The Earth Under Surveillance

Environmental data are treasured stuff these days. They assist the work of experts busy considering trends in climate change at the IPCC headquarters and of those examining sea-level patterns in remote islands endangered by floods. But where do these records come from?

The answer is not as straightforward as one might believe. Just a few months ago the UK Ministry of Defence announced its intention of declassifying previously restricted oceanographic data on Arctic water in an effort to help climate analysts forecast the shrinking of the ice-cap at the North Pole. Such an initiative is not the first of its kind. In the late 1980s US Congressman George E. Brown Jr. (Democrat, Southern California) lobbied for the release of ‘your eyes only’ space-based satellite images to chart deforestation, urban development and the drying up of lakes.

Hasok Chang, incoming BSHS President, is our interviewee on page 14. As ever, you will also find in these pages the latest Society news, including announcements of our latest prize competitions: ‘Great Exhibitions’ and the Singer Prize.

Contributions to the next issue, which will celebrate the 50th anniversary of the British Journal for the History of Science, should be sent to viewpoint@bshs.org.uk by 15th August 2012.

Melanie Keene, Editor
in a variety of countries. The decision to focus on the continent is particularly suitable given its strategic and political role in the conflict; its division into polarised blocks; and the presence of a dexterous research community innovating environmental studies.

TEUS benefits from collaborative activities bringing together history of science centres in Manchester, Strasbourg and Barcelona, which gives the investigations a distinctive international flavour. Teamwork has allowed the comparison of national trends, discovering similarities in the sponsorship and funding of novel scientific research. It has also paved the way for reconstructing important episodes of international scientific collaboration, such as during the International Geophysical Year, 1957-58, within the framework of defence alliances (NATO), and through European research organizations (EURATOM).

Our preliminary findings show that the legacy is not just revealed by the re-utilization of environmental data. Current methods of environmental monitoring have, by and large, been inherited from practices that typified earth science investigations after the end of World War Two. By focussing on research practices, we have been able to track down disciplinary genealogies as well as research agendas, tying together practitioners and patrons in national and international research organizations. At times these research interests instigated the collaboration between researchers and officers within the states’ “hidden hand” as the Cold War invigorated the search for scientific methods of surveillance. This is the reason why in the last two decades the environmental analysts have gazed at precious classified records while looking for clues about environmental change. We thus conclude that these practices represent “aggregation cores” for disciplinary work and research patronage.

At least three sets of practices have been critical to the growth of the geosciences during the Cold War period: prospecting, monitoring and surveying. They all anticipated in different ways current forms of environmental monitoring. They emerged in the same timeframe, but gained more prominence in different periods. In its early days the Cold War was primarily a competition based on the gathering of natural resources. National security, an essential ingredient in the assertion of economic and military power at home and abroad, relied heavily on oil provisions. Food demands could be met only through new agricultural methods using rare phosphates. Nuclear projects (whether motivated by military or civilian ambitions) were founded on uranium supplies. The search for raw materials mobilized both the geologist and the geophysicist; using a variety of methods based on physical instrumentation, they traced precious ores and the richness of the underground.

Notably, US crews of undercover specialists were despatched to Europe and Russia to find out about the availability of natural resources on both allied and enemy territories, and to make predictions about future economic and military capabilities.

Another aspect of supply that the project considers is petroleum, a commodity vital in both peacetime and wartime. The possibility of Soviet interference in European supplies from the Middle East was a continual fear from the early 1950s onwards, and several Western nations established state oil companies to ease the safeguarding of supply. In the TEUS project, the prospecting strategies of the state oil companies in France and Italy come under particular scrutiny, while other national strategies, such as the British exploration of the North Sea and the incredibly rapid exploitation of the gas and oil supply discovered there, are explained in terms of energy security. Britain was heavily involved in NATO committees concerned with oil, such as the Petroleum Planning Committee and the NATO Study Group on Soviet Oil Export Policy, and the discovery of gas and oil in British territorial waters in the 1960s led to hopes that Britain’s continual worries over energy security might be eased.

While prospecting continued to be prac-
tised, the proliferation of nuclear arsenals pressed the Superpowers and their allies to focus on monitoring each other’s nuclear programmes. Throughout the 1950s US intelligence was responsible for the organization of stealthy aerial missions aiming to analyse radioactivity levels in the atmosphere. In the following decade, seismological research featured prominently in these monitoring activities and got the largest piece of the funding cake. There was a twofold agenda behind the promotion of novel environmental work detecting radioactivity levels in the atmosphere and seismic shocks underground. Firstly, it tied into the effort to prove that a nuclear test ban treaty could be policed, if signed. Secondly, it gathered otherwise restricted information on the state of, and advancement of, foreign nuclear weapons programmes. Thus from the end of the 1950s the US administration created powerful surveillance networks in collaboration with close allies such as Britain and Norway to provide accurate information on seismic events that might be nuclear explosions.

While seismologists were busy monitoring the underground looking for ‘suspicious’ events, other earth scientists launched extensive geophysical surveys plotting unknown areas and features of our planet for their strategic importance. The IGY was the landmark event that brought together the Cold War’s propagandistic and strategic urgencies in new ways. It aimed to dampen tensions by strengthening the collaboration of geoscientists across political divides. But it also proved critical to Western scientists’ efforts to amass environmental data which had operational use. Notably, a then unknown geochemist from the Scripps Oceanography Laboratory, Charles David Keeling, began collecting data on the rising concentration of CO2 in the atmosphere, initiating pioneering work that would later feature prominently in the climate change discourse. Meanwhile the deployment of submarines armed with nuclear weapons propelled the effort to chart the oceans. The North and South Poles gained a more prominent role as a focus for military operations underneath pack ice, and European oceanographic institutions played a key role in this endeavour. NATO was particularly active in sponsoring oceanographic work through a sub-committee on oceanographic research, which operated between 1960 and 1973.

