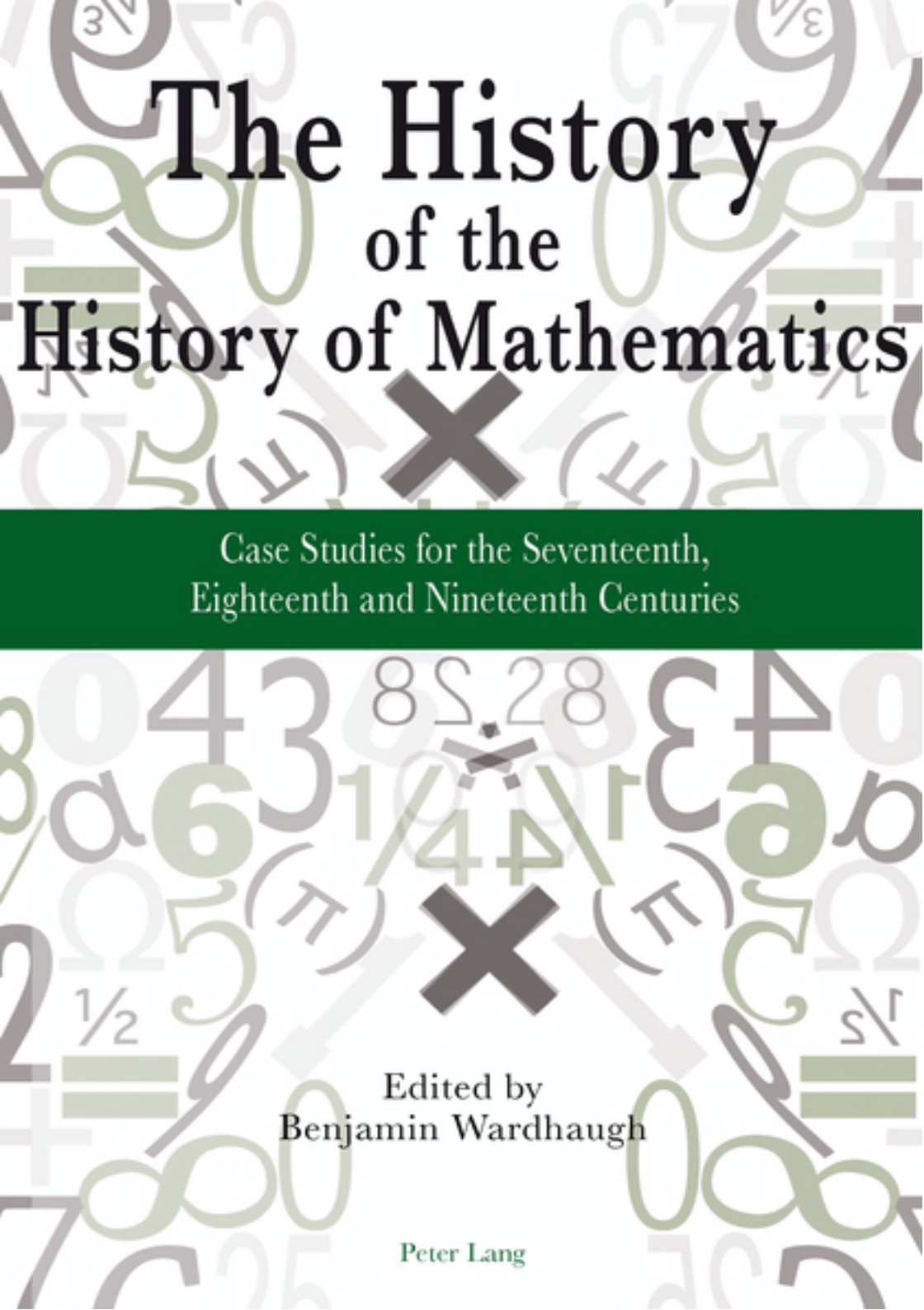
The History of the History of Mathematics

Case Studies for the Seventeenth, Eighteenth and Nineteenth Centuries



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Introduction

> [O]ur history will embrace *all* mathematicians [...]. And not, moreover, in just a historical fashion – what age they lived in, what manner of life they led, what country they inhabited – but rather mathematically: what they wrote in what field, how well they wrote it and how useful it is for teaching beginners. Since I intended to say this, I could not, without fault, omit a discussion of the whole of mathematics and each of its branches.[1]

Mathematical histories have been written in Europe since the sixteenth century, yet on the whole there has been relatively little reflection on the trajectory which the history of mathematics itself has taken over time. Nor has sustained attention often been given to the historiography of a subject which by its nature involves methodological choices and dilemmas different from those of other kinds of history.[2] Henry Savile's demanding programme for the study of the history of mathematics, set out during his 1570 lectures on Ptolemy at Oxford and quoted above, illustrates the magnitude of the task facing the historian of mathematics. It also illustrates the tendency of mathematical histories to be dependent on particular understandings of the nature of mathematics, and of course to respond to the needs of particular audiences.

