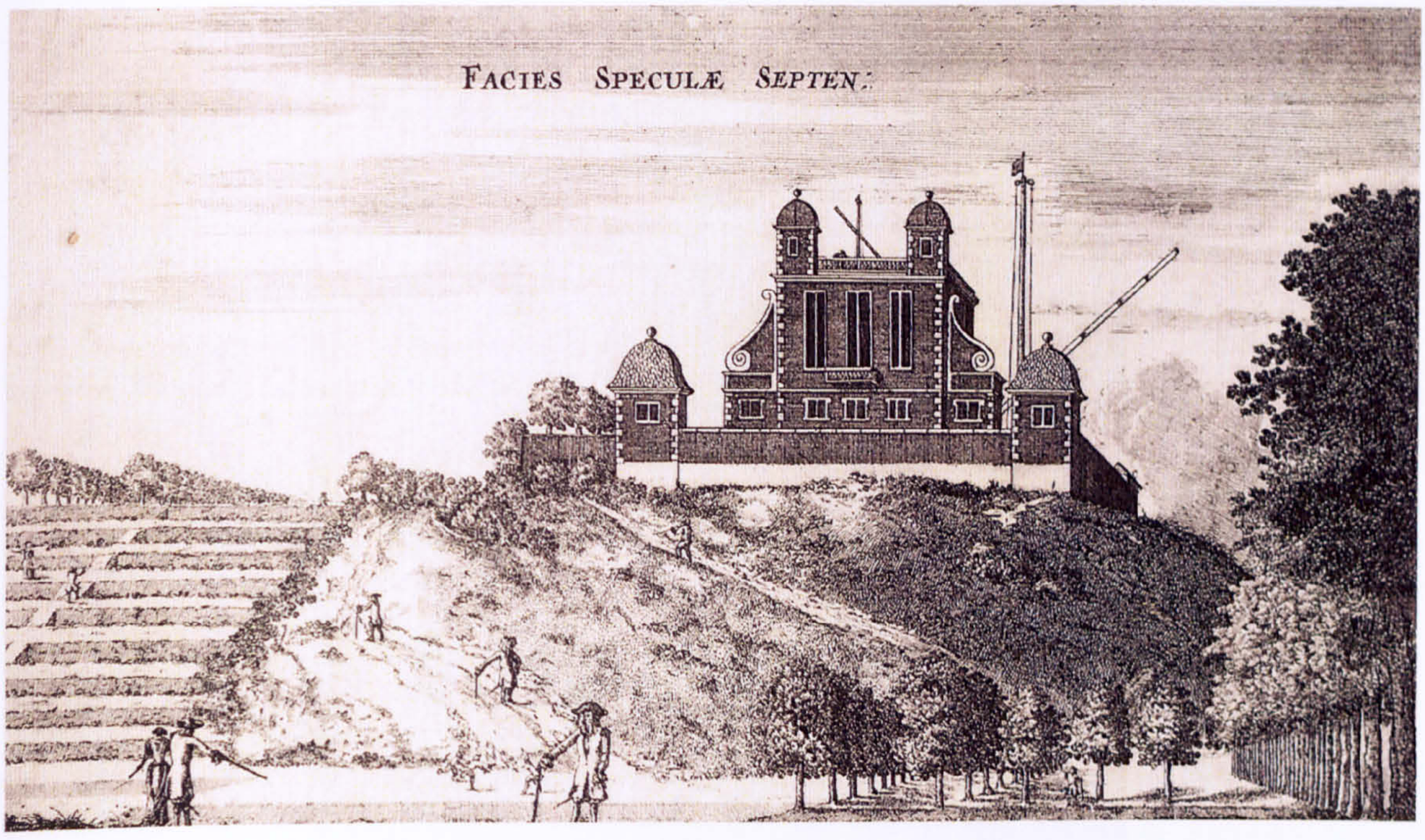


28. *Southampton House*, London, built *c.*1638-1640, demolished *c.* 1800, engraving by John Dunstall (before 1693).

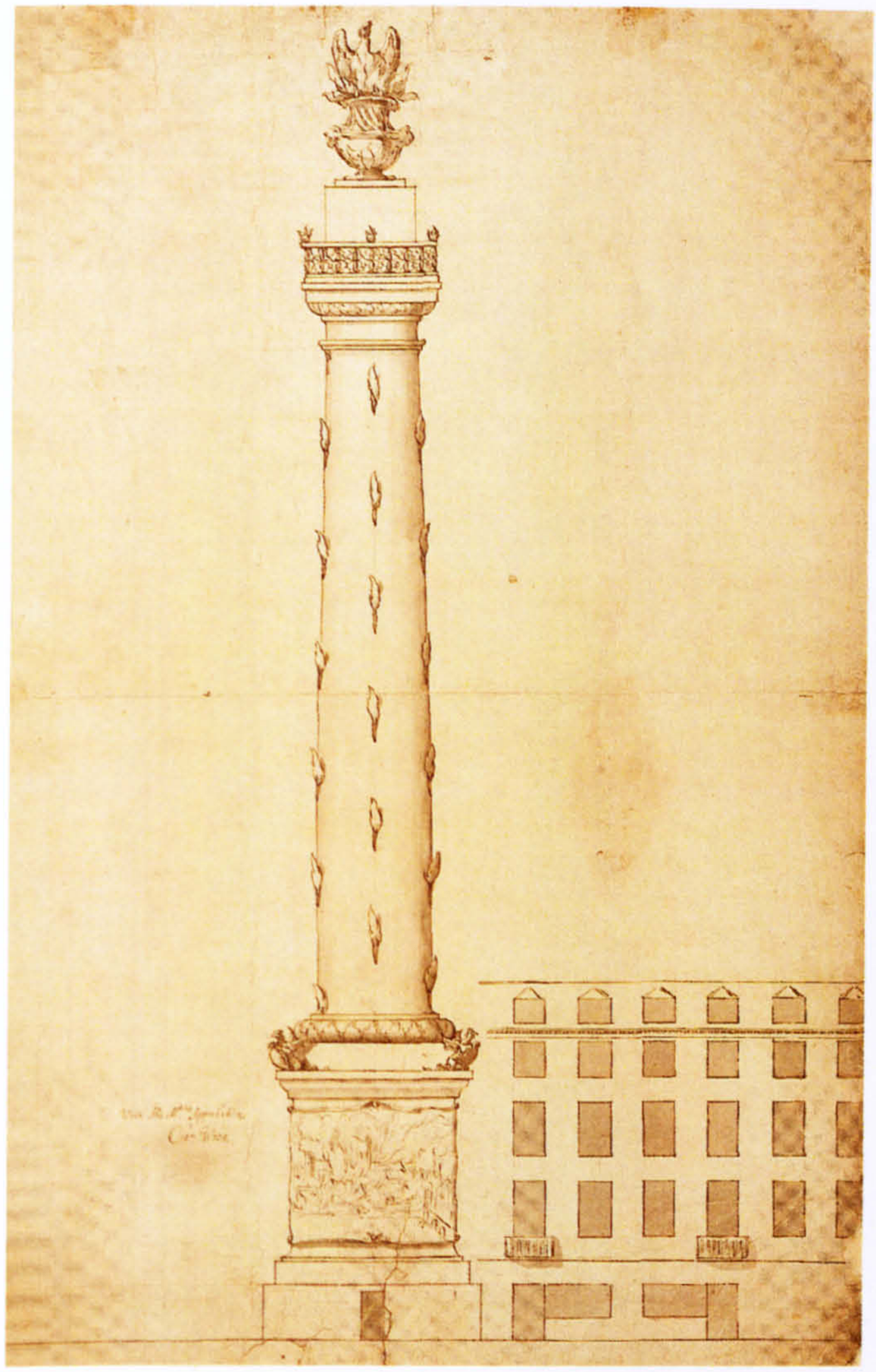
The prospect of Montague house to the Street London
Elevation de L'Entree de L'Hoſtel de Montague a Londres

29. *Screen and Entrance Gate of Montagu House*, London, engraving from Colen Campbell's *Vitruvius Britanicus* (1715).

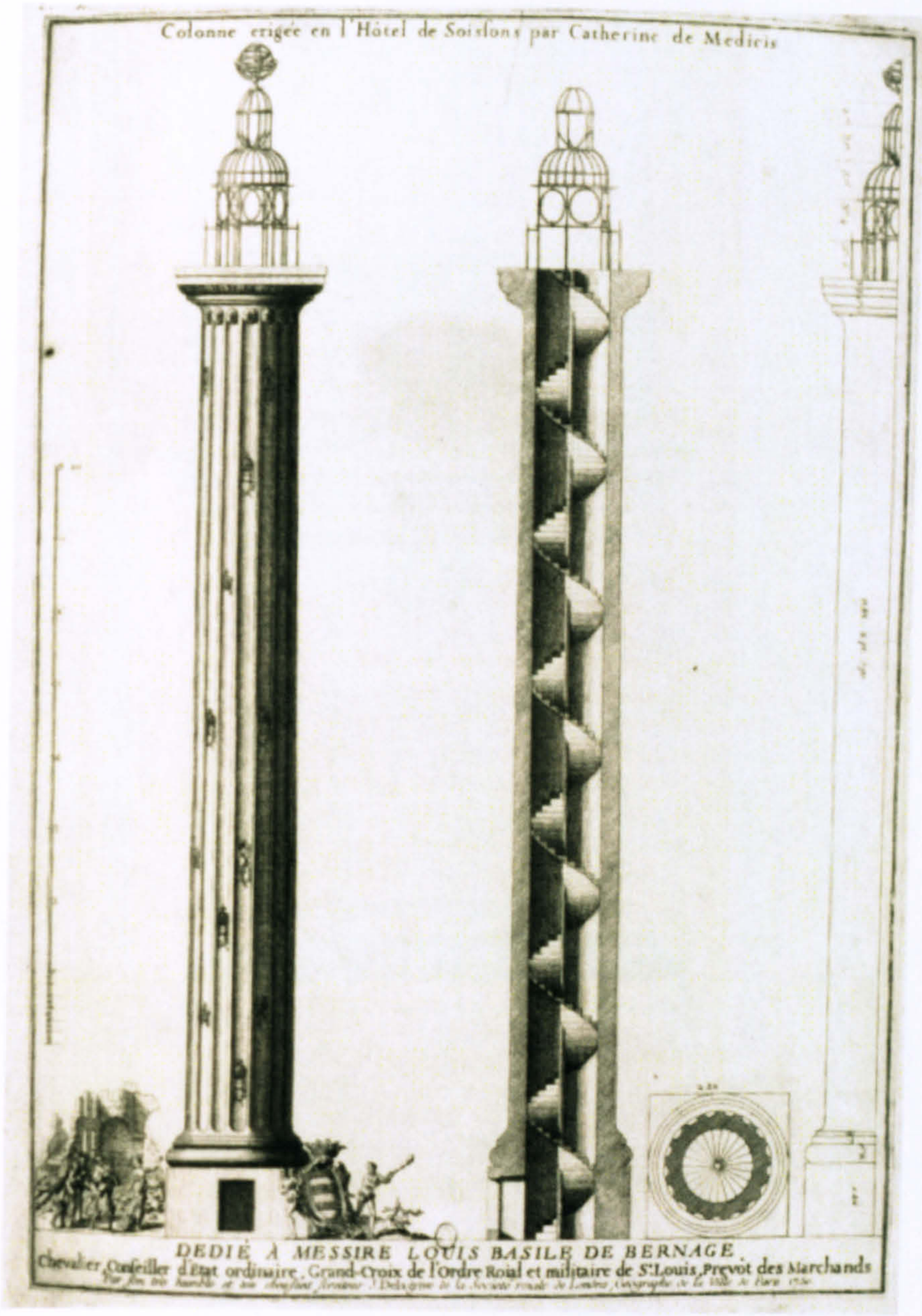
30. Screen and Entrance gate of Montagu House, London, watercolour (*c.* 1830).



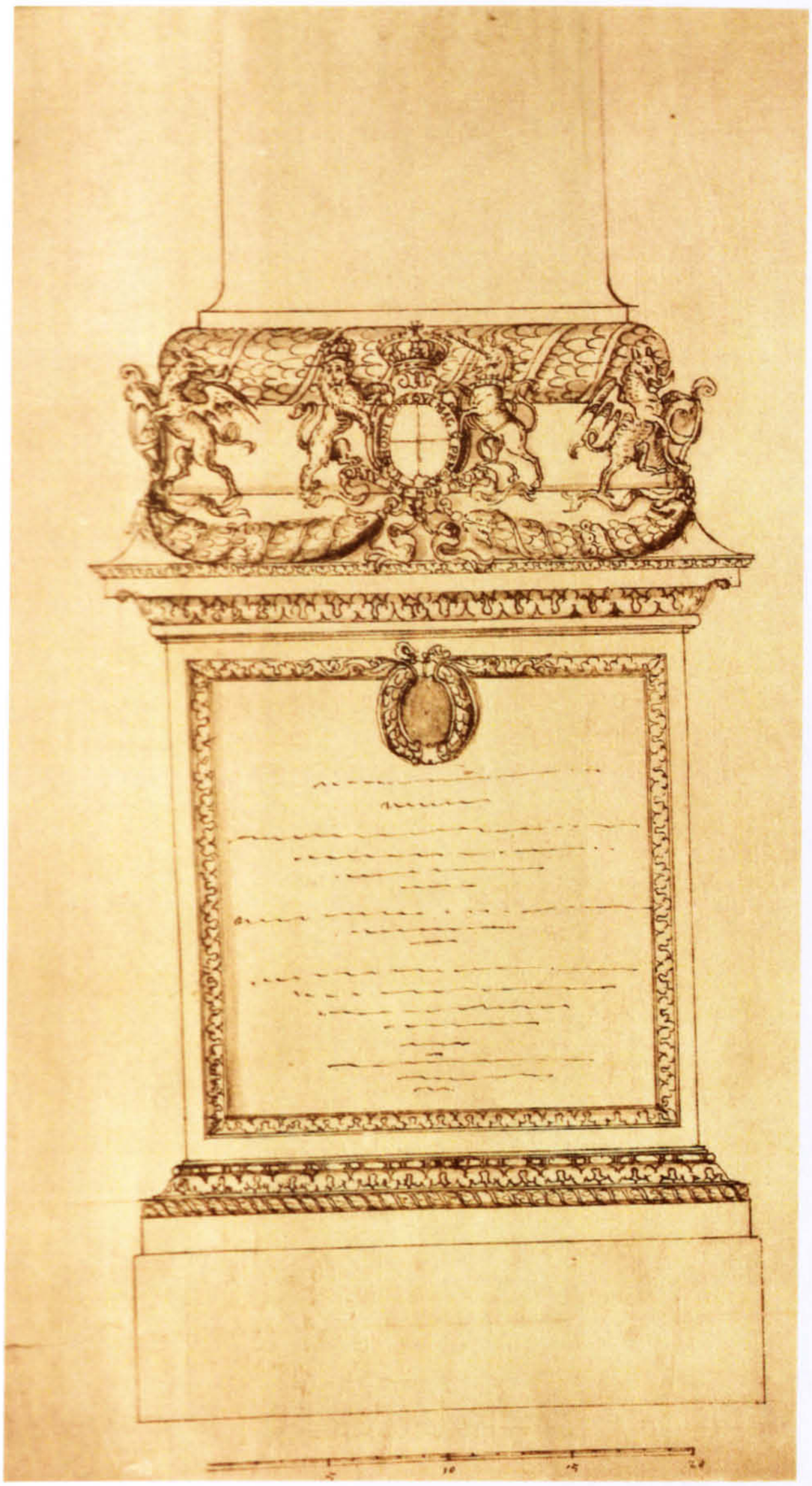
31. *The Royal Observatory, Greenwich*: designed by Christopher Wren, 1675, engraving by Francis Place (*c*. 1676-1680).



