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Editorial

I would like to thank all of those who have complimented me and the rest of the BSHS Council on the first issue of *Viewpoint*. It is good to know that our investment in the change of format has caught the attention of our members and, I hope, of future members. Likewise, thanks to those who have responded enthusiastically to my call for contributions in the hope of continuing this success.

One feature that has caught the imagination is that on 'Science Fiction'. This term, which is, strictly speaking, anachronistic in the context of pre-20th-century writing, is challenged by one of the two contributions to this series in this issue. Their subject matter is, perhaps, better described as 'Pre-Sci-Fi'. However, the series is set to continue under its existing name: look out for it in the October issue.

Anyone interested in contributing articles, reports, reviews or news, or in replying to any previous articles, should contact me at newsletter@bshs.org.uk. The deadline for the next issue is 18 August 2006.

Rebekah Higgitt, Editor

The history of science is dead. Long live the history of science!

John van Wyhe questions our *raison d'être*

The history of science is dead. Practising historians of science nowadays no longer believe there is a thing out there in the world called 'science' which is distinct from the rest of human culture. Strictly speaking this is correct. What we mean by the word 'science' is a sub-set of culture. It is cognitive, it is knowledge as well as artefacts and behaviour. Yet this seems to put us in the ironic position of being historians of something we no longer believe in. True the name of the discipline and of many university departments have been inherited from earlier generations. But if there is no discrete entity called science, what are historians of science historians of?

Perhaps we are historians of scientists (passing over the obvious anachronism)? It is increasingly the case that historians of science investigate the social and political lives and interests of past scientists. Indeed it is these other, so-called non-scientific aspects of their lives, that are now often centre stage. This is well and good because we can never revert to an old-fashioned history of science in which these things were ignored, or worse, believed to be totally irrelevant to the creation of natural knowledge.

However, one can now read a scholarly article or even entire book on a historical man of science and learn about his social interests, his political agenda and career manoeuvres, back stabbings and so forth but never discover what he did during his day job. What scientific activity did he engage in? I have attended countless talks and seminars where the 'scientific' activity of the figure(s) under discussion was never substantively mentioned. Instead, all too often, one hears

the predictable, and now therefore hackneyed conclusion that so-and-so's science was in fact shaped by his career ambitions or politics. Really? This is a discipline-wide tenet of belief, taught to all students in the history of science. So our starting point hardly makes an interesting conclusion. It is no surprise that students of the history of science are taught that this is true, and sent out to find new instances of it— and then they do!

In fact, the problem for the death of the history of science may be the illegitimate child of its greatest achievements in past decades. If we are only historians of past people then what is the difference between us and other historians? They also study what people in the past thought, wrote and did. Why then do we not simply merge with our scholarly cousins and become just plain historians without the



Dead as a dodo? Rembrandt's The Anatomy Lecture of Dr. Nicolaes Tulp

anachronistic word science attached?

But of course we are not the same as historians of politics or economics. We have evolved our own sub-culture which often makes it difficult for us to communicate entirely clearly with scholars from other traditions. But this is no argument for the viability of the history of science.

No. If the history of science is different from the history of politics, economics and so

forth it is because of the people we study. Of course they were whole people once immersed in their own particular context and imbibed with the highly variable and historically specific culture of their time. But this is equally and identically true for the dead statesman. What distinguishes a historical figure studied by historians of science from one studied only by political historians? Here is the rub. Scientists, men of science, natural philosophers etc. all have something in common which silently keeps them within our scope. What is this invisible characteristic that allows generations of historians of science to largely agree on who they study? I would argue that it is nature. The people we study had something to do with it. Either they had ideas about it, or they may also have poked and prodded it in various ways as one of their culture could do. Or they may have had various other naturalistic perspectives or activities.

Yet it is just this aspect of our discipline that is going out of fashion. Otherwise a great pluralism of causal factors is now acceptable. Scientific knowledge can be explained as caused or influenced by sources such as social contexts/ interests, politics, gender biases, career ambitions and so forth. Many seem to think it is naïve and old-fashioned to give nature a role – as if this would be paramount to old-fashioned rational progressivism in which simply working at the coal face of science led to an inevitable deepening of understanding, and ever more accurate knowledge or ever truer facts. Perhaps the most persuasive argument against seeing nature as a causal factor for scientific knowledge is that perceptions of nature are not ‘raw’ input arriving independently from cultural filters, social preconceptions and the like. But this observation stops half way. How do the social and contextual features get into a person’s head in the first place? The only route is through the senses. If this undeniable feature is considered at this basic level, what is there to distinguish social input through the senses from ‘natural’ input? Or is this a chicken and egg problem? Does nature make the knowledge, or does knowledge the nature? Nowadays we should be far beyond this old question. It’s both. People do not arbitrarily fabricate ideas about the world based on all factors apart from sensory input derived from non-human sources – and observing natural things does not cause some objective knowledge to spring forth de novo in the observer’s head.

Today we should bring together and make use of everything we have learned over the past decades to make a new history of science; one that is not insular and inward looking but cosmopolitan and widely read. All the sorts of things that influence natural knowledge should be used – the contextual, social, political, psychological, sociological, anthropological and the natural.

Historians of science often complain that popular audiences don’t care about what they write and that popular history of science books are written primarily by journalists or (retired) scientists. Yet people want to read about discoveries and how things were figured out. If we combine our cultural sophistication with an openness to give nature a role we can increase the explanatory capital of the history of science. We can explain both how something new was discovered and the fact that natural knowledge never stands still but, to paraphrase Darwin, has always been and is being evolved. Long live the history of science!

John van Wyhe, University of Cambridge
jmv21@cam.ac.uk

President’s Reflections

The retiring President of the BSHS, **Peter Bowler**, reflects on his time in office.

When I was invited to become the next President of BSHS, my reactions were rather complex. There was the conventional – although nonetheless real – sense of being honoured by one’s peers after years of service within the community of historians of science operating in the U.K. But I was also very concerned that Council didn’t know what it was letting the society in for. I am not a natural committee-person, and being located on the geographical fringe of the U.K. has always meant that I am rather out of touch with what is going on in the magic triangle. But the most practical question was: how much of my time and energy



is the job going to take up? By most standards we are a pretty small society, but even so the president will necessarily have a significant number of things to do to keep things functioning smoothly. This is perhaps the point at which I should acknowledge the contribution to our affairs made over many years by Wing Commander Geoff Bennett. The transition to a new executive secretary, Philip Crane, has gone very smoothly, and Philip’s efficiency has helped to keep me on track.

The real question, though, was whether some large-scale issue would emerge during my presidency demanding an even greater level of commitment. It turned out, of course, that I had indeed drawn the short straw in that particular lottery. Council decided that its meetings were becoming overloaded with matters requiring its attention, and at the same time there was a growing feeling that the society needed to take some initiatives that would help it to reach out to a wider potential membership than is available in the university-level academic community. As a result I found myself part of a Business Plan group charged with not only the formality of drawing up such a plan, but also with the task of designing a whole new apparatus for the society’s operations. The result was a series of meetings which were indeed time consuming and have led me to an uncalled-for familiarity with the operations of a certain budget airline flying between Belfast and Stanstead. Some of the work could be done by email, but when things get really complicated, there is no substitute for face-to-face meetings. I can only thank my lucky stars that the other members of the group, Janet Browne, Aileen Fyfe, Sally Horrocks and Frank James, were willing to put vast amounts of their own time and effort into the job. Our new executive secretary also played a major role. As a result we were able to keep on top of the vast number of issues

which needed to be integrated and to plot a course which we were reasonably confident would lead to a workable programme. The rest, of course, is history. The new arrangements were approved at last year's EGM, and so far, at least, they seem to be working pretty well. I can't even be accused of building a house of cards and ducking out just before it falls to pieces, because under the new arrangements I shall take over the chair of the Communications Coordination Committee for next year.

One important consequence of our deliberations is Viewpoint, the newly-reorganized replacement for the Newsletter, in which these musings appear. Our thanks are due to Rebekah Higgitt for taking over this demanding and crucially important job, and for producing a result which has, as far as I can tell, been greeted with universal enthusiasm. (At the time of writing I've only seen it briefly myself, my own copy being still trapped in the backlog of mail piled up after the Belfast postal strike.) The attractive format is designed to bring the Society to the attention of a wider range of readers, some of whom we hope will be tempted to explore further. At the same time, the Outreach Committee under Emm Barnes is doing great work, exploring imaginative ways of bringing the history of science to a broader audience including school-teachers and those working in museums. At a time when the community of full-time academic historians of science continues to shrink as universities become ever more commercially-minded, it is vitally important that we forge stronger links between this community and the large number of people, including many scientists, who are interested in the history of science and in the impact of science on society (and vice versa).

Having been based in Ireland for many years, I am acutely aware of the need to foster such links since here there are only a handful of professional historians of science working on the whole island. The Royal Irish Academy's national committee for the history of Irish science (which also takes a general responsibility for the history of science on the island) has always seen its primary duty as the promotion of interest in the subject at the widest possible level. The British Society for the History of Science clearly has different functions, because it must serve the needs of both the professional historians and of the wider community. But the latter function looms larger in our sights as the pressures mount on the former, and I can only hope that any initiatives made while I have been in the hot seat will serve the society well in the future.

