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Editorial

In this issue we explore science and technology in different workplaces. Jim Grozier highlights the hidden work of the “scanning girl” in 20th-century physics, and Matthew Hoffarth reveals the history behind staff stress and “burnout.” Our object of the issue is the trusty cargo bike, which Peter Cox explains has had a rocky journey lasting over a century. Daniele Macuglia explores the efforts to bring Newtonian ideas to Rome, a story surprisingly absent from English-language histories.

We also have several reports on some of the exciting conferences that took place this summer. This includes the annual BSHS Conference in Swansea, with pictures from the conference and the many events in the packed programme. There is also a special account of the lessons to be learned from trying out ancient working practices, provided by Tracey Rihll who organised the metallurgy demonstration at the *Technologies of Daily Life in Ancient Greece* conference that also took place in Swansea.

Contributions to the next issue should be sent to viewpoint@bshs.org.uk by 15th December 2015.

Alice White, Editor



“Scanning Girl” Pat Procter examines a bubble chamber print.
Photograph courtesy of Pat and Brian Luetchford.

The Rise & Fall of the “Scanning Girl”

Jim Grozier discusses the hidden figures in particle physics

On the wall of the High Energy Physics Group’s meeting room at University College London there is a photograph of the former Bubble Chamber Group. It is not difficult to guess, from the clothes and hairstyles, that it was taken in the early 1970s; but there is another fascinating thing about the group in this photograph – it is nearly 50% female.

For two decades in the late 20th century, particle physics groups all over the world could boast gender ratios that their modern equivalents can only dream of. Yet these women were not destined to win Nobel prizes or get their names into the history books. They were scanners – relatively unskilled women taken on to do a specific task. Many of them stayed in the field only for a few years; few if any will have even got their names onto a scientific paper. This is the story of some of them.

With the advent of particle accelerators and

bubble chambers in the 1950s, the amount of data available to physicists outstripped the human resources available to analyse it. These data were in the form of photographs – thousands and thousands of them – taken in the hope that some of them would reveal the tracks of certain rare particles. Someone had to methodically scan each picture and decide whether it showed an interesting event. So advertisements were placed for people to do just that: no physics knowledge necessary, only GCE “O” level maths.

Jill Flewitt was one who answered the call. In 1961, the 20-year-old saw an advert in the *London Evening Standard* for scanners at UCL, and liked the sound of the job, once she had found out what it involved; she had not studied science, although her family had a medical background.

She joined 19-year-old Pat Procter, who had



Project Launch: Speakezee.org

Giving a public talk can be a delightful experience where the appreciative crowd is genuinely interested in what you have to say. Many voluntary organizations cannot afford professional speaker fees and yet many academics would be all too willing to talk about their expertise.

With that in mind, Bruce Hood launched www.speakezee.org a searchable database of voluntary academic speakers that connects experts with audiences. It's an open-access system that can allow anyone to organize a pop-up lecture so long as they can find a reasonably sized group of fellow enthusiasts and a venue.

Speakers can create a profile page with a brief bio, areas of expertise and a suggested talk for a general audience (or provide a professional talk for colleagues trying to organize departmental seminars). Organizers can search by topic, location and availability, and make a request. Eventually the system will enable feedback and comments on both speakers and organizations to provide evidence of impact.

“Scanning girls” Jill Flewitt at the scanning table (above) and Pamela Towlson at the measuring machine (right). Photographs courtesy of Pat and Brian Luetchford.

answered the same advert. Their job consisted of sitting at a specially designed table onto which the photographs were projected from above. The film they were examining came from a bubble chamber at CERN, into which a beam of K^- mesons was directed and a picture taken every few seconds. They were trained to recognise “interesting” events with the help of flow charts, and if they found one they were instructed to call a physicist.

In the early 1960s, gender equality and sexism were concepts that had yet to reach the mainstream; and although the adverts did not specify gender, in practice the pay was so low, as Jill recalls, that men were unlikely to apply. Physicist Russell Stannard, who was effectively the scanners’ line manager, confirms that, although some men were employed, this was ‘thought to be a women’s role.’ They were known, unofficially at least, as “scanning girls”.

Jill and Pat were eventually joined by four other female scanners – including Elizabeth Boardman, who had arrived from South America to visit family, and Pamela Towlson, a geography graduate and the wife of one of the physicists in the group. Their duties

expanded to include measuring particle tracks on a special machine which stored co-ordinates on paper tape. A variety of machines was in evidence; there seems to have been an atmosphere of “work in progress” – Elizabeth remembers one machine that had its cross hairs (for pinpointing an event) stuck on with Sellotape. Perhaps even the scanners themselves were part of the experiment: maybe, as Jill muses, ‘we were just their guinea pigs.’ Pamela recalls that one strategy the physicists tried was offering incentives, such as chocolates, for finding an interesting event – compensation for what Stannard describes as ‘terribly painstaking work.’

Peter Galison, in his book *Image & Logic* (University of Chicago Press, 1997), tells us that scanners had been employed in Cecil Powell’s emulsion group at Bristol, in the 1940s, and they were credited with discoveries by being named in photograph captions. (This may or may not have been connected with the fact that one of them was Powell’s wife!) But gradually their names faded from view. In 1964 a landmark discovery – the Ω^- particle – was made in the 80 inch hydrogen bubble chamber at Brookhaven National Laboratory in New York (*Physical Review Letters*, vol 12, no. 8, pp 204-206, February 1964). A *Horizon* documentary made that year features physicist Nicholas Samios describing the discovery. With some irony, he was filmed at a blackboard in a room with scanners working in the background, yet their role was not explained; the paper reporting the discovery does not name the person who first found the particle in picture no. 97,025, the only mention of scanners being at the very end, where acknowledgement is given to ‘the untiring efforts of the... scanning and programming staffs.’

Galison describes the advent of huge accelerator-based bubble chambers in the 1950s as ‘a shock to the physicists’ self-image.’ A process he describes as the “industrialisation” of the laboratory led to first the particle beams, then the detectors, and finally the data itself – the photographs – coming under the control of others. The question of scientific authorship was one of their many worries; before the advent of “big science”, there was a tradition of associating discoveries with individual physicists – a culture reinforced by the lure of the Nobel and other prizes but incompatible with large collaborations. The gradual eclipse of the scanners may have been partly a reaction to this; they became the latest manifestations of Steven Shapin’s “invisible technician”.

Elizabeth and Pat left in 1965 to pursue their own careers. Elizabeth started a degree in maths, having completed her A-levels at night school, then took a PhD and became a lecturer at LSE; Pat and her husband, Brian Luetchford, both got jobs at the UKAEA research establishment at Windscale, Cumbria,

where Pat worked in the Reactor Development Laboratory; she later taught maths. Pamela stayed until the birth of her son in 1967, and later worked as a librarian. Although they did not stay in particle physics, all have fond memories of their time in the scanning room.

Jill Flewitt (now Jill Clifford), however, looks back with a slightly jaundiced eye; she had left before the others, after only two years. She remembers 'a very nice atmosphere, which I never encountered ever again ... there was a very relaxed attitude towards everything. In a way I liked it but at the same time I thought, "this can't be right."' One of the things she didn't like was the lack of supervision, particularly on the measuring machine: 'I did not feel competent enough to be sure that what I was doing was correct. I suppose I should have asked to be checked. Nobody seemed to bother.' This has made her slightly cynical about whether public spending on science is cost-effective, particularly at a time when many people are struggling to pay bills. She herself was struggling financially at the time, and despite a pay rise negotiated with Russell Stannard by herself and Elizabeth, the salary was still low and, combined with her worries about the work itself, this led her to resign after two years. She trained as a primary school teacher, and is now happily retired.