1 Oxford, Bodleian Library, MS Savile 29, fols 17^{r}–17^{v}, quoted and translated in Robert Goulding, *Defending Hypatia: Ramus, Savile, and the Renaissance rediscovery of mathematical history* (Dordrecht: Springer, 2010), 97.

2 Notable exceptions are Joseph W. Dauben and Christoph J. Scriba, eds, *Writing the history of mathematics: Its historical development* (Basel: Birkhäuser, 2002) and Amy Shell-Gellasch, 'Introduction: The Birth and Growth of a Community' and Ivor Grattan-Guinness, 'History or Heritage? An Important Distinction in Mathematics and for Mathematics Education', both in Glen Van Brummelen and Michael Kinyon, eds, *Mathematics and the Historian's Craft: The Kenneth O. May Lectures* (New York: Springer, 2005), 3–6 and 7–22.

The history of mathematics in the sixteenth century has been addressed by Robert Goulding in his recent book on Peter Ramus and Henry Savile.[3] Ramus's *Prooemium mathematicum* of 1567 was one of the earliest published histories of ancient mathematics. Widely read at the time, it continued to influence mathematicians and writers on the history of mathematics over the next century, partly because of its comprehensive scope, but equally because of the practical and progressive lens through which Ramus observed, selected and arranged his sources on the history of mathematics. One of the earliest extended critical responses to Ramus's history is found in Savile's lectures on Ptolemy. There, in the early part of those lectures, Savile presented a history of ancient mathematics based almost entirely on his study of Ramus's *Prooemium*, but arguing for an entirely opposite account of mathematics: not practical and changeable, but theoretical and eternal. What Goulding has called the 'malleability' of the evidence available to Renaissance scholars concerning the history of ancient mathematics was manifested most dramatically in the two men's divergent attitudes to that most famous of mathematical texts, Euclid's *Elements*. Where Savile saw a single 'most beautiful body', Ramus wished to 'pull apart the bones, flesh, spirit, and blood' in an attempt to 'cure the disease' he found in a flawed and corrupt text.[4] Thus divergent attitudes to mathematics could lead to radically different textual practices, to entirely opposed understandings of the mathematical past as history, and to wholesale disagreement concerning the interpretation of historical mathematicians and their work.

The mathematical narratives of Ramus and Savile set the stage for the later development of mathematical history writing. Later historians would face some of the same issues and replay some of the same types of disagreement in respect – often – not of ancient but of modern mathematics. Like Ramus and Savile, they would be concerned not just to construct but to use the mathematical past, their agendas shaped by national and local

3 Goulding, *Defending Hypatia*.

4 Henry Savile, *Praelectiones tresdecim in principium Elementorum Euclidis Oxonii habitae MDCXX* (Oxford: Iohannes Lichfield, & Iacobus Short, 1621), 140; Petrus Ramus, *Scholarum mathematicarum libri unus et triginta* (Basel: Episcopius, 1569), 91, trans. in Goulding 177, 170 respectively.

considerations as well as by differing assumptions about the nature of mathematics and mathematicians. This volume presents seven case studies illustrating the diversity which resulted in thinking and writing about the mathematical past from the early modern period until the early twentieth century.

During the second half of the seventeenth century, the growth of scientific communication contributed to major advances in mathematical knowledge, but it also engendered an increasingly bitter spirit of competition, expressed in the numerous disputes over priority in discovery which plagued the Republic of Letters. History of mathematics could effectively become a cover for establishing a certain author's claim to priority, as exemplified for instance by the historical accounts of the cycloid produced variously by Blaise Pascal, Carlo Dati, and Johann Gröning, and it was all too often a self-serving enterprise rather than anything more.

John Wallis, the Savilian professor of geometry at the University of Oxford, was not completely averse to this new kind of historical writing. But in his *Treatise of Algebra* he embarked on a much broader historical mission, seeking to evince the ancient roots of algebra and to show how it had progressed through the centuries to the heights it had attained in his day. His project was arguably a *historia* in an Aristotelian sense, concerned to document facts rather than to discover causes. The results were not entirely free of the biases of party and nation, but Wallis's conception of history was neither unsophisticated nor inherently one-sided. By putting the *Treatise of Algebra* in its scientific and cultural setting, Philip Beeley attempts to resolve the evident tension in Wallis's work between different types of concerns, and thus to reassess his legacy as a historian of mathematics.