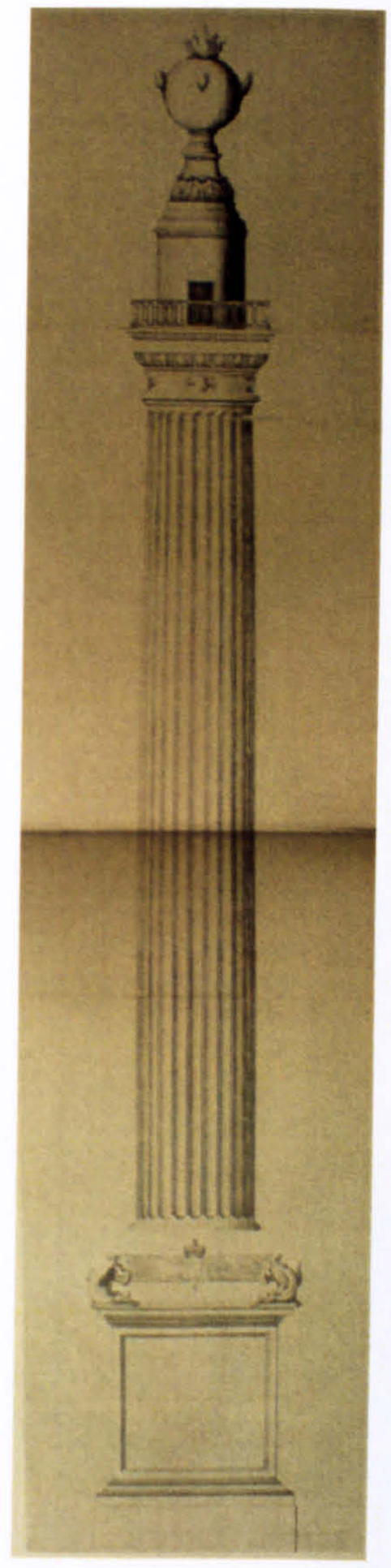
32. Robert Hooke. *Preliminary Drawing for the Monument*, 1671, All Souls College, Oxford.



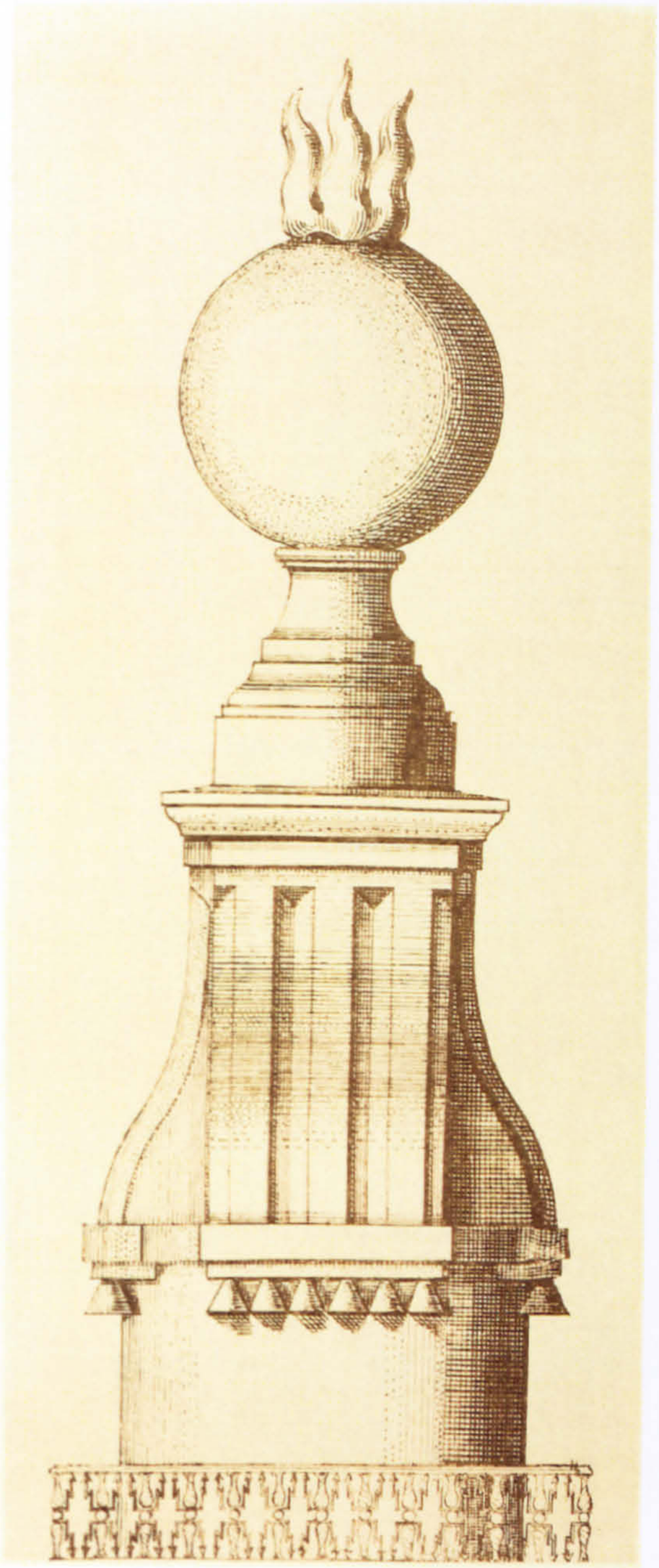
33. *Colonne Astrologique*, Paris: designed by Jean Bullant *c.* 1572, engraving by Abbé Jean La Grive (1750).



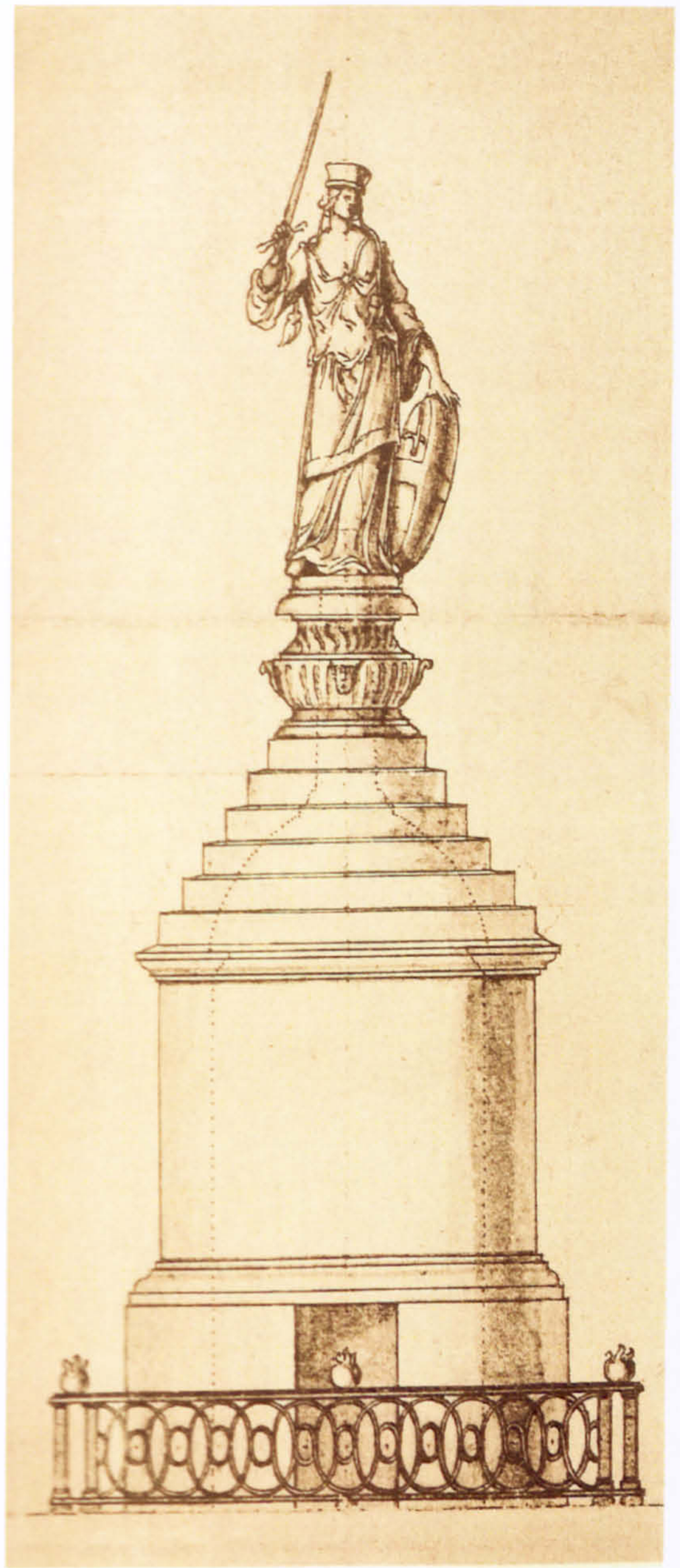
34. Robert Hooke. *Preliminary Drawing for the Base of the Monument*, *c.* 1673, British Library.



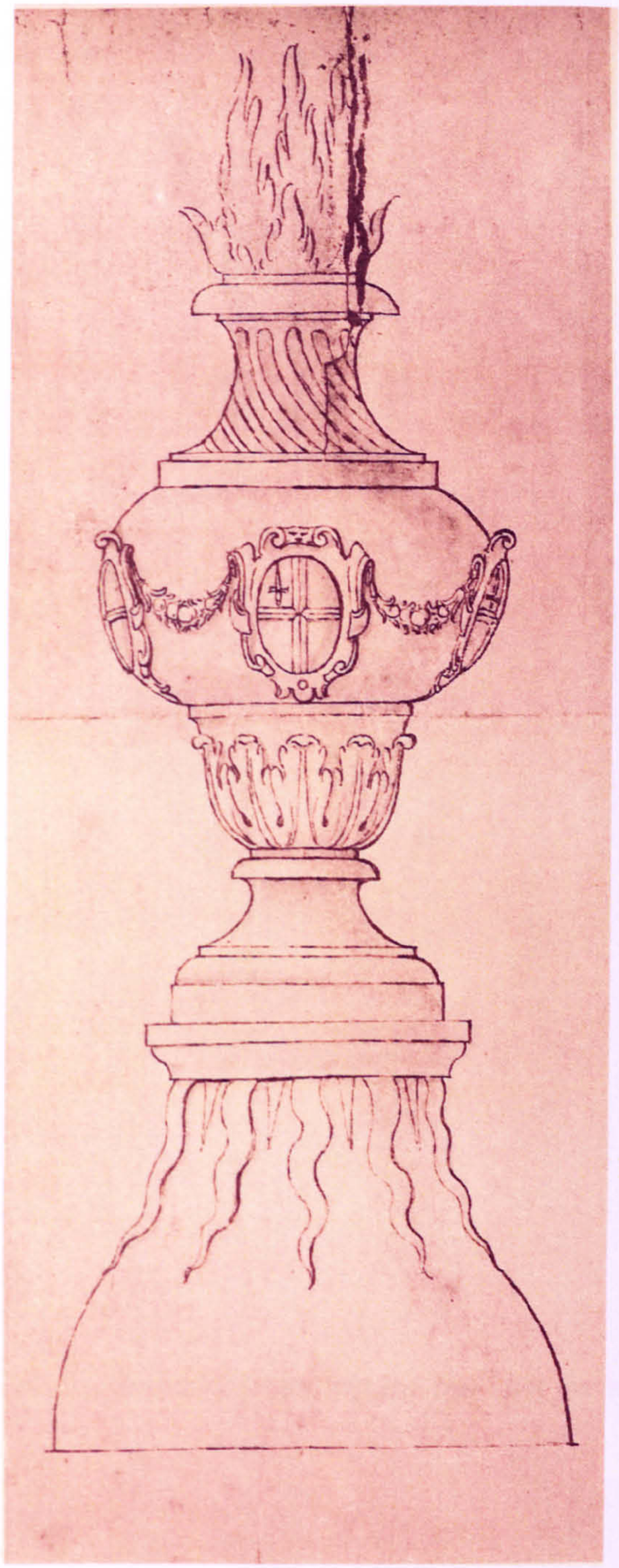
35. Edward Woodroofe. *Drawing of the Monument with Hypothetical Gilded Ball*, 1675, British Library.



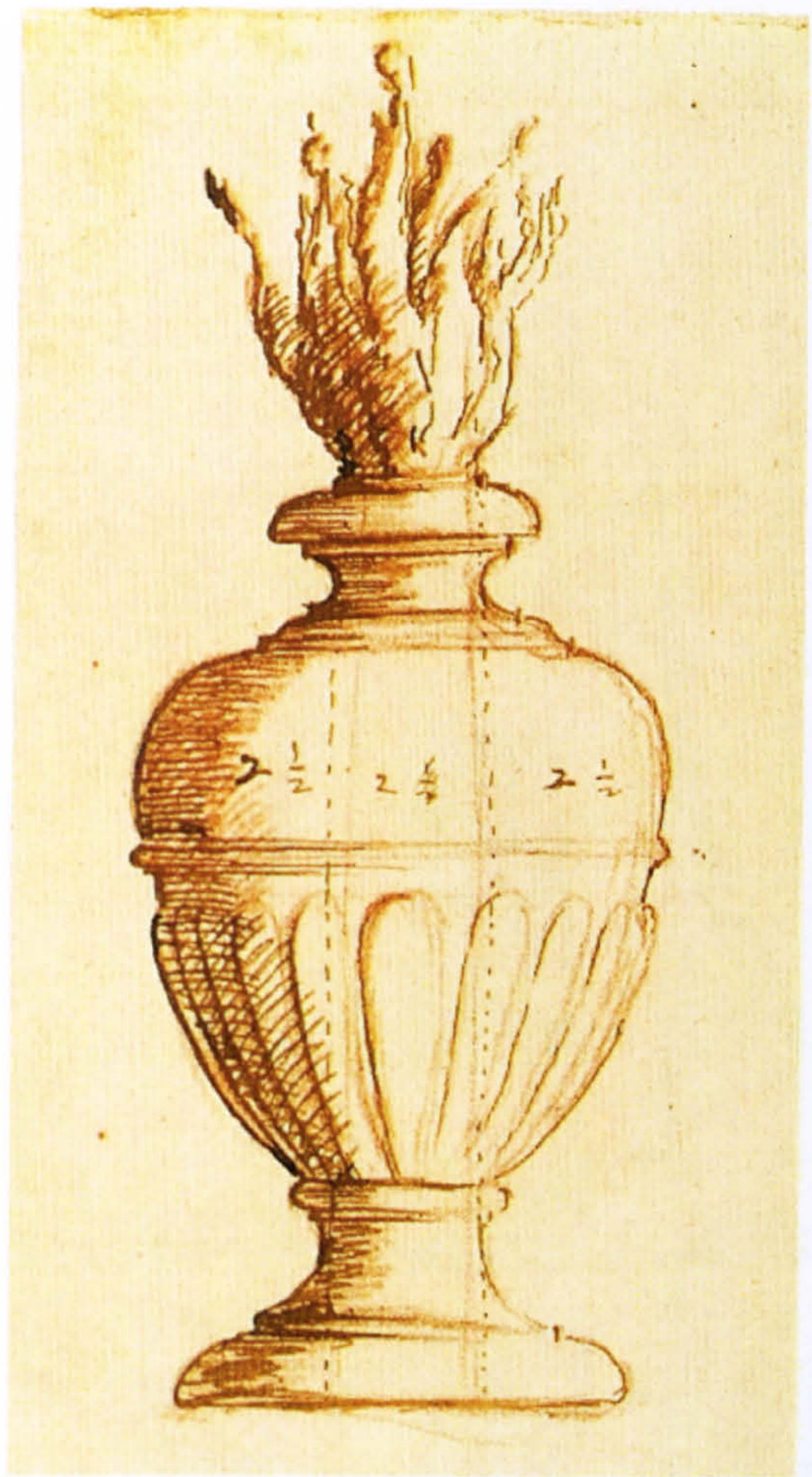
36. Edward Woodroofe. *Drawing of Hypothetical Gilded Ball for the Monument*, 1675, British Library.



