



# UNIVERSITY OF CAMBRIDGE

## Cambridge University History of Mathematics Society

presents an illegal, immoral, *and* fattening lecture series

### A HISTORY OF SCIENCE

#### EARLY ISLAM, ISLAMIC SCIENCE, TECHNOLOGY AND MATHEMATICS

Held *in* the faculty of mathematics, but NOT *by* the faculty of mathematics

*4 pm MR4, Thursdays, Michaelmas & Lent Terms 2023-24*

Well, to the First Years, welcome to Cambridge, and to the Second and Third years, welcome *back* to Cambridge, and to anyone else watching these lectures online, welcome to Cambridge education, sitting on your couch watching videos. It's lovely to have you all back up in Cambridge, although I can't tell if the people on Zoom are in Cambridge or Seoul, or anywhere between ... so "coming [back] up to Cambridge" is something of a misnomer. But, with thanks to the Cambridge University History of Maths Society, who now organise my history of maths and history of science courses, welcome to Cambridge In-person and On-line, Inc., purveyor of education to the interested elites everywhere.

This year we will continue as normal – as if anything about Cambridge could be described as normal – with face-to-face lectures, with the addition that I'm going to be streaming these lectures on Zoom, for those that prefer Zoom or those outside of Cambridge who would like to sit in on my lectures. Links and news will be in my irregular emails to those that attend these lectures; you need to sign up to the email list (QR Code below). This will be the last year these lectures are in-person in the Maths Faculty, so I don't know if they will ever be done in-person anywhere in the future. I have not put these lectures up on YouTube – the task of editing them into something tolerably adequate for YT is more than I'm willing to do – although if any of you are adept at video editing and would like to help, please let me know: I might reconsider. Lectures are recorded, however, so if you miss a lecture and want to catch up you will be able to get the recording.

Cambridge and the Cambridge experience is back to normal, including the glamorous social life, networking, organising World Revolution (or your future career as a boring banker), sex'n'drugs'n'rock'n'roll, fancy dress dinner parties in bib'n'tucker, erudite

(and/or pretentious) seminars and talks about everything, and cycling in the bitter and cold rain of Cambridge. Sobriety optional. If you're new here, you will soon know what I mean. And for those who have been here, you also know that loneliness, depression, Impostor Syndrome, fatigue, alienation, vitamin deficiencies, despair, total immersion in maths and occasional moments of actually understanding some maths are also included, free of charge. And you're a mathmo, so you aren't going to get much of the partying and glamour of all those Hooray Henrys and Henriettas anyway, so the glamour of your social life is ... well, relative. Welcome to Cambsville.

### ***Lecture topics this year***

This year's History of Science for Mathmos lectures will be on early Islam, Islamic science, technology, and mathematics, and how all of this came to influence medieval Europe. The course will be on-line as well as in person and is open to everyone. There are no prerequisites (you don't need a history A level, nor a maths A level, nor a Media Studies A level), although not being brain dead is probably helpful. You're Cambridge students, after all, so fairly sharp and aware, and you know how to learn new stuff. These lectures are non-examinable, so the point is to learn something interesting and do no work.

This is not particularly a course about Islamic *religion*, its doctrines, beliefs, and faith (although inevitably these will come up a bit), but more about how the religion came to be formed, and then how Muslim societies and Muslim attitudes to science developed, and why. I will tell some of the story of the origins and development of Islam and the Islamic world from the time of the Prophet Mohammed to about the 11th or 12th centuries, and then look at some of the influences of early Islamic science beyond the Muslim world. The questions I want to answer are (1) *why* Islam suddenly got interested in science, and (2) how this transferred to & influence the Latin West.

At the time Mohammed began to preach what was to become a new religion (in the early 7<sup>th</sup> Century) Arabic society and communities shewed pretty much zero interest in what we might call science. They were literate, stable, but economically marginal and low-tech. But after about 750 there was suddenly the most extraordinary blossoming of learning, arts, science, and technology in the Islamic world – one of the most remarkable flourishing of culture, science, and industry the world has ever seen. Why this happened is a story that has started to be understood recently, and just how much science, maths, medicine, technology, etc., was developed over the next few centuries is one of the most remarkable events in history ... and something not always understood in the West.

This flourishing of science in the Islamic world was also one of the most important factors in the revival of Europe in the Middle Ages, and I want to look at how (and why) that came about, and how different the story is from what you may have been told. Why things happened in the past is often for the most bizarre and unexpected reasons, and the origins of some of your deepest scientific intuitions come from the strangest, unexpected places. I'll explain ...

And in answer to your question "Isn't al-Khwarizmi the father of algebra? Didn't the Arabs discover algebra?" ... the answer is "no, no, no, and no". That story is pretty much completely, totally, wrong. The story is way more interesting, and complicated, and what al-Khwarizmi actually *did* makes a lot more sense.

Lectures this year will cover:

- Sources, geography (in case you need it), traditional history and modern historical research, the dialectics and difficulties of the history of religion.
- The Arabian Peninsula before Islam: demographics, religion, communities, and history.
- Polytheism and monotheism, Jews and Christians in the peninsula (ca. 600).
- The life & times of the Prophet Mohammed, and how the early community of followers developed.
- After Mohammed: starting a religion: politics, institutions, texts, war, personalities. This just isn't easy.
- The first three caliphs, establishing an Islamic state, vast social changes.
- Civil war, Ali and the Umayyads and the caliphate in Damascus; alchemy and medicine, Jews and Greek Christians.
- The Umayyad state, civil war(s), and the Abbasid caliphate in Baghdad (750-ish). The Persian problem.
- The Abbasid court, false histories, administering a world empire, statecraft, astrology, and Greek doctors. Translations, Christian texts, Greek pagan texts.
- Debate amongst the religions, reading Aristotle (why?), alchemy and alchemical industries; science and knowing God, medicine, astrology, astronomy, geometry.
- So what are equations, anyway, and who actually studied what, for what reason? Who is the mother of algebra?
- Military expansion, political fragmentation, a passion for rationalism, exploding science and technology.
- Al-Andalus (Spain), a similar but different story: conquest, Muslims, Christians, and Jews, a flourishing, rich, peaceful, happy society. 11<sup>th</sup> century: civil war, Northern Christian kingdoms, Toledo, and the Church.

- 11<sup>th</sup> century trans-Pyrenean Latin Europe: a demographic and economic revolution; the Catholic Church in crisis.
- The great technological transfer: engineering, chemical industries ... and then the first great wave of Greek and Muslim Arabic texts into the Latin West. And then the world changes, Cambridge Uni founded. You come up to Cambridge, the world changes again.

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The lectures are also supposed to be an opportunity to think about *sciences*, which is a slightly different project from regular maths faculty lectures and a bunch of awesome and mind-blowing theorems you need to be able to prove and apply.

It is supposed to be for your amusement (for some fairly strange definition of amusement ... but you're mathmos, so that's OK), and it is more about listening and thinking than taking notes and not understanding what the lecturer is talking about. Attendance will require a sense of humour, however.

If you are not already signed up to my lectures-email list please do so via the QR below or at [www.lists.cam.ac.uk](http://www.lists.cam.ac.uk), search for maths-history-lectures. Room changes, reminders, and the such will be announced in the emails.



Piers Bursill-Hall

*dpmms*

October 2023