

**Piotr Błaszczyk, Pedagogical University of Kraków:** On Newton's series for sine and arcsine

We analyze Newton's *Two Treatises of the Quadrature of Curves and Analysis by Equations of an Infinite Number of Terms* from the perspective of mathematical techniques.

On pages 336--338 of the 1745 edition, Newton derives series for sine and arcsine. To this end, he employs Euclidean proportion, Cartesian understanding of proportion in terms of the arithmetic of line segments, and Cartesian interpretation of the Pythagorean theorem, infinitesimals, formal power series, and binomial theorem -- the technique exposed by every modern commentary. Moreover, Newton refers to the Euclidean concept of magnitudes of different kinds, which allows him to apply different units, namely infinitesimal unit line and the unit within -- say -- usual line segments.

We focus on the technique of formal power series, which enables Newton to determine the derivative -- to phrase it in modern terms -- of the inverse function. Finally, we contrast Newton's derivation of the series for arcsine with modern calculus and show that the so-called arithmetization of calculus is not a complete success.

**Roderick Gow, University College Dublin:** Who was J. Walton, Berkeley's Dublin antagonist?

In 1734, an anonymous pamphlet entitled *The analyst: or a discourse addressed to an infidel mathematician* was published separately in Dublin and London. The work had an immediate impact and, although anonymous, it was rapidly surmised that its author was George Berkeley, who had been appointed to the bishopric of Cloyne a month or two earlier. Not the least part of its impact derived from the implied criticism of Newton's method of fluxions. It provoked a brief pamphlet war from supporters of Newton, with the occasional anonymous reply from Berkeley. Our interest is centred on two pamphlets written by a certain J. Walton, also published in Dublin and London, in 1735. One is *A vindication of Sir Isaac Newton's principles of fluxions*, the other *The catechism of the author of the minute philosopher fully answer'd*. The question we wish to raise here is: who was J. Walton? It is surprisingly difficult to give a conclusive answer, and other investigators have failed in the endeavour, not least even to identify the name signified by the initial J. Sufficient information has emerged to suggest that Walton was a wealthy man with scientific interests and connections to leaders of Dublin society, but virtually unknown to historians.

**Harald Gropp, Universität Heidelberg:** Easter dates in the early church in Ireland

In 2019 we all celebrated Easter Sunday on the wrong Sunday. "True Easter Sunday" was the first Sunday after the first full moon in spring (March 24). The official dates were April 21 for the Western world and April 28 for the Orthodox world.

While in the 16th century the Gregorian calendar reform yielded different Easter dates in Catholic and Protestant countries until the 18th century in Western Europe, the focus of this talk will be on the early history of Christianity in Ireland. The early arrival of Christianity to Ireland is related to particular connections with the Christian orient. This is also reflected in the Irish way how to compute the correct Easter date. Several centuries later Irish missionaries were quite important and successful in the Christianization of Central Europe and beyond also discussing the computes question.

**Sue Hemmens, Marsh's Library:** Considering conics: reading Apollonius in the collections of Marsh's Library

The seventeenth century saw a sustained fascination with the treatise on conic sections by the 'Great Geometer' Apollonius of Perga (c.240C–c190BCE). Characterised by some as the first significant advance in geometry since Euclid, Apollonius' writings were known to the Islamic world and subsequently rediscovered in Western Europe during the Renaissance where they formed the basis of many subsequent developments.

Narcissus Marsh (1638–1713) is known to have been deeply interested in mathematics in general. He made extensive notes using his copy of La Hire's 1685 edition of Apollonius. Marsh also owned an important Arabic manuscript, now held in the Bodleian Library, which was used by Edmund Halley in preparation of his edition of the Conics, including a reconstruction of the 'lost book'. This paper will discuss the reception and reading of Apollonius as reflected in the collections of Marsh's Library.