It turns out that the only supervision available was reserved for the scanning stage itself, since this would require judgement to be exercised. The physicists saw measuring as, in Stannard's words, 'very mechanical – you set the cross wires and pressed a button – you didn't have to understand what you were doing.' His former colleague, Mike Esten, describes it as "straightforward", while conceding that it was not popular, and that only one scanner actually liked it; Pat says she 'tried to

avoid it.' Here the scanners' lack of technical knowledge – together with the physicists' failure to appreciate its significance – may have counted against them. Brian Luetchford, then a PhD student, explained to me that a computer was used to generate idealised particle tracks and that precise positioning of the measurement cross wires was not essential.

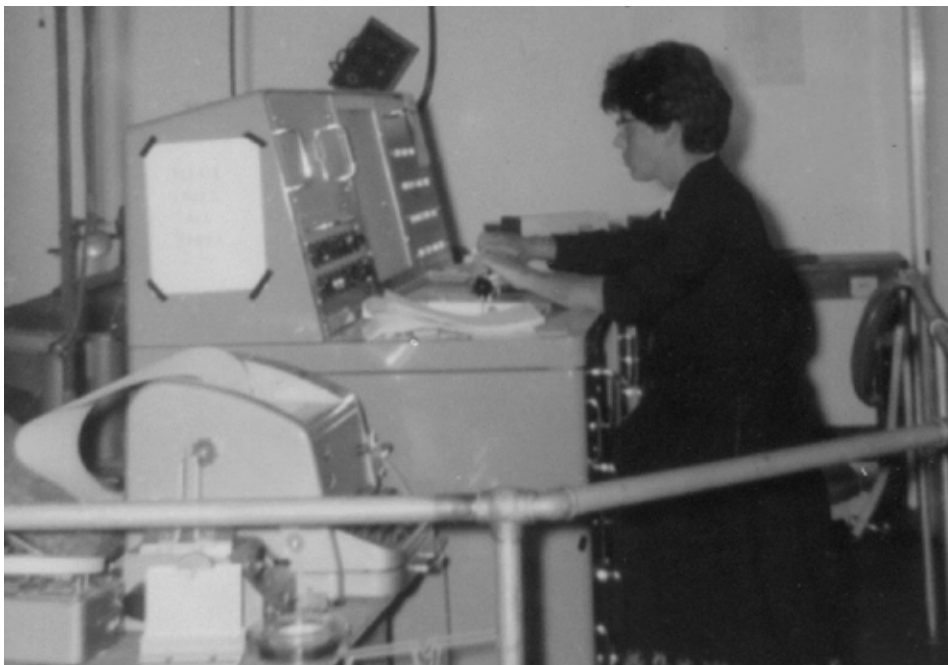
Jill's concerns do appear to have been noted: at UCL in the 1970s, a different generation of scanners, working on the Gargamelle experiment which was searching for weak neutral currents, followed a very tightly organised system which involved independent analysis of each picture by two scanners, plus oversight by a supervisor. Yet the scanners remained invisible: none were mentioned in the paper that announced the discovery of weak neutral currents in 1973, and there was not even an acknowledgment such as that given nine years earlier by the Brookhaven group.

Nowadays the particle physics community is more inclusive, acknowledging the contributions of engineers, technicians, programmers and the many other "trades" that make big science possible. The scanners are no longer with us – modern particle physics experiments use electronic detectors that log the data straight into a computer without the need for a human intermediary – but if they were, I like to think that they too would get their share of the credit.

Jim Grozier

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Conference News

Annual BSHS Postgraduate Conference

Wednesday 6 - Friday 8 January, 2016

Department of History and Philosophy of Science, University of Cambridge

Postgraduates in all areas of the history of science, technology and medicine throughout the world are welcome to attend and give papers. The supportive environment of the postgraduate conference is particularly good for those who want to present new ideas or works in progress, polish arguments or work on their presentation style and their confidence.

For more on the conference and travel grants, see: www.bshs.org.uk

CfP: 3 Societies Meeting

22-25 June 2016

Edmonton, Alberta, Canada

The theme of the 8th joint meeting of the BSHS, the Canadian Society for the History & Philosophy of Science, and HSS will be 'Transitions.' The deadline for paper proposals is 4th December 2015. Details of how to submit your session or abstract can be found at: www.uab.ca/3societies

Enquiries concerning the conference can be directed to: threesocieties2016@ualberta.ca
The next issue of *Viewpoint* will give a taster of the exciting events planned in Edmonton.

"A History of the Sun, Our Closest Star"

Saturday, November 21, 2015

10.30am - 5.30pm

St Cross College, University of Oxford

The Sun, our closest star, has been a source of fascination and awe since the very earliest civilisations and was worshipped by many ancient peoples. By the 19th century solar astronomy was gaining momentum with observations of sunspots and measurements of absorption lines in the spectrum of light from the Sun, and in the 1930s the Sun's mechanism for the production of energy was determined to be nuclear fusion. There have been a series of increasingly sophisticated satellite missions which have discovered many intriguing features of the Sun, however, a number of mysteries remain including the coronal heating problem. This conference seeks to review the history of the Sun and engage with the latest research.

Registration to attend this conference is free, but must be confirmed by Monday 16th November, using the Conference booking form here:

www.stx.ox.ac.uk/happ/events/history-sun-our-closest-star-one-day-conference

Burning Out on Burnout: Stressing Self-Assessment

Matthew Hoffarth explains the history of the science behind the syndrome

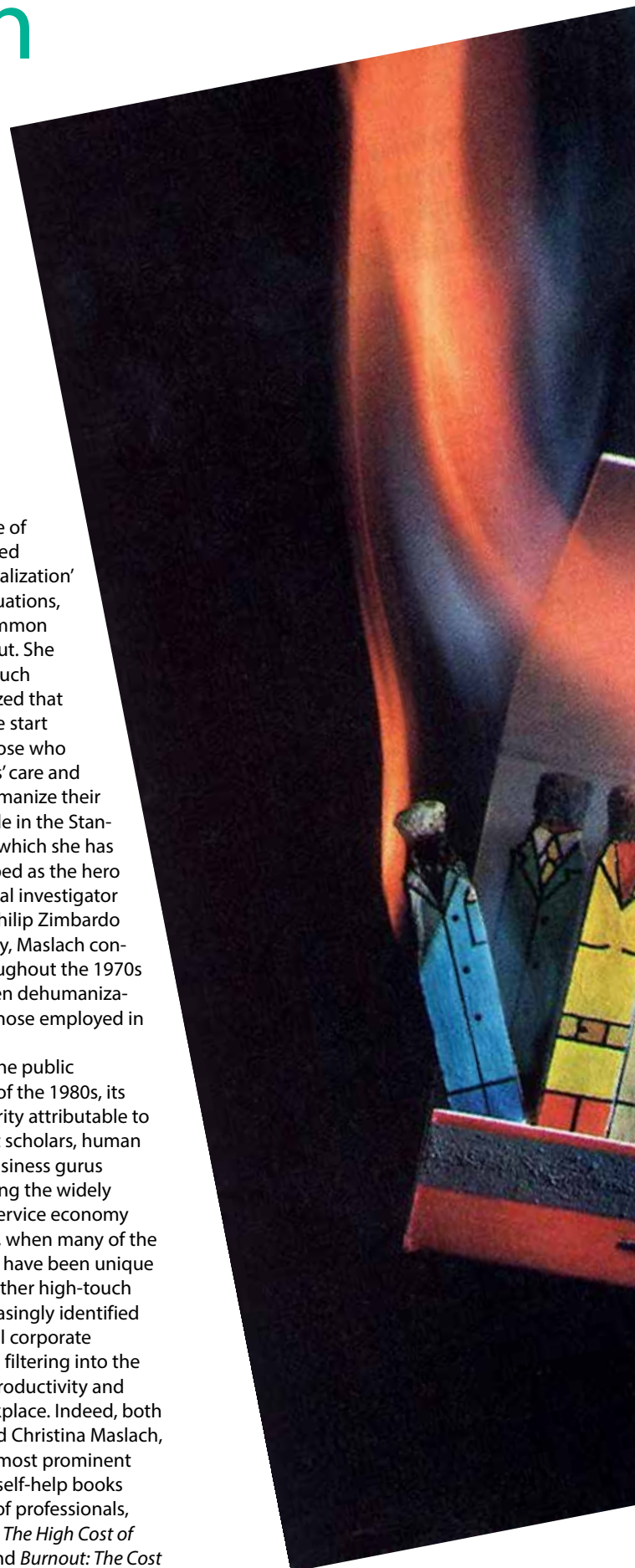
Burnout: a common term for a common complaint. Of recent provenance, the 'burn-out syndrome' is the conventional name for the feeling of exhaustion and cynicism that one might have after being overworked and underappreciated. Notwithstanding the term's earlier use by rocket scientists and nuclear engineers to denote the exhaustion of fuel in an engine, burnout was coined in the early 1970s to describe a common feeling of fatigue and loss of efficacy among those who worked in the so-called 'helping professions.'

Herbert Freudenberger, a New York-based psychoanalyst, was the first person to describe the etiology and character of the burn-out syndrome in a 1974 article titled, 'Staff Burn-Out.' Drawing on his experience as director of psychological services at the St. Mark's Free Clinic, a community health centre for homeless youth and drug users in New York City's East Village neighbourhood, Freudenberger said that burnout was apt to strike the over-achievers, the dedicated and committed members of the staff of the free clinic who 'feel a pressure from within to work and help and...feel a pressure from the outside to give.' Free clinics, crisis intervention centres, and other sorts of self-help organisations were thus described as places where burnout was endemic, owing to the workers who were there to 'gain enlightenment...looking for some further personal identity or for a shift of [their] own life style.'

This porous boundary between work and life, between occupational duty and personal identity, has often been identified as one of the causes of burnout. When Christina Maslach, social psychologist at the University of California, Berkeley, started to investigate burnout among psychiatric nurses, poverty lawyers, prison personnel, and other health and social service professionals in the mid-1970s, she noted that the separation of work

from home life, and the use of techniques such as 'detached concern' and the 'intellectualization' of emotionally stressful situations, were some of the most common ways of combatting burnout. She was dubious, however, of such techniques: she hypothesized that their use foreshadowed the start of the process by which those who were entrusted with others' care and wellbeing, started to dehumanize their charges. Inspired by her role in the Stanford Prison Experiment, in which she has subsequently been described as the hero who convinced the principal investigator (and her husband-to-be) Philip Zimbardo to end the experiment early, Maslach continued to do research throughout the 1970s on the relationship between dehumanization and burnout among those employed in the helping professions.

Burnout exploded into the public consciousness at the start of the 1980s, its sudden increase in popularity attributable to its uptake by management scholars, human resources professionals, business gurus and self-help authors. During the widely publicized transition to a service economy and post-industrial society, when many of the functions that were said to have been unique to the social services and other high-touch occupations became increasingly identified with the duties of mid-level corporate managers, burnout started filtering into the popular literature on job productivity and self-motivation in the workplace. Indeed, both Herbert Freudenberger and Christina Maslach, up until that time the two most prominent burnout scholars, penned self-help books aimed at a wide audience of professionals, respectively titled *Burnout: The High Cost of High Achievement* (1980) and *Burnout: The Cost*



of *Caring* (1982).

Burnout's ability to straddle the line between 'objective' science and 'pop' psychology is what has made it such a ubiquitous, if oftentimes controversial, diagnosis. Both its popularity and scientific credibility have been facilitated by the creation of a number of psychological self-assessments and personality tests that measure a person's risk of burning out on the job. The most prominent of these assessments, the Maslach Burnout Inventory (MBI), was created by Maslach and her colleague Susan Jackson and published in 1981. A

21-item inventory in which the test-taker is asked to evaluate his or her feelings on a 7-point scale about such statements as, 'I feel used up at the end of the workday,' and 'I doubt the significance of my work,' the MBI has been the most common tool for conducting psychological research on job burnout.

However, scores of similar quizzes and tests written by human resources professionals, stress consultants, and management gurus were distributed widely in newspapers, magazines, and trade journals throughout the 1980s and 1990s.

For the 'moral entrepreneurs' who created these self-assessments, their distribution was the first step on the path to popularizing the burnout diagnosis, and then to

commodifying the experience through the sale of workbooks, audio and videotapes, and consulting services to both individuals and organisations.

Most scholars have emphasized the notion that burnout is a sign of organisational disorder or social pathology, and not a result of the idiosyncrasies of the person who experiences burnout. However, many of the solutions that these same scholars and popular authors have proposed for burnout (e.g., stress reduction and self-management techniques, meditation and visualisation exercises, or the development of interpersonal and communication skills) have focused on the individual's self-care and self-maintenance and the ability to modify one's negative perception of the workplace. Similarly, as the tests that have been developed to identify burnout have been given to individuals who are then prescribed a personalized risk score and burnout remediation plan, the idea that burnout is the product of a society with misplaced values, or of an organisation that mistreats its members, has often been lost during the process of identification and remediation.

When Herbert Freudenberger started writing about burnout in the 1970s, he linked its appearance to the supposed decline in the importance of the family in Western societies. He promoted the idea that burnout was the result of a new generation of young people trying to create surrogate families in organisations (be they free clinics or large corporations) that promised self-development and self-actualization in return for unswerving dedication. The irony is that most of the tests, exercises, and techniques that were created to prevent burnout have instead fed into this development, collapsing the distinction between a person's sense of self-worth and his or her evaluation of motivation and productivity on the job. As such, the burnout critique that had its impetus in the attempt to weaken the bond between self and work in the 1970s played a major part in its reinforcement in the 1980s and 1990s.

The illustration that accompanied Maslach's first article on burnout: 'Burned-out,' *Human Behavior* 9 (1976): 16-22.
Courtesy of Keith Batcheller, www.keithbatcheller.com.

Object of the Issue

The Ups & Downs of the Trusty Cargo Bike

Outward similarities can hide changing meanings, argues [Peter Cox](#)



A 1912 carrier tricycle (above, courtesy of the Deutsches Museum Photographic Archives) and a modern delivery trike (right, courtesy of Andrea Casalotti, www.ChristianiaBikesUK.com).