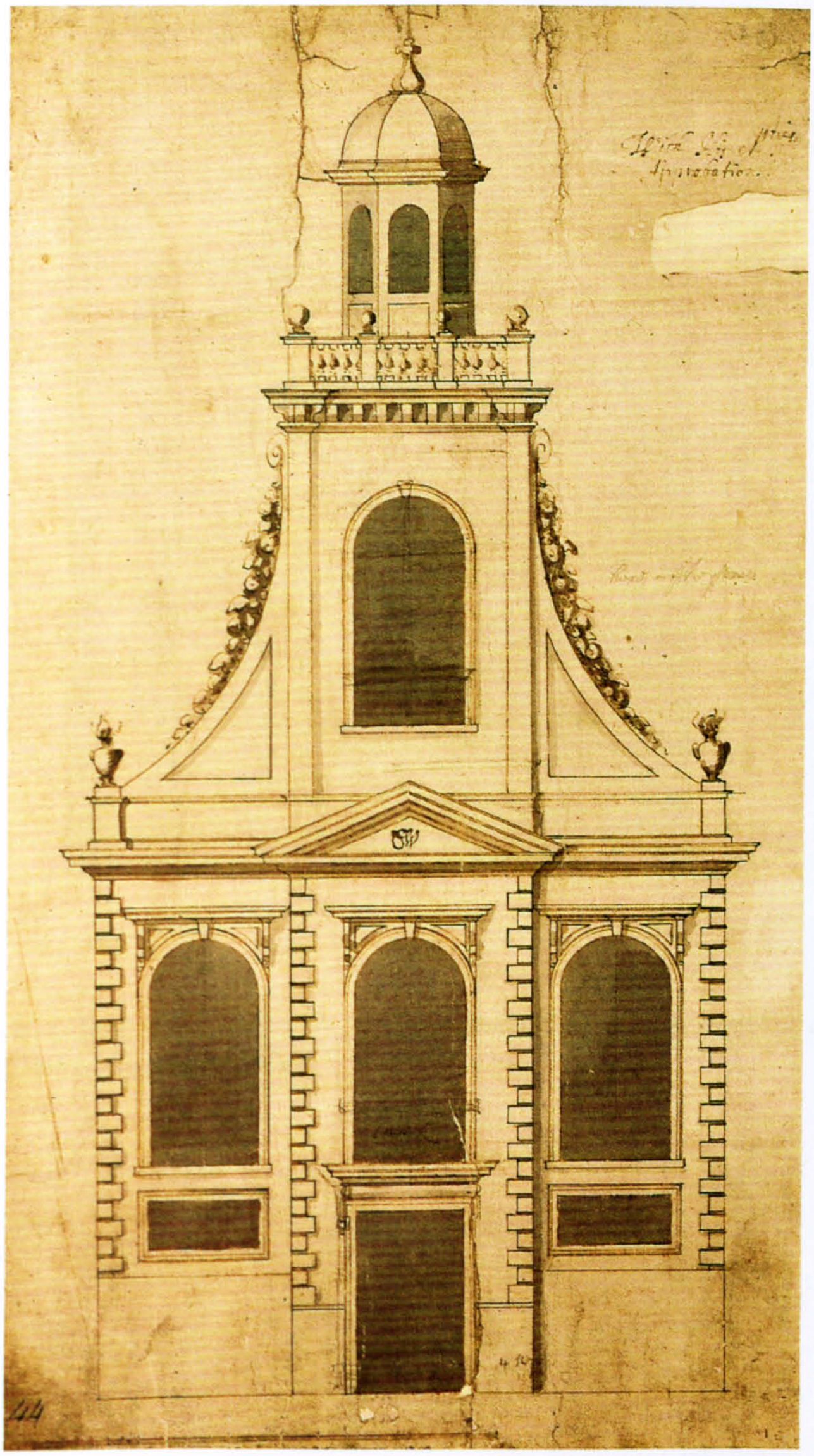
37. Christopher Wren. *Drawing of Hypothetical Statue of Augusta for the Monument*, 1675, British Library.



38. Christopher Wren. *Drawing of Hypothetical Urn for the Monument*, 1675, British Library.

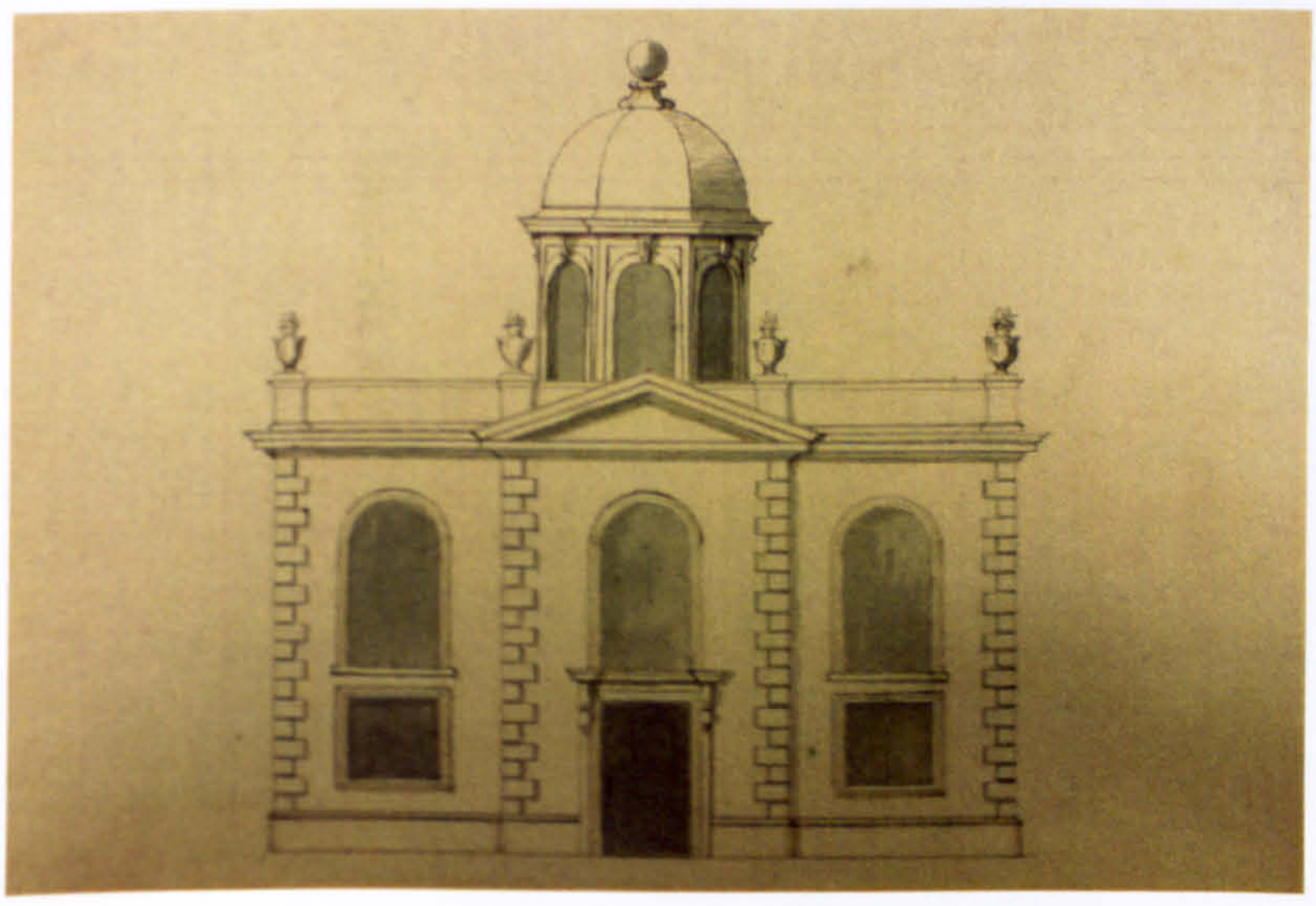


39. Robert Hooke. *Preliminary Drawing for the Urn for the Monument*, 1675, Royal Society.

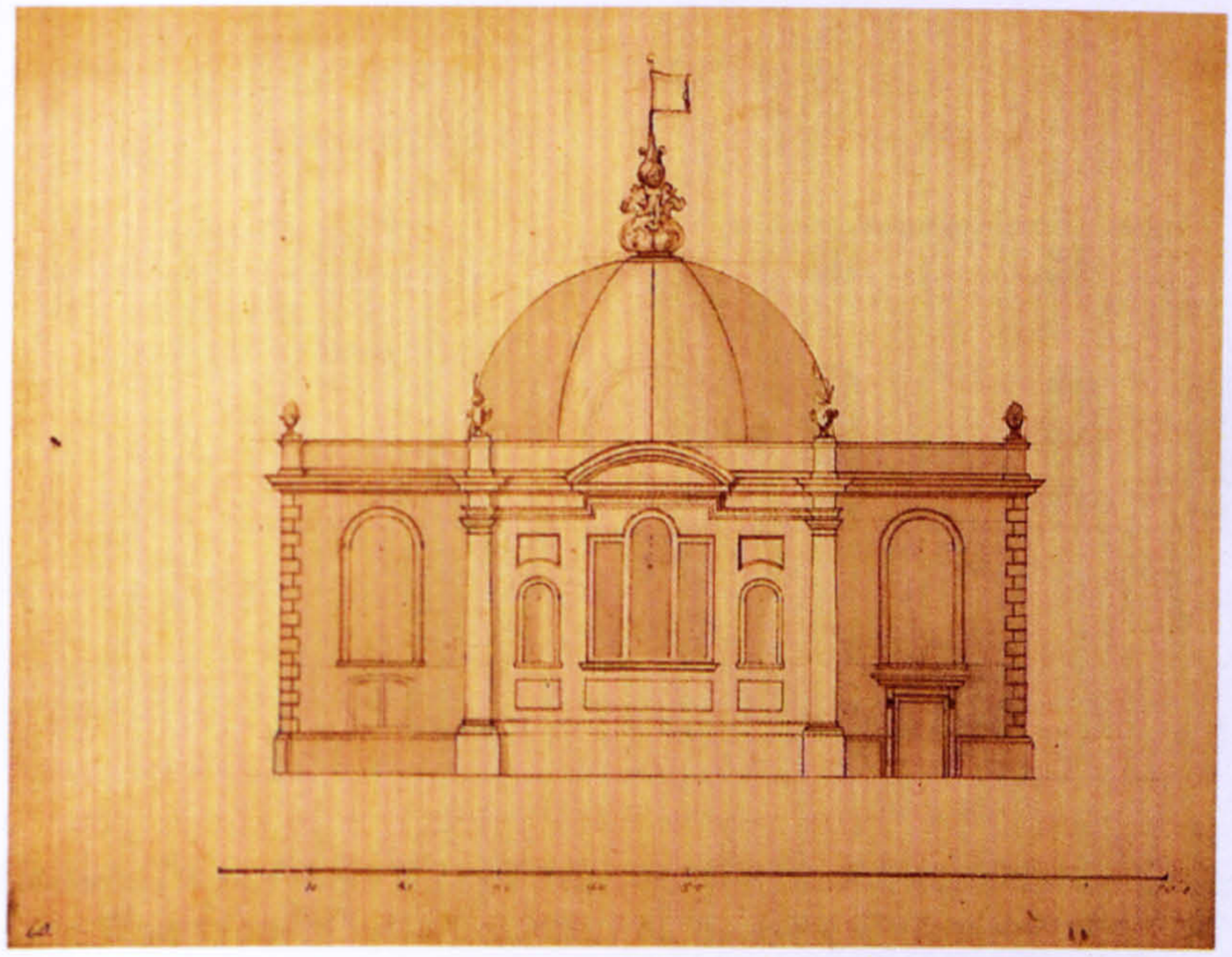


40. Edward Pearce. *Drawing for St. Edmund the King, Lombard Street, c.* 1670, All Souls College, Oxford.

41. Edward Pearce. *Drawing probably for St. Edmund the King, Lombard Street, c.* 1670, Warwickshire County Record Office.

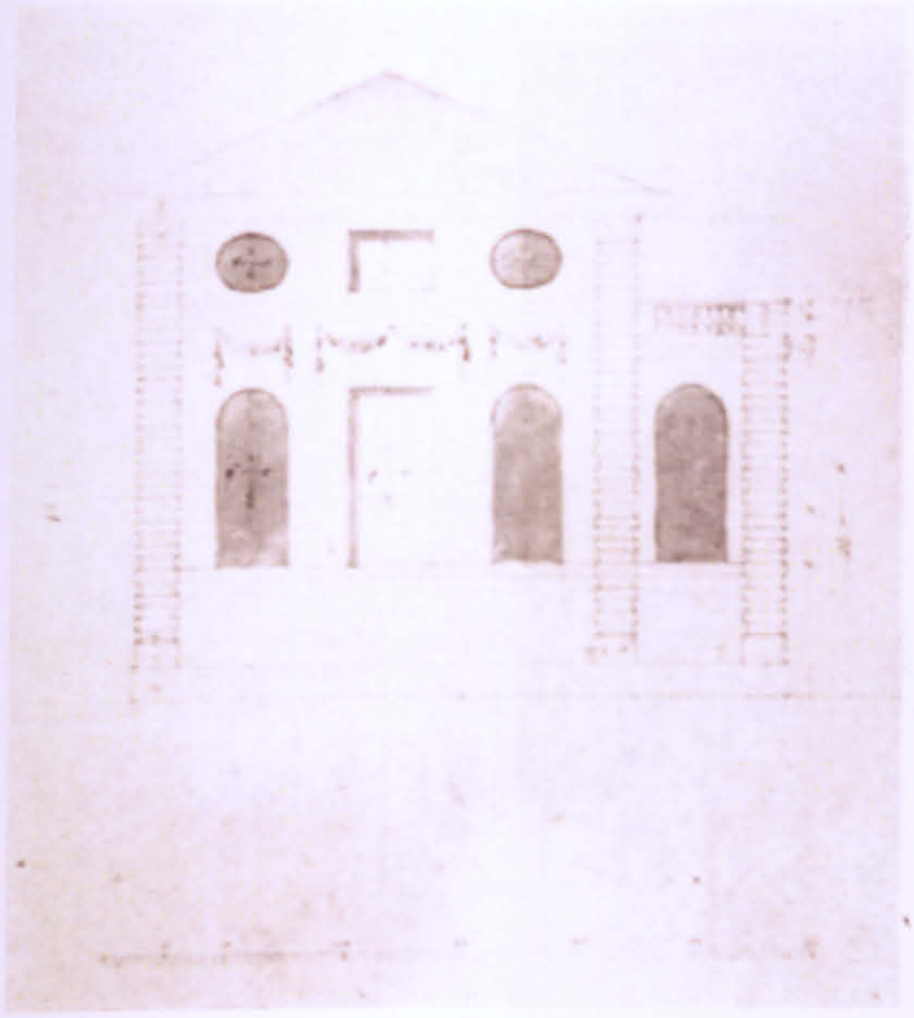


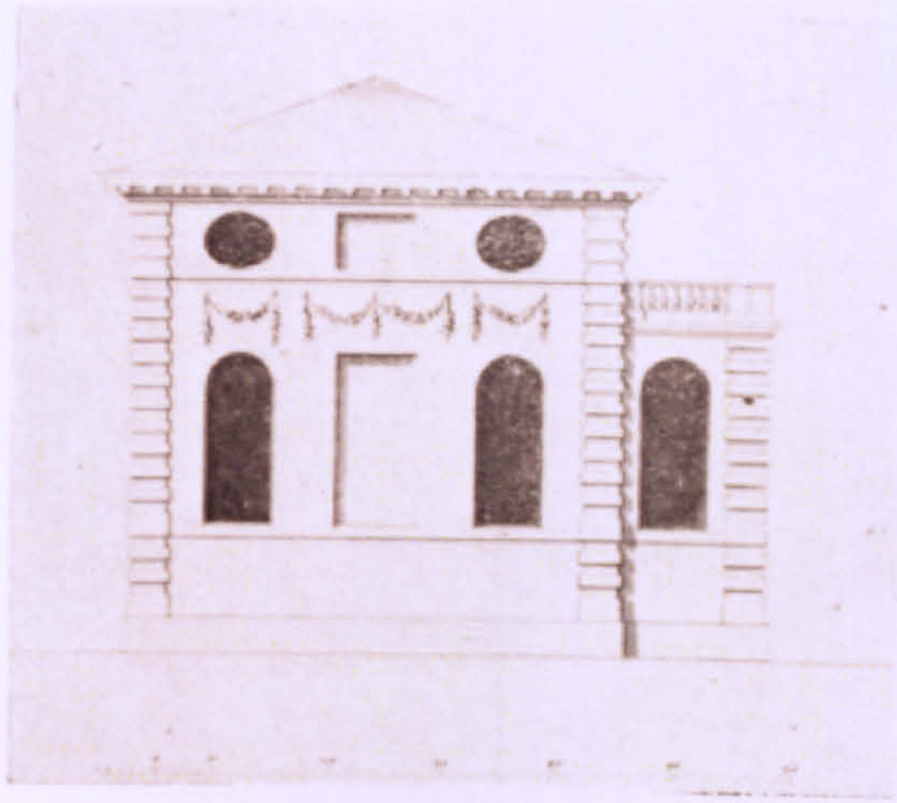
42. Edward Pearce. *Drawing for an Unidentified Church*, Warwickshire County Record Office.