**Olivia Lardner, University of Limerick:** An enlightened archbishop: collecting mathematics in the Bolton Library

The core of what has become known in the 21st century as the Bolton Library – formerly Cashel Cathedral Library – was circa 75 years in the making, collected by two Irish men across the island of Ireland between 1669–1744, with activity in each of the four provinces. They would both go on to become Church of Ireland archbishops: William King (1650-1729) in Dublin and the eponymous Theophilus Bolton (-1744) in Cashel. Little research has been undertaken on the collecting activities of the latter, but a wealth of information exists on that of the former, due in the main to his own assiduous marking of and reflections on items acquired across 50 years of collecting activity. This talk will look at three mathematical volumes - two manuscripts and one early printed book - acquired by Archbishop King during this Age of Enlightenment.

**Ciarán Mac an Bhaird, Maynooth University:** Euclid's Elements in Irish: A 19<sup>th</sup> century tale

Special Collections in the University College Dublin (UCD) Library holds a manuscript which includes, amongst other non-mathematical material, approximately sixteen pages of Euclid's Elements written in old script (seancló) Irish. In this talk I will consider the contents of these pages which seem to have been written by the Irish language scholar John O'Donovan (Seán Ó Donnabháin) around the middle of the 19<sup>th</sup> century. We will look at Eoin MacNeill's commentary on O'Donovan's text in the Gaelic Journal (Irisleabhar na Gaedhilge) in the 1890's, which paid particular attention to the Irish words chosen by O'Donovan. We will also briefly outline the careers of the people involved, including O'Donovan, MacNeill, and James O'Laverty as we try to identify why these pages were written in the first place, and their curious route, via Belfast, to UCD.

**Mark McCartney, University of Ulster:** The Lion, the Witch & the maths graduate: studying maths at Queen's College, Belfast in the 1880s

The 1880s saw the dissolution of the Queen's University of Ireland, the formation of the Royal University of Ireland, and the admission of women as students to Queen's College Belfast.

This talk will look at the mathematics curriculum and examinations around that time and aspects of the lives of Florence Hamilton and Alice Everett.

**Padraig Ó Catháin, Dublin City University:** Hadamard's Determinant Inequality

A famous inequality due to Hadamard in 1893 establishes a bound for the determinant of a matrix in terms of an upper bound on the matrix entries. To the modern reader, the proof is curious as it uses techniques of nineteenth century determinant theory, rather than results about inner product spaces. We will trace the historical development of this result and its generalisations, comparing nineteenth and twentieth century proof techniques, and concepts of proof.

**Maurice O'Reilly, Dublin City University:** What's happening in the History of Mathematics Education? Perspectives from ICHME7

In September 2022, the seventh International Conference on the History of Mathematics Education (ICHME7) took place over five days in Mainz, Germany, where 32 papers were presented. In an attempt to give an overview of areas of current interest in the field, I review a selection of the presentations under six headings. These are: pre-Enlightenment texts on mathematics, the emergence and development of engineering mathematics in military contexts in the 18<sup>th</sup> and 19<sup>th</sup> centuries, teaching mathematical analysis in the 19<sup>th</sup> century, school geometry in the 19<sup>th</sup> and early 20<sup>th</sup> centuries, international networks concerning mathematics teaching, and, last but by no means least, the advent and reception of the New Math from the 1960s. This review anticipates the publication of the ICHME7 proceedings at the end of August (see <https://ichme7.uni-mainz.de/>)

**David Wilkins, Trinity College Dublin:** Potential Approaches to the Theory of Proportionality in Ancient Greek Geometry

This presentation seeks to explore the potential for geometric approaches to proportionality in the development of ancient Greek geometry prior to the establishment of the theory of proportionality attributed to Eudoxus. The aim is to show that, if appropriate geometric criteria are taken to represent proportionality, when applied in the context of straight line segments and parallelogrammic areas, then the majority of the propositions in Book 6 of Euclid's Elements of Geometry could be proved, consistent with the standards of proof typical of ancient Greek geometry, on the basis of the concepts, propositions and proof techniques exhibited in the first four books of Euclid's Elements. Such an approach should not introduce any logical dependence on the contents of Book 5 that present the theory of proportionality traditionally attributed to Eudoxus.