That oceanographers were working within NATO’s science framework by the 1960s reflects an evolving relationship between ocean scientists and military authorities. This relationship had its origins in the Second World War, when oceanographers tackled military issues relating to Sonar, Waves (amphibious landings), and anti-mine warfare. By the 1960s, the development of submarines carrying inter-continental ballistic missiles, such as Polaris, made the tracking of such weapons platforms paramount to NATO’s strategic planning. The issue was not that effective sonar systems had yet to be developed; the problem was that there was insufficient knowledge of the changes in the physical properties of the sea thought the year. The particular physical property that frustrated sonar systems was the thermocline, a layer of water of a different temperature to that above it which changes the acoustic properties of seawater; a submarine sitting below the thermocline was effectively hiding under a naturally occurring invisibility cloak. Each of the countries within NATO had independently developed instruments which when combined could enable the mapping of thermoclines: Norwegian current meters; American bathythermographs (which measure temperature); British wave recorders and buoys. Combining international expertise with NATO funding, extensive physical oceanographic surveys were carried out both in the Greenland-Iceland-Faroe-Shetland gap, a line Soviet submarines from the Baltic would have to pass through to attack the USA, and in the Mediterranean, where NATO established a oceanographic research laboratory at La Spezia. Such research arrangements had mutual benefits, albeit towards different ends: the oceanographers gained greater understanding of ocean currents and NATO was able to improve sonar capabilities. This kind of project led, in the 1970s, to purely scientific buoy arrays being used to enhance the forecasting El Niño events in the Pacific Ocean.

From the 1970s, orbiting satellites greatly reduced the need for direct expensive and time-consuming geophysical explorations of the earth’s surface, and provided more efficient tools for monitoring and surveying missions. The availability of these tools assisted bourgeoning efforts to gain a more accurate understanding of environmental change as this became an issue more central to late- and post-Cold War political concerns.

However, in his pioneering 1979 volume Gaia, environmental pioneer and geochemist James Lovelock famously remarked that the now environmentally savvy geoscientists had until then been ‘riding the war horses of the silent war between the Soviet Union and the United States’. The conflict was prolific indeed, helping them to lay ground for current environmental analyses through a variety of new practices and data-gathering exercises. Oil prospecting allowed the assessment of current reserves of fossil fuels, aiding predictions about the sustainability of current energy consumption levels, and though historically such predictions have been understood in mainly economic terms, the importance of both sustainability and security are becoming clearer, both in the past and in the present. The CTBTO, the international organization presiding over a comprehensive nuclear test ban treaty, has recently made available historical data on airborne pollutants and their dispersion in the atmosphere to assist environmental change work. Hydroacoustic networks conceived at the height of the Cold War conflict and intended to survey and monitor underwater events are now precious resources in the investigation of the oceans’ biodiversity.

By highlighting the connections between past and present, TEUS enriches our understanding of this shift in focus in the application of environmental analysis from Cold War concerns to contemporary issues, yet it also raises new research questions in the process. While the benefits derived from the present re-utilization of environmental data are undeniable, the Cold War also engrained other – perhaps more problematic – legacies, such as the growing weight that expert advice plays in the decisions of governments and international organizations and the promotion of ‘quick-fix’ solutions to environmental issues, especially through geo-engineering. So does the Cold War still loom large on approaches to environmental policy-making? Where does the ‘cold-warrior’ meet the ‘eco-warrior’ and where do they part ways?
BSHS News

BSHS Dingle Lecture

The Singer Prize, of up to £300, is awarded by the British Society for the History of Science every two years to the writer of an unpublished essay, based on original research into any aspect of the history of science, technology or medicine.

The Prize is intended for younger scholars or recent entrants into the profession. The Prize may be awarded to the writer of one outstanding essay, or may be awarded to two or more entrants. Publication in the British Journal for the History of Science will be at the discretion of the Editor. Essays under consideration elsewhere or in press are not eligible.

Candidates must be registered for a postgraduate degree or have been awarded such in the two years prior to the closing date. Entry is not limited to British nationals.

Essays must not exceed 8,000 words (including footnotes following the style guidelines in the British Journal for the History of Science), must be fully documented, typewritten with double-line spacing, and submitted in English. Use of published and unpublished primary material is strongly encouraged, and full and correct use of scholarly apparatus (eg footnotes) is expected.

Essays should be sent to office@bshs.org.uk before 15 December 2012. Essays must not bear any reference to the author, either by name or department; candidates should send a covering letter with documentation of their status and details of any publications. Essays must be received in either MS word or PDF format. Enquiries only by email to secretary@bshs.org.uk.

On Thursday 10th May Patricia Fara gave the Dingle Lecture at the Royal Institution, on ‘What you see depends on how you look: time and space in scientific imagery’. An appreciative audience heard her pick apart assumed dichotomies between images and words, art and science, or the intuitive and the rational, as she analysed a range of wonderful images. Maps, charts and graphs, portraits, frontispieces, cartoons and even road signs were used to demonstrate the visual languages of a range of scientific topics, from revolutionary clocks to the aurora borealis.

Fara won the 2011 Dingle Prize for her Science: A 4000-Year History (Oxford University Press). Nominations for the next Dingle Prize will open in early 2013.
OEC Grants and Projects

Innovative Teaching Grants

Do you teach the history of science, technology and medicine? The BSHS is looking to support new approaches to teaching and learning in the discipline. If you have an innovative approach which would benefit from a grant of up to £250 then apply to outreach@bshs.org.uk. This could cover the cost of a piece of software, a video camera, access to online databases or archives, course materials, etc. Please send up to 500 words briefly describing the use to which you would put this grant, and how this would enhance teaching and learning. Successful applicants will be asked to write a short account of their exciting new pedagogy for the BSHS magazine, Viewpoint. This year’s deadline is 31st August 2012.