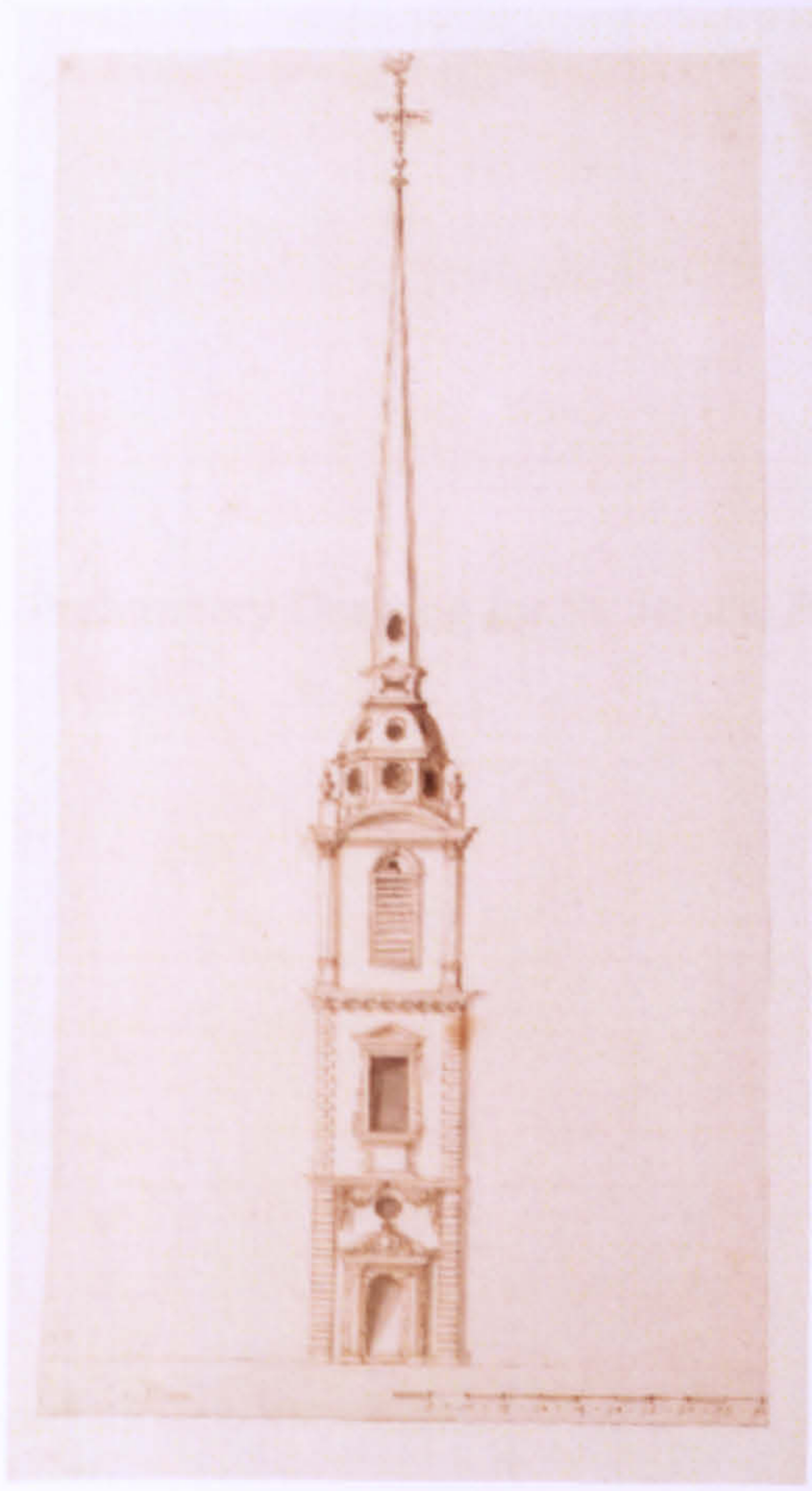
43. Edward Pearce. *Drawing for an Unidentified Church*, All Souls College, Oxford.

44. Edward Pearce. *Elevation for St. Clement Danes*, *c.* 1680, Cherokee Ranch and Castle Foundation, Sedalia, Colorado.

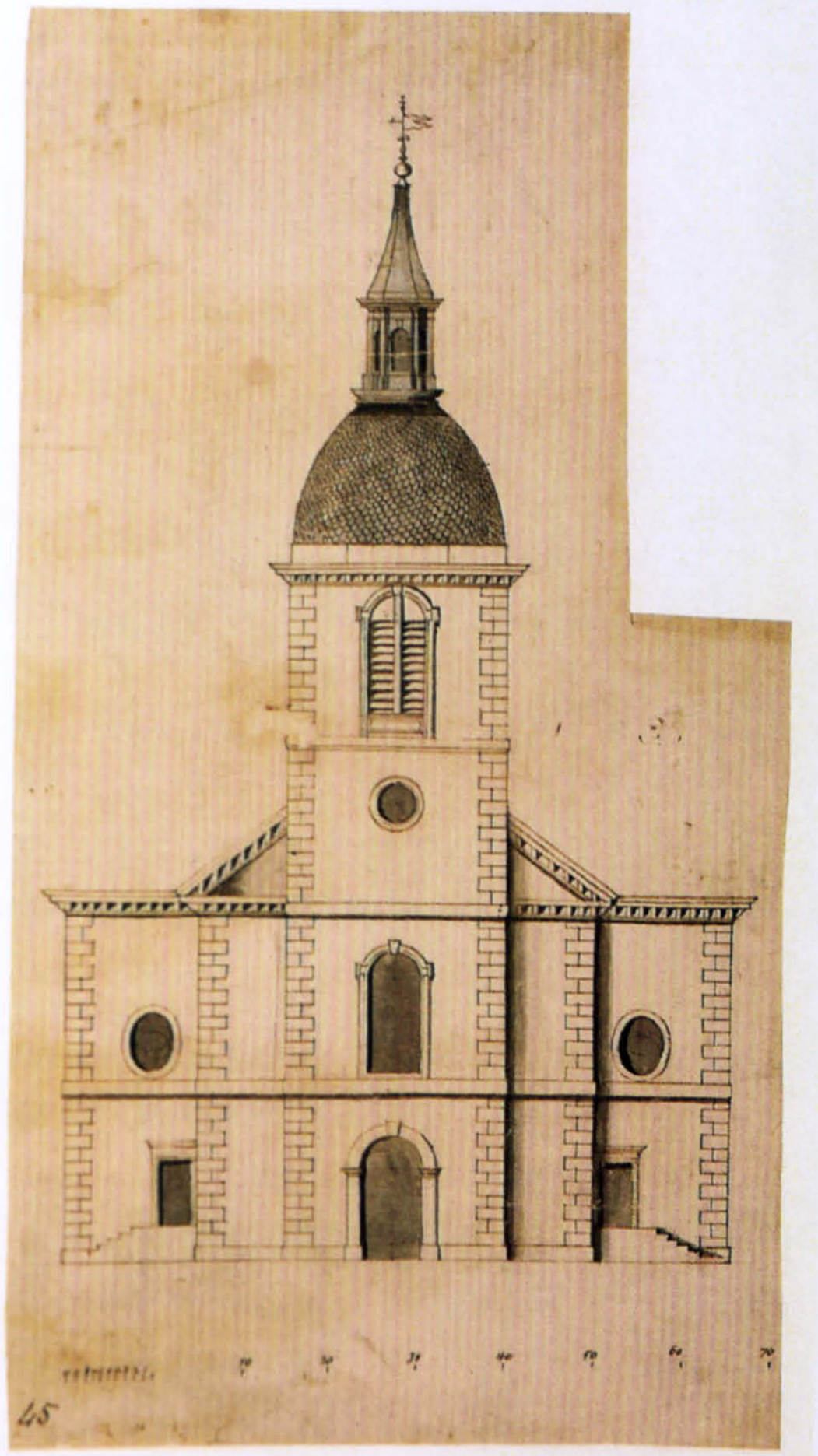




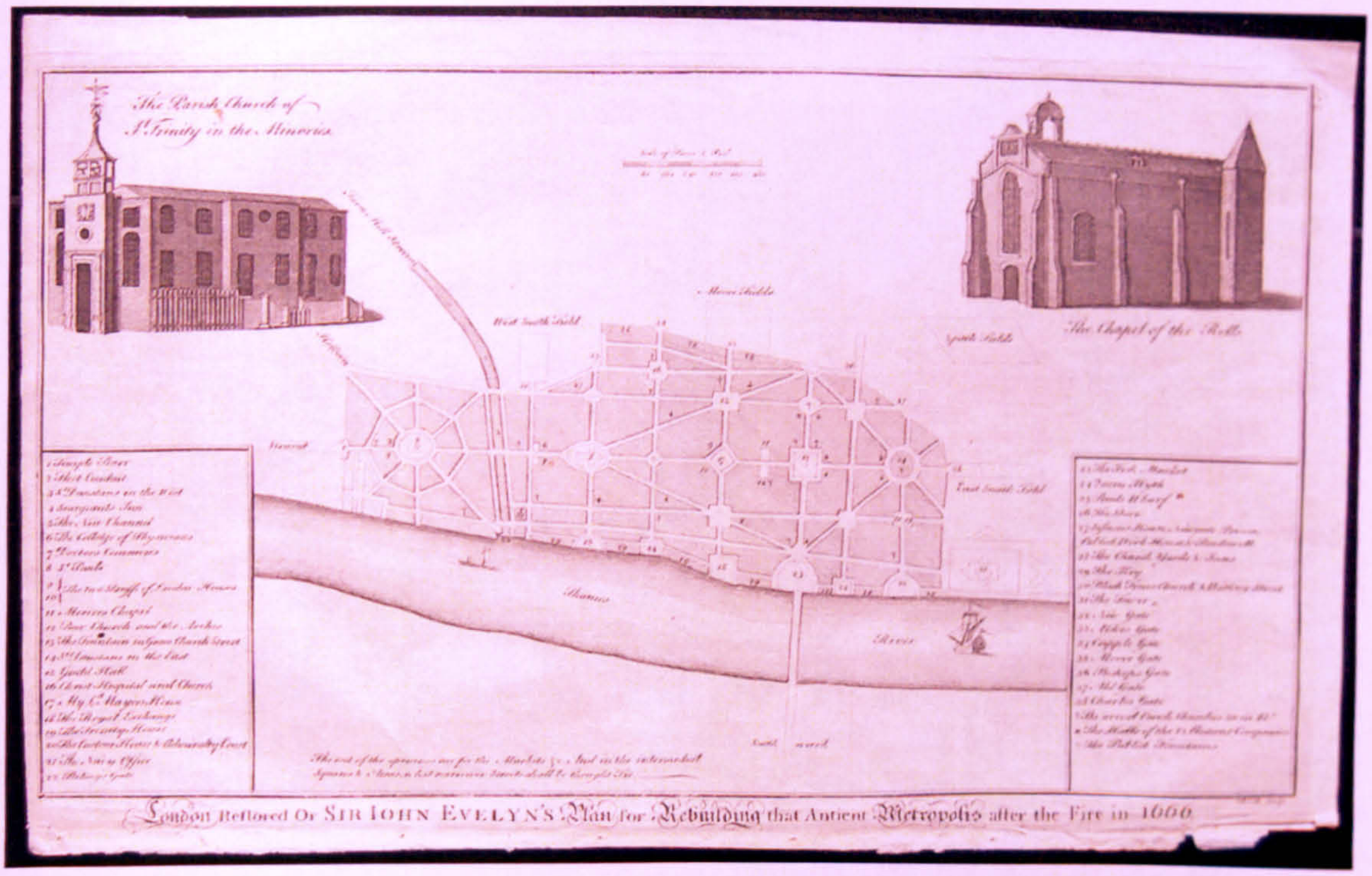
45. Robert Hooke. *Two of a Series of Drawings for St. Benet, Thames Street, c.* 1677 (Cherokee Ranch and Castle Foundation, Sedalia, Colorado.



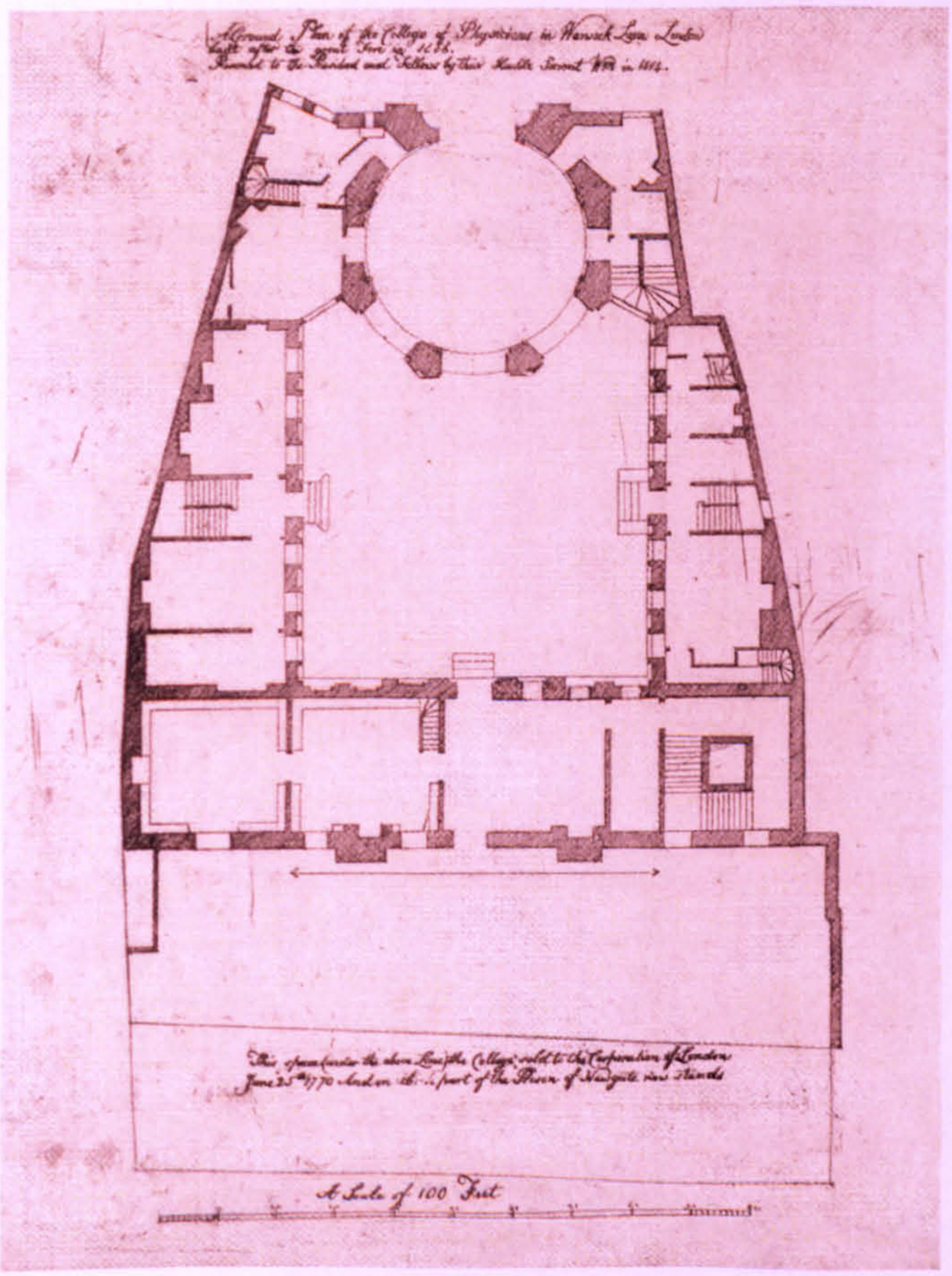
46. Robert Hooke. *Preliminary Drawing for the Steeple of St. Benet, Gracechurch, c.* 1681, Sir John Soane Museum.