By the eighteenth century, an interest in the ancient mathematical past – already evinced by Ramus and Savile, and by Wallis and his contemporaries – was beginning to find a place even in the most popular accounts of mathematical subjects such as arithmetic primers and dictionaries, with consequences for the way mathematical history, and therefore mathematics, were presented to unsophisticated readers. If learners of arithmetic were to be motivated and encouraged they should ideally be presented with a convincing ancient pedigree for their subject: yet the available historical

sources for the earliest mathematics hardly enabled one to be constructed. Writers fell back on unabashed speculation or added a Christianizing spin to a small selection of ancient materials, gravely suggesting even that 'some Method of Numbering was used by *Adam* and *Eve* in *Paradise*', and thereby writing mathematics into history in ways previously unthought of. Benjamin Wardhaugh's chapter considers these popular accounts of the origins of arithmetic written in eighteenth-century England, and asks what they tell us about the developing reputation of mathematics and its history.

Equally important for that reputation, and for the developing genres of mathematical history-writing and of mathematical biography, one of the defining issues in the eighteenth and nineteenth centuries was the treatment of specific prominent mathematicians of the recent past. This was true of no-one more than of Isaac Newton and Gottfried Wilhelm Leibniz. Newton's reputation would come to tower over British science and mathematics, and his quarrel with Leibniz was a locus for a remarkable quantity of historical and biographical assessment. Three chapters in this volume examine different ways in which writings about Newton and about the Newton–Leibniz dispute illuminate the development of mathematical history and biography, from the eighteenth to the twentieth century.

Rebekah Higgitt considers the depiction of Isaac Newton as a mathematician in biographies across that period. As with other aspects of Newton's life and work, the discussion of his mathematics varied over time as views of the discipline and its practitioners underwent significant change. At the same time, national context and disciplinary and personal interests all played roles in shifting perceptions of Newton's life, personality and work, and the relationship between them. While Newton's mathematical accomplishments continued to be revered, there was some criticism, even in biography, of the obscurity of his published work. This issue was particularly important at key periods, such as when the distinctive Continental and British traditions were established in the early eighteenth century, and when they were largely reunited a century later. Alongside such concerns we also find more popular portrayals that largely avoid detailed consideration of Newton's mathematics, effectively sidelining what many considered Newton's most significant work, or contributing to a popular image of the

mathematical genius. Tracking how Newton the mathematician has, or has not, been integrated with dominant themes in Newtonian biography not only illustrates the history of mathematical history; it also provides a window onto changing views about the relationship between mathematics and other branches of science, and the role of mathematics in considering the persona of the man of science.

A work which dealt with the calculus controversy between Newton and Leibniz in particular detail was Jean E. Montucla's *Histoire des Mathématiques*, first published in 1758 and revised with the contribution of Joseph Jérôme de Lalande around the turn of the century. Niccolò Guicciardini considers the image of the calculus controversy conveyed in this monumental history, and draws comparisons with contemporary British historical work, including that of Hutton, Rigaud, and Brewster. He shows how these diverse accounts of the notorious controversy reflect the diverse agendas of the historians concerned. Montucla's was not a nationalistic account, but a balanced one in which the calculus was conceived as emerging from the contributions of many individuals over an extended period. It was shaped by the milieu of the French encyclopedists, for whom history was expected to show the progress of knowledge as a matter of universal, enlightened, cooperation.

Thus differences in national context and intellectual agenda could result not just in different judgements about the narrow issue of Newton *vs*. Leibniz, but also in different understandings of what it might mean to 'invent the calculus', and of what criteria should properly be used to assess matters of intellectual priority and discovery. But despite the existence in print of such sophisticated assessments as Montucla's, British mathematicians in the nineteenth century continued to regard Leibniz as an underhanded plagiarist, an attitude reinforced by the virtual deification of Newton by his British biographers. One of the first to question this view was the nineteenth-century mathematician Augustus De Morgan, who, in a series of works published between 1846 and 1855, attempted to set the historical record straight. Adrian Rice examines De Morgan's research in this area and investigates the motivations that led him to initiate the rehabilitation of Leibniz among British mathematicians. His position as a religious nonconformist and his critical stance towards both the Church of