Finally, let me comment on the annual conferences which have now become a regular part of our schedule. While I have been president, we have enjoyed two splendid meetings in Liverpool and Leeds, and we look forward to another in Canterbury. These meetings have become an important rallying point for the subject, and a vital part of our social engagement. The following year it will be our turn to host a "Three-Societies" meeting with the Americans and Canadians, and I hope we shall all pull together to make this a success. I have a red St Louis Cardinals baseball bat to pass on to Frank James – a symbolic baton which represents our commitment to this enterprise. I'm sure he will wield it effectively.

Postgraduate Support: The Butler-Eyles Fund

Just over a tenth of the Society's members are currently studying for a postgraduate degree. These students are not only producing some of the most exciting and innovative research in our field, but they are the future of our discipline. BSHS is committed to supporting them. The conference organised each January by and for postgraduates has become a highlight of the BSHS calendar, and enables postgraduates from all over the country (and sometimes far beyond it) to meet with their peers in an informal environment. There is also a lively postgraduate presence at other BSHS meetings, and the Society is proud of its reputation for friendly mingling between junior and senior colleagues.

The benefits, both academic and social, of attending conferences are obvious – yet for many postgraduates, it can be financially difficult. The limits of a research grant may mean making a choice between a conference or a crucial trip to the archives. BSHS has a long tradition of offering students half-price registration rates to its conferences, but it can now offer even more support. In addition to subsidising accommodation for students attending the postgraduate conference, it now makes a similar subsidy for the annual summer conference. Around seventy students a year benefit from these subsidies.

The Society has also recently extended the remit of the Butler-Eyles Fund. The Fund originated in two bequests: from Francis H. C. Butler, a founding member of the BSHS and its first Secretary; and from Joan and Victor Eyles, founding members of the Society and members of its Council in the 1950s and 1960s. The Fund was initially (2001) used to make travel grants to students attending the postgraduate conference, but it now makes travel grants to students attending any BSHS conference. Last year, eight grants were made.

Grants come from the Fund's capital, so unless we keep adding to it, there will come a time when we can no longer make grants. This was why Council appealed for donations to the Fund in 2005, and again in 2006. Council would like to thank the seventy generous members who helped add almost £1,000 to the Fund last year. Together, they give us the potential to help ten to fifteen students in the coming year.

Please consider adding a donation to the Butler-Eyles Fund to your next membership renewal or to your next conference registration – or send it to the Executive Secretary directly! To give you some ideas, a 'saver' train ticket to this summer's conference in Canterbury costs £25 from London, £88 from Leeds, and £110 from Glasgow. If you are a UK tax-payer, please sign a Gift Aid declaration, to allow the Society to reclaim the tax on your donation – it costs you nothing, but it makes a big difference to us!

Aileen Fyfe (BSHS Treasurer)

How to apply

For details and an application form for the Butler-Eyles Fund see:

www.bshs.org.uk/butlereyles

Applicants must be student members of BSHS. Grants are not usually more than £100. The closing date for applications is the same as the final registration date for the conference in question.

BSHS now also offers Research Grants and Master's Degree Bursaries: see www.bshs.org.uk/grants for further details.

Reports of Meetings

BSHS Postgraduate Conference

Melanie Keene reports on this annual event, held this year in January at Brighton



On a chilly January night, 35 delegates from over 15 European universities assembled by the illuminated Brighton pier for the 9th BSHS postgraduate conference. As in previous years, this enjoyable event provided a friendly introduction to the world of academic presentation, questioning, and networking.

Starting with Picasso (Chiara Ambrosio, UCL) and ending with power stations (Sorcha O'Brien, Brighton), the range of topics covered was broad, and demonstrated the strength and diversity of current graduate student scholarship. We appreciated Dickens' fear of potential purple houses (Charlotte Nicklas, Brighton), found out what happens when you rub a lodestone with garlic (Andrew Campbell, UCL), laughed at cartoons of the babyish Professor Branestawm (Alice Bell, Imperial), as well as experimenting with a replica mathematical compass (courtesy of Benjamin

Wardhaugh, Oxford).

Several themes emerged from the rainbow of PowerPoint presentations. Interest in medical history continues, represented by 17th-century receipts for the cure of gout (Michelle Di Meo, Warwick), the story of Margery the diabetic dog (Andrew Gardiner, Manchester), and the grotesque pathologies presented to society-goers in Victorian Newcastle (Vicky Blake, Durham). Mathematics featured strongly, including Josipa Petrunic's (Edinburgh) brave attempt to introduce non-Euclidean space first thing in the morning. A cluster of papers dealt with Italian topics, from the Vatican's censorship lists (Neil Tarrant, Imperial) to the Futurist 'Telegraphic style' (Meg Greenberg, Cambridge). Many students were concerned with communities, be it in the form of provincial geological societies (Leucha Vermeer, Leeds) or diverse

institutions such as science museums (Louise Thorn, Imperial), Bethlehem asylum (Bob Wycherly, Brighton), and the 'holiday camp' atmosphere of the Common Cold Unit (Tal Bolton, Kent).

Most papers concentrated on the 19th and 20th centuries, with some dealing with very recent issues; for example, Sarah Davies (Imperial) chronicled evolving attempts at science communication, from PUS to PEST, and Morgan Clarke (Oxford) introduced Lebanese reactions to the new reproductive technologies. Appropriately, then, the modern motif of computers recurred: Alexi Baker (Oxford) and Gael Lancelot (Manchester) both argued for the increased use of IT resources in historical research. We even earned our own 'Home Computing' certificate, courtesy of Tom Lean's (Manchester) engaging talk on microcomputer magazines.

Outside the official programme, conversations flowed over tea, coffee, beer and seemingly-endless tapas, and during walks along the pebbly seafront or through the gardens of the ostentatious Royal Pavilion. New collaborations and friendships were forged, and many agreed to meet soon at future history of science events.

Many thanks to Fern Elsdon-Baker, the BSHS programmes committee, and everyone else who helped with the organisation of such a successful conference. As the multicoloured sticks in our conference packs attested, we all agreed that Brighton rocks!

Melanie Keene
University of Cambridge
mjk32@cam.ac.uk

Franco-British Interactions

In March Aileen Fyfe was at the Maison française in Oxford

Fifty delegates gathered at the end of March for a symposium with a difference. It was apparent from the moment the introductory speeches began: we may have been in Oxford, but this was a new, bilingual Oxford. Some conferences would have let their good intentions lapse as the day wore on, but not this one. Some session chairs spoke French,

some English; some papers were presented in English, some French; and some particularly impressive speakers were able to respond equally well to questions posed in either language. It was a delight that so many French colleagues made the journey to Britain; and a pleasure to discover that so many British colleagues are involved in the history of science

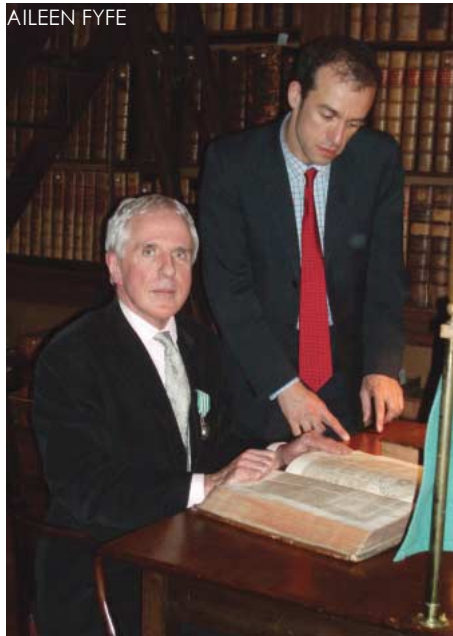
beyond our island shores.

It was hosted by the Maison française in Oxford, and organised by Robert Fox, the current president of the recently-founded European Society for the History of Science (ESHS). Both the British Society for the History of Science and the Société française d'histoire des sciences et techniques offered their sup-

port, as did the Europaeum, a network of EU universities which includes both Oxford and Paris I – Sorbonne. The impressive list of credits is testament to a healthy enthusiasm for international cooperation, and the ESHS will surely wish to repeat this success at its annual meeting in Cracow this September.

The symposium theme was 'Franco-British interactions in science since the 17th century'; and there were speakers dealing with the entire period since then. Although there did seem to be a strong preference for mathematics and astronomy, there were also papers on 17th-century ornithology, 18th-century ship-building, 19th-century publishing and 20th-century tropical medicine. But as always, the social activities proved as important as the formal proceedings. Lunch and tea breaks were provided on site, but the highlight was Friday evening, when a drinks reception in the Museum of the History of Science was followed by a formal dinner in the 17th-century surroundings of Oriel College.

After dinner (and before the evening's second Latin grace!), Oriel proved to be the venue for an unexpected honour. Alexis



Robert Fox, newly created Chevalier, with Alexis Tadié. The ribbon of the Ordre des arts et lettres has thin green-and-white stripes, while the medal itself is an eight-pointed star.