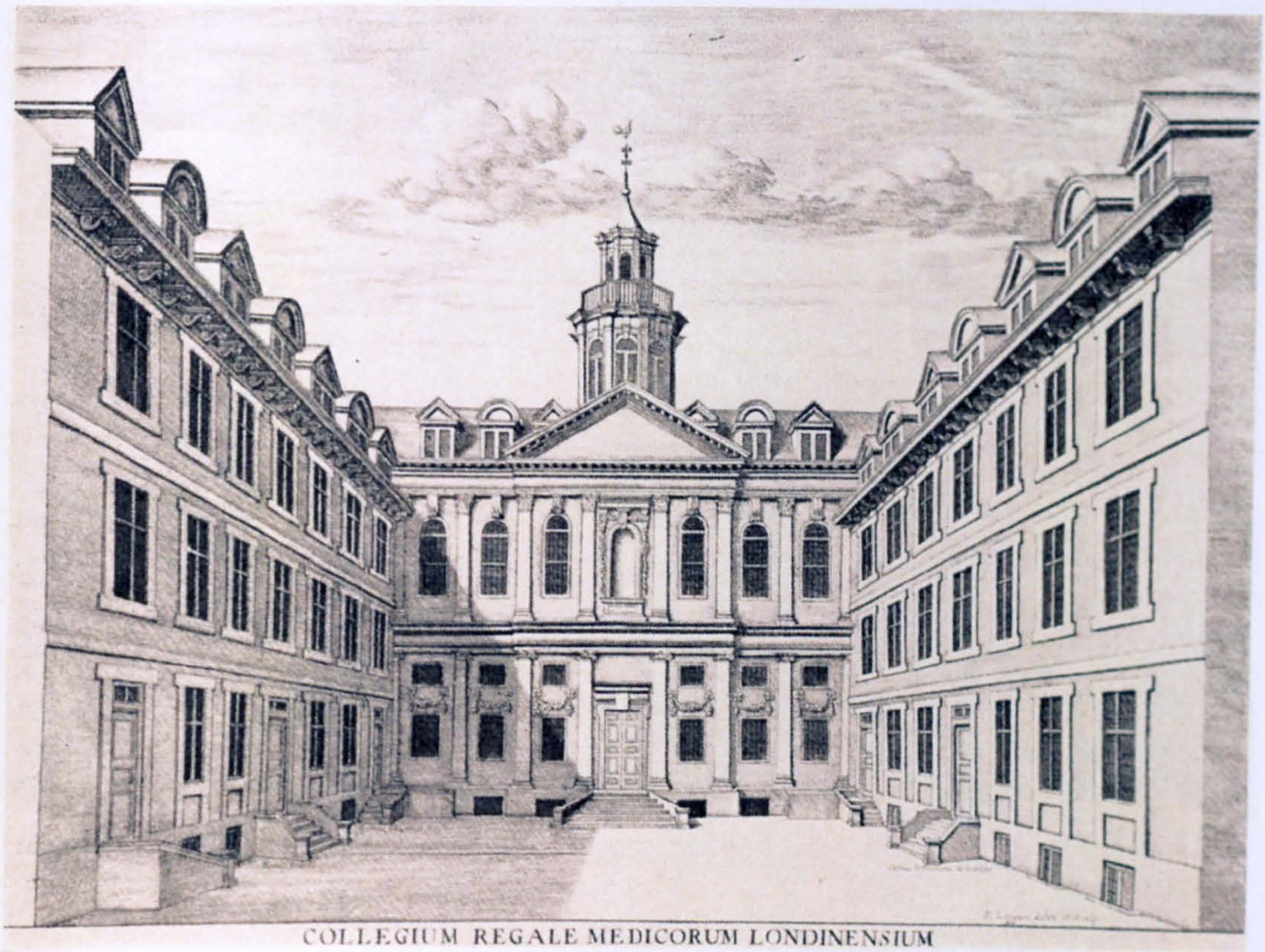
47. Robert Hooke. Preliminary Drawing for St. James, Piccadilly, All Souls College, Oxford.



48. John Evelyn. *Plan for the Rebuilding of London after the Great Fire*: engraving (1756). The College of Physicians is marked 6 on the plan.

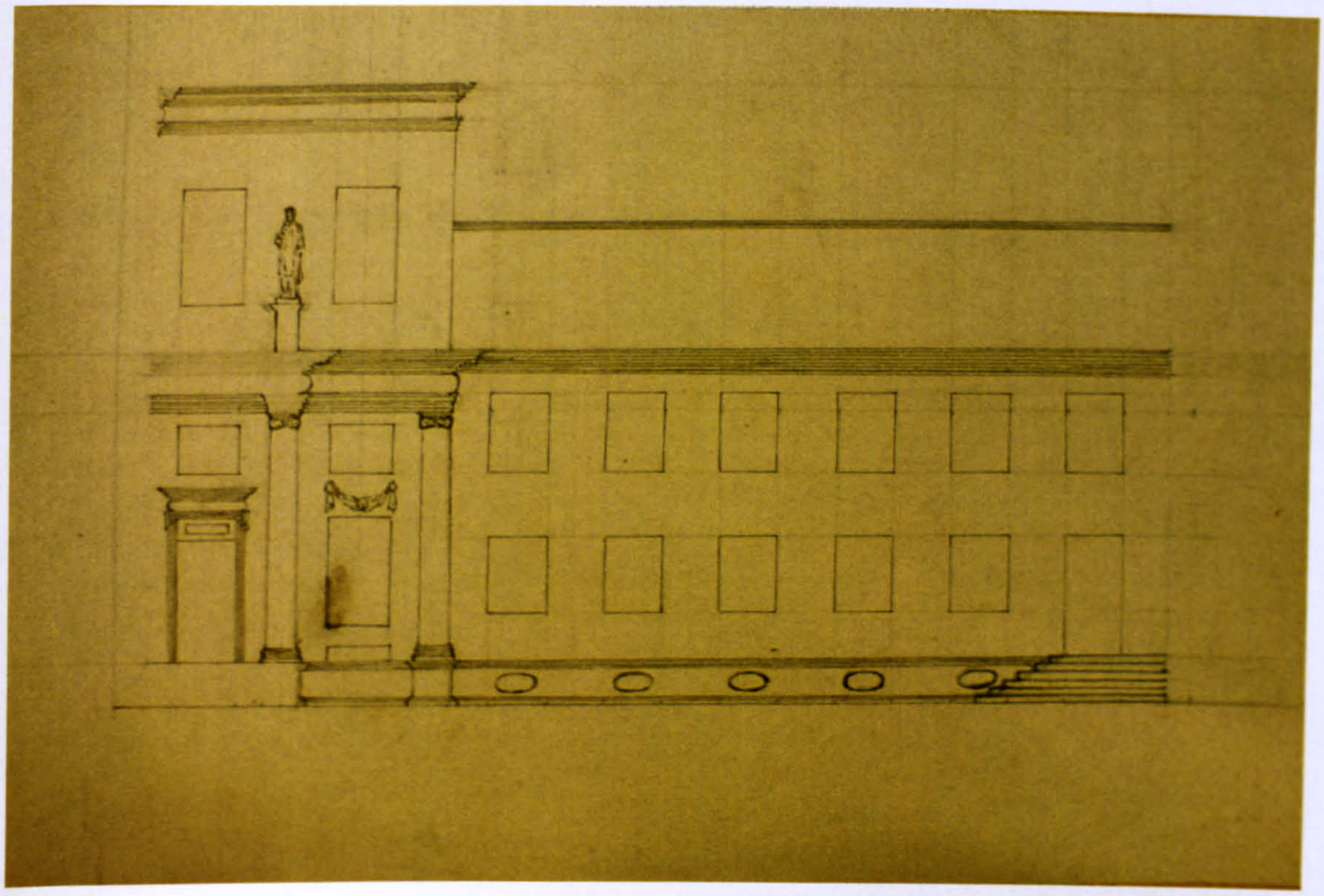


49. *Ground Plan of the College of Physicians*, London: drawing (1814). The anatomy theatre, at the east of the site, is at the top of the image.

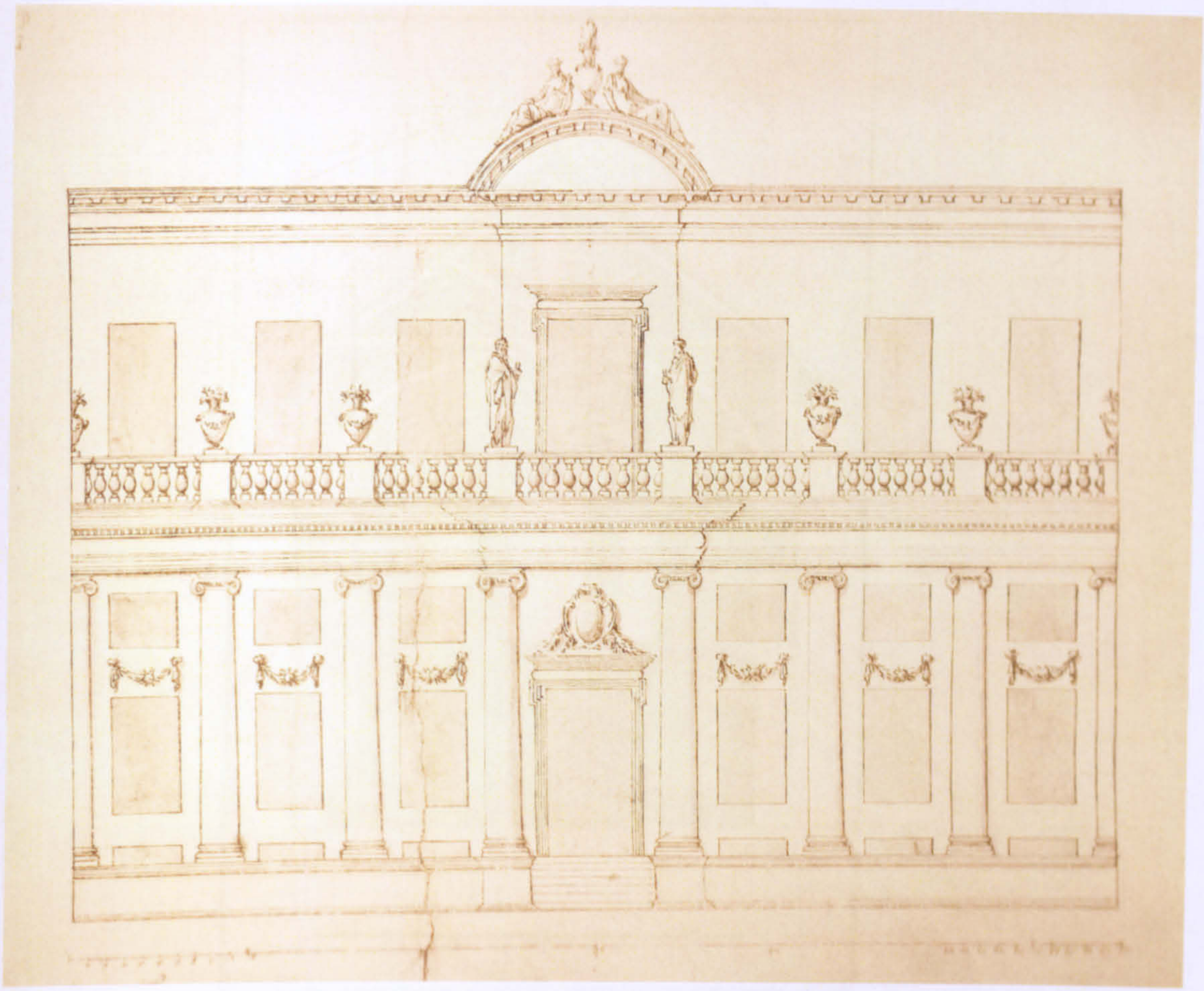


COLLEGIUM REGALE MEDICORUM LONDINENSIUM

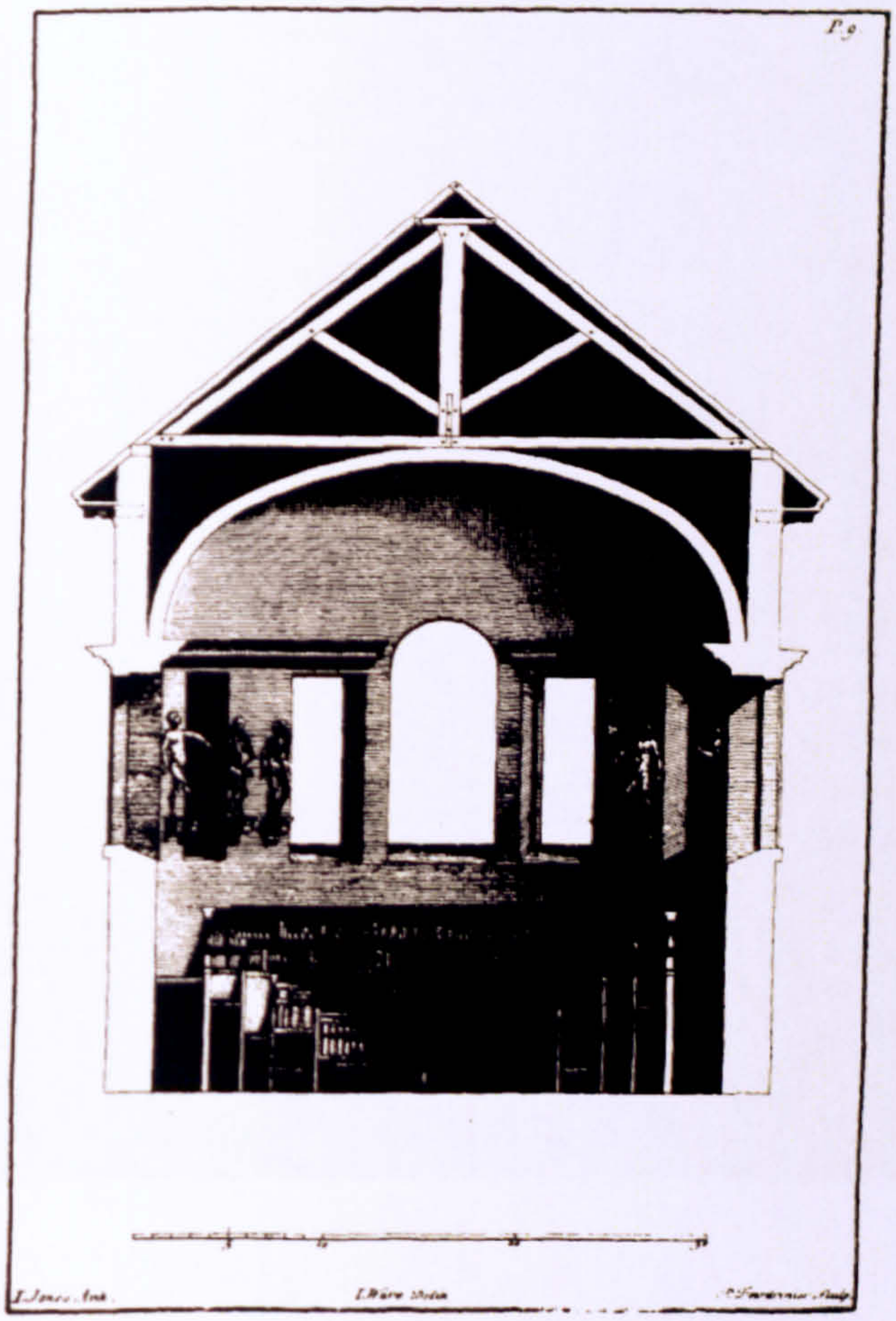
50. *The Courtyard and College House of the College of Physicians*, London: engraving by David Loggan (1677).



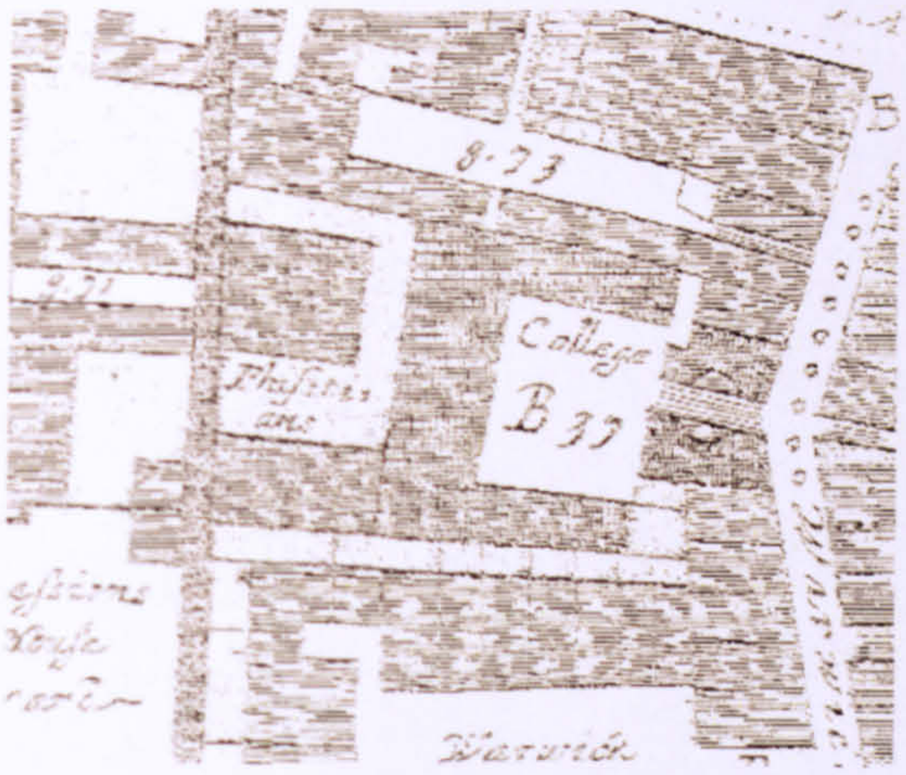
51. Robert Hooke. *Preliminary Drawing for the College of Physicians*, 1671, Warwickshire County Record Office.