Online Museums Directory

The BSHS would like to compile an online directory of UK-based collections of interest to historians of science, technology and medicine. We are particularly interested in listing specialist or little-known collections to bring them to the attention of researchers. We are seeking an individual who would be willing to collate this information into a downloadable resource, to be hosted on the Society’s webpage. A one-off amount of £300 will be paid for the task. For further information or to apply for the position please contact outreach@bshs.org.uk. We hope to make the resource available by the end of 2012.

Online Anniversaries

The BSHS would like to compile an online calendar of anniversaries of interest to historians of science, technology and medicine. We are seeking an individual who would be willing to collate this information into a downloadable resource, to be hosted on the Society’s webpage. A one-off amount of £200 will be paid for the task. For further information or to apply for the position please contact outreach@bshs.org.uk. We hope to make the resource available by the end of 2012.

Great Exhibitions

The British Society for the History of Science Prize for Exhibits on the History of Science or Medicine 2012

The BSHS Outreach and Education Committee is pleased to announce its second ‘Great Exhibitions’ competition, kindly funded by the B.Gee bequest. The 2010 competition was won by Museo Galileo in Florence, with the Thackray Museum in Leeds taking second place for their exhibition ‘How William Astbury’s X-Ray Vision Changed the World’.

The competition is open for any public exhibition that deals with the history of science or the history of medicine. Entries are welcome from institutions in any country and exhibits may be permanent or temporary. Eligible exhibits must use artefacts or places of some kind and this may include buildings or locations, pictures, instruments, objects and books. Web-exhibits are not eligible for the prize. The closing date is 1st September 2012 and exhibits should still be available for viewing until the end of November 2012. There will be two prizes of £300, one for large and one for small exhibitions. The winning exhibit will be the subject of a special feature in the BSHS’s Viewpoint magazine.

For further details and an entrance form please visit http://www.bshs.org.uk/great-exhibitions

Any further queries should be addressed to outreach@bshs.org.uk.

British Science Festival - History of Science Section Events

Events organised by the History of Science Section at the British Science Festival, 4-9 September 2012, Aberdeen. This year we welcome Dr Aileen Fyfe as Section President.

(Dates and times provisional - please check http://bahistoryofscience.wordpress.com/ for updates)

‘Energy: past and future’ (talks and debate) - Wednesday 5th September, time tbc.

‘Victorian Science Spectacular’ (performances with debate) - Saturday 8th September, 3.30-5.30pm at the University of Aberdeen

‘Finding Aberdeen (the Historical Way)’ (activity) - Sunday 9th September, 1-3pm at the Aberdeen Maritime Museum

Affiliated events:

‘All at Sea – a History of Maritime Communications’ - Thursday 6 September, 2-3pm at the University of Aberdeen. A lecture organised by the British Science Association, Edinburgh branch.

‘Energising the Public: Have your say on how energy should be supplied and used in the future!’ Interactive exhibition organised by the University of Cardiff. Tuesday 4th September, 10am – 5pm in the University of Aberdeen Library.
Benjamin Franklin, inventor, scientist, and statesman, lived in Philadelphia from 1723 until his death in 1790 (aside from multiyear stays in London and Paris). His contributions to the study of electricity capped an impressive career dedicated to public service. In Philadelphia numerous places and institutions carry his name. The Franklin Institute, funded in part through funds set aside from Franklin’s will, is one of many sites honouring Franklin in the city.

Located on Logan Square, at 20th Street and the Benjamin Franklin Parkway, in the heart of Philadelphia’s museum district, the Franklin Institute is a large, classically-styled building with a columned façade. It houses one of the leading hands-on science museums in the United States, a collection of Franklin artifacts, and the Benjamin Franklin National Memorial.

With a spacious rotunda designed by noted architect John Torrey Windrim and modelled after the Pantheon in Rome, the Memorial serves as the Institute’s main entrance. It is the only section of the Institute building that is free to the public; the science museum has an entrance fee. In the center of the Memorial is a six-metre high statue of Franklin, sculpted by James Earle Fraser. Beyond the Memorial is the science museum, which features numerous exhibits including a 26-metre Foucault pendulum, and a large steam train built in 1926. Outside the museum building is a Grumman Lunar Module, built for the Apollo program.

Another Philadelphia museum dedicated to Franklin is Franklin Court, the site of his former home and print shop, located near the corner of Market Street (Philadelphia’s high street) and Third Street. Although the original building had been demolished, in 1976, during the bicentennial of American independence, the ruins of the house’s cellar and foundations were excavated, and new structures were built to offer a sense of how it looked. An underground museum, free to the public, showcases Franklin’s achievements.

Several streets away from Franklin Court are other notable sites related to Franklin. Franklin’s grave is located in Christ Church cemetery near the corner of Fifth Street and Arch Street. It is a tradition to toss pennies on his grave marker for good luck. At Fifth and Vine Street is the entrance to the Benjamin Franklin Bridge. Within its entrance plaza stands a metal sculpture commemorating Franklin’s reported ‘kite and key’ electrical experiment. Designed by Japanese-American artist Isamu Noguchi to depict a kite and a lightning bolt, it is called Bolt of Lightning and was erected in 1984.

Franklin was the founder of many organisations and scholarly institutions, including the American Philosophical Society and the University of Pennsylvania. The original site of the latter, the corner of Fourth and Arch Streets, is commemorated by a wall plaque.