Tadié, the director of the Maison française, read a citation on behalf of the French Ministry of Culture. Praising the work that Robert Fox has done to promote the history of French science (and the history of science in France) over the last thirty years or more, the citation announced that Professor Fox has been appointed Chevalier des arts et lettres. This honour is awarded to persons distinguished for their artistic or literary creations, or for their efforts in supporting and disseminating the arts and letters in France or the world. (Other recipients have included the actors Bruce Willis and Meryl Streep, as well as the writers James Joyce and Kazuo Ishiguro...) Everyone present was delighted with the recognition thus bestowed on the history of science in general, and Robert Fox in particular. It is not every academic meeting which will have such a wonderfully memorable moment!

Aileen Fyfe

National University of Ireland, Galway
aileen.fyfe@nuigalway.ie

Reviews

Books

Jon Agar, *Constant Touch: a Global History of the Mobile Phone*, Icon Books, 2004, pp. 180, £6.99

Historians love to explore new methods of analysis. Four pages into this survey, Jon Agar pioneers a literal brand of deconstruction by attacking his unfortunate mobile phone with a hammer. Sifting through the components, he traces their origins to begin telling the story of one of our modern world's defining technologies.

The story, like the device itself, roams increasingly freely through cities and states and across intercontinental divides, from early and rather chaotic development in the US to Sweden and Finland, whose widely-dispersed populations were among the first to obtain a manageable standard for long-distance calls, and on to the emerging European Union, Africa and the Pacific Rim. We hear

something of the principles behind cellular telephony — and the constant geographical surveillance it demands — but much more about the social, cultural and personal meanings which have developed around the mobile. This apparently globalising technology actually demonstrates widespread cultural differences: text-messaging is relatively marginal in a USA habituated to analogue standards, while Japan's "i-mode" information service has created a social phenomenon without equivalent elsewhere.

Readers familiar with the Icon series will know what to expect stylistically. The tone is straightforward, fresh, and non-technical. The prose in *Constant Touch* occasionally lapses into note form, resembling an enthusiastic monologue; yet it draws on good sources with considerable insight. Agar's eyes are open to the murky global practices on which our sleek little gadgets depend: rising demand for tantalum, essential to the capacitors used in modern handsets, helped to finance and aggravate the war which tore apart the Democratic Republic of Congo between 1998 and 2003. Agar further suggests that mass access to mobile networking jeopardises the very principle of rule by centralised hierarchy, whether for good or ill.

Well-chosen and wryly-captioned illustrations demonstrate the complementary

change in nature and meaning of the mobile as physical artefact. To some users, it is almost talismanic: like a loaded gun, its very presence within a hand's reach suggests power and control. This may be illusory, however, as Agar indicates with a personal anecdote about a call rudely terminated as a friend's phone is snatched in the street. At the moment he most needs to reach out with help and reassurance, he cannot. To most users, the mobile phone brings freedom; but it also brings unconscious dependence on a technological system often barely glimpsed behind the streamlined packaging which Agar's hammer breaks open.

James Sumner, University of Manchester,
james.sumner@manchester.ac.uk

David Tyrrell and Michael Fielder, *Cold Wars: The Fight Against the Common Cold*, OUP, 2002, pp. 268, £27.50

As the second, and last, director of the Common Cold Unit, (the late) Dr David Tyrrell uses his specialised knowledge to convey to the general reader the particular problems, suc-

cesses, and painstaking research associated with the common cold since the research facility opened in Salisbury in July 1946, supported by the literary skills of Michael Fielder. Providing an update on the previous publications of his predecessor, Sir Christopher Andrewes, which served to inform as well as recruit volunteers, Tyrrell's account explores the scientific investigations and breakthroughs in understanding the transmission and composition of common cold viruses. The recruitment and use of volunteers between 1946 and 1990, when the unit closed, makes the Common Cold Unit rather unique. Thousands of men and women assisted with the unit's research which courted much media attention, not to mention goodwill from the numerous volunteers, many of whom attended more than once.

In many respects, *Cold Wars* is as much of a tribute to Tyrrell's colleagues as it is an account of their research and as such is very much a personal account. He pays due respect to a host of virologists, bacteriologists, pathologists and researchers associated with the unit, as well as brief encounters with others, such as Francis Crick who along with James Watson identified the double helix structure of DNA. The domestic, administrative, and nursing staff employed by the unit through the years also feature within the text, from the gardener to the medical superintendents, and the involvement of volunteers at the unit occupy their own chapter. This is full of anecdotes and recollections from past participants who attended the Common Cold Unit, advertised as a free holiday, and the routines they took part in. The importance of the role of these volunteers is not lost within the history of research into the common cold, indeed Tyrrell gives a very balanced account of all those involved in the history of the unit.

Tyrrell's long-term position as researcher, then director, of the Common Cold Unit from 1957 until 1990 means that his book is more than just a story of the common cold, it provides an account of how science is viewed from the scientist's perspective. Tyrrell draws out the particular difficulties common to research, such as slow progress and the trial and error of experimentation, and demonstrates the importance of networks within the scientific community and the publications of findings. Whether intentional or not, the book reveals the concerns of scientific researchers and the pressures they faced to secure funding and credibility, and as such is a useful contributory read for those interested in understanding such features of the scientific community. The scientific terminology is clearly explained with diagrams and illustrations which are provided for the 'uninitiated' and therefore for the general reader, *Cold Wars* is an interesting account of an episode in the history of science that confounded

researchers from the outset, and even after four decades of research left many questions regarding the common cold unanswered.

Tal Bolton
University of Kent

Diamuid Jeffreys, *Aspirin: The Story of a Wonder Drug*, Bloomsbury Publishing, 2004, pp. 352, £16.99

As a popular history of science, Diamuid Jeffreys' *Aspirin: The Story of a Wonder Drug* is a highly readable account of the history of aspirin, from the early acknowledgements of the medicinal properties of willow in the Ancient World to the epidemiological studies of the 1970s which confirmed the benefits of aspirin to sufferers of cardiovascular diseases such as strokes. Jeffreys draws out the links between medicine, science and industry and takes the reader on a global journey from Ancient Egypt to 18th-century England, then through Western Europe, Australia and America as the competition for commercial dominance of the aspirin market was fought out between the main pharmaceutical companies.

Court room battles, advertising ploys making grandiose claims, and flouting of loopholes in patents featured heavily in the history of aspirin, giving this book all the intrigue and pace of a novel while providing an interesting story of a common household drug taken, and taken for granted, by millions of people throughout the world. The history of this 'wonder drug' is also the history of invention and demonstrates how technological developments, such as chemical processes developed in the aniline dye industry in the mid-19th century, contributed to putting together the 'pieces of the puzzle' which resulted in the mass production of aspirin.

While academics might take issue with the finer historical details, such as the assertion that Hippocratic medicine was free of 'mumbo jumbo' and represented a 'new' rational response to illness and disease, such is the brevity of the book that generalisations cannot be particularly avoided. The range of sources cited by Jeffreys demonstrate solid research of past publications and journal articles, incorporating interviews and memoirs as well as the proceedings and transactions of scientific societies. However some assertions are somewhat speculative, especially in the first part of the book when clearly there is a dearth of available sources on the discovery of an Ancient Egyptian papyrus which identified the pain killing properties of willow, with a reliance on anecdotal comments to fill gaps.

Despite this, for the general reader *Aspirin* highlights how science is not just confined

to, and fought out within, the laboratory and demonstrates the wider social, political and commercial issues which have bound science to industry and vice versa. The book also shows how science has been used as a powerful tool in exploiting the commercial interests of pharmaceutical giants, and that there is more to brand-names such as Panadol, Aspro, and Ibuprofen than mere packaging!

Tal Bolton
University of Kent
tb40@kent.ac.uk

Edward Grant, *Science and Religion, 400BC–AD1550: From Aristotle to Copernicus Greenwood Guides to Science and Religion*, Greenwood Publishing, 2004, pp. xxvi + 307, £36.99

Richard G. Olson, *Science and Religion, 1450–1900: From Copernicus to Darwin Greenwood Guides to Science and Religion*, Greenwood Publishing, 2004, pp. xxvi + 293, £36.99

To start their new series of textbooks on science and religion, Greenwood Press have produced this two-volume set of historical surveys. Because they are intended for undergraduates, they both include annotated bibliographies and a short selection of primary sources. Given that the historical relationship between science and religion is still widely seen as one of unending conflict, there is certainly a need for good entry-level textbooks on the subject.

Edward Grant has been writing on medieval science for many years and his work has become steadily more revisionist as he has grown older. For those familiar with Grant's previous books on Catholic science in the Middle Ages, there will be nothing new in his latest work. Rather, those academics who do not see the medieval world through Grant's eyes might be nervous that his ideas have been packaged in textbook form. Despite the annotated bibliography, he does not really engage with other medievalists outside the relatively narrow circle of historians of medieval science. Personally, I think he is usually right in what he says and will be pleased if this book leads to his thoughts reaching a wider audience. The only chapter about which I have serious misgivings is the last. Here, Grant briefly touches on Byzantium and

Islam. Whereas the authority of most of the book is enhanced by Grant's careful reading of a great number of primary sources, the last chapter is based on a relatively restricted set of secondary works. He reaches quite strong conclusions on the failure of Byzantine and Islamic science based on this quite limited evidence.