Two images of carrier tricycles, built almost a century apart. The first is from a 1912 catalogue in the archives from the Deutsches Museum in Munich. The second is a Christiania Bike from a recent catalogue. At a glance, they appear to show remarkable continuity, even the longevity of a single technological artifact. But their histories tell hidden stories of social change, in shops and shopping, of counter-culture and alternative lifestyle, and of the convergence of environmental sustainability and economic efficiency in the 21st century.

From the very earliest days of the crank-driven bicycle, the possibility of designing machines for commercial goods carriage was apparent. In a satirical set of drawings commenting on the new craze for the velocipedes, the *Leipzig Illustrierte Zeitung* of 3 July 1869, carried a sketch of an imagined

wheelbarrow-velocipede hybrid, complete with cargo of an unfeasibly large sausage. The cargo bike existed in cartoon before reality. Yet by the mid 1880s, most manufacturers of the increasingly popular tricycle offered commercial carrier models. The standard safety bicycle was still an expensive plaything for the bourgeoisie, but for commercial buyers, carrier cycles offered a modern, novel and cost efficient solution to the everyday delivery of business services.

The late 19th century retailer was not just in the business of selling, but was a mediator between the customer and the objects of sale, expected to deliver as well as supply. While a delivery bicycle might not carry as large a volume of goods as carriage by animal traction, it had obvious advantages in that there were no constant running costs and it could be easily

be left unattended or unused (and unfed). The iconic roles of butchers', bakers' and grocers' cycle deliveries were forged at an early stage. The delivery bicycle was also a deeply modern vehicle, an efficient device for the reproduction of capital in the growing retail economy.

Where growing rates of private motorized transport changed patterns of individual mobility (especially for male employees) in 1950s and 1960 Europe, the cargo bike suffered a parallel fate. Although it lost none of its economic efficiency relative to other means of delivery, the changing character of retail made it redundant. The advent of self-service shopping stripped out the delivery role of the retailer. Even before the widespread growth of supermarket sales in the 1970s, the changes of shopping patterns and the role of the supplier had dealt a considerable blow to the



*Illustrierte Zeitung (Leipzig) No. 1357. 3 July 1869 page 15 (Volume 53)
in The Deutsches Museum Photographic Archives, File 220, BN 113843.*

traditional carrier bike. Its image had slipped from a symbol of innovation to an old-fashioned anachronism, as its potential economic roles declined. Major cycle manufacturers let their cargo bikes quietly disappear from their catalogues, specialist manufacturers went out of business.

Yet just as commercial cargo bike manufacture disappeared, small-scale, independent construction began. A resurgence of popular interest in cycling in the light of the growth of radical environmental activism reimagined the bicycle as a means of sustainable transport. Cycling for everyday transport, which had sunk to low levels across Europe, became a means of expressing an individual critique of car-centric cultures. And old cargo tricycle designs were rediscovered as potential alternatives to the car. Practical carrier cycles and trailers began to be made and distributed through counter-cultural networks and com-

munities, most famously, the Christiana bikes first built in 1976. What had been a means for the efficient reproduction of capital had become a means of its critique.

The cargo bike had a role in the formation of 20th century consumer capitalism, as a means of distribution of consumer products. Its place disappeared as the retail trade outsourced final distribution to the customer – part of the customer's transitions to consumer, enabled by the growth of private motor transport. The cargo bike re-emerged as a counter-cultural alternative to the car, enabling continued participation in societies restructured by automobility. As recognition of the unsustainability, impracticability and undesirability of accommodating universal urban private motoring (and the rebuilding of cities necessary to facilitate this) has spread, so what was once the basis of a marginal critique has been translated into mainstream policy for

many European cities. The market for carrier bikes and trikes as car replacements, whether for ideological or for practical reasons, has grown sufficiently to warrant their mass production once again.

As if this twist was not enough, there is now another story emerging as the retail trade continues to restructure today. Many European cities, focusing on the quality of life, seeking to avoid congestion, air and noise pollution and conscious of CO2 emissions in the transport sector increasingly close – off core areas at certain times of day. Coupled with the growing importance of logistics for small volume, just-in-time deliveries and maximum flexibility in retail supply chains (rather than holding large amounts of fixed stock) enabled by digital information systems, cargo carrying bikes and trikes are increasingly economically competitive options. Fleet operators such as DHL are today reporting considerable savings after replacing delivery vans with cargo bikes for some operations.

Today's cargo bikes may appear to present an unbroken continuity over a century of travel, but how they got from there to here is far from a simple story.

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Some of the information for this article has been drawn from Peter Cox and Randy Rzewnicki, "Cargo Bikes: Distributing Consumer Goods", in Cox, P. (ed.) *Cycling Cultures*, University of Chester Press, 2015 pp. 130-151.

The Work of the Roman Newtonians in the Italian Enlightenment

Daniele Macuglia explores the exploits of the Newtonians Galiani & Bianchini between 1700-1740

In his *Preliminary Discourse to the Encyclopedia of Diderot*, Jean le Rond d'Alembert (1717-1783) expressed his concerns about excessive ecclesiastical power and control:

A tribunal whose name still cannot be spoken without fear in France became powerful in the south of Europe, in the Indies, and the New World. [...] It condemned a celebrated astronomer for having maintained that the earth moved and declared him heretic [...]. It was thus that the abuse of the spiritual authority, conjoined with the temporal, forced reason to silence; and they were not far from forbidding the human race to think.

(Schwab, 1995: pp. 73-74)

This encapsulates how the controversial relations between the Roman Catholic Church and Enlightened Europe's intellectuals are usually seen. On one hand was the *libertas philosophandi*, and on the other was terror. These ideas are commonplace—not only with respect to Galileo Galilei (1564-1642), but also with regard to the spread of Sir Isaac Newton's (1642-1727) physics in 18th-century Italy.

However, the spread of Newtonian ideas occurred in a situation that is quite different from that which is often envisaged. In a period characterised by remarkable tensions between Newtonianism and the orthodoxy of the Catholic tradition, Rome was one of the main gateways through which Newtonianism entered the Catholic world. It was the formal seat of the Roman Inquisition as well as the base of a series of universities and cultural academies and circles directly controlled by the Roman Catholic Church. While all of the major Italian urban and cultural centres responded to the spread of Newtonianism, Rome was remarkable as an international centre of study with journals and academies dedicated to the new ideas.

After the end of the Council of Trent and the close of the Thirty Years' War (1618-1648), the Holy See aimed to enrich its cultural system. It was increasingly open to modern concepts, though this openness was a 'Machiavellian move,' as the Church's interest was likely an attempt to modify and transform them into versions more compatible with Catholic doctrine (Ferrone, 1982: pp. 11-15). The Church



Francesco Bianchini. Line engraving by G. Bozza after C. Rizzardini. Courtesy of the Wellcome Library, London.

had embarked on this work at the end of the 17th century by creating the *Giornale de' Letterati* (1668-1683) [The Journal of the Men of Letters] and the *Accademia Fisico-matematica* (1677-1698) [Physic-mathematical Academy].

