The British Society for the History of Science

BSHS ANNUAL CONFERENCE

Swansea University

2-5 July 2015
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Emergency Contact Details

Contact Details for Campus Accommodation

Preseli Reception
Swansea University
Singleton Park
Swansea
SA2 8PP

Tel: 01792 602910

The Reception Office is staffed 24 hours per day.

University Switchboard

Dial 5678 on an internal phone, or 01792 205678 from an external one (Monday to Friday, 08.30-17.00).

Security, Emergency Services, Police

In the event of an on-campus emergency, dial 333 from any internal telephone; your call will be answered by the University Switchboard during the daytime and by the security team based in Fulton House after hours. If you contact the emergency services by dialling 999 from your own telephone whilst on campus, the University asks that you subsequently dial 333 from an internal telephone, so that the emergency services can be assisted and directed by University staff.

Off-campus, dial 999 on any telephone to contact the emergency services.
Welcome to the BSHS 2015 Annual Conference!

With over 160 delegates from 22 countries, this first BSHS conference in Swansea promises to be as intellectually and socially exhilarating as BSHS regulars have come to expect. There are over 40 sessions, featuring talks and roundtables on everything from anatomy and audiology to rats and race, and from correspondence and computing to Islam and illustrations. As ever, the range of tours, special events and extracurricular activities, including an HSTM Wikipedia Edit-a-thon and an evening reception at the National Waterfront Museum, is imaginative and impressive. And for those wanting a literal taste of Wales, you can look forward to a Saturday evening menu that includes traditional cawl (soup), Welsh lamb, lemon posset with Penderyn whisky cream and Welsh cakes.

Given a programme as crowded with enticing options as the one you hold in your hands, it would be easy to overlook a rather humble-sounding entry: the BSHS Extraordinary General Meeting, or EGM, due to take place at 1.30 pm on Saturday. But if you can come along, please do, as, alongside traditional EGM business, we’ll be discussing the question of whether, in addition to participating in the Three Societies conference in Edmonton next June, the BSHS should run its own conference in 2016 – and if so, when, what sort etc. Our two ‘sister’ societies, HSS and CSHPS, will be running their own annual conferences next year and there are several considerations in favour of the BSHS doing something too. But a 2016 BSHS conference would be a break with precedent, so my Council colleagues and I are the more grateful in advance for your views and good ideas, on this as on all other aspects of the BSHS’s activities. (For the latest on the latter, do have a look at the recently revamped BSHS website, at www.bshs.org.uk.)

Our annual conference – normally the highpoint of the year for the BSHS – could not take place without the backstage work of a number of people and organizations. It is a great pleasure to acknowledge the expert and heroic efforts of lead local organizer Adam Mosley and his Swansea colleagues, along with members of the BSHS Conferences Committee, in particular Ben Marsden, the chair of the committee, and John Henry, the programme coordinator. We also thank the BSHS executive secretary Lucy Santos, the chair of the Outreach and Education Committee Jamie Stark, our web manager Jia-Ou Song, Malcolm Noble, and various other members and officers of BSHS Council. Finally, we are grateful to the Learned Society of Wales and the College of Arts and Humanities, Swansea University, for their financial support for the conference.

I hope you will enjoy this year’s conference, and may its warm glow prompt you to return to future BSHS meetings!

Greg Radick
President, BSHS
Local Gazetteer

**ATMs** On campus the most accessible of these are located on the ground floor of Fulton House and the Taliesin Arts Centre. Off campus they are readily found in the city centre, in the Uplands and in the Mumbles.

**Bookshops** On campus: John Smith’s, Taliesin building. Off campus: Waterstones, 17 Oxford Street, SA1 3AG.

**Breakfast** Breakfast will be served in the Fulton Refectory (The Venue), on the first floor of Fulton House, from 07.30 to 09.00.

**Buses** Delegates arriving by train or coach may take the 4/4A bus direct to Swansea University; this service runs approximately every fifteen minutes at peak times. A day ticket, costing £4.20, is an economical way to travel around the city via this and other First bus services.

**Cafés** On campus: Blas (ground floor of Fulton House); Fusion (first floor, Fulton House); Callaghan’s (basement, James Callaghan building); Cafe Glas (first floor, Institute of Life Sciences); Taliesin (first floor, Taliesin Arts Centre). All but Taliesin are open weekdays only, and usually during restricted hours in the vacation.

City centre: independents include The Cwtch (Saint David’s Place, SA1 3LG); Kardomah (11 Portland Street, SA1 3DH); and The Snow Lodge (9 Caer Street, SA1 3PP). Chain outlets comprise Starbucks (812 Oxford Street, SA1 3AF); Coffee#1 (26-36 Princess Walk, SA1 5HE); and Costa (at 9-11 Whitewalls, SA1 3AA, the bus station, and the train station).