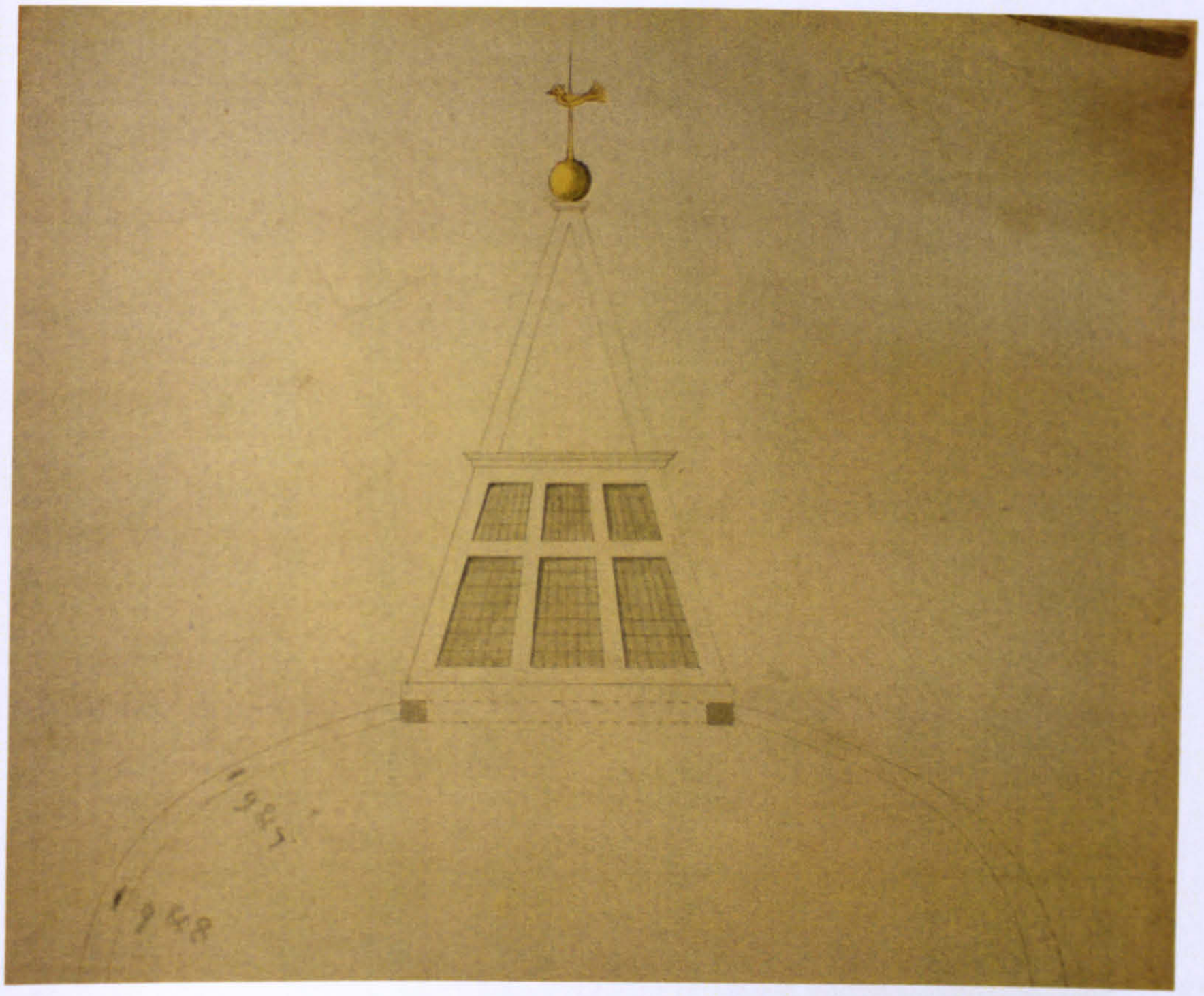
52. Robert Hooke. Preliminary Drawing for the College of Physicians, 1671, British Library.



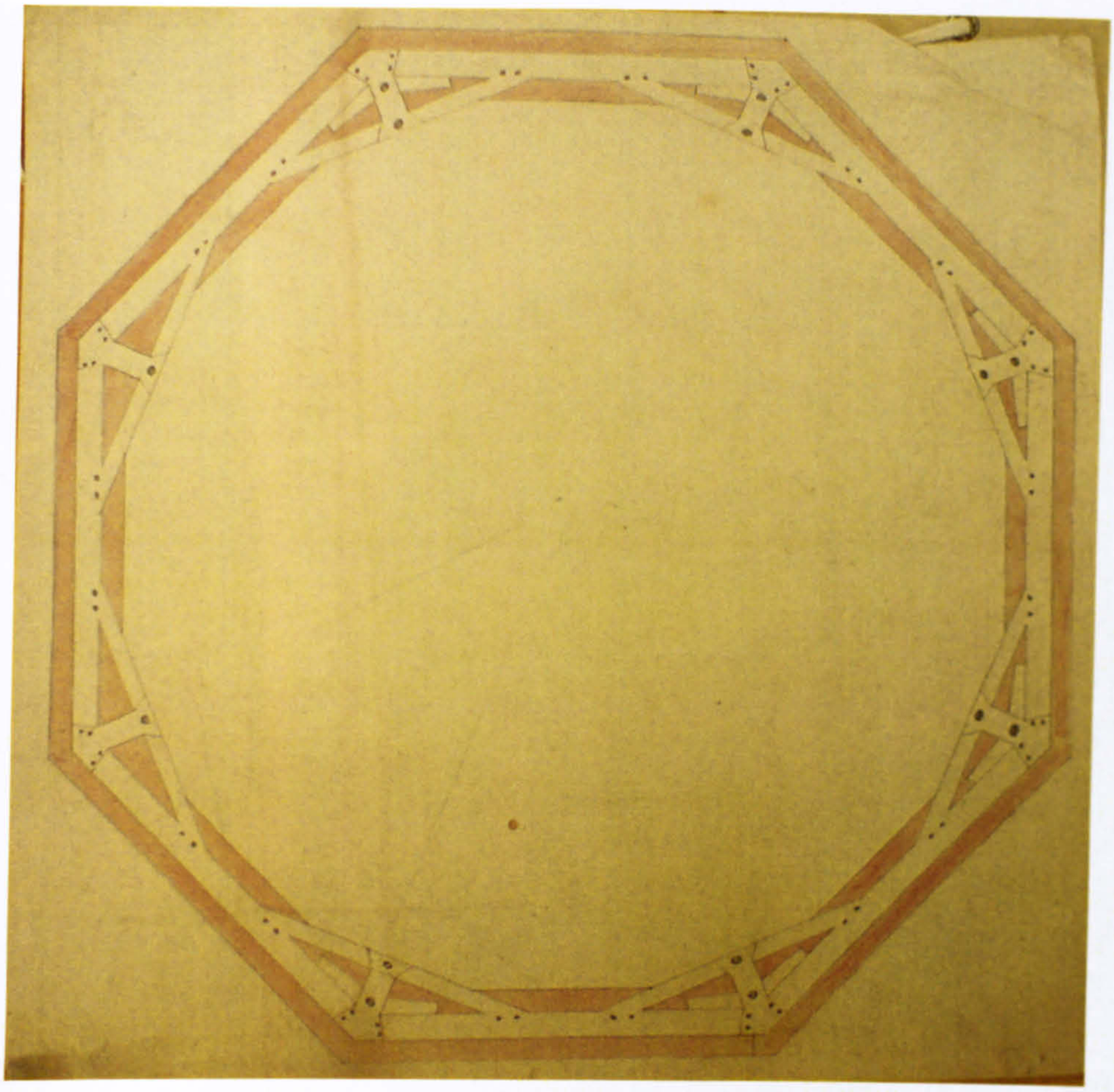
53. *Barber Surgeons' Theatre*, London: designed by Inigo Jones, *c.* 1636, demolished 1785, engraving by I. Ware (1743).



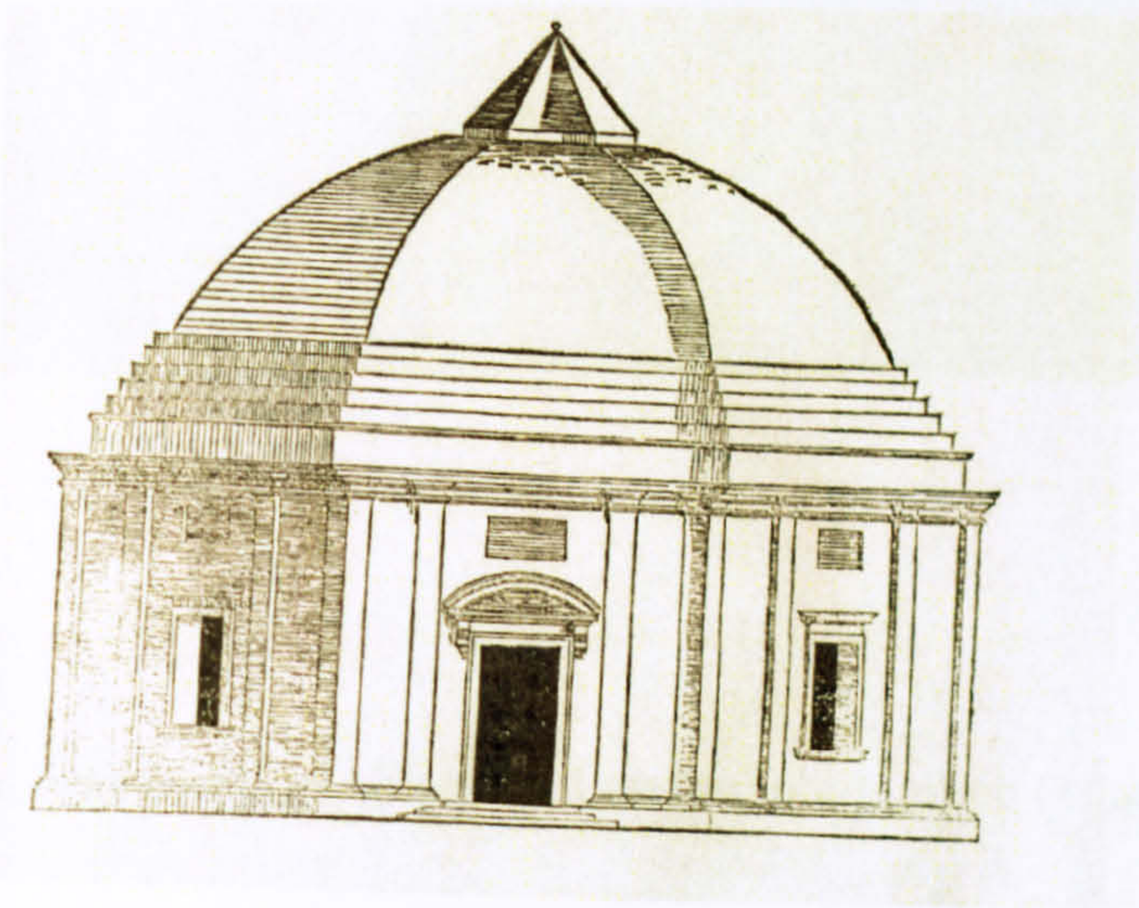
54. *The College of Physicians*, London: engraving by William Morgan (1676).



55. Robert Hooke. Drawing for the Cutlerian Anatomy Theatre, 1676, Warwickshire County Record Office.



56. Robert Hooke. *Drawing for the Roof Truss of the Cutlerian Anatomy Theatre*, Warwickshire County Record Office.

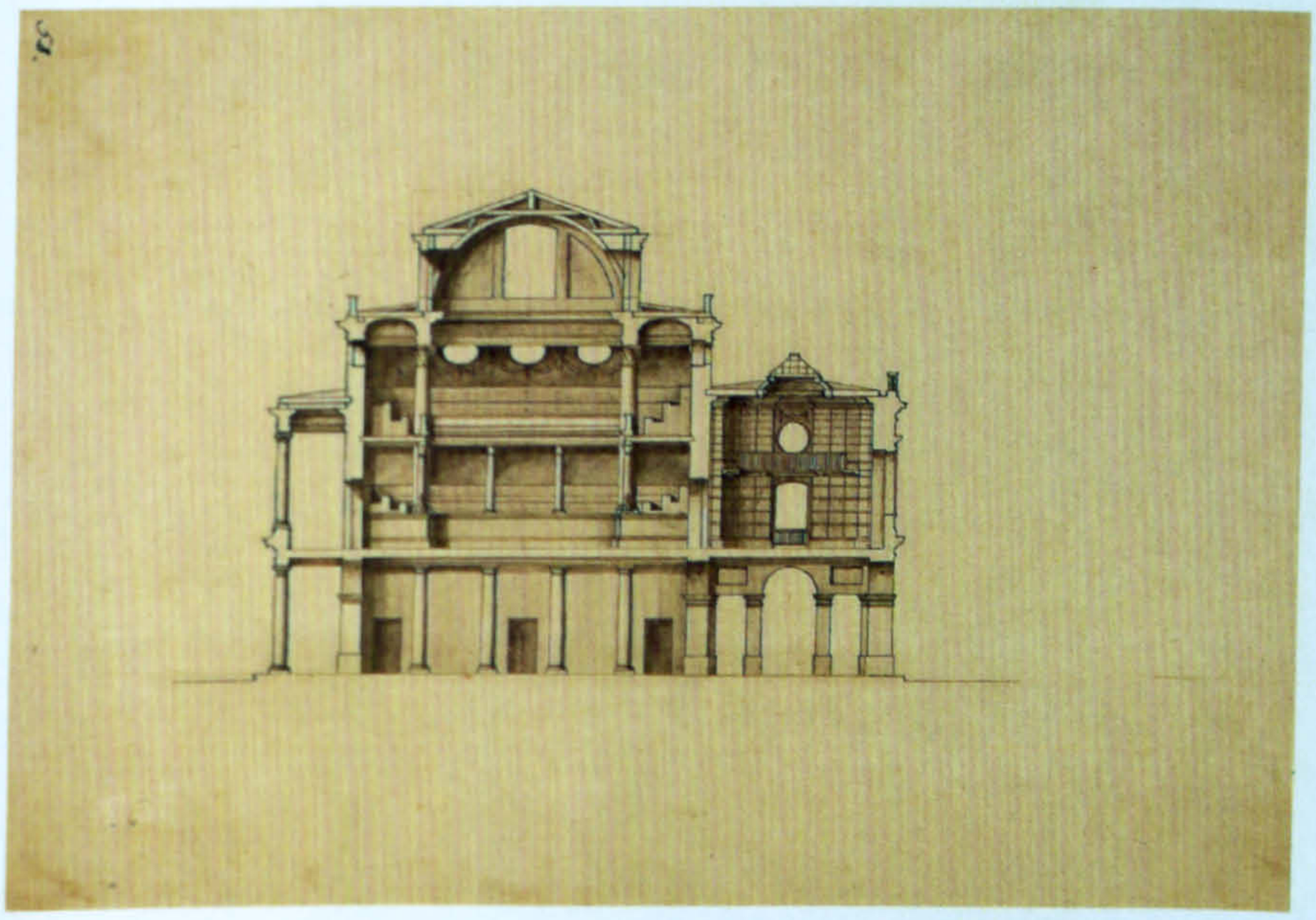


57. Sebastiano Serlio. *A Design for a Temple*: illustration from *The Fifth Book of Architecture* (1547).

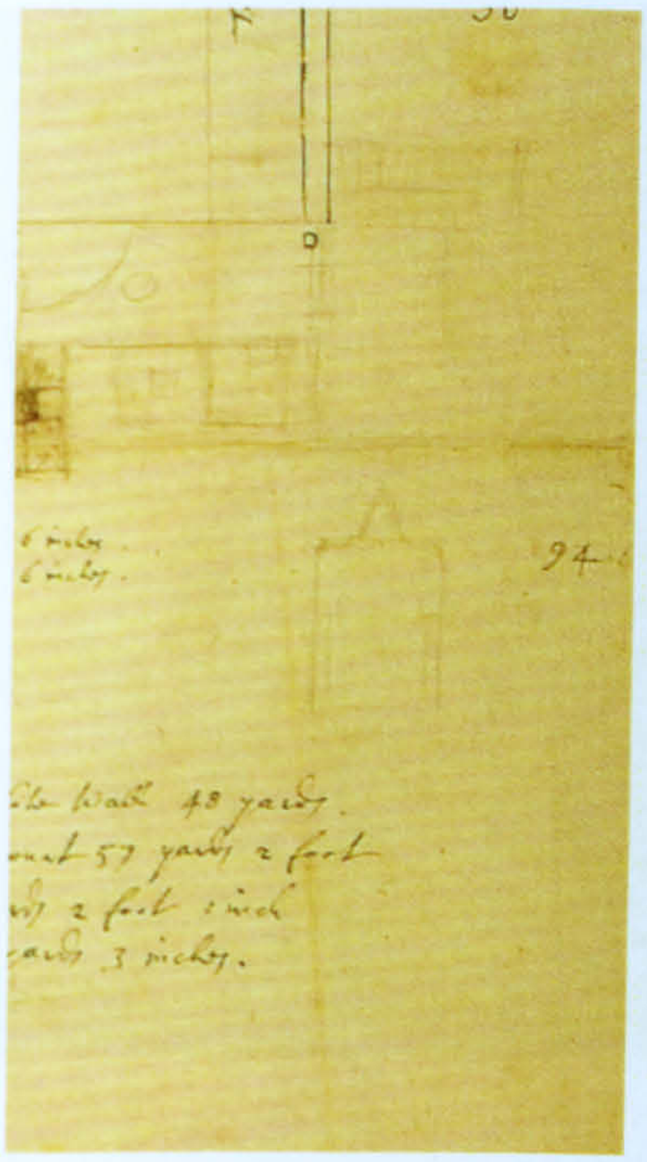
58. *The Cutlerian Anatomy Theatre*, London: photograph (1866).

