Research workshop. Charles Hutton (1737–1823): being mathematical in the Georgian period

Thursday and Friday 17 and 18 December 2015
All Souls College, Oxford

ABSTRACTS

Nerida Ellerton, Illinois State University

Beginnings of Modern Secondary School Mathematics: The Royal Mathematical School at Christ’s Hospital, London, 1673–1798

Historians of mathematics education have not documented clear examples of notable schools teaching mathematics beyond arithmetic and elementary geometry to 12- to 16-year old children before 1673—the year when Christ’s Hospital, London, established its Royal Mathematical School (RMS). We provide evidence to support our conjecture that RMS was the first well-established school in the world to offer, to teenagers, a mathematics curriculum that went well beyond arithmetic and elementary geometry—and in that sense can be regarded as the birthplace of modern secondary school mathematics. This paper will discuss events which led to the creation of RMS, and will sketch the history and influence of RMS during the period 1673–1798.

Ken Clements, Illinois State University

A Galaxy of Stars in the Royal Mathematical School at Christ’s Hospital, London, 1673–1798

This paper identifies 10 stars in the firmament of the Royal Mathematical School (RMS) in London between 1673 and 1800. The stars were Samuel Pepys, Jonas Moore, Christopher Wren, Robert Hooke, Isaac Newton, John Flamsteed, Edward Halley, James Hodgson, John Robertson, and William Wales. We also identify an eleventh person, Humphry Ditton—a mathematics master at Christ’s Hospital between 1706 and 1715—as someone who had an important influence on the future of RMS. The 10 stars illuminated the educational world within the Royal Mathematical School at Christ’s Hospital at various times during the period 1673–1800. Not all the stars shone at the same time, with the first 30 years of RMS’s existence being a time when more of the stars were shining together than at any other time. After briefly considering unique characteristics of each of the stars, and of Humphry Ditton, their contributions to RMS’s development are described. We conclude that the greatest contribution came from James Hodgson, RMS master between 1709 and 1755, and that by the end of Hodgson’s era Christ’s Hospital could claim to be the leading mathematical school in Great Britain, and perhaps in the world.

Olivier Bruneau, Université de Lorraine

Mathematics and its diffusion in British military academies

The role of military schools in Europe was crucial for the development of mathematics at the turn of the nineteenth century. For instance, the central place of mathematics in the Ecole Polytechnique and in the applied school at Metz is well known.

The traditional historiography considers this period as a dark age for British mathematics or a period of stagnation. But recently, some papers have re-evaluated this position and pointed out places and people who actively participated in the development of mathematics.

As Guicciardini and Bruneau have partly shown, Woolwich and Sandhurst—with the Scottish universities—were the main places in which mathematics was taught and was a subject of research.

My talk will be firstly focused on the role of mathematics in these academies. Secondly, I will show what kind of mathematics was really taught and, finally, I will try to evaluate how these places and their teachers participated in the diffusion of mathematics in Great Britain.
Jo Elcoat, University of Leeds

*Mathematical-philosophical education at Robert Thomson’s Military Academy, 1793–99*

Between 1793 and 1799, brothers George and John Thicknesse-Touchet attended Robert Thomson’s well-regarded academy in Kensington. An archive of invoices, itemising the many texts used by the boys at Thomson’s school, provide rich insight into the mathematical and philosophical training available to those, from wealthy families, intended for careers in the navy and army. In the first half of this paper, I describe the course of instruction given to Thomson’s students. I highlight how the two brothers received a liberal or general education, including mathematics and sciences, until their mid-teens, followed by a more focussed study of mathematical and philosophical subjects as they prepared to enter military service. I next place Thomson’s school, and the textbooks it used, within the context of a burgeoning educational marketplace for mathematical and scientific training. Although this marketplace was diverse and catered for a variety of needs, I argue that military contexts were central to its development and, by the late eighteenth century, the Royal Military Academy at Woolwich, and in particular the textbooks produced by its staff, had taken a leading role in defining a course of mathematical-philosophical study in late eighteenth-century schools.