Created in Rome by abbot Francesco Nazari (1634-1714), the *Giornale* was inspired by the English *Philosophical Transactions of the Royal Society* and by the French *Journal des Sçavans*. It presented translated articles taken from the *Philosophical Transactions*, along with reviews of books that appeared elsewhere in Europe. It was primarily thanks to this periodical that Italian scientists knew about the most important scientific research going in England, France, and Holland. By contrast, the *Accademia Fisico-matematica* represented the most advanced Italian centre of scientific research at the close of the 17th century. Established by Cardinal Giovanni Giustino Ciampini (1633-1698), it operated under the protection of Christina, Queen of Sweden (1626-1689). The academicians focused on some of the most insidious threats to the Catholic orthodoxy—such as the Copernican system, the *horror vacui*, and the epistemological models connected to atomism and to the structure of matter—and studied the possibility of bringing them into alignment with the scholastic tradition. This was their main occupation: as poet and critic Giovanni Crescimbeni wrote in *Le Vite degli Arcadi Illustri* (1710):

All the eclipses and comets of those times were observed in the academy [...], where people were focused in solving mathematical problems [...]. There was no celestial or terrain discovery [...] that was not carefully examined by its members.

After Ciampini's death, when the *Accademia Fisico-matematica* ceased to operate, the prelate Francesco Bianchini (1662-1729) and Celestine monk Celestino Galiani (1681-1753) took charge of the Roman scene. They created a circle where some of the most worrisome aspects of the new science could be analysed and discussed. At the same time, a diplomatic relationship with England began to flourish. Sir Henry Newton (1651-1715)—a brilliant statesman belonging to a noble family from Staffordshire—served as the envoy-extraordinary in the Grand Duchy of Tuscany (1704-1709) and provided the Roman scientists with a copy of the second edition of Newton's *Opticks* (1706). Shortly after this, in 1707-1708, crucial experiments on the nature of light took place at the *Cenacolo di Sant'Eusebio*, in the Quirinal palace. Here Galiani assembled a group who formed the *Accademia degli Antiquari Alessandrini*. They carried out sophisticated optical experiments and commented on Newtonian and Cartesian texts. Supervised by Bianchini and supported by one of Pope Clement XI's nephews, Alessandro Albani (1692-1779), the new *Accademia* was among

the first places on the continent—if not the first anywhere—where Newton's experiments on the nature of white light were discussed and reproduced (Heilbron, 2010: pp. 63-4). The *Accademia* planned a revival of Italian sciences by establishing contact with some of the major European research centres and promoting an effective spread of Newtonianism in the Italian peninsula. Galiani's own studies culminated in two manuscripts: *Animadversiones Nonnullae Circa Opticem Isaaci Newtoni* and *Differenze tra le Scoperte di Newton e l'Ipotesi Cartesiana*. In 1708, after he got a copy of Newton's *Philosophiae Naturalis Principia Mathematica*, he produced a third manuscript entitled *Osservazioni Sopra il Libro di Newton, Intitolato Principia Mathematica*. This output was significant considering that all of Rome was 'in arms against the mathematicians and physic-mathematicians' and the prisons of the inquisitorial tribunal were 'full of men to be questioned,' and their number was always growing (Costa, 1968: p. 427).

Yet the *Accademia* continued to connect Italy to the latest thinking in natural philosophy. From 1712-1713, Bianchini travelled to France, Belgium, Holland, and England on a diplomatic mission for the Holy See. In London, he met with Newton himself who gave him five copies of his *Commercium Epistolicum* to distribute among his Italian colleagues—Galiani, Guido Grandi (1671-1742), Eustachio Manfredi (1674-1739) and Gabriele Manfredi (1681-1761). Unable to provide him a copy of his *Principia*, Newton gave Bianchini two copies of the *Opticks* (one of which was a gift for the Vatican), and a series of rare mathematical manuscripts, like the *Methodus Differentialis*, which was still unpublished at that time.

In 1714, a new academy was founded in Rome, the *Accademia Gualtieri*. This operated under the patronage of Cardinal Filippo Antonio Gualterio (1660-1728), but Galiani and Bianchini maintained an active role. We still do not exactly know how scientific meetings proceeded at this academy, but it is clear that the institution was focused on aspects of modern natural philosophy, especially Newtonianism. What was truly remarkable about the academy were the considerable funds the Church provided it: in a 1714 letter to Grandi (held in the Biblioteca Universitaria di Pisa Carteggio Grandi, ms. 92), Galiani remarked that Cardinal Gualterio 'built a prodigious collection of instruments and gadgets, and he is ready to spend all that one may desire.' That year, Galiani produced his *Epistola de Gravitate et Cartesianis Vorticibus*, in which he demolished the Cartesian cosmology and motion of planets.

With the election of Pope Benedict XIV in 1740, and with the arrival of Ruggiero Giuseppe Boscovich (1711-1787) at the *Collegium Romanum* [Roman College], the city of Rome entered a new period of hope for

the acceptance and spread of Newtonianism. 'A curious openness towards heliocentrism,' was initiated inside the Roman College when Boscovich started to advocate for Newton and attacked the Cartesian metaphysics defended by his Jesuit brothers everywhere in Europe (Ferrone, 1982: pp. 643-644). When Galiani was sent to Naples in 1731 to become *cappellano maggiore* (commissioner of education) of the Kingdom of Naples and Bishop of Taranto, the task of promoting Newtonianism was taken on by Boscovich and also by the Minim monks François Jacquier (1711-1788) and Thomas Le Seur (1703-1770). The monks produced 'the best of all editions of the *Principia* in three richly annotated volumes' realised under the patronage of the Pope between 1739 and 1742 (Casini, 1983: p. 194; Heilbron, 2010: p. 70, p. 72).

The spread of Newtonianism has been largely studied in terms of its dissemination in European countries such as England, France, and the Holy Roman Empire. No substantial international has been paid to the Italian (and especially the Roman) case, but it is important to promote the study of this topic as it is essential for understanding the transition of Italian society into the Age of Enlightenment. The Newtonianization of the Italian peninsula depended profoundly on the cultural program initiated in Rome at the beginning of the century. Although the Holy See was formally against the new cosmological ideas, Galiani, Bianchini and others created a surprisingly vibrant and culturally active group that affected the entire Italian cultural scene, bringing the peninsula back into the centre of debates from which it had long been excluded.

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BSHS Annual Conference

Swansea University, 2nd-5th July



(L-R) Swansea University in the sunshine. Last year's host Aileen Fyfe makes the most of a chance to relax this year with other delegates on the balcony. The Swansea wake-up call.

This year the BSHS conference was in Swansea and, being Wales, it was raining when people began to arrive. As well as helping delegates to get settled, on the first afternoon I also had the opportunity to attend the postgraduate meet and greet, which proved to be an excellent relaxed welcome to the conference.