59. *The Cutlerian Anatomy Theatre*, London: photograph (1866).

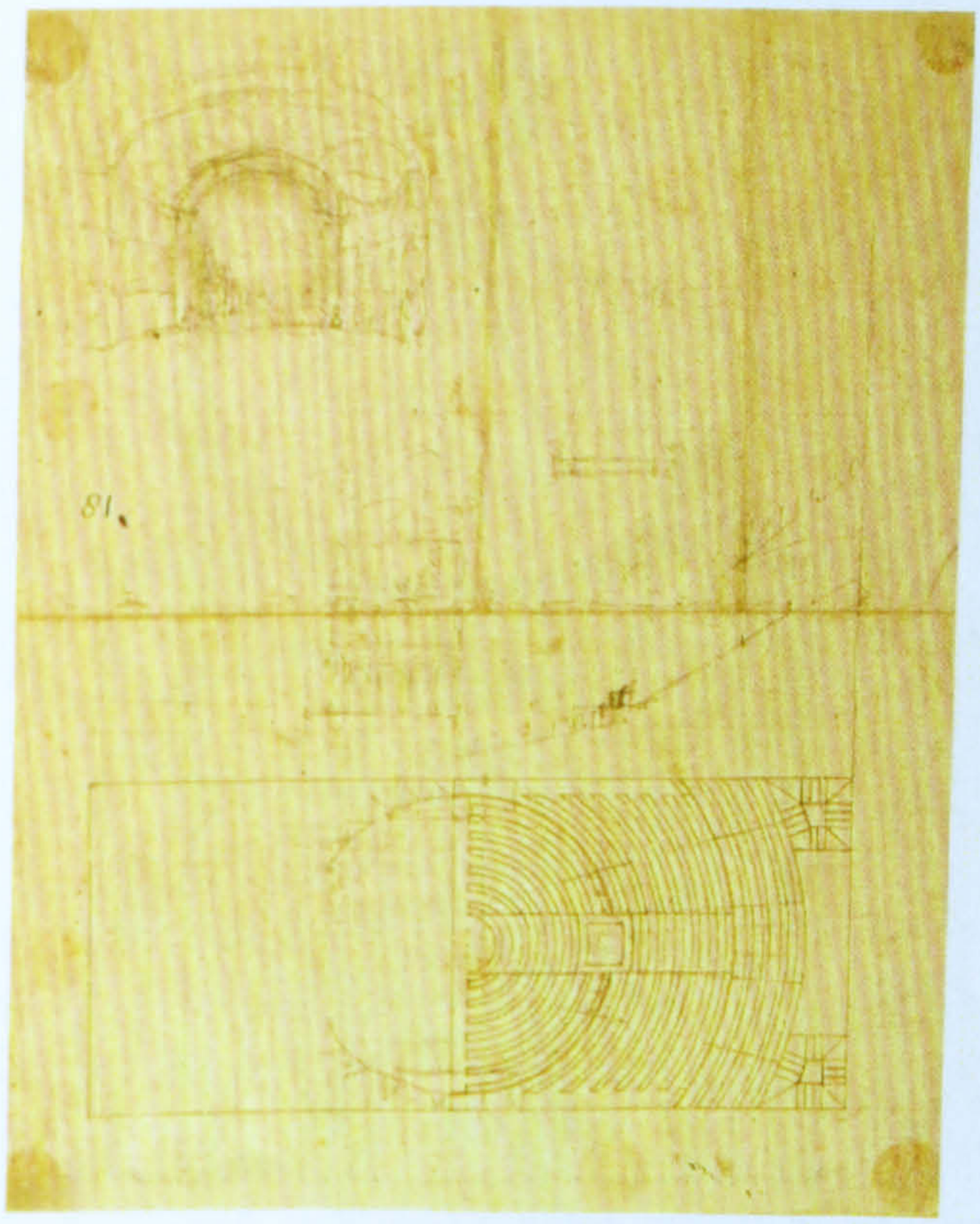
60. St. Paul's Cathedral and the City of London from the North West, photograph, *c.* 1857, Birmingham Central Library. The roof of the anatomy theatre can be seen to the left of the cathedral.



61. Christopher Wren. Preliminary Drawing for Commencement (Senate) House, Cambridge *c.* 1675, All Souls College, Oxford.

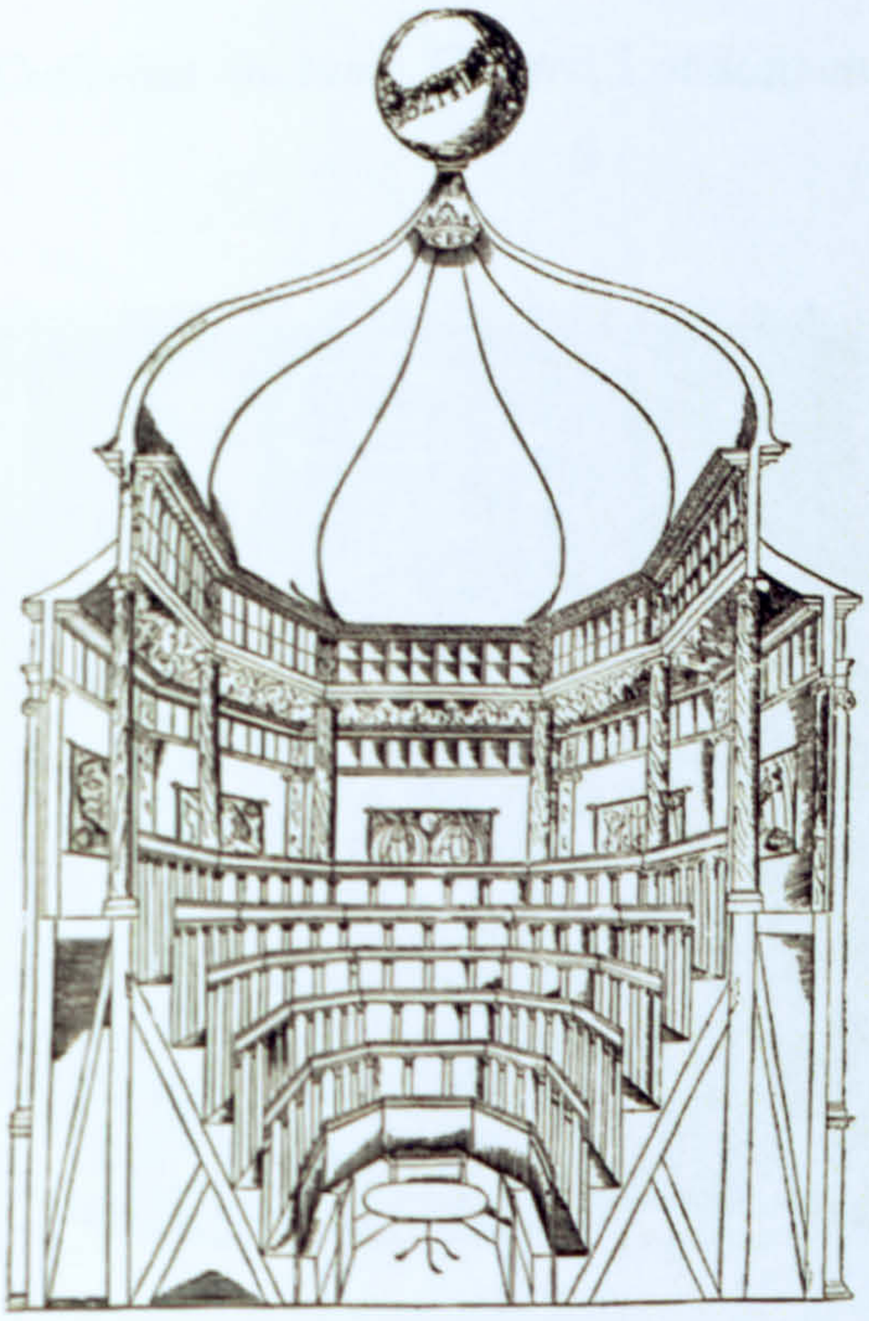


62. Christopher Wren. Preliminary Design Probably for Trinity College, Library *c.* 1675, All Souls College, Oxford (detail).

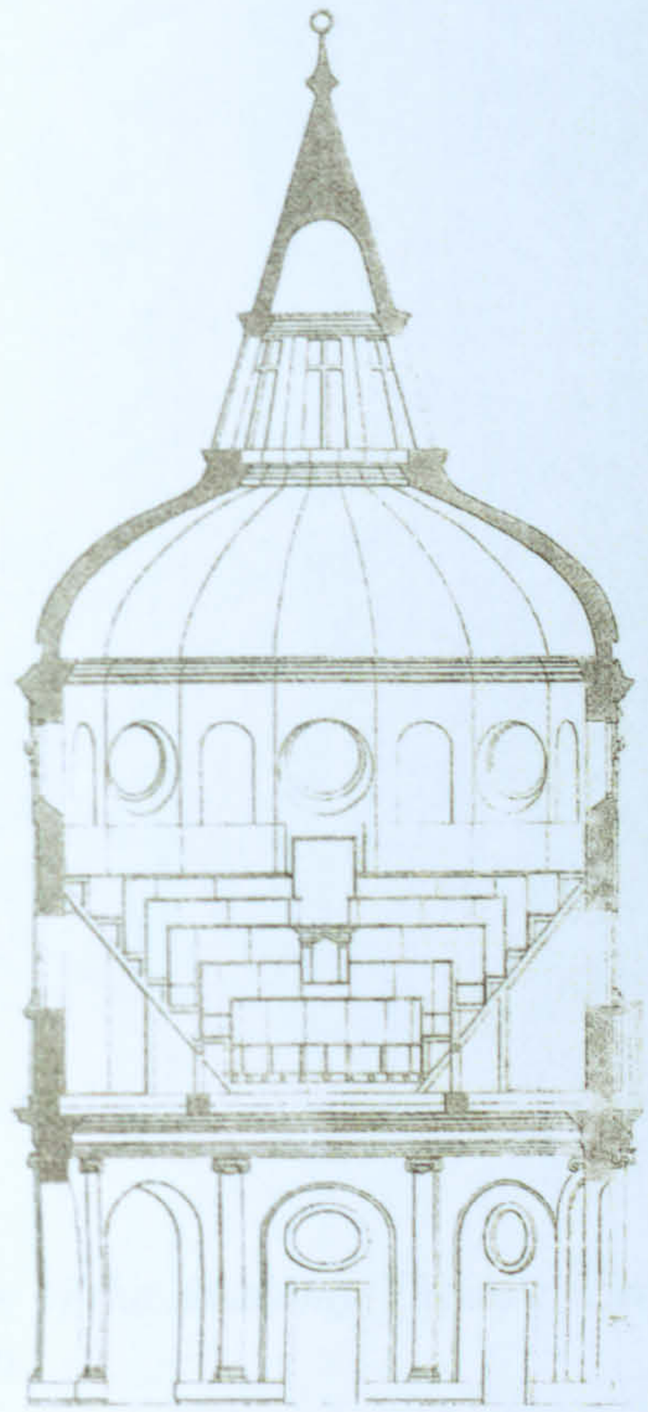


63. Christopher Wren. Design for an Unidentified Theatre, *c.* 1663, All Souls College, Oxford.

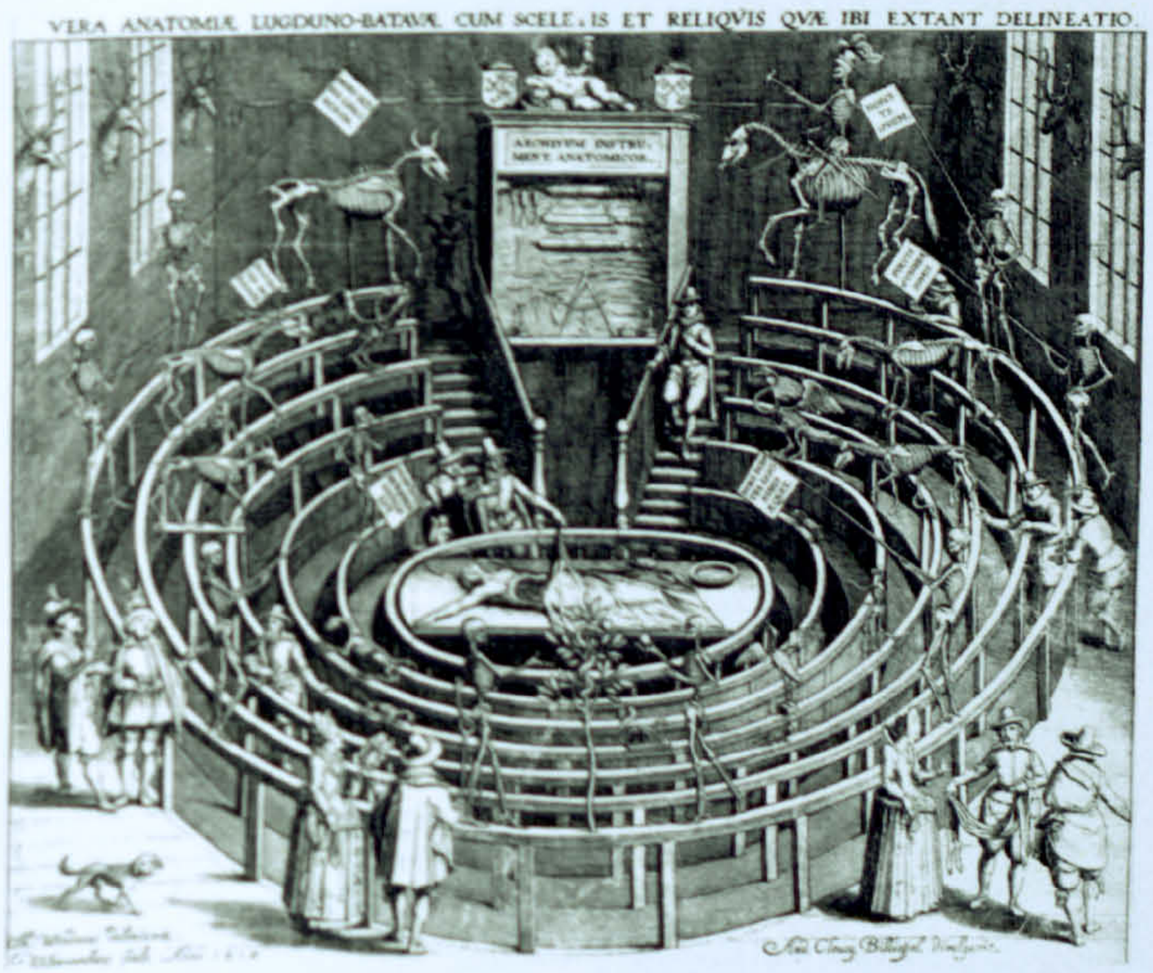
64. *The Cupola of the Anatomy Theatre of the University of Upsala*: designed by Olaus Rudbeck, 1662.