Jenny Bulstrode, University of Cambridge

*The promiscuous exercises of the Woolwich bois boys*

The community of mathematics masters fostered by Charles Hutton at the Royal Military Academy, Woolwich, is considered crucial to the revival of the physical sciences in late Georgian Britain. Further, the Woolwich professors are recognised for their central role in the transmission of a mathematically-characterised, experiment-driven mechanical philosophy, dubbed *la physique*, from France to Britain. While historians have noted the significance of the Woolwich community, contemporaries like French civil engineer Charles Dupin, and successors such as Cambridge mathematician Isaac Todhunter, queried the theoretical value of their contributions. In the second edition of his celebrated *Course of Mathematics*, Hutton introduced French theory on timber strength to his ‘promiscuous exercises’. Following this, his protégés, Olinthus Gregory and Peter Barlow, carried out the promiscuous exercises on timber in practice; updating both the theory, and the *Course*, through practical experiment. Yet, Hutton himself noted that ‘no materials whatever accord less with the theory than timber.’ Well-recognised by contemporaries for its evident utility, but in the same breath denigrated for its impoverished theory: what kind of science was being revived here? This paper traces the frequent reworking of Hutton’s *Course*, including the 1812 West Point edition brought out by emigré insurgent Robert Adrain, to analyse how *la physique* was interpreted, incorporated, and disseminated. Using unpublished archival material on the Woolwich timber experiments; undertaken first to reframe French experimental mathematics; and second, with Dupin’s work, to update Hutton’s *Course*; this paper explores what was revived by the promiscuous exercises of the Woolwich bois boys.

Emily Winterburn


Charles Hutton and William Herschel led parallel lives. Hutton was born in 1737 in Newcastle; Herschel a year later in Hanover. Both grew up knowing they must earn a living and viewing education as their best route to success. In 1773 Hutton moved south to become Professor of Mathematics at Woolwich and take on the editorship of the *Ladies’ Diary*; that same year Herschel brought over his sister Caroline to Bath and was finally able to dedicate his time to learning fluxions and astronomy, and so in time become able to contribute to the *Ladies’ Diary*.

While on the face of it, Hutton’s education seems more conventional than Herschel’s – he went to school, studied mathematics at evening class, began teaching, then writing then worked his way up to professor – there was much common ground between the two. Herschel, as an outsider to England and to mathematics had to find an educational path of his own, in that sense he was self-taught. At the same time, many of the resources he relied on were the same as those used in more formal settings. This paper uses William Herschel’s experience of transforming himself from musician to astronomer to explore that world of informal “self-education” in eighteenth England.
Rebekah Higgitt, University of Kent

‘Intimate friends’: Charles Hutton and Nevil Maskelyne

The biography of Nevil Maskelyne that appeared in Rees’s *Cyclopaedia* in 1812, written by the mathematician and astronomer Patrick Kelly, referred to Charles Hutton as one of his ‘intimate friends’. This paper will look at this friendship and its relationship to the work of both men and the mathematical circles of London in which they moved.

Benjamin Wardhaugh, University of Oxford

*Charles Hutton and the ‘Dissensions’ of 1783–84*

It is notorious that in 1783 the mathematician Charles Hutton was sacked from his job as Foreign Secretary to the Royal Society and that the ensuing row held up the scientific business of the Society for several weeks during the first half of 1784. It was the largest row the Society had ever seen and it threatened (impotently, as it turned out) to unseat Joseph Banks from his role as president, a role he in fact continued to hold until his death in 1820. The story is told in every biography of Banks, in every history of the Royal Society in the period and in the biographies of a number of other figures such as Henry Cavendish and Nevil Maskelyne.

The incident has been interpreted as being about social class at the Royal Society; it has been interpreted as a mere personal spat between two men who did not like one another; it has been interpreted as the last throw of John Pringle's circle for control of the Society. It has also been interpreted as a row between real scientists and amateurs (Samuel Horsley famously called Banks's party the ‘macaronis’ of the Royal Society) and as a mutiny of mathematicians in particular.

This talk will re-examine the ‘Dissensions’ through the lens of Charles Hutton's career, his personal connections and his personal networks. This turns out to be revealing, and I will propose that it enables us to cut through some of the layers of reinterpretation now surrounding the incident and provides some worthwhile reminders about how scientific and particularly mathematical careers worked in Georgian England.