Richard Olson's book is a collection of case studies. The ground that he covers is more familiar than Grant's thanks to many studies on 17th- to 19th-century science and religion. Olson begins with the inevitable recap of the Galileo affair in order to dispel the conflict hypothesis from the start. His second chapter looks at medieval and Renaissance science wherein I spotted two minor errors (Aristotle did not die in Athens and Giles of Rome wrote *Errors of the Philosophers* in 1274, not 1224). This worried me slightly because I cannot be sure that there are not similar mistakes in the parts of the book containing material with which I am less familiar. Assuming their accuracy, I enjoyed the following six chapters and thought they provided a good introduction to subjects such as Jesuit science, Newton's religion, debates about the deluge and finally Darwin. Olson's book is more a synthesis of current scholarship than Grant's and so probably functions better as a textbook. For anyone other than beginning students it is not nearly as good as John Hedley Brooke's *Science and Religion: Some Historical Perspectives*.

Overall, we can only welcome the publication of these textbooks. They may not be perfect, but they contain a great deal of information that undergraduates starting in the history of science will not know. Olson's book will be the more popular, largely because the period he covers is more likely to feature in an undergraduate course. I cannot recommend either of these books to the interested layperson because they are focused too narrowly on the student market.

James Hannam, University of Cambridge, jh430@cam.ac.uk

Theatre

Shelagh Stephenson, *An Experiment with an Air Pump*, Bridewell Theatre, 28 Feb–4 March 2006

In a recent somewhat unenthusiastic review of Carl Djerassi's new play *Taboos*, Ian Johns, in *The Times*, commented that 'science plays tend to fall into certain loosely identifiable genres': first, there are 'the portraits of scientists as troubled misfits'; then 'the dramas

Tower Theatre. Director Sue Lacey admitted that the apparatus consisted of a sweet jar, an upturned plant stand, an old brass rose sprayer, and a few bits of tubing found in the street!



that convert scientific ideas into profoundly imaginative metaphors; and finally 'the "problem plays" that take on the ramifications of a particular issue.' But is the 'science play', with all its genres, a useful concept? Surely it can only reinforce the notion of the remoteness of scientific thought and activity from everyday life. After all, a great many plays deal with 'troubled misfits', but that does not imply that there are genres of plays defined by the misfits' occupations or preoccupations: we hardly think of *Waiting for Godot* as 'a tramp play.' If Johns is right, as soon as a principal character is identified as a scientist, or as soon as the discussion turns to scientific concepts, the play is labelled a 'science play,' and so presumably of interest mainly to aficionados rather than ordinary playgoers.

It was therefore pleasant to have to hand an immediate counter-example to Johns' 'three genres' thesis in Shelagh Stephenson's *An Experiment with an Air Pump*, which was recently presented in London by the Tower Theatre Company. The play was first staged in 1998 and was inspired by the famous painting of almost the same name, by Joseph Wright of Derby. The experiment showed that life, in particular that of a bird, cannot exist in a vacuum, and it is presented in a family setting, with the daughter of the house very distressed at seeing the bird suffer. That Stephenson so explicitly derived her title from the painting led me to fear that we might be in for a glorified lecture on scientific history and principles, but fortunately the play was much more entertaining than this gloomy prognosis suggested.

The action takes place in a house in the North of England, and the central conceit is that of two parallel story-lines, set in 1999 and 1799: the same members of the excellent cast played both the present-day and period characters in a sequence of inter-cut scenes. The contemporary theme is the moral dilemma of a female academic geneticist, inevitably engaged in ground-breaking research, who receives a too-good-to-refuse

involves a good deal of fine distinction and nice ethical argument, which is contrasted with the robust and earthy approach to scientific enquiry that obtained two centuries earlier in the household of the natural philosopher Joseph Fenwick, modelled on that shown in Wright's painting. The overbearing Fenwick makes life a misery for his family in his single-minded pursuit of scientific enquiry, aided by his libidinous and increasingly creepy assistant Thomas Armstrong. Scientific discussions turn largely on sex, the fascination of deformity, and the merits of grave-robbing as a tool of medical advancement, all of which leads to a climax which it would be unfair to reveal, but which provides a far more tangible link to the present than mere coincidence of place.

There is a surprising amount of humour in all this and the play can certainly be enjoyed as straight entertainment, for it does not depend on an interest in science for its appeal. Yet there is much for the historian of science: the Fenwick household shows how selfishness, egoism and a dormant conscience can be the drivers of scientific progress, an ethos which our tortured present-day geneticist would find wholly abhorrent; yet maybe she is, in her own way, similarly driven. And in an ironical touch the play opens with her telling us that as a teenager she was inspired to dedicate herself to science by Wright's painting: at the end, we know, although she does not, that the values she drew from it are very different from the sordid reality that it may have concealed.

This is, I think, too complex a play to be boxed up and pigeonholed as belonging to one of three predetermined genres: it works on too many levels, and for someone who sees a function of the history of science as being the demolishing of barriers rather than their erection, that is good news indeed.

John Heard, Imperial College
john_heard@hotmail.com

PreSciFi: Fantasy Travel in the Eighteenth Century

Patricia Fara argues that SF should stand for Satirical Fantasy, not Science Fiction.

Mary Shelley had a voracious literary appetite. While she was writing *Frankenstein* (1818), she studied Humphry Davy's chemistry lectures, listened to *Gulliver's Travels* (courtesy of her husband) and in a single sitting gobbled up its Scandinavian equivalent – *A Journey to the World Under-ground*, first published in Latin in 1741. Now scarcely known in Britain, this imaginary voyage was favourite reading for authors as varied as Giacomo Casanova, Thomas de Quincey and Edgar Allen Poe. It describes the farcical adventures of Niels Klim, who tumbles down a cave in Norway to discover several planets beneath the surface of the earth, where he encounters bizarre peoples with alien social codes.

Klim's creator – Ludvig Holberg, Denmark's equivalent of Voltaire – wanted to savage corruption, disparage scholarly ambition and ridicule social foibles. Like *Frankenstein*, *Klim* is simultaneously a work of fiction and a social commentary that incorporates contemporary scientific knowledge and can be read at many levels. For instance, in one episode Klim becomes rich and famous by introducing wigs to the inhabitants of Martinia, a satirical version of France enabling Holberg to lambast commercial opportunism and fashionable aspirations (Figure 1).

Shelley may perhaps have been drawn by Holberg's unusually early preoccupation with women's rights. Klim first lands in Potu ('Utopia' backwards), a land populated by intelligent mobile trees (Figure 2). After inadvertently urinating against an eminent

astronomer, Klim is tried for climbing up a female constable. To his astonishment, he discovers that the supreme judge 'was a Virgin ... For among these People there was no Difference of Sexes observed in the Distribution of public Posts; but an Election being made, the Affairs of the Republick were committed to the wisest and most worthy.' He finds himself in an underground province where 'the Males alone perform the Drudgery of the Kitchen, and every such ignoble Labour ... The Females, on the other Hand, are in Possession of all Honours and Employments sacred, civil, or military.' Klim is later banished to the firmament, just below the earth's crust, for proposing a law to banish women from entering the Potuan government.

There are several strong parallels between *Frankenstein* and *Klim*. Both comprise successive narratives embedded like Russian dolls, in which fact and fantasy are inextricably intertwined as their heroes travel to outlandish places. Like Holberg, Shelley explores social issues – education, ethics, gender differences – and in particular, tackles discrimination on the grounds of appearance. The outlandish appearance of her creature is crucial to his rejection by everyone except the blind cottager; once educated out of his original innocence, even he is appalled at his own reflection in a pool. In Potu, an ideal state, Klim repeatedly comments that although its inhabitants resemble trees (Figure 2), they exhibit civilised, rational behaviour, and – in contrast with above-ground terrestrials – refrain from 'flock[ing] in Heaps to any Thing that is new and uncommon, that they may feast their Curiosity.' Holberg knew about racial prejudice from his own experiences in Italy, where 'a young Piedmontese would not believe that I was a Norwegian, because he had learned from a historical itinerary, which he had at Rome, that the Norwegians were a deformed race of people, having pigs' eyes, and mouths which reached to the extremities of their ears.'

Despite their similarities, neither *Frankenstein* nor *Klim* are works of science fiction. It is very tempting to look back and pick out early examples of this genre that is now so popular, but such retrospective re-labelling is anachronistic wishful thinking. Defining what writers meant by 'science' at the time is problematic, because the word itself was constantly changing in meaning. There is no one-on-one mapping of any single 18th-century activity on to any modern scientific discipline: instead, during the 19th century, selected aspects of various interests – collecting, surveying, natural philosophy, navigating, mining – became

linked together in new ways.

There was no sharp distinction between scientific texts and imaginative works of literature, which marked opposite ends of a continuous spectrum. Spread out between the fact/fiction poles lay teaching books that relied on fictional scenarios, and also fictional books that drew on scientific knowledge. Ethical problems about science were aired in fiction, and imaginary travel stories deliberately resembled those of authentic narratives, often incorporating true-life events; reciprocally, educational authors devised fictional settings to engage their pupils' interest in scientific knowledge, and voyages of scientific exploration were narrated as heroic adventures.