The current site of the University of Pennsylvania is in the western part of Philadelphia. There stands yet another Franklin memorial, a bronze statue of a seated Franklin created by John J. Boyle in 1899.

The BSHS Travel Guide continues to thrive, with regular updates of articles on history of science sites around the world, and an ever-expanding online audience. If you would like to contribute an article please see the website for further information: http://www.bshs.org.uk/travel-guide/ Here we reproduce a recent article by Paul Halpern on several sites in our 3 Societies Conference host city connected with one of their most famous former inhabitants.

Paul Halpern
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An African Viewpoint

Walter Gam Nkwi is a Senior Lecturer in the History Department of the University of Buea, Cameroon. He teaches an undergraduate course on the History of Science and Technology.

When did you first start working in history of science and technology?

I was not interested in science after my Ordinary Levels where I never even made a pass in any of the science subjects not to talk of Advanced Levels where I took History, Economics and English Literature. As time passed I became interested with new advances, especially the introduction of cell phones, internet, computers etc. in Cameroon. I gradually started developing interest on what existed before all these. The time came in 2006 when I was to write a PhD proposal on the history of communication technology. It was then that my interest in earnest had started to mature.

Which books have influenced you most in your history of science and technology research?

Although many books have influenced me in the history of science and technology, the following books did the most: Wiebe E. Bijker, and John Law’s edited volume, Shaping Technology/Building Society: Studies in Socio-technical Change first taught me that society could shape technology as well as technology could shape society. This was followed up by another book which Bijker wrote with Thomas Hughes and Trevor Pinch, The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology. I gathered from this book that technology could be constructed in a more meaningful way by those who appropriated it. Finally, Daniel Headrick’s edited volume The Tools of Empire: Technology and European Imperialism in the Nineteenth Century was quite fascinating as it showed different types of technology at the disposal of Europeans to conquer and dominate Africa and Asia in the age of imperialism.

If you could meet any historical figure from the history of science and technology, who would it be and why?

There are two historians of technology whom I would like to meet. Their works have since I first read them been invaluable and fascinating sources to me. First, is Daniel Headrick who wrote...

…the history of technology once consisted of nuts and bolts; stories of great inventors and famous engineers. Today technologies are no longer viewed as ‘externalities’ that arise fortuitously from the minds, geniuses, but as an intrinsic part of the culture and economy of every society … the work of the social historian of technology is to study the economic and cultural context in which innovations arise and, in turn, their impact upon the societies in which they appear. (1986: 4-5)

The second is Chris Armstrong who describes technology, saying:

The phrase has become so fashionable that it is at times misunderstood. Some people used it at times to mean only new technologies like the internet, satellite based communications, cellular phones and computer systems. ICTs in reality have been around a long time since long before the first satellites were put up into the orbit, and even long before the computer was invented so to speak of the ICT only in terms of the new technology will do more harm than good. … To talk of the ICT is to talk also about what animates the IT-communication, the content, the stuff flowing through the pipes. (2004: 10-11)

A street in Buea, Cameroon, showing the prevalence of telecommunications cables, as well as the yellow office of MTN (a major mobile phone operator) on the right hand side. Photograph courtesy of Charlotte Connelly.

How do you think studying the history of science and technology in Africa differs with studying in other places?

Oh yes the study of technology will probably differ with other places. It is good to note that the meaning of technology in Africa differs with other places especially in Europe and America. The history of science and technology in Africa is still at infancy as compared to the UK where there are already associations to that effect.

How do you see the future of history of science and technology studies in Africa?

In a world of intensified global encounters and cross cultural encounters, I think the future of history of science and technology in Africa is optimistic. As per now, I say that much attention has not been paid to the history of science and technology in terms of the university curricula.

What support would you like to see from the international community of historians of the history of science, technology and medicine?

For a start, the international community of historians of science, technology and medicine could set up networks in universities in Africa. These networks would liaise with the international community as to how best to propagate the history of science, technology and medicine. Secondly, conferences and workshops need to take place in Africa to train interested persons in this area. Through these workshops and conferences updated textbooks in this area will enter the universities and hence new curricula will be design towards the history of science, technology and medicine.
Object of the issue
Coronelli and the business of cartography

Gillian Hutchinson introduces a globe from Greenwich

This globe by Fra Vicenzo Coronelli, the Cosmographer of the most serene Venetian Republic, is dedicated to the English king William III. With a diameter of only 47 cm, it is a very modest affair by Coronelli’s standards, as his greatest claim to international fame was the pair of vast globes, 3.85 metres in diameter, which he created for Louis XIV of France in 1681-3. There are features which indicate that this particular globe was not a royal presentation piece – the gores are pasted on very carelessly, as you can see in the close-up of the cartouche, and it is mounted in a very plain tripod wooden stand. So why the ‘made in England’ claim on the cartouche?

1696 was the year in which Coronelli travelled with the Venetian ambassadors to Germany, the Netherlands and England. In London he was welcomed by the Royal Society and he observed the satellites of Jupiter with Robert Hooke. It is recorded that he did give William III a pair of 1 ½ foot diameter globes but it seems that he also brought with him a quantity of sheets of globe gores to sell. Coronelli was in the process of compiling a large volume, the Libro dei Globi, containing the gores of all five pairs (terrestrial and celestial) of his printed globes, ranging from 5 cm to 108 cm in diameter. He marketed this as an atlas, from which customers could have globes made if they wished. The gores for the 47 cm globe in the Libro dei Globi and those on the National Maritime Museum’s globe are engraved identically, except that the dedication, previously honouring an Italian nobleman, has been changed and the British royal coat of arms has been added.