Shelley Costa

*Hutton’s imprint on recreational mathematics: When innovation becomes tradition*

In 1773 Charles Hutton became editor of the *Ladies' Diary, or Woman's Almanack*, founded in 1704, an annual periodical whose recreational mathematical problems were renowned by mid-century for their innovation and difficulty. Hutton showed his ever keen historian’s sensibility when in 1775 he published an annotated five-volume compilation of the *Diary’s* past issues. Posterity has much to be thankful for; without Hutton’s work – a fine example of the general-knowledge Enlightenment projects he took on elsewhere – it is hard to say how lasting the influence of the ephemeral *Diary* would have been. Yet what was the impact of Hutton’s compilation on the unique role of the *Ladies’ Diary* in the practice of recreational mathematics? My paper examines this question by comparing the *Ladies’ Diary* with its rival, the *Gentlemen's Diary* (founded in 1741), in the years before and after the appearance of Hutton’s comprehensive volumes. I demonstrate substantial differences in the early mathematical content of the two periodicals along the lines of innovation, tradition, gender, and social class – differences that gradually diminished as the two became virtually indistinguishable in mathematical style. To what extent did Hutton’s consolidation of the *Ladies’ Diary* contribute toward a shared mathematical aesthetic among Britons? Does this path parallel the role of mathematics and class transformation in his own life’s journey?
Alex Craik, University of St Andrews

*Learning from the French: some views and reviews*

Though Charles Hutton wrote prolifically and made worthy achievements, particularly in gunnery, he was not one of the main promoters of the revival of British mathematical science through the adoption of the methods of French analysis and physical astronomy. Following the promptings of John Playfair and Robert Woodhouse, this was mainly accomplished by William Wallace, James Ivory and William Spence, and later by William Herschel and Charles Babbage.

Several reviews by Playfair and Woodhouse are described, that relate both to Hutton’s *Dictionary* and *Tracts* and to various French works.

Mary Croarken

*A Mathematical Workforce: Maskelyne’s computers and assistants*

Nevil Maskelyne, the fifth Astronomer Royal, and close associate of Charles Hutton, was a significant employer of mathematical labour in the eighteenth century within the Royal Observatory for the reduction of astronomical observations and for astronomical tablemaking. Some were employed full time and others as piece workers; some relished the work and others struggled. This session will look at how Maskelyne recruited staff and tell the stories of some of those people in terms of how they made their living by being mathematical in the Georgian period.

Alan Morton

*The Measure of Man*

The Measure of Man? For a steam engine, “each square inch of the piston being nearly equivalent of a labourer.” Thomas Young, Royal Institution, 1802

This paper examines ideas about measuring human labour in the eighteenth century: human beings as suppliers of the physical effort needed for the production of goods and services. These ideas come between John Locke’s suggestion in the later seventeenth century that human labour is the source of economic value and Adam Smith’s discussion of the division of labour a century later.

Around 1700 there was no alternative to human or animal power for many tasks. Water, wind, and steam power were available but only for limited purposes in particular locations; they were not universal. But by the 1780s Matthew Boulton boasted of steam mania amongst manufacturers who realised the potential of rotative steam engines for driving machinery. For the first time there was a universal alternative to using human beings or horses to power machines. Though this potential was not realised until the nineteenth century, ideas about the relationship between human beings and machines changed in the later eighteenth century.

Drawing on contemporary accounts of machines and industrial disputes this paper examines how perceptions of labour and machines changed as human and animal labour was measured (James Watt’s horsepower), and in London new machines were used to unload coal and saw wood, and steam engines powered a cornmill.

Jane Wess, University of Edinburgh

*Field Instruments and Mathematical Relationships in the Early 19th Century*

This paper will look at the emerging science of geography as constructed by the Royal Geographical Society from its founding in 1830. The RGS was engaging with the development and use of instruments which were based on mathematical relationships developed in the early years of the century in areas such as tides, magnetism, hypsometry, map projections and the calculation of longitude. Some of these relationships were contested. The paper will consider mathematics as one of the inherent, embodied values contained in an instrument. The resource of the mathematical community, and the RGS who vetted, managed and developed their instruments, will be viewed as embodied assets. These assets had to be unlocked by mathematical training, another resource necessary for successful mobilisation of the instruments.
The paper will survey the types of instrument relied on by the early members of the Council of the RGS, relate these to the inherent mathematical relationships, comment on the training available for prospective explorers, and argue that the package which constituted an instrument involved considerable resource from mathematicians of the Georgian, in particular late Georgian, period.