Uplands: Costa (32 Uplands Crescent, SA2 0PG); Steam (75 Uplands Crescent, SA2 0EX).

**Checking in/out** Accommodation check-in is from 14.00 on the day of arrival; check-out is from 10.00. During the registration period (14.00-17.00 on Thursday 3 July), delegates may collect their room keys at Registration in the Faraday Foyer; after opening Registration, delegates should collect their keys from the Reception desk in the Preseli Building.

A luggage store will be available in the Faraday Building from 11.00 for delegates arriving before registration opens. A luggage store will be available in Fulton House on Sunday 5 July for delegates attending academic sessions after check-out.

**Chemist/Pharmacy** Boots Pharmacy has outlets in the city-centre (Quadrant Shopping Centre, SA1 3AD), and the Uplands (51 Uplands Crescent, SA2 0NP).

**Doctor** The University Health Centre, an NHS Medical General Practice, is located on the ground floor of the Penmaen building. Call 5321 from an internal phone, 01792 295321 from an external one, 08.30-18.30, Monday to Friday. For out-of-hours medical advice (evenings and weekends), call 0330 123 9180.
**Groceries/Newspapers**

On campus: Costcutter, ground floor of Fulton House, is open 08.00-19.00 Monday to Friday, 09.00-18.00 Saturday and Sunday. Off campus, delegates will have little difficulty locating a convenience store, supermarket, or newsagent in the city centre or in other parts of Swansea.

**Internet**

Wifi internet access is available via eduroam and the conference-wifi network.

**Library**

The University Library is open from 08.00-22.00, Monday to Saturday. Swansea Central Library can be found in the Civic Centre (Oystermouth Road), and is open from 08.30-20.00 on weekdays, 10.00-16.00 at weekends.

**Police**

Swansea Central Police Station, Gove Place, SA1 5EA (24 hrs). Telephone 999 in an emergency, 101 otherwise. If you are on campus and using a campus phone, dial 333 in the event of an emergency.

**Parking**

On-campus parking is extremely limited during the daytime. Delegates who wish to bring a car are encouraged to park at the nearby Recreation Ground car park, just east of the University campus on Mumbles Road.

**Post / Mail**

There is an on campus post office on the ground floor of Fulton House, open Mondays to Fridays only. There is a post box immediately outside it. Swansea’s main post office is located within WH Smith in the Quadrant Shopping Centre.

**Printing**

Delegates are encouraged to print hard copies of travel documents and their conference papers before they arrive in Swansea; printing facilities are not easily accessed by visitors to the campus. It may be possible to arrange for small quantities of essential printing; please inquire at the conference information desk.

**Pubs**

On campus, JCs bar, on the second floor of Fulton House, will be open until midnight throughout the conference. Nearby pubs include The Pub on the Pond (Singleton Park, by the Boating Lake, SA2 8PY) and The Rhyddings Hotel (Brynmill Ave, SA2 0BT). A slightly longer walk away (20 mins), in the Uplands, can be found The Uplands Tavern (42 Uplands Crescent, SA2 0PG) and Noah’s Yard bar (38 Uplands Crescent, SA2 0PG).

In the city centre, Wind Street is famous for its bars, pubs, and clubs. Establishments on Wind Street include Bambu, the No Sign Wine Bar, Peppermint, Revolution, Walkabout, and Wetherspoons. Elsewhere, No. 6 Bar (6 Princess Way, SA1 3LW), specialises in cocktails and gins; The Brunswick Arms (3 Duke St, SA1 4JJ), is a traditional pub serving real ales.

**Registration**

Opening registration will occur from 14.00-17.00 in the foyer of the Faraday Building. The registration and information desk will remain in the Faraday Foyer throughout the conference, opening shortly before academic sessions commence.

**Taxis**

There is a free phone direct to a local taxi firm near the main entrance of Fulton House (17), opposite the university reception. Local firms include Swansea Cabs (01792 588588); Yellow Cabs (01792 644446); and Station Cabs (01792 477477).

**Vending machines**

Vending machines can be found to the rear of Union House and on Level 2 of the Library.
7 - Library and Information Centre
Richard Burton Archives, Wikipedia Edit-a-thon venue

8.1 – Faraday Building
Registration and information desk, academic sessions, plenary lectures, arrivals luggage store

17 – Fulton House
University reception, supermarket, JC’s (student bar), lunch and dinner venue, tea and coffee (Sun), departure luggage store & key drop-off

20 - Preseli
24hr accommodation reception

31 – Taliesin Annexe
Conference tea and coffee (Fri/Sat), publishers’ stands

32 – Taliesin Arts Centre
Bookshop, Gallery & Shop, Egypt Centre, Bank, Restaurant, Cinema/Theatre
Programme