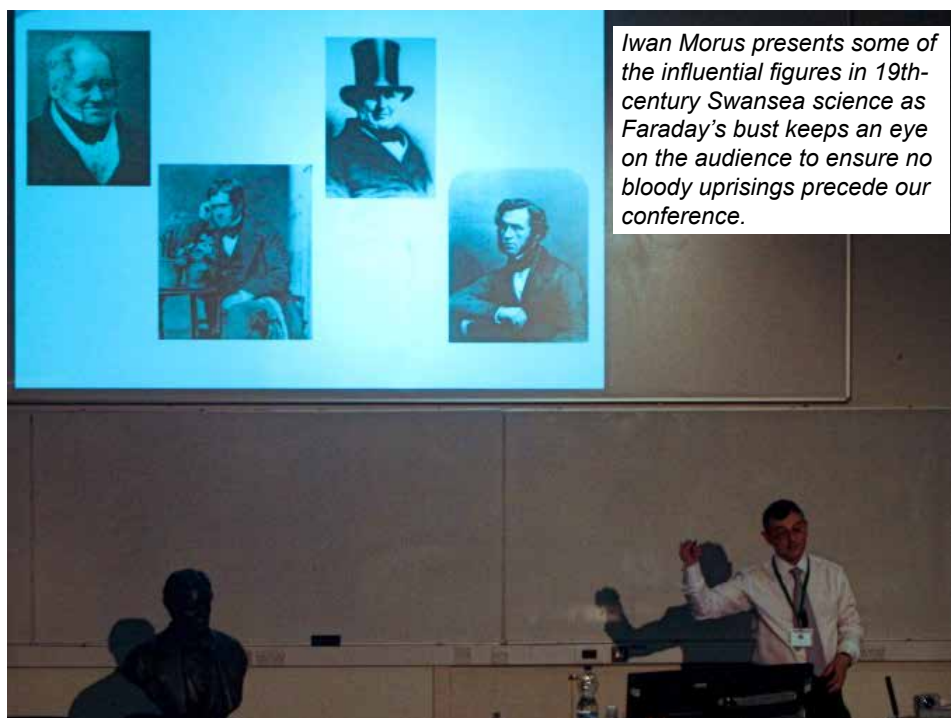
Professor Iwan Morus delivered the Opening Public Plenary Lecture entitled 'The Day the BAAS Came to Swansea: 1848 and All That'. This talk was a great introduction to the conference and why it was fitting for the BSHS to hold their conference in Swansea—rather appropriately in Swansea University, the original buildings of which were the former home of the Vivian family, influential copper magnates responsible for bringing BAAS meetings to Swansea in 1848 and 1880. This talk helped delegates engage with the history of science at Swansea and prepared everyone for an extremely successful conference.

Later in the evening, delegates of the BSHS conference were invited to attend either a showing of *À nous la liberté* introduced by Tim Boon, or a demonstration of the smelting of an arrowhead, organised by Tracey Rihll for the Technologies of Daily Life in Ancient Greece conference. Although (or because) the arrow head was not successfully smelted, this gave an impression of the amount of effort needed to smelt metal in antiquity.

During the conference, I attended a number of sessions. These included: early modern science, historicizing humans in 19th-century Britain, science and religion, and scientific correspondence. Memorable aspects included Bill Jenkins's comments regarding 19th-century Scottish Evangelical's beliefs concerning extra-terrestrial beings and the location of

hell (which they believed to be on a comet, because of the extremes in temperature and great speeds). Other talks I attended were also very interesting, such as Maria Avxentevskaya's research on early modern Stambuch; Victoria Pickering's talk about Hans Sloane's botanical correspondence; Chris Manias's exploration of 19th-century interpretations of prehistoric humans; our local organiser, Adam Mosley's talk about Kepler's *Mysterium cosmographicum*; and Greg Radick's presidential address, in which he stressed some very interesting points about a "de-Mendelized" genetics curriculum.

A prominent aspect of the BSHS annual conference was the programme of events and tours. The Dingle and Pickstone Prize-giving (before the reception on Friday) was well attended by both conference-goers and the public. Delegates then headed to the conference reception, on the Waterfront Museum's balcony overlooking the marina. The view was truly stunning and gave delegates the opportunity to discuss the conference, and help themselves to wine and a selection of canapés. As this was a joint event with the Technologies of Daily Life in Ancient Greece conference, there was also the opportunity to



Iwan Morus presents some of the influential figures in 19th-century Swansea science as Faraday's bust keeps an eye on the audience to ensure no bloody uprisings precede our conference.



attend a talk about the Antikythera mechanism, although some delegates continued to appreciate the view from the balcony on an unusually dry evening. Later, there was an opportunity to sample Swansea cuisine; I went with a group to Pant Y Gwydr. After dinner, many delegates chose to experience some true Swansea culture and went to the infamous Wind Street for the rest of the evening – needless to say, there were a few sore heads in the morning!

On Saturday evening, the conference banquet featured traditional Welsh food. The meal started with leek soup, the main was a lamb shank and there was lemon posset for pudding. Afterwards, the whiskey tasting exhibited three different whiskeys (including one Welsh option). Delegates then retired to J. C's bar and, later in the evening, to the grass outside Fulton House, to continue their conversations.

On the final day, a number of delegates concluded the trip with a brief walk to Swansea beach. We also visited the original buildings of the university, in particular, Singleton Abbey, the former home of the Vivian family, who helped to bring the BAAS to Swansea. This helped to round off what had truly been a fantastic BSHS conference. Hopefully, unlike the BAAS, the BSHS will not take 32 years to return to Swansea!



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(Clockwise from top left) Postgraduates assemble at the welcome reception held on the first day. Delegates enjoy the view from the balcony during the Waterhouse Museum drinks reception. In his Presidential Address, Greg Radick namechecks former presidents Haskok Chang and Jeff Hughes. Everyone tucks into the Welsh fare on offer at the conference dinner. Sam Robinson introduces whiskeys from around the world. The copper smelting (courtesy of Tracey Rihll, Society for the Promotion of Hellenic Studies). We DO like to be beside the seaside! Sightseeing at Singleton Abbey (courtesy of Jenny Rampling). Impressive technology & exhibits shown on the Waterfront tour. Devouring the "very small" nibbles at the reception. Unless otherwise stated, all images courtesy of Alice White.

Putting Theories to Work: A Metallurgy Demonstration at the Technologies of Daily Life Conference

Swansea University, 2-3 July, 2015



Images courtesy of Tracey Rihll and the Society for the Promotion of Hellenic Studies

We are surrounded by things whose manufacture is a mystery to us and whose existence and utility we take for granted. Those who develop an interest in something with a physical dimension may read about it to greater or lesser degree. But it is very difficult to gain any real understanding of practical achievements via words. Actions and phenomena may lack words to describe and label them; the time involved is shrunk to that needed to read the word, if it exists. Everything works. Results are as expected.

The real world isn't like that. Things take time, skill and materials, brought together in a specific set of often uncontrollable conditions, in order to come into existence. That existence is not a given when the process begins. Things go wrong, even in modern robot-filled factories, where quality control strips out the mistakes, rather than prevents them happening in the first place. Can you imagine how much more this is true of the past, of manufacturing in history?

Metallurgists simulate volcanoes. They try to melt (and then contain) molten rock. If you've tried to have a BBQ in Britain this summer, you'll understand what that means better than someone who hasn't. Our experiment, led by Denis Morin from the Université de Lorraine, demonstrated well the time and effort, skill and equipment required to melt a little

bellows) was on the point of collapse, and the flame and crucible colour just seemed to be stuck where it was, and not getting hotter.

Various opinions were offered as to why it didn't quite get hot enough to work: cold wet ground (despite it being near midsummer, July 2, we had had a lot of rain earlier), inadequate quality charcoal (how do you evaluate charcoal anyone?), other? Who knew? No-one actually knew. We might have known if we had been in a lab, or had instruments for finding out about these things. But that was not the point. The point was, we were simulating ancient metallurgy practices, when labs and thermocouples did not exist. What practical demonstrations like this teach us is how damn hard it is to make and work with metal, how clever and resourceful were (and are) the people who achieved (and achieve) this on a regular basis in the past (and in the present), with what we might describe as very 'primitive' equipment. And how little we really understand it, or appreciate them, without trying it for ourselves.

lump of bronze in order to cast it into a desired shape. As it turned out, the attempt had still not succeeded long after most onlookers drifted away, the slave manning the bellows (Nick Barley, whose efforts were heroic for a volunteer and complete novice at working ancient-style

Abnormality & the Abnormal in the 19th Century

Durham University, May 7th, 2015

The 'Abnormality and the Abnormal in the Nineteenth Century' postgraduate conference opened with an engaging keynote address by Professor Martin Willis (University of Westminster) entitled 'The Case of the Soho Sleeper: Catalepsy, Care, and the Politics of Seizures'. Professor Willis used a high-profile case of catalepsy from 1887, known to the Victorian press as the Soho Sleeper, to argue that such conditions produce conceptions of the abnormal, and also of the normal from which the cataleptic was understood to have moved away.