Frankenstein shocked because it hovered on the edge of feasibility. Modern alarmists celebrate *Frankenstein* for its prescient warnings of disasters and dilemmas, but Shelley produced a commentary on her own present rather than a manifesto for ours. Modern science fiction shares some aspects of *Klim*, *Frankenstein* and other imaginary voyages – most significantly, they all provide vehicles for making social critiques. However, the label 'science fiction' implies an oxymoronic contrast between two supposed opposites, and depends on the separation of the sciences and the arts that had not been completed in Shelley's time. Then, SF should stand for Satirical Fantasy rather than Science Fiction.

Patricia Fara, University of Cambridge
pf10006@cam.ac.uk



Figure 1: A Martinian inhabitant with a wig. Ludvig Holberg, Nicolai Klimii iter subterraneum (Leipzig, 1745), Plate 3.



Figure 2: A picture of a Potuan citizen, Ludvig Holberg, Nicolai Klimii iter subterraneum (Leipzig, 1745), Plate 2.

Copernicus and the Wild Goose Chase

Mark Brake and Rev. Neil Hook look at an early fictional treatment of Copernicanism

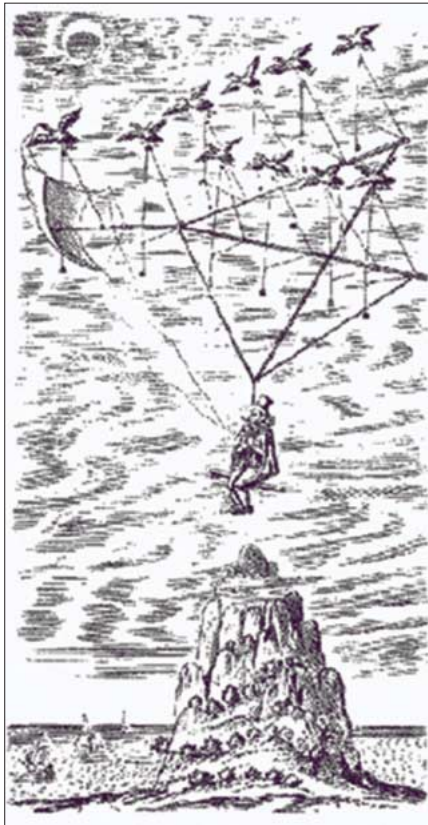
It's a rainy day in London, April 1706. A well-off gentleman eager to impress his good lady decides to take her to the opera. Once seated comfortably in the theatre they are delighted by an extravagant show which features flying geese on wires, a Spanish gentleman of indiscriminate morality, and giant lunar royalty. After the show, they make themselves comfortable and eagerly discuss what they have seen. We can only guess at their topics of conversation, but they had just witnessed a very early and rather revolutionary piece of dramatic science communication: the first science fiction stage play.

The inspiration for Thomas D'Urfrey's comic production, *Wonders of the Sun*, was the world's original science fiction story written in the English language – Francis Godwin's *Man in the Moone*. Like its great rival for the honour of inventing modern science fiction, Johannes Kepler's *Somnium*, Godwin's story is an off-world voyage of discovery greatly influenced by the radical ideas of The New Philosophy, especially those of Copernicus.

Man in the Moone begins with a short account of the events that lead its Spanish protagonist, Domingo Gonsales, away from home to begin his travels. It is on the return journey to Spain from the East Indies that Gonsales is taken ill and is left to recuperate on the island of St Helena. Whilst there, in an effort to amuse himself, he hand rears some 30–40 wild geese, called gansas. Having tamed them, Gonsales has a moment of inspiration. He reasons that the gansas could be trained to carry objects from place to place. Determined to present his rational scheme to the Spanish court, he pays for passage for himself and his flock aboard a ship in a fleet bound for Europe. But the fleet is attacked by British Privateers and Gonsales' ship is breached, and in an effort to reach the nearby shore Gonsales harnesses himself to all of the birds at once. The geese carry him higher and higher. Gonsales suddenly remembers that the geese migrate each year to the Moon to hibernate, and it is to the Moon they carry him.

Godwin then makes direct reference to the new physics:

my Gansas took none other way then directly toward the Moone, but also, that when we rested (as at first we did for many howers) either we were insensibly carried (for I perceived no such motion) round about the Globe of the Earth, or else that (according to the late opinion of Copernicus) the Earth is carried about, and turneth round perpetually, from West to East, leaving unto the Planets onely that motion which Astronomers call naturall.



On leaving the Earth, Gonsales gets progressively lighter, and somewhat heavier on reaching the Moon – a clear example that Godwin was trying to convey a principle like that of gravity, flirted with by Kepler in his *Astronomia Nova* and established by Newton's *Principia* (1687). On the Moon, Gonsales finds a utopia inhabited by a near-immortal race of giants, who can cure even the most mortal wound. Lunar women are so beautiful that no man wants to commit adultery. Indeed, crimes are unknown due to the eugenics programme run by the giants, who identify potential sinners and ship them to Earth, specifically North America!

Francis Godwin, son of Thomas Godwin, Bishop of Bath and Wells, was born in Northamptonshire in 1562. He became a student of Christ Church, Oxford, where he took both bachelors and masters degrees. Whilst sub dean of Exeter Cathedral in 1601 he published his *Catalogue of the Bishops of England since the first planting of the Christian Religion in this Island*, a work which so impressed Elizabeth I that she gifted him the Bishopric of Llandaff. In 1616 he published an edition in Latin with a dedication to King James, who appreciative of this flattery conferred upon him the Bishopric of Hereford. But it was during his time as Bishop of Llandaff that Godwin

conceived his science fictional travelogue.

There are two major influences to be charted within *Man in the Moone*. The early fictional obsession with space voyages began with the rapid powering of the economy from overseas trade through the European voyages of discovery. The influence of accurate celestial navigation upon voyages made at this time has been substantially documented. In his *Treatise of the Sphere*, the Portuguese scholar Pedro Nunes Salaciense wrote in 1537, that there was at this time 'a new sky and new stars'! It was this new spirit of endeavour that influenced Godwin to develop his work; his friendship with Hakluyts the geographer in Hereford, and his contact with merchant adventurers in Llandaff, provided him with ample source material for his narrative.

The second primary influence on Godwin was the revolution in astronomy that was already haunting Europe early in the 17th century. *Man in the Moone* was an extremely high profile and populist treatment of Copernicanism. The format of a fictional biography allowed its wider dissemination and this left a lasting legacy upon all who came across it. Godwin realised that to understand the new Moon of the Copernican universe, it was necessary not only to put one's observations into words, but for the words themselves to be transformed by a new sort of fiction. That's why there is something revolutionary and epoch-making about books like *Man in the Moone* in the history of science. Throwing words at the Moon, as it were, has a dialectic effect – the words come back to us changed. By imagining strange worlds, we come to see our own science in a new and potentially revolutionary perspective.

If Godwin's agenda was to advance Copernicanism then he certainly succeeded. The principal reason for the success of *Man in the Moone* was the profound influence it was to have upon John Wilkins, secretary of the Royal Society and author of a scientific paper that dealt with lunar matters. Wilkins' paper was amended to include an additional fourteenth proposition: "that tis possible for some of our posteritie, to find a conveyance to this other world; and if there be inhabitants there, to have commerce with them". The extraterrestrial hypothesis moved far higher up the scientific agenda after Godwin.

Professor Mark Brake & Reverend Neil Hook
University of Glamorgan

mbrake@glam.ac.uk; nhook@glam.ac.uk

The authors are currently writing *Different Engines: How Science Drives Fiction and Fiction Drives Science* (MacMillan Science)

HSTM People: The Questionnaire

Sally Horrocks is a Lecturer in the School of Historical Studies at Leicester University. She served on Council in the 1990s, and has been the Society's Secretary since 2000. She retires from this role in 2006. Her previous work has focused on industrial science, scientists in the food industry, and post-war industrial research and development. She has just started a project looking at women scientists between the Second World War and the Sex Discrimination Act of 1975.



PHILIP CRANE

Who or what first turned you towards HSTM?

I took the International Baccalaureate at school, in which the Theory of Knowledge – the examination of the basis of knowledge claims in different disciplines – is compulsory. I then took the course in History and Philosophy of Science in my second year studying the Natural Sciences Tripos at Cambridge University. I was better at that than at chemistry, and Stephen Pumfrey was my supervisor. I got hooked on research while doing my dissertation in the history of science in my final year, when I was supervised by Jan Golinski and then Simon Schaffer.

What's your best dinner-table HSTM story?

I've got lots of stories about scientists in the food industry, since this was the topic of my PhD. My favourite is that when Colman's set up a lab in the mid 1920s, one of its early projects was to try to devise a way of making mushroom ketchup without needing to use maggots in the process! It's a good example of the scientization of the food processing industry.

What has been your best career moment?

When students write really good dissertations it is very satisfying, especially when as first years they could hardly put several sentences together. My best research moment was when David Edgerton and I won the T.S. Ashton Prize for the best article submitted to *Economic History Review* by authors under 35, for an article published in 1994.