65. Interior of Anatomy Theatre, University of Upsala, 1662.

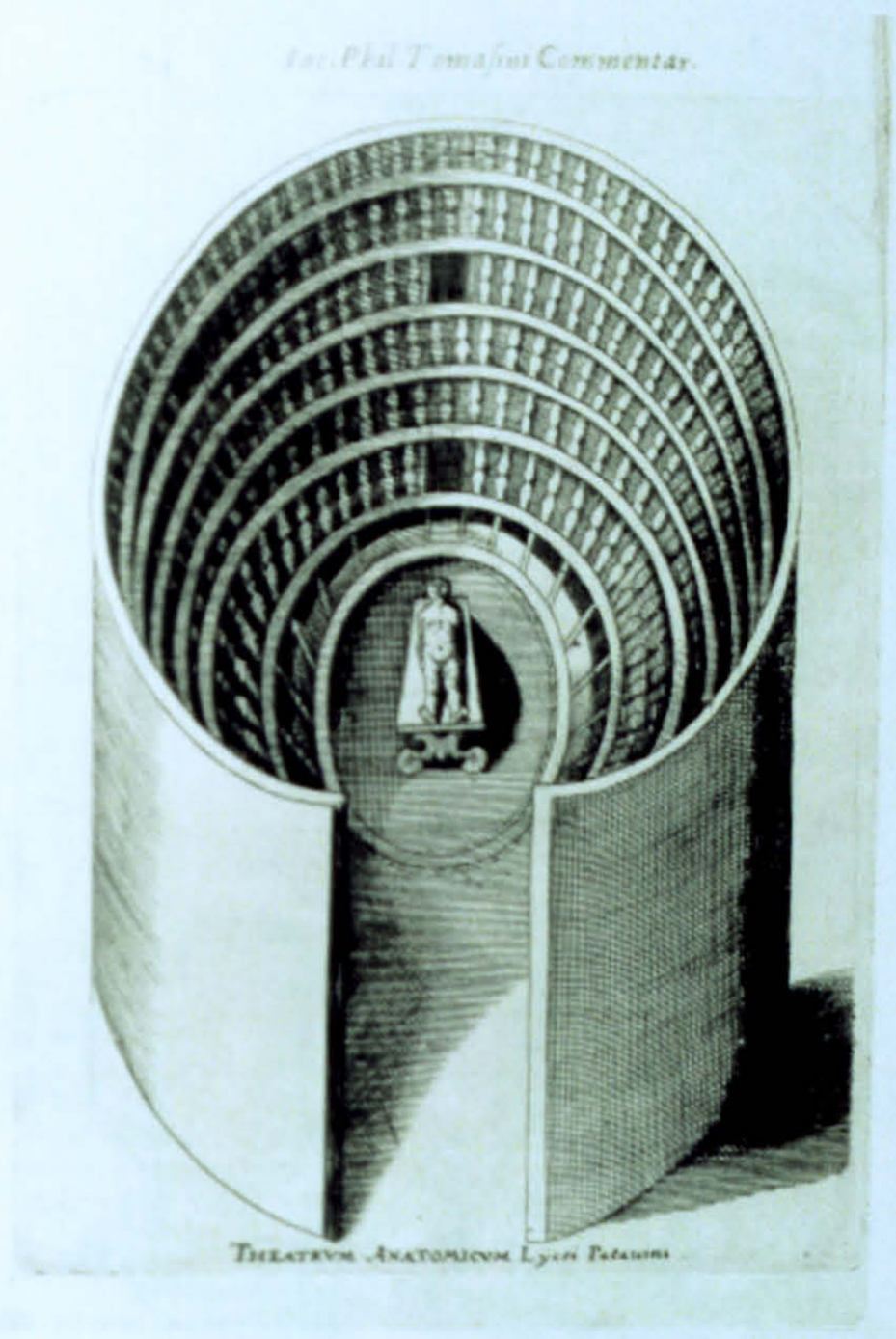


66. *The Cutlerian Anatomy Theatre*, London: engraving (1823).



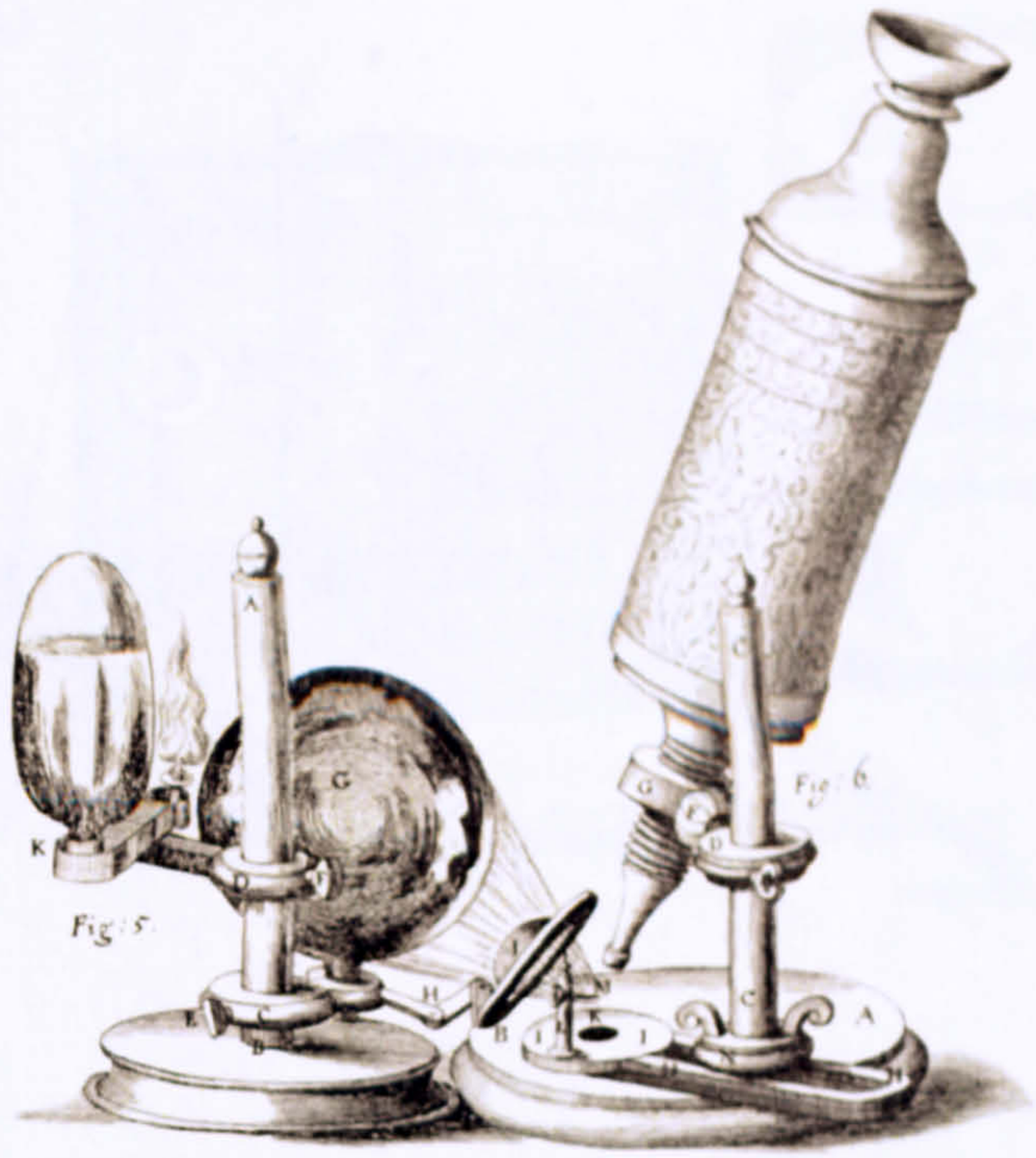
67. *The Anatomy Theatre, University of Leiden*, 1593: engraving by W. Swanenburg (1610).

68. *Reconstruction of the Anatomy Theatre*, University of Leiden: Museum Boerhaave, Leiden.

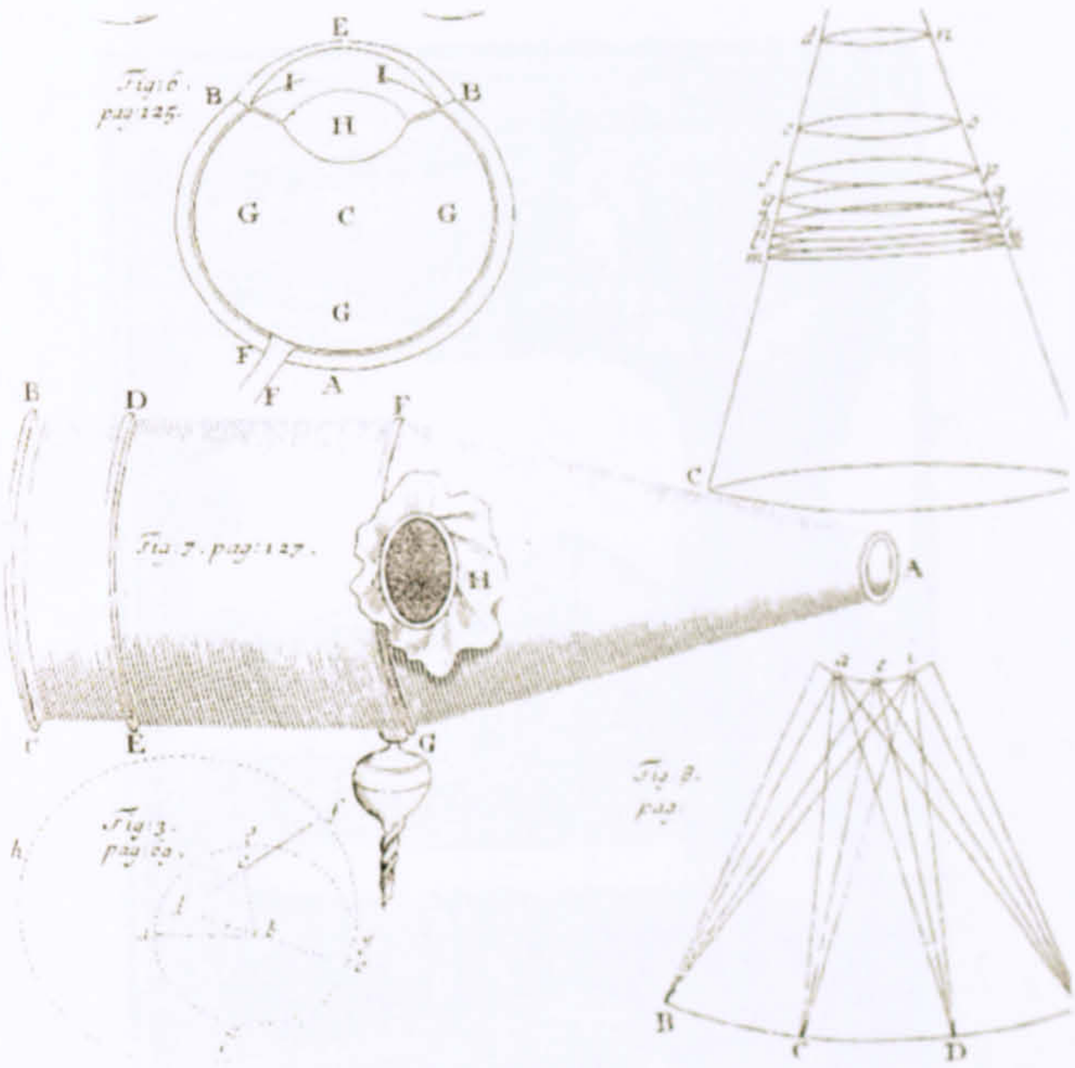


69. *The Anatomy Theatre*, University of Padua: *c.* 1594, engraving (1654).

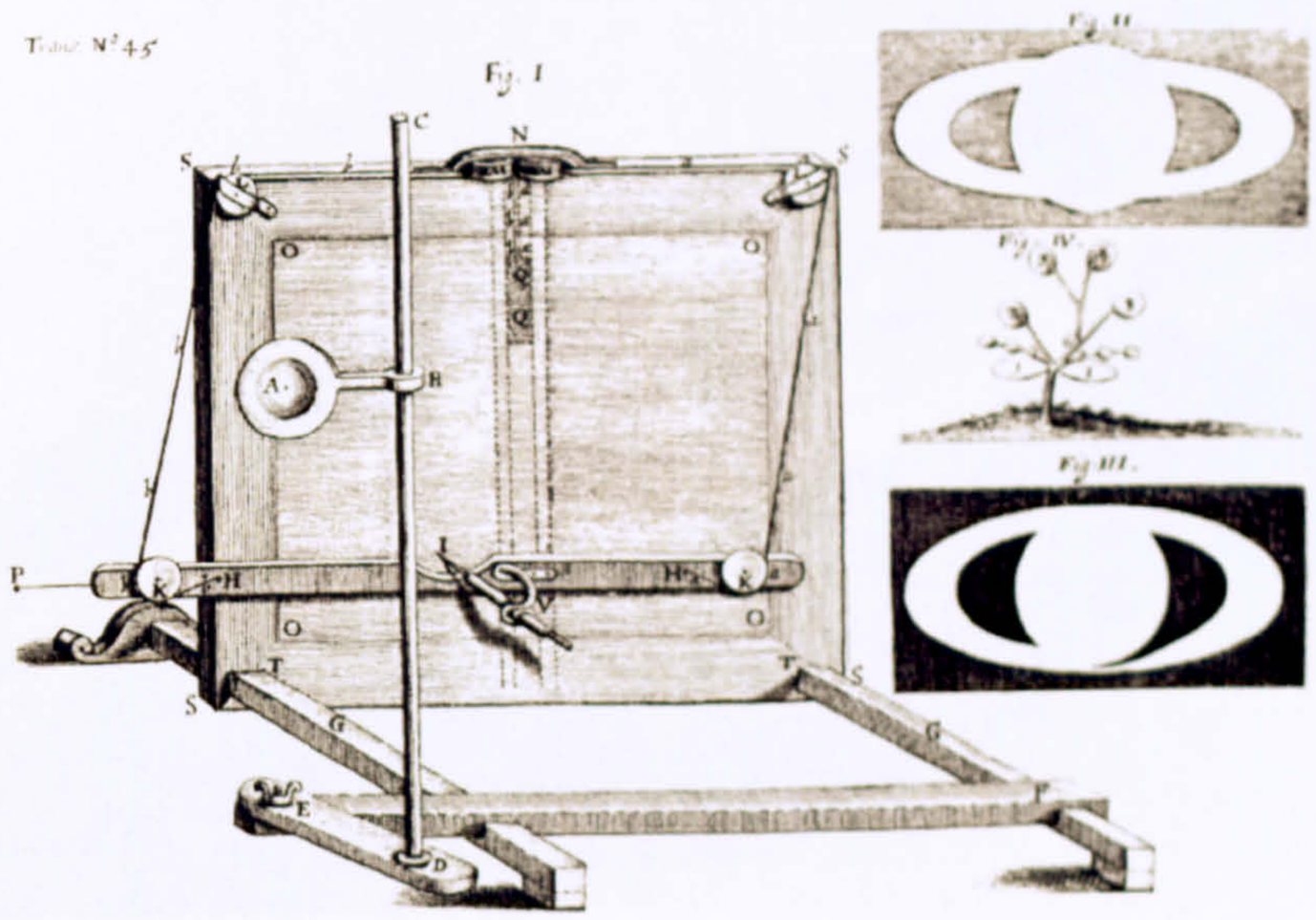
70. *The Anatomy Theatre*, Cambridge University: early eighteenth century, aquatint (1815).



71. Robert Hooke. *Compound Microscope*, 1664.



72. Robert Hooke. *Perspective Box*, 1703.



73. Christopher Wren. *Perspectograph*, 1669.

74. Robert Hooke. *An Instrument of Use to take the Draught or Picture of any Thing*, 1694.

75. *Ivory Anatomical Model of a Pregnant Woman*, seventeenth century, Wellcome Library.