Professor Willis's talk initiated a productive conversation ranging from the ethics of care to the methodology of research. The first panel of the day, 'The Social and Political Function of Abnormality', featured three methodologically diverse papers, which each dissected various ways in which a concept of abnormality can be created in the service of a particular ideology. The second panel, 'Abnormality and the Body', offered literary, archaeological, and philosophical analyses of bodily and mental deviations from a norm in terms of an implicit association between normalcy and morality. The last panel of the day, 'Gender and Sexuality', addressed a topical nexus between embodiment and social norms; each paper offered an analysis of the construction, communication, and celebration, of a particular



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Pictured above, the Conference Prize Giving with Professor Bennett Zon, and below, the Keynote Address by Professor Martin Willis, University of Westminster. Images courtesy of the Centre for Nineteenth-Century Studies, Durham University.

instance of gendered or sexual abnormality.

All three postgraduate panels generated stimulating and wide-ranging discussion; the continuity between contemporary and 19th-century ideas about abnormality, and the connections between abnormality, morality, and power were recurrent themes. Despite a programme which endeavoured to maximise opportunities for conversation, the conference ended with many more questions than answers. The Abnormality Research Network, launched at this conference, will facilitate the continuation of this conversation; this postgraduate-led initiative will explore conceptualisations of abnormality across disciplines from the early modern period to the present day.

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Beyond Lepers & Leeches: Medieval & Early Modern Medicine

University of Edinburgh,
May 2nd, 2015

On Saturday, 2nd of May, the University of Edinburgh's historic Anatomy Theatre played host to the conference, "Beyond Leeches and Lepers: Medieval and Early Modern Medicine. Conference." Presenters came from across the UK, as well as France and the United States. They delivered papers spanning topics such as medical texts and medicine in literature, madness in the monastery, "gay cures" in the 17th-century, and medical panaceas in the medieval and early modern ages.

The objective of "Beyond Leeches and Lepers" was to provide an opportunity for scholars in the history of medieval and early modern medicine to present their research in a historically significant location. The University of Edinburgh Anatomy Lecture Theatre played a substantial role in the development of medicine and surgery in the 18th century, and the room is the same infamous location of the dissection of murderer and body snatcher, William Hare of the Burke and Hare legend. One other key objective of "Beyond Leeches" was the audience participants.

"Beyond Leeches and Lepers" invited a public audience to participate. Those in attendance were a varied group with diverse backgrounds and experiences. There were certified medical doctors in attendance, as well as exam invigilators, students in both science and humanities, and also audience members who were curious to see beyond the stereotypes of pre-modern medicine.

Overall, the conference was greeted with very positive feedback. Attendees outside of academia were enthusiastic; they asked questions and continued conversation over tea breaks and lunch. The scholars in attendance were thrilled with the keynote speaker, Irina Metzler, who is one of the foremost scholars on disability studies in the medieval period. She was an invaluable source for the conference, and the organizers, Jessica Legacy and Helen Smith would like



Images of the Anatomy Lecture Theatre courtesy of the conference organisers.

to extend heartfelt thanks for her involvement and her energy.

"Beyond Leeches" created a Twitter account prior to the conference, and it proved useful for promoting and maintaining interest after the fact. Many of the photos taken and presentation subjects can be found through the Twitter handle @BeyondLeeches. Additionally, one of the presenters, Samuel Campbell wrote a piece for the University of Edinburgh School of Humanities and Social Science PhD blog, *Pubs and Publications*; a link to that post can be found here: <http://bit.ly/1lonhSC>.

The organizers of "Beyond Leeches" would like to extend their heartfelt thanks to the British Society for the History of Science for its gracious support. We would also like to thank the support of the Society for Renaissance Studies, the Royal Dick Veterinary School and the University of Edinburgh department of Languages, Literatures, and Cultures Graduate School.

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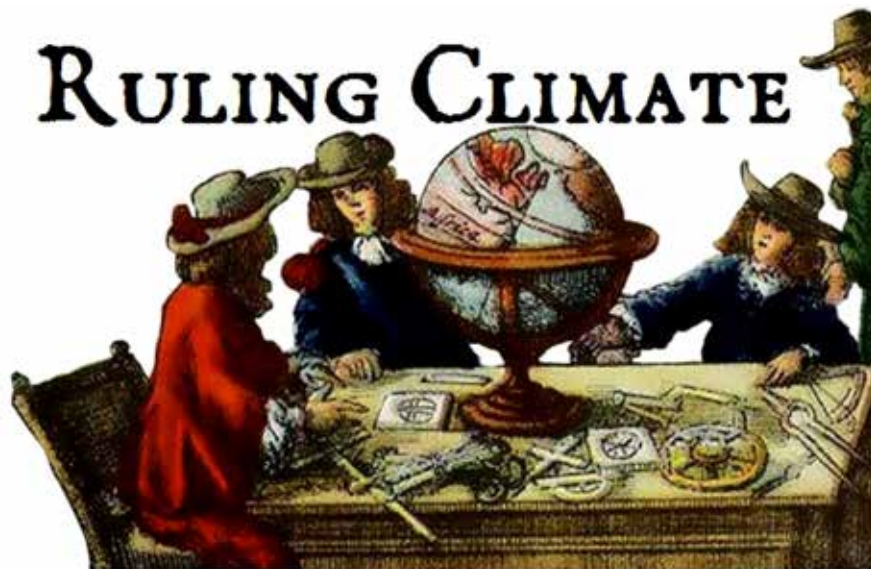
Ruling Climate: The Theory & Practice of Environmental Governmentality, 1500-1800

University of Warwick, May 16th, 2015

The relationship between understandings of climatic influence and practical attempts to manipulate environments is a largely obscure chapter in the history of Western ecological attitudes. However, questions over how climates and environments affect people, and what can be done to combat, or exploit, their influence were central to scientific, philosophical, and political inquiry, throughout the early modern period. 'Ruling Climate' brought together forty scholars working on the relationship between cultural perceptions of the environment and attempts to modify specific climates and environments in the early modern period. Discussions converged around two themes: 'Thinking Environmental Influence in the Early Modern Period', discussing shifting cultural constructions of climate and nature, and 'The Empire of Climate: Environmental Management in the Early Modern Period', on practical applications of climatic doctrines.