Which historical person would you most like to meet?

Norman Booth, the chemist behind Cadbury's Dairy Milk. He became the first general manager of the Cadbury's factory in Tasmania. I've got a photograph of him and his laboratory, taken in 1905 or 1906. I'd like to ask him why did he go to Tasmania and never come back?

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

Technology isn't just about nuts and bolts and engines and machines. A colleague from the Sociology Department wanted some reading on technology that women might be interested in, I suggested something on the development of disposable nappies, and he said I hadn't thought about that as a technology.

Do you have a nick name?

One of my colleagues calls me Hollyhocks, but I don't know why. I do do a lot of gardening.

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

Probably something to do with food, either growing it or preparing it. I wouldn't be a chef. I like growing vegetables: I have one and half allotments, and grow more than I can eat.

What are your favourite HSTM books?

I like Janet Browne's two-volume biography, *Charles Darwin* (Pimlico, 1996 and 2003), because it's a great read and very Janet. I also like Maxine Berg's *The Age of Manufactures: industry, innovation and work in Britain 1700–1820* (Fontana, 1985) because it puts women and children back into the Industrial Revolution, and Ruth Schwartz Cowan's *More Work For Mother: The Ironies of Household Technology from the Open Hearth to Microwave* (Basic Books, 1983) because it defines technology to includes things that are part of everyday life, for everybody. I remember reading Roger Cooter's *The Cultural Meaning of Popular Science: Phrenology and the Organization of Consent in Nineteenth-Century Britain* (CUP, 1984) as an undergrad and it suddenly made all the sociology of scientific knowledge stuff click into place.

What would you do to strengthen HSTM as a discipline?

We need a history of science that pays more attention to what most scientists do, that is they work for private companies. I think there is too much attention to just a few individuals and institutions at the expense of a broader picture and a danger that we could return to a history of the great men. Also, too many historians of science write in a way which is incomprehensible to other historians. This narrows the audience for HSTM and makes it difficult to teach HSTM topics to History undergraduates. Historians of science need to drop the conceit that they're more methodologically rigorous than anyone else. Other historians may have different concerns, but it does not make them worse historians!

BSHS Prizes

Web Essay Competition: Who cares?

To celebrate the relaunch of the BSHS website, and the foundation of the Outreach and Education Committee, the BSHS is proud to announce a new competition. We are offering a prize of £250 for the best 500-word answer to this question:

Why should anyone need to know about the history of science?

The winning entry will be made available on the BSHS website. Essays should be written for a general audience; footnotes should be avoided. Entries which are accompanied by one or more images (not exceeding 200KB in memory size), on which there are no copyright restrictions, are especially welcome. The prize may be split between two entries if the judges decide that they are both of high merit.

The competition is open to non-members of the Society, but only one entry per person may be made, and all entrants must be aged 18 or older. Anyone wishing to submit essays should contact outreach@bshs.org.uk to be given an entry identification number, before any essay is sent. This will permit essays to be assessed anonymously.

The closing date for submission is **31st August 2006**. The winner will be announced, and the prize awarded, by the end of October 2006.

Slade Prize

BSHS is pleased to announce that the winner of the 2005 Ivan Slade Prize is Dr **Hasok Chang** (University College, London) for his essay "Adventures of a Scientific Potter: The Rise and Fall of the Wedgwood Pyrometer." The prize of £300 is given by Dr Slade for the best essay dealing with an episode in the history of science from the viewpoint of conceptual innovation or scientific methodology. A formal citation will appear in the next issue of *Viewpoint*. It is hoped to present the prize at the Society's annual conference.

The judges have also decided to award a commendation to Mr **Guy Ortolano** (Washington University in St Louis), for his essay "Human Science of a Human Face? Social History and the 'Two Cultures' Controversy."

Museums

New 'Time Galleries' at the Royal Observatory, Greenwich



The Great Star Room (now the Octagon Room) at the Royal Observatory Greenwich, from an engraving by Francis Place, c. 1676. [Image number F5061]

In 1676, two pendulum clocks were installed at the newly-constructed Royal Observatory, Greenwich, establishing a link between Greenwich and timekeeping that endures today. 330 years later, time is once again in the spotlight at the Observatory, with the opening in February 2006 of a suite of four new permanent 'Time Galleries'.

Together, the new Time Galleries contain almost three times as many artefacts as were on display in the old galleries, and many of the clocks are shown working for the first time in recent memory. Three of the galleries

explore subjects for which the Observatory is famous: Time and Longitude, Time and Greenwich, and Time for the Navy. The fourth, Time and Society, takes a more personal look at time as we use it to make sense of the world and order our lives.

On display are some of the most significant timekeepers ever made, including the famous sea-clocks by John Harrison; Britain's first national standard clock, by Charles Shepherd; one of the earliest timepieces operated by electricity, by Alexander Bain; and the original Edward Dent regulator which provided the time for the BBC 'six-pip' time signal. Astronomical and navigational instruments

on show include telescopes, globes and armillary spheres, as well as the world's first nautical sextant, by John Bird. Important early astrolabes and astronomical compendia complete the sequence.

New additions never seen before include an early and rare prototype quartz clock from 1944, used as the original time standard for the MSF Rugby radio time transmissions started in 1949; a second-generation

telephone Speaking Clock from BT; and an ion trap from the latest optical clocks at the National Physical Laboratory, the Observatory's Science Partner. The Time Galleries, which are free to visit, also include the Observatory's horology conservation workshop, on public view at selected times, and displays of hundreds of marine chronometers, watches, sundials and other timekeepers from the museum's stores, on show for the first time.

David Rooney, Curator of Timekeeping
National Maritime Museum
drooney@nmm.ac.uk



Royal Observatory curator of timekeeping, David Rooney, working in the new horology workshop, visible to the public through a display of 120 marine chronometers. [Image number F5116-003]

Too bold to imagine? Science in fiction

Rebecca Stott reflects on using the imagination in the history of science and the history of science in fiction.

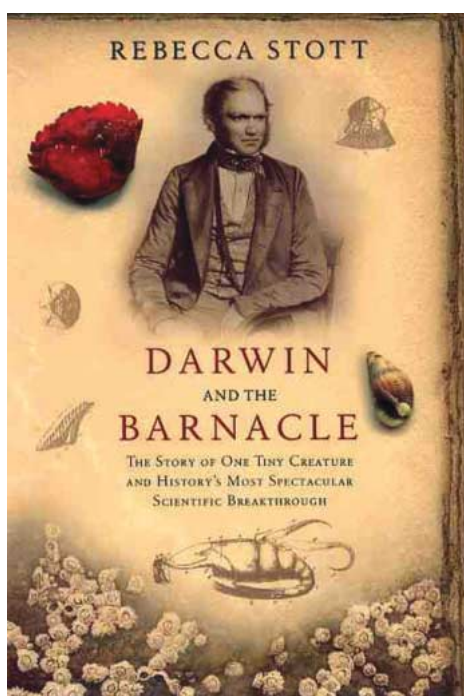
Did Darwin take off his shoes when, as a seventeen-year-old student, he walked on the beach at Leith in Edinburgh, searching for cuttlefish after the night's storms? This was typical of the kind of questions that taxed me when I was writing *Darwin and the Barnacle* (Faber, 2003) a few years ago, a book that attempted to engage with Darwin's eight-year research into barnacles (1846–54) as well as telling that history as if it were an intellectual adventure story for a general reader. I wanted to enable that reader to imagine being a young Darwin on the beach, cold and wind-blown and thinking about the problem of zoophytes as that problem was formulated in 1825.

In writing this book I was lucky enough to be able to draw on the expertise and generosity of a group of Cambridge philosophers, historians, historians of science, literary critics, cultural historians and theologians who attended a reading group which met for two terms to read my book as it was being written. They too were taxed by such questions. Would a young man of genteel birth have taken his boots off to walk on a beach in 1825?

I wanted Darwin's feet un-booted because his bare feet said something about a young man following his private passions for studying nature, a maverick, heading away from the anatomy lectures he was supposed to be attending and heading instead for the sea – surely he would take off his boots once he reached the beach? Together the combined knowledge of all of these academics at the reading group, working across a half dozen different disciplines, failed to answer the question about boots or no boots without 'reasonable doubt'. Did it matter?

These questions were important to ask not because of pedantry but because of establishing authenticity for the educated reader and because the book was an attempt to dramatise and bring to life a historical account of a scientist thinking his way through a puzzle. The publishers – Faber & Faber – had asked me to write a history of science but to tell it 'as if it were a novel'.

So I took some liberties in the name of dramatising history, but I stayed as faithful as I could to the primary materials I was working with. If, for instance, I knew from a Darwin letter that Darwin was worried about some aspect of plant distribution and his pear crop at the same time on a particular day, I wrote a



scene in which Darwin was thinking aloud about plant distribution whilst walking amongst his ripe pear trees. In the end I didn't need to worry. The story telling, the speculations, the reconstructions, were generally admired by reviewers, not seen as the book's Achilles heel.