Being a father in the Franciscan order did not prevent Coronelli from running a highly commercial cartography business. To finance his globe and map-making, he set up a subscribers’ organisation (sometimes described as the world’s first geographical society), the Accademia Cosmographica degli Argonauti. The Doge of Venice was its patron. As a Venetian, Coronelli was well placed to gather and synthesise new scientific information from the rest of Europe. Venice had high status but was not one of the great powers competing for empire, so Coronelli’s enquiries could be accepted purely as a quest for knowledge. He cultivated an international network of correspondents.

Coronelli had made a systematic study of the history of exploration and plotted on his globes the discoveries of named navigators from the ninth century onwards. He used Portuguese sources for recent mapping of Zambesia; German (Hiob Ludolf) for the Blue Nile; Dutch charting of Australia and Narborough’s 1670 voyage for the Strait of Magellan.

While working in Paris on the globes for
Reviews

Books

Translating the stage onto the page, with the help of illustrations and disembodied hands. Image in public domain.


Michael Faraday’s lectures on candle chemistry are the most famous object lesson in the history of science. Taking a seemingly insignificant quotidian artefact, he used it as an ‘open door’ to scientific knowledge, a familiar entry-point to an unfamiliar realm. Comparing his audience of children to candles themselves, he urged them to ‘shine as lights’ to their companions, sharing the secrets of nature and acting as moral exemplars. He employed everyday examples, live experiments, and a conversational style in what can be viewed (as David Phillips writes in the foreword) ‘not only as an historical document, but as a lesson in how to communicate science’, kindling sparks of interest into a fire of appreciation.

This welcome new edition by Frank James puts the text of William Crookes’ 1861 first published version alongside scans of Faraday’s handwritten lecture notes, in a sesquicentenary commemoration. The excellent introduction surveys the performance and publishing history of the lectures, reminding us of the transitions between spoken and written incarnations over its 150-year life. James covers a lot of ground, in a clear and succinct manner, as he adumbrates the Royal Institution lectures’ origins, audiences, and star performers, and traces Candle’s metamorphoses and legacy. His unparalleled grasp of RI minutiae, from official records of attendee numbers to personal correspondence to meeting minutes themselves, gives a fine-grained contextual detail to his account. Such detail brings the lectures to life, evoking, for instance, the cold December and sudden thaw of that early January, and the consequent burst pipes that made their way into lecture III, as well as into Faraday’s own home.

The first version of the lectures, we learn, was given in June 1831, and throughout the introduction we witness how Faraday reworked the same material over the intervening three decades. James shows well the interplay between the lecturer and his audience of up to 740 people (some members of whom, for instance, brought in their own examples of candles); the reportage of the lectures in the periodical press; and Faraday’s correspondence with eminent contemporary figures. He also chronicles the wrangling over the lectures’ appearance in print: it is apparent that Faraday was not at all certain that it was appropriate or even possible to translate the stage onto the page. The effective educational experience of the lecture hall, he thought, was potentially lost when reduced to prose. Others, too, commented that the ‘great secret’ of Faraday’s success was to ‘show’ rather than ‘tell’, to ‘inform the eye at the same time as you address the ear’. Would this be possible in print?

Only once Crookes had demonstrated to Faraday’s satisfaction that serialised articles in his Chemical News could capture the experience of being in the lecture hall did he permit the lectures’ publication. It is clear how editorial insertions as well as ostensibly verbatim transcripts helped convey a multisensory lecture hall experience to readers reclining in fireside armchairs. For instance, the immediacy of the lecture format was preserved in the prose, describing the speakers’ actions (‘I have here a flame’); the audience’s instructions (‘you observe’); and the collective enhancement of knowledge (‘See there how beautifully we can get our results!’). Disembodied hands loitered on the edges of the woodcut illustrations suggesting the ghostly presence of the man himself, pouring a saturated salt solution underneath a porous column of salt to illustrate capillary attraction, or holding a lit taper to a glass gas jar.

Overall, then, in this edition James, too, has taken a single object and complicated its history, unveiling its hidden secrets. Candle, like the candle itself, is shown to be more than just one thing.

This beautifully-produced volume was published to coincide with the centenary of the death of botanist Joseph Dalton Hooker (1817-1911). The introduction, by Jim Endersby, the biographer of Joseph Hooker, sets the achievements of this titan of Victorian science into context, whilst the remaining text examines in some detail – both textual and pictorial – the archive of Hooker’s engagement with 19th-century botany.

By the time of his retirement in 1885, Hooker’s position was, according to Endersby, one of ‘scientific emperor’. During his lifetime, the status of scientist in imperial Britain was transformed from gentlemanly amateur to salaried professional, indeed, in Hooker’s case to imperial technocrat. However, Endersby is keen to impart to the reader that none of this was inevitable and to emphasise the role played in this shift by Hooker himself and by the X Club of which he was a leading light.

Despite the auspicious circumstance of being born to the first Director of the Royal Botanic Gardens, Kew, Hooker strove initially to find a paid position in a scientific landscape where these were still relatively few in number. With no independent income he relied utterly on the influence of his father – William Jackson Hooker – to acquire a series of commissions, and he belonged to the age in which a voyage of exploration was a rite of passage in achieving scientific credibility. His first taste of expeditionary science - as assistant surgeon and *de facto* botanist on Ross’s Antarctic expedition (1839-43) - sparked his lifelong interest in botanical geography.

The latter was a frequent subject of the correspondence between Hooker and his mentor and scientific associate, Charles Darwin. Endersby reminds us of Hooker’s contribution to the genesis of Darwin’s *On the Origin of Species* through the provision of supporting data and constructive criticism; and of his contribution to the *Origin’s* reception by his very public support of it. What is unresolved, however, in this short tribute, is the question of why Hooker himself never produced a philosophical work of the order of the *Origin*, despite his commitment to raising the status of botany above that of the economic. Instead he dedicated his personal scientific endeavour to the practices of classification and nomenclature, a branch of the science which was to be somewhat eclipsed in the 1870s by the physiological turn of the ‘New Botany’.

The remainder of the book concentrates on the annals relating to Hooker’s travelling, collecting, and botanising; indeed, it conveys the sheer quantity of surviving collections of all kinds from his life and work. There are extracts from his correspondence, notebooks, journals, and publications; botanical studies which demonstrate his gifts as an illustrator; and ethnographic artefacts which reveal not only an active engagement with economic botany, but also a keen interest in the then burgeoning science of anthropology. By focussing on Hooker’s scientific achievements, the book manages to avoid hagiography. Joseph was ‘not always cordial’, as author Pat Griggs confirms. But what is less clear from the text is that he lacked his father’s urge to popularise botany, and in his 1871 annual report was famously dismissive of that class of visitors to Kew whom he deemed, ‘mere pleasure or recreation seekers…whose motives are rude romping, and games’!

*Joseph Hooker: Botanical Trailblazer* is an excellent introduction to the life and achievements of its subject, and a visual celebration of his material legacy. It’s a welcome addition to the literature on Kew and 19th-century botany.
The periodic table, whether coloured or black and white, grandiose or basic, is perhaps one of the most emblematic icons of modern chemistry. While it serves as the ‘ultimate paper tool’ for chemists, it conceals a wealth of historical detail of both ontological and epistemological concerns. How did it come into being? Under what circumstances have we come to acquire our modern knowledge of the periodic table? More intriguingly, it also has the power to incite philosophical debate. Is there an optimal form of the periodic table? Accordingly, the periodic table appears to offer something more than a seemingly definite systematisation of the chemical elements.

In The Periodic Table: A Very Short Introduction, Eric Scerri, a lecturer in both chemistry and the history and philosophy of chemistry aims to present a more detailed account of the historical development of the periodic table that transcends the popularized additions by Mendeleev. This is not to say that Scerri has downplayed Mendeleev’s contribution; Scerri has most appropriately dedicated a significant chunk of his book to the ‘Russian genius’. Rather that he also reminds us of the perhaps lesser-known actors who were engaged with its evolvement. The author also hopes that he can ignite a realisation within his readers’ minds that the periodic table still retains a certain enigmatic quality by presenting the sheer number of periodic tables that may be permitted (over 700!). I believe that Scerri is successful in all of his intentions. Yet, the depth of his success lies in his unique ability to explain complex scientific terminology in such a manner so that it may not intimidate non-scientists, while at the same time, should not bore those who are more familiar with chemistry. Scerri has ensured that his book is accessible to both scientists and non-scientists alike.

Professional chemists will perhaps enjoy the manner by which Scerri presents the development of the periodic table against the backdrop of quantum theory. It is particularly refreshing to read about the history of chemistry without a constant fear that physics may devour chemistry, or that it may lose its autonomous status with respect to her sister science. Scerri breaks down its barriers, and most commendably shows us how Bohr’s assignment of electrons to their shells was spurred on by chemical intuition and also the ways in which quantum mechanics has significantly affected our modern perception and understanding of the periodic table.

Chemical educators of all levels may also find this most welcomed edition to the Very Short Introduction series particularly useful. For example, its pedagogical value could be found in providing a means of engaging their students with the periodic table. Chapter nine is especially fun. Scerri reveals how the dreams of the ancient alchemists have finally become a reality, such that modern science has achieved transmutation of one element into isotopes of another. Now, while we all know that chemists have not developed a method to make metallic gold, this aspect may excite prospective students of chemistry.

For a particularly slim paperback, this book certainly punches above its weight. In its totality it is clearly written, extremely readable and, regarding the number of diagrams and images (including a delightful copy of G. N. Lewis’s original sketches), visually stimulating. The book also contains a list of additional readings. I would especially recommend Scerri’s other published works on the periodic table, which may serve to supplement the wealth of key knowledge that you will gain from this book. One thing is for sure that after reading this introduction; you may never look at the periodic table in the same way again.

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Fiction


*Curiosity* is an intriguing and interesting novel, but is not for the reader seeking action, adventure or a fast-moving plot. (It’s also probably not for the historian of science seeking an escape from work!) The prose is rich and varied, and the characters speak in convincing tones and language, but the main challenge of such a novel, for both author and reader, is that the fictionalization of real-life individuals requires the maintenance of engaging drama in the story alongside a certain amount of historical accuracy. This is a challenge that Thomas meets head-on, and with a great deal of success, though the detailed portrayal of the early lives of Mary Anning and Henry De la Beche may make it a bit drawn out for some readers, as might the meticulous descriptions of fossils and the painstaking rendering of contemporary geological debates.

The book starts in the childhood years of the two main characters, and we alternate between them as their stories become ever more closely intertwined. This is where history and fiction are also intertwined, for though there is a small amount of evidence that Mary Anning had a close relationship with an unidentified gentleman geologist, the relationship between Mary and Henry is the basis of the novel. Nevertheless, Thomas’s assertion in the ‘author’s note’ that De la Beche is the most likely candidate is reasonable, and she tells her imagined tale in sympathetic, and ultimately credible, tones. The main disappointment is that the book ends rather abruptly in 1824, when De la Beche went to Jamaica to see to his failing plantations, for though we alternate between Mary and Henry as the chief characters, it is Mary who is the true lead, and we are given but brief hints as to the rest of her life and work. Nevertheless, the realization that I was disappointed showed me that I had been gripped, despite the slow start and gradual progress of the book, and, indeed, in spite of the obvious growth of the bond between the central characters – there are certainly no twists in the development of the main plot (partly due to the inclusion of a brief prologue that is best described as a flashforward). There is, though, considerable subtlety in the telling of a plausible tale of two maturing hearts and minds infected with the fever of scientific curiosity.