In his keynote address on the origins of climatology, Franz Mauelshagen presented a conceptual history of the idea of climate. Mauelshagen traced the intellectual relationship between physical geography and climatology, arguing that before the 18th century, 'climate' was a geographical category related to the location of a place, retaining a meaning much closer to its Greek stem *klíma*, meaning 'slope' or 'inclination'. Four papers then discussed notions of climate in early modern intellectual culture. Richard Spavin argued that Jean Bodin (1530-1596), often seen as the arch-determinist, used climate theories in a much more playful and ironic way than has been appreciated. Instead of being a 'climatic determinist', Spavin argued that Bodin used climate as a rhetorical tool, which enabled him to make political criticisms of France's rulers. Sundar Henny then provided a further example of non-deterministic climate theories in his account of climate in Isak Iselin's *History*

RULING CLIMATE



Pictured above, the conference poster, and below, one of the conference papers. Images courtesy of the conference organisers.

of *Mankind* (1764). Michael Hill and William Cavert then both spoke about climate in relation to the turmoil of the mid-17th century. Hill used a list of requisitioned Royalist books to reconstruct the intellectual worlds of early modern English nobles, demonstrating how understandings of domestic agriculture and tropical climates were interlinked in Royalist libraries. Cavert then addressed the social implications of the 17th century climate crisis, arguing that climate crises were less the drivers of spectacular episodes of political discontent, instead, more slow and creeping, necessitating gradual and incremental governmental responses.

Rebecca Earle's keynote lecture on climate, travel and colonialism in the early modern world illuminated the theme of practical attempts to manage climates. Through an analysis of the ways in which Spanish American colonists used food and apparel to mitigate the damaging affects of unfamiliar climates, Earle showed how the practical application of humoral and climatic theory linked social and environmental phenomena through their influence on the human body. Raphaël Morera then discussed 17th century French marshland drainage, showing how the monarchy's schemes were designed to increase agricultural productivity as well as make local populations more easily governable. Focussing on the River Tyne, Leona Skelton demonstrated how the local government intervened to protect natural processes in early modern Newcastle, driven both by an early concept of environmental conservation,

and a need to manage competing commercial interests. Anthony Carlson gave the final paper, on American perceptions of the link between disease and wetland drainage, demonstrating how theories of environmental influence continued into the 19th century.

Through fruitful multi-disciplinary discussion, 'Ruling Climate' shed new light on early modern environmental attitudes, including the coexistence of multiple (and sometimes competing) climatological models; the close relationship between these models and an ancient tradition of climate theories; the inaccuracy of the label of 'climatic determinism' often used to characterise such theories; and the crucial importance of the notion of vulnerability (of man with respect to climate, but also of climate with respect to man) for early modern environmental thought.

An archive of tweets and photos from the day is available as a Storify at <http://storify.com/rulingclimate/ruling-climate>. The proceedings of the conference are expected for publication in 2016. The organisers would like to acknowledge the generous support of Warwick's Humanities Research Centre, Centre for the Study of the Renaissance, and Research Student Skills Programme, and the British Society for the History of Science.



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The Viewpoint Interview

David Kirby is a Senior Lecturer in Science Communication Studies at the Centre for the History of Science, Technology and Medicine, University of Manchester.

Who or what first turned you towards the history of science?

I began my academic career as a bench scientist in the field of evolutionary genetics. We were encouraged to take seriously the works of evolutionary biologists from previous generations like T.H. Dobzhansky, R.A. Fisher and J.B.S. Haldane. In fact, Sewall Wright's concept of "epistatic selection" was a key theoretical foundation for my PhD thesis. My PhD supervisor believed that history of science could inform my scientific work so he asked me to read Will Provine's book *Sewall Wright and Evolutionary Biology*. If he had known that this book would lead to my leaving science I am not sure he would have been so eager for me to read it! I got the chance to let Will know of his book's role in my conversion to the "dark side" when I undertook a re-training postdoc in Cornell University's STS department.

What's your best dinner-table history of science story?

One of my favourite stories involves the time that Arthur Conan Doyle punked his then friend Harry Houdini. They had an unlikely friendship in that Doyle was a well-known supporter of spiritualism while Houdini had worked hard to discredit fraudulent mediums. Doyle decided to play a joke on his skeptical friend in 1922 by showing the Society of American Magicians an early reel from the film adaptation of his novel *The Lost World* without telling them that the film's dinosaurs had been created by a brand new style of special effect called stop motion animation. Instead, he told the magicians that the dinosaurs on screen were "preternatural" creatures. The magicians, including Houdini, were thoroughly fooled into believing that these dinosaurs really existed. Doyle revealed the truth to

needed a bit of real magic in their lives.

What has been your best career moment?

It would probably be a tie between holding a copy of my book *Lab Coats in Hollywood* for the first time and receiving an Investigator Award from the Wellcome Trust for my current project on bioscience, religion and entertainment. On a more fun note, it was certainly a career highlight to hang out on the set of the Big Bang Theory with the cast and crew. Although nothing beats the opportunity I had to talk science and movies with Werner Herzog in the middle of a Hollywood party

And worst?

I left the stability of a tenure track job in the Biology Department at American university in order to pursue my interests in studying the intersections between science and society. So, there were a number of times in my career where I questioned whether or not it was worth the hardships that move entailed. Probably the lowest point for me was having to teach undergraduate lab courses to make ends meet during my re-training postdoc. Given that this is a job usually given to first and second year PhD students it seemed like a giant step backwards rather than an opportunity to move forward.

Which historical person would you most like to meet?

My current book project involves an exploration of science and movie censorship in the mid-20th century. I have spent a lot of time combing through the archives of the Catholic Legion of Decency which was one of the primary US censorship organizations at this time. One of their film reviewers was a Jesuit priest named Father Sal Marioletta. His reports on films always struck me as insightful but also very playful. He seemed like the kind of

thoughtful moviegoer who it would be fun to spend hours with down at the pub arguing about movies, science and religion.

What are your favourite history of science books?

Martin Rudwick's book *Scenes from Deep Time* and Adrian Desmond's *Archetypes and Ancestors* were important in my transition from bench scientist to historian of science. I am also a fan of Spencer Weart's *Nuclear Fear* and Jon Turney's *Frankenstein's Footsteps* as history of science books focusing on science and popular culture. In terms of history of science books dealing with radio and television it is hard to beat Tim Boon's *Films of Fact*.

If you did not work in the history of science, what other career might you choose?

I love my job so I am hoping I don't have to make that choice. If I was forced to leave the field I would either seek work in film/television or try to get a job at a science advocacy organization like the Royal Society or the US National Academy of Sciences. Or barring those options I would open a combination movie theatre/cat café.

What would you do to strengthen the history of science as a discipline?

From my perspective I see the history of science as a discipline that is becoming stronger each year. I think the best thing we can do to accommodate the influx of scholars into this discipline is to create more scholarly outlets such as the new *BJHS Themes* journal.

How do you see the future shape of the history of science?

I am amazed at how much the field has expanded since I moved over to the UK in 2004. It was incredible to see how many historians of science gathered in Manchester for the 2013 iCHSTM congress. My sense is that a growing number of scholars from a range of disciplines now view the history of science as a welcoming space..

The British Journal for the History of Science

Forthcoming papers include:

- Natalie Lawrence, 'Assembling the dodo in early modern natural history'
- Lee T. MacDonald, 'Making Kew Observatory: the Royal Society, the British Association and the politics of early Victorian science'
- David N. Livingstone, 'Finding revelation in anthropology: Alexander Winchell, William Robertson Smith and the heretical imperative'
- Bill Jenkins, 'Phrenology, heredity and progress in George Combe's Constitution of Man'
- Fiona Williamson, 'Weathering the empire: meteorological research in the early British straits settlements'
- Tim Boon, 'Sounding the field: recent works in sound studies'

www.bshs.org.uk/publications/bjhs



Viewpoint: the Magazine of the BSBS

Contributions

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