Since then I have become a bolder speculator not for aesthetic reasons but because I have become curious about what 'fiction' or fictional reconstructions can do in a certain kind of historical writing. I have migrated from writing history of science 'as if it were a novel' to writing fiction based on the history of science.

My new book, *Ghostwalk* (Weidenfeld and Nicholson, March, 2007) is a literary thriller set in part in 17th-century Cambridge, in part in contemporary Cambridge and driven by both the entanglement theory of quantum physics and in part by the questions Newton was asking in 1665 about optics. It is not science fiction, but rather fiction that draws on the imaginative possibilities opened up by the history of science and by fascinating questions that conventional histories raise but sometimes cannot answer.

In writing *Ghostwalk* I have been driven by several tricky and interesting questions – what if Newton had been so caught up in alchemical circles in the 1660s when he was

first in Cambridge as a young student, what if he was so desperate for a fellowship, that he was prepared to get involved in shady dealings? Or what if Newton was not the recluse we think him – what if he had a secret fellow experimenter? How did the plague, then spreading across Britain, affect his early optical experiments? What was it like to be in Cambridge with plague approaching? Who made the glass prism that were so central to his experiments with light?

Readers of a historical novel would, I hoped, not be so taxed by questions of absolute 'foot-noteable' truth and so I would be freer to speculate about the relationships between optics, alchemy, prisms and plague, but the authenticity and verification of the historical source materials was no less important. *Ghostwalk* has some footnotes because those historical sources – biographies, histories of glass, histories of optics and also the rich source materials provided on line by the Newton Project (<http://www.newtonproject.ic.ac.uk>) – are where the questions began.

The natural philosophers I am studying were speculators – they used their imaginations to formulate new questions: what if the age of the earth was greatly older than we have previously thought? What if we evolved from aquatic filaments? 'Would it be too bold to imagine' is the question that Erasmus Darwin repeated several times in the famous generation chapter in *Zoonomia* – no, never too bold to imagine surely? There are many different ways of reaching back into the past and there is also, I would argue, a role for the novel in thinking our way back into the past, as a way of asking questions about what might have been, about aspects of history that are not recoverable from archives alone.

Rebecca Stott
Anglia Ruskin University, Cambridge
r.k.stott@anglia.ac.uk

Rebecca Stott is currently working on two books that draw on the same source materials: an academic monograph for Chicago University Press on the history of evolutionary ideas before Darwin called *Speculators* and a novel for Weidenfeld and Nicholson called *The Coral Thief*.

Outreach and education: *Ideas About Science*

Alice Nicholls presents a case study that could be explored within the GCSE science curriculum

Launching nationwide in September, the new *Twenty First Century Science* GCSE curriculum aims to expand students' understanding of *Ideas About Science*. The examining board, OCR, explains: *it is important not only to understand some of the fundamental scientific explanations of the behaviour of the natural world, but also to know something about science itself, how scientific knowledge has been obtained, how reliable it therefore is, what its limitations are, and how far we can rely on it – and also about the interface between scientific knowledge and the wider society.*

Real-life case studies can give *Ideas About Science* true meaning. At the annual conference of the Association for Science Education in January 2006, I looked at how studying work of epidemiologist Alice Stewart can generate teaching opportunities in the new curriculum. Stewart's story has the potential to engage students' attention with its hooks – a woman in science, researching an emotive issue, whose findings were debated and contested by her peers.

Alice Stewart and childhood cancer

An outstanding physician, Alice Stewart was the youngest woman elected as a Fellow of the Royal College of Physicians in 1946. As an epidemiologist she became deeply involved in issues of radiological protection. Despite fierce debate throughout her career, her work on the Oxford Survey of Childhood Cancers is widely acknowledged for its contribution to our understanding of the connection between antenatal x-rays and childhood cancer.

In the 1950s, the incidence of leukaemia was increasing. Stewart and her team looked at the statistics – the disease mainly affected people over the age of 50, and children



Alice Stewart (1906–2002)

aged between 2 and 4, and it occurred more frequently in countries with better healthcare facilities – and asked why this was the case.

Stewart collected data about all children in England, Scotland and Wales who died from cancer from 1953 on, matching each cancer death to a live control child. Data was obtained from death certificates, interviewing mothers, and examining medical records. Stewart's initial findings were published in *The Lancet* (1956) and the *British Medical Journal* (1958) and were contested and then corroborated by other scientists. Her own survey continued until the 1980s. Stewart found that antenatal exposure to x-rays increased the risk of childhood cancer by almost half.

Teachers can use Stewart's survey as a case study for teaching three of the *Ideas About Science* specified in the syllabus (specification numbers in brackets).

Correlation and cause

Factors might increase the chance of an outcome, but do not invariably lead to it (2.5):

Stewart's survey found that children exposed to x-rays *in utero* had about a 40% greater risk of cancer than children not exposed. The risk was highest for children born during the 1940s, before radiation doses were reduced.

Sample match and size (2.6): To reach her conclusions, Stewart compared samples matched by age, gender and geographical location. The survey was carried out for almost 30 years – one of the longest running case-controlled studies of childhood cancer. Over 14,000 cases and their matched controls were analysed between 1953 and 1979.

The scientific community

The peer review process (4.1): Stewart published her findings in peer-reviewed journals. Richard Doll, William Court-Brown and A. Bradford Hill refuted her claims in a paper of 1960. As esteemed researchers, their influential study delayed acceptance of Stewart's findings. Obstetricians were reluctant to change their practice.

A scientific explanation is rarely abandoned just because some data are not in line with it (4.4): Stewart recalled, 'they went on x-raying, so we went right on monitoring.' Further studies in America and Sweden confirmed the association between antenatal x-rays and childhood



Mobile x-ray machine, 1940–1955. Science Museum/SSPL.

cancer. The research eventually led to a change in practice: in 1980, 3% of pregnant women had an x-ray examination, compared to 42% in 1970. The availability of an ultrasound service from 1976 also contributed to this change.

Risk

New technologies often introduce new risks (5.1): X-rays had been in popular clinical use for about 20 years before Stewart studied their effect on childhood cancer. There were other risks with new x-ray technology – overexposure could lead to burns, and the cellulose nitrate films were flammable.

Benefits of activities that have a known risk (5.4):

You could ask your class: would you give a pregnant woman an x-ray if it was the best way to diagnose a life-threatening injury? What if radiotherapy was her best choice of treatment for cancer?

Further reading

Although criticised for imbalance, the following biography is a good place to start: Gayle Greene, *The Woman who Knew too Much: Alice Stewart and the Secrets of Radiation* (University of Michigan Press, 1999).

Other scientists' anniversaries in 2006

Further teaching opportunities were promoted at the conference by Peter Ellis and Peter Fowler, who gave presentations on chemist Amedeo Avogadro (d.1856) and astrophysicist Meghnad Saha (d.1956) respectively.

Alice Nicholls, Science Museum
alice.nicholls@nmsi.ac.uk

Further information: outreach@bshs.org.uk

History of Science at the Royal Society



Since its foundation in 1660 the Royal Society and its Fellows have endeavoured to promote its own history and iconography of its 'brightest stars' in establishing its authority. Today, through a fellowship scheme, educational programmes, public events, grants, open access to its archives, and publishing activities, the Society hopes to encourage academic research and public interest not just in the History of Science, Technology and Medicine, but in science itself. The following is a brief summation of the activities currently undertaken in the field and which are being developed over the next few years leading up to the Society's 350th Anniversary in 2010.

The annual Wilkins-Bernal-Medawar Lecture is the Society's premier award in the history and philosophy of science. Previous lecturers include Lewis Wolpert, Lisa Jardine and Roy Porter. The Wilkins-Bernal-Medawar Lecture itself forms parts of a wider range of lectures, debates and exhibitions which are free-of-charge, open to all and available to view at no cost from the Society's video-on-demand facility (a complete archive of lecture videos can be downloaded from www.royalsoc.ac.uk/live). Full details of the Society's public events can be accessed at www.royalsoc.ac.uk/events.

The Society's education programme focuses mainly on science and mathematics in schools and colleges, but the history of science is gaining profile as part of the science curriculum at this level, and is known to engage some students who otherwise dislike traditional science subjects. In recognition of this, the Society has supported the development of an AS level in the History, Philosophy and Ethics of Science by providing advice, access to our archives, funding for publicity and trial materials, and representation on a steering group. Known as 'Perspectives on Science', this qualification has also been supported by the BSHS and is currently being piloted in schools by the awarding body Edexcel. The Society also seeks to make our library archives accessible to education audiences by showcasing at our annual Summer Science Exhibition which is attended by around 1000 post-16 students each year, offering small group tours for teachers and young people, and responding to opportunities like the Young Cultural Creators scheme which enabled us to work in partnership with a local school, library and children's author to provide an inspirational experience for Year 9 students based on objects from our archives.

The Royal Society's Library is well-known as a repository and information source for the history of science. Although often associated

with the development of natural philosophy in the 17th century, the Library covers all periods of scientific endeavour and the most recent accessions of manuscripts are most often collections of 20th-century Fellows' papers. A most exciting recent acquisition, Robert Hooke's draft Council Minutes, was returned to the Royal Society on 17 May and digitized versions will be made available on the Society's website as soon as possible. The originals will be on display during our Summer Science Exhibition this year between 3 and 6 July and the September issue of *Notes and Records of the Royal Society* will include Lisa Jardine's article covering the significance of the manuscript, and should be available online before the end of the summer.