The supporting cast are researched and crafted with as much care as the central figures, and most of them are also genuine historical individuals. The descriptions of Lyme Regis evoked both town and shore beautifully for me, though I did wonder whether a reader unfamiliar with the area might be topologically confused, since the geology of the shoreline is crucial to the story, both fictional and historical. The heroic trait of rejection of social orthodoxy is present to a fault in both major characters, and, though that is not historically inaccurate in itself, I felt (wearing my historian-of-geology hat) that the religious orthodoxy of William Buckland and William Conybeare and the scientific orthodoxy of the Geological Society were over-emphasized to throw this into yet sharper relief. Buckland’s eccentricities make a natural source of occasional light relief for a narrative that deals mostly with both emotional and more mundane struggle, yet the lack of gravitas that infuriated some of his contemporaries seemed absent. I felt, too, that he and various other ‘elite’ figures, such as Conybeare, Cuvier and Saint-Hilaire, and even Sowerby, received somewhat raw treatment. Of course, we generally see them from Mary’s point of view, so the thoughtlessness of their elitism is perhaps unsurprising, yet again I felt its purpose was to throw De la Beche’s thoughtfulness into sharp relief (and thus emphasize his carelessness as well).

*Curiosity* is a well-researched and well-written novel, perhaps a little lacking in pace in its gradual development, but rich, multi-layered and erudite. In imagining a tale of love and betrayal in the context of the history of geology, Joan Thomas has produced a sensitive answer for anyone who might want to ask what historical figures were feeling and thinking, and the pleasure of such a tale is found as much in the imagination as in the historical evidence.
Television

*Call the Midwife*, BBC1, January-February 2012.

*Call the Midwife* is a BBC period drama set in London’s East End and based on the bestselling memoirs of the late Jennifer Worth (née Lee). Worth's midwife trilogy has sold over a million copies and spawned a new subgenre with titles like *Twelve Babies on a Bike* and *Catching Babies*. Adapted for television by Heidi Thomas and starring Jessica Raine as Jenny Lee, the series was a surprise hit: nearly 10 million viewers watched the opener and a second series is planned for 2013. A laudable landmark in a genre customarily obsessed with emergency wards and white-coated male doctors, *Call the Midwife* explores a lost world of pregnant women and heroic midwives. Though occasionally described as a 1950s version of *One Born Every Minute*, the Channel 4 reality series shot in a Southampton maternity hospital, most reviews present *Call the Midwife* as a human version of James Herriot's *All Creatures Great and Small*, the series that inspired a generation of veterinary surgeons. This hard-to-resist analogy is not accidental.

Worth was inspired to put pen to paper by a 1998 call by midwifery lecturer Terri Coates in the Royal College of Midwives' magazine for someone to do for her profession what Herriot did for vets. Worth sent Coates a handwritten manuscript and she agreed to correct the misremembered clinical content. The producers of *Call the Midwife* subsequently asked Coates to help maintain clinical accuracy on set with authentic-looking props: glass rectal tubes, Pinard stethoscopes, fake blood and umbilical cords, pigs’ placentas and real babies. As much about death and dying as it is about childbirth, each episode is worth watching, not only for the historically accurate delivery scenes, but also for the portrayals of routine urinalysis, antenatal clinics, district nursing, pelvic models and sex education in the 1950s. Yet, attention to detail aside, comparing Worth to Herriot, midwives to vets, and tales of East End women to animal stories highlights some problems with the show.

Since pregnant women have more agency than farm animals, their experiences and networks should play more of a role, even in a drama about midwives. This may be clearest in the decision to have an abortion. Worth's books demonise backstreet abortionists and in the *Guardian* she attacked Mike Leigh’s film *Vera Drake* (2004) as “implausible”. Yet, as historians Stephen Brooke and Emma Jones have noted, *Vera Drake* offers perhaps the least sensationalised and most historically accurate portrayal of what illegal abortion was like before the 1967 Abortion Act. Vera could have been one of the abortionists interviewed in Holloway women’s prison by Moya Woodside in 1963. Oral history interviews with district midwives disclose how they viewed such women as providing an important service and protected them from prosecution, and a few convicted abortionists were themselves registered midwives struggling to make ends meet.

Although Worth practiced for only seven years, David Kynaston's recent social history of the 1950s, *Family Britain*, has already drawn on her authority to doubt the existence of “real-life Vera Drakes”. This highlights a significant problem with relying too heavily on Worth’s memoirs as a historical document: the vast majority of women who successfully ended their unwanted pregnancies in the 1950s did not call the midwife, or at least not one as hostile as Worth. So while the *Telegraph* has plausibly endorsed the show’s relevance to current debates over the safety and cost-effectiveness of homebirths under the NHS, *Call the Midwife* is best watched alongside *Vera Drake* to remedy the conspicuous absence of abortion in the former. Both should be viewed with an eye for the complexities of representing a contested past, whether in nostalgic memoirs, cosy television, kitchen sink cinema or social history.

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Episode 4 of 6 begins with Shirley Redmond (Emma Noakes), whose previous baby was stillborn, going into labour. In this publicity still, which differs slightly from the show, Jenny (Jessica Raine) listens for the fetal heartbeat through a Pinard stethoscope, a 19th-century invention, as Sister Evangelina (Pam Ferris) counts the seconds on her wristwatch. Followed by X-rays, urine tests and ultrasound, stethoscopes were among the earliest technologies used by doctors, nurses and midwives to disclose the hidden contents of the womb. © Neal Street Productions.
Who or what first turned you towards the History of Science, Technology and Medicine (HSTM)?

It all goes back to a wonderful teacher I had in high school (Northfield Mount Hermon School in Massachusetts), Dr Glenn Vandervliet, who had done a PhD in history of science at Wisconsin and then come back to his alma mater to teach. When I went to Caltech to study physics he made sure that I also learned history at the feet of Dan Kevles. Later I went to Stanford to do my PhD in philosophy, and there was a fantastic HPS collaboration there, and I learned a great deal about history of science from Peter Galison and Tim Lenoir. By the time I had done my postdoc with Gerald Holton, history was in my bones even as I continued as a card-carrying philosopher. Beyond the first two years of graduate school, I could never do philosophy of science to my own satisfaction without getting deeply into history of science.

Which historical person would you most like to meet?

Count Rumford is up there, though I don't think I would actually like him. Similarly with Henry Cavendish. I think the top of the list has to be the whole Lunar Society, including Joseph Priestley, and also Jean-André De Luc, who was an important visitor to the group.

What should every 16-year-old know about HSTM?

What little science they think they know, they don’t really know.

If you did not work in HSTM, what other career might you choose?

I did once consider going into psychiatry. What I would not want to be doing is philosophy that doesn’t involve any history.

What are your favourite HSTM books?

That’s a difficult one - it’s like being asked as a child whether you prefer your mother or father! The most useful HSTM book I have encountered is Bill Brock’s *Fontana History of Chemistry*. The book I admire the most would have to be Wilhelm Ostwald’s 1896 *Electrochemistry: History and Theory*.

What would you do to strengthen HSTM as a discipline?

A clear consciousness of why it exists as a separate discipline would be good, going beyond the notion that we do it just because it is fascinating. No, what is the use of the history of HSTM aside from our own individual enjoyment, or, why is it that society should pay our keep to do this strange work? To me, the answer crucially involves connections with STM itself, and with philosophy.

What does HSTM have to say to scientists? What do they have to say to us?

I think we should lose the squeamishness or disdain about “service teaching”, and plunge into the task of pulling the science students into history; if we can’t do that, there is little hope of talking meaningfully to grown-up scientists. But as Paul Forman has been stressing, it is crucial to preserve our independence from scientists, even as we engage with them closely. Sometimes I think what we can and should say to scientists is “You don’t know everything about science”, and say that in a way that doesn’t let them get away with saying “But you don’t know anything!”

Do you think the relationship between philosophy of science and HSTM is changing?

Yes, if I have anything to do with it… I certainly think we are right now experiencing a serious renewal of interest in enhancing that relationship.

Should we all be re-enacting HSTM experiments?

We already do – we just don’t know it! (Boiling water comes to mind.) Seriously, at the least I think it is crucial for us to get a sense of what was really involved in the old science that we try to learn and think about; that is not only about experiments, either. Going beyond that, having our own experience of the science helps us retain the independence that I just mentioned above.

Tell us about how you have developed new ways of teaching HSTM?

The chlorine project has been my best work in teaching innovation, and that partly arose from needing to escape the tedium of marking large piles of standard essays! There’s much more to be said about this, but I think the crucial thing is to develop new ways in interacting with your own particular students, rather than trying to impose some general conceptions.
24th International Congress of History of Science, Technology and Medicine, University of Manchester, 22nd - 28th July 2013

The International Congress is the largest event in the field and takes place every four years. Recent meetings have been held in Mexico City (2001), Beijing (2005) and Budapest (2009).

For 2013 the British Society for the History of Science was successful in bidding to host the 24th Congress at the University of Manchester. This will be the third time that the Congress will have been held on these islands. The 2nd Congress, at which the Soviet delegation made a strong impact, was held in London in 1931 and the 15th in 1978 in Edinburgh.

The theme of the 24th Congress, which we expect to be attended by around a thousand historians of science, technology and medicine, is ‘Knowledge at Work’.

The basic structure of the meeting is divided between themed panels (symposia) and individual papers. The call for individual papers is now open. Further details can be found at: http://www.ichstm2013.com.

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Notes and Records Essay Award
The winner of the second Notes and Records Essay Award was publically announced at a reception at the Royal Society on 18th May.

The award winner is Meghan Doherty, for her essay entitled ‘Discovering the “True Form”: Hooke’s Micrographia and the Visual Vocabulary of Engraved Portraits’. The essay is a detailed analysis of Robert Hooke’s artistic connections and his studies of drawing.
The British Journal for the History of Science

The June issue of BJHS will include the following, plus reviews:

‘States of Secrecy’ special issue, edited by Koen Vermeir and Dániel Margócsy:

- Koen Vermeir and Dániel Margócsy, ‘States of secrecy: an introduction’
- Koen Vermeir, ‘Openness versus Secrecy: Some historical and conceptual issues’
- Vera Keller, ‘Mining Tacitus: Secrets of Empire, Nature, and Art in the Reason of State’
- Mario Biagioli, ‘From Ciphers to Confidentiality: the Temporality of Secrecy and Openness’
- Peter Galison, ‘Blacked-out spaces: Freud, censorship and the re-territorialisation of mind’
- Stephen Hilgartner ‘Information Control in Genome Research: On Selective Flows of Knowledge in Technoscientific Interaction’

www.bshs.org.uk/publications/bjhs

Viewpoint: the Magazine of the BSHS

Contributions
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