The Library maintains online archive and library catalogues, both rapidly expanding with monthly releases of newly-compiled information. The combined resource now stands at 163,000 records, with supplementary images, documents and over 8,000 biographies of Royal Society Fellows. The Library also acts as commissioning agent for the published essays of historical record, *Biographical Memoirs of Fellows of the Royal Society*.

A highly-regarded picture library service is offered to historians of science. Related promotional activities include the use of the Library and its resources by film crews as television-based interest in history of science becomes increasingly common. The Library holds regular exhibitions of archival material (this summer's focus is on Benjamin Franklin) and encourages both scholarly and educa-



Inquiring minds: Summer Science Exhibition

tional uses of its reading rooms. Informal talks, tours for visitor groups and use of facilities for student seminars are all encouraged.

In addition to funding 50 per cent of the British Academy-Royal Society Postdoctoral Fellowship in the History of Science, currently held by Dr Richard Noakes at Cambridge University (until Jan 2007), the Society, through the Library Committee, offers grants in support of History of Science Projects. Some involve the long-term backing of particular scholarly endeavours, such as the Cambridge-based Charles Darwin Correspondence Project. Other support is available for one-off or short term projects, such as assistance in conference or event organisation. In the run-up to the Society's 350th anniversary, this type of activity is likely to acquire increasing significance, and the committee will entertain new and unconventional suggestions to raise the profile of historical study.

Along with *Biographical Memoirs*, the Society publishes *Notes and Records of the Royal Society*, its premier journal on the history of science. *Notes Rec. R. Soc.* provides a rapid reviewing service for authors with a target of 60 days from receipt to acceptance and articles can expect to be published through FirstCite Early Online Publishing within 50 days of finalization, ahead of the bound issue which is published in January, May and September each year. *Notes Rec. R. Soc.* includes peer reviewed scholarly articles, revealing reminiscences and discoveries, archive and project reports and authoritative book reviews relating to the history of the Royal Society and its Fellows, either directly or indirectly. A guide for authors and instructions for electronic submission, access to past articles, and registration for email alerts can be accessed at www.pubs.royalsoc.ac.uk.

The Society is currently working to broaden its activities in the history of science and wishes to encourage those in the field to use its extensive facilities and numerous resources in addition to playing a part in this development by contributing comments and suggestions. Further enquires or feedback can be sent either via the website which is accessed at www.royalsoc.ac.uk, or to Jilliene Jewell (jilliene.jewell@royalsoc.ac.uk).



Picture Library: Comic strips promoting the use of penicillin (True Comics, Dec. No. 41, 1944).

Listings

Conferences

European Society for the History of Science: Second International Conference
'The Global and the Local: History of Science and Cultural Integration of Europe', Cracow, 6–9 Sep 2006. See www.eshs.org/news/conference.html.

Historicide and Reiteration: Innovation in the sciences, humanities and the arts
Faculty of Arts and Culture, Maastricht University, The Netherlands, 9–10 Feb 2007. This symposium presents contributions from the history and sociology of science, the history of art, the history of literature, literary theory, and philosophical aesthetics. See www.easst.net/node/709.

History of Science Society
Annual Meeting at Vancouver, 2–5 Nov 2006. Annual Meeting at Washington, 1–4 Nov 2007. Further details at www.hssonline.org.

Society for the History of Alchemy and Chemistry: Chemistry and Publishing
Science Museum Lecture Theatre, Science Museum, South Kensington, London 26 Oct 2006, 1.45pm
This half-day meeting will examine various aspects of chemistry and the written word from early modern times to the present. For further details please see www.ambix.org or contact Dr Anna Simmons (A.E.Simmons@open.ac.uk) or at Department of History of Science, Technology and Medicine, The Open University, Walton Hall, Milton Keynes, MK7 6AA.

Courses/Programmes

The Sciences in Historical Context
University of Vienna, Faculty of Historical and Cultural Studies, with the Faculties of Life Sciences, Mathematics, Philosophy/Education and Physics. The Doctoral Program 'Naturwissenschaften im historischen Kontext/The Sciences in Historical Context' announces the award of up to 12 doctoral student positions beginning 1 October 2006. Deadline 14 June 2006. Contact mitchell.ash@univie.ac.at

Exhibitions

American Innovator: the life of Benjamin Franklin
Entrance Hall, British Library, 8 Apr–5 Jul 2006. 2006 marks the 300th anniversary of the birth of Benjamin Franklin, printer, innovator, scientist, American patriot and diplomat. This small display celebrates Franklin's life and long connection with letters, London and science, his work as a printer, his role in the Enlightenment's 'Republic of Letters' and the dramatic birth of the American Republic. It showcases

several unique Franklin items that he either printed or wrote by hand, including a letter written to one of the founders of the British Museum's collections, Sir Hans Sloane, offering a 'salamander' purse – a bag made of asbestos now held by the Natural History Museum.

Wireless World: Marconi & the making of radio

Museum of the History of Science, Broad Street, Oxford, to 1 Oct 2006.

The Marconi Collection has been presented to the University of Oxford by the Marconi Corporation. The paper material has gone to the Bodleian Library and the objects to the Museum of the History of Science. In this exhibition, library and museum combine to present some of the extraordinary riches of the collection, from Marconi's research and trials of the late 19th century to the beginnings of radio broadcasting in the 1920s. It includes equipment used to send the first messages across the English Channel and across the Atlantic, original records of radiograms exchanged during the sinking of Titanic, and equipment from World War I and from the pioneering days of broadcasting before the BBC.



*Guglielmo Marconi.
Museum of the History of Science*

Vacancies

British Association

The History of Science Section of the British Association needs a new Recorder to organise the history of science programme of the annual meeting of the Association. If you are interested in undertaking this valuable outreach role for our subject please contact Peter Reed, Peter@peterreed.plus.com

Websites

"The Electric Century"

How did technologies like CDs, DVDs, batteries, and jpeg files end up having pretty much the same form anywhere we go in the world? This didn't happen naturally. This year sees the centenary of an organization that did much of the diplomatic work to encourage shared standards and formats: the International Electrotechnical Commission. To celebrate its centenary the IEC has launched an interactive web resource on the scientists, engineers and technologies involved at www.iec.ch/100years/techline/

To advertise:

Email the Editor: newsletter@bshs.org.uk.

Further listings:

A comprehensive newslist is available on our website: www.bshs.org.uk/hstm/news.

BSHS conferences

Annual Conference 2006

University of Kent, Canterbury, 7–9 July 2006

Scientists and Social Commitment: historical perspectives on the political, religious and philosophical ideas and activity of scientists

Science Museum, London, 15–17 September 2006

BSHS Postgraduate Conference 2007

University of Durham, 4–6 January 2007

The 2007 postgraduate conference will be hosted by the Department of Philosophy at the University of Durham. The conference, organised by postgraduates for postgraduates, is a great opportunity to make contacts and develop friendships within the postgraduate community, both across the UK and internationally. In keeping with previous conferences, we aim to bring postgraduates together in an open, friendly, and stimulating environment. We particularly seek to encourage those students who are geographically and institutionally more isolated.

Further details: www.bshs.org.uk/bshs/conferences

The British Journal for the History of Science

The June issue of BJHS will contain the following articles:



- Peter Bowler: Presidential address: 'Experts and publishers: writing popular science in early twentieth-century Britain, writing popular history of science now'
- Jon McGinnis: 'A medieval Arabic analysis of motion at an instant: the Avicennan sources to the forma fluens/fluxus formae debate'
- Paul Elliott & Stephen Daniels: 'The "school of true, useful and universal science"? Freemasonry, natural philosophy and scientific culture in eighteenth-century England'
- Faidra Papanelopoulou: 'Gustave-Adolphe Hirn (1815–1890): engineering thermodynamics in mid-nineteenth-century France: 6–1870'
- Claire Brock: 'The public worth of Mary Somerville' (an expanded version of the essay awarded the 2004 BSHS Singer Prize)

www.bshs.org.uk/bjhs

Viewpoint: the Newsletter of the BSHS

Contributions

All contributions and correspondence should be sent to the Editor, Dr Rebekah Higgitt, Institute of Geography, The University of Edinburgh, Drummond Street, Edinburgh EH8 9XP; newsletter@bshs.org.uk. Electronic communication is preferred. Viewpoint is issued three times a year – in February, June and October. The next issue will be in October 2006 and the deadline for copy is **18th August 2006**.

Circulation

Enquiries about circulation should be sent to the BSHS Executive Secretary, 5 Woodcote Green, Fleet, Hants GU51 4EY, UK. Tel: +44 (0)1252 641135; execsec@bshs.org.uk. Viewpoint is free to BSHS members and is priced £10.00 a year (three issues) for non-members.

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All enquiries to the BSHS Executive Secretary, 5 Woodcote Green, Fleet, Hants GU51 4EY, UK. Tel: +44 (0)1252 641135; execsec@bshs.org.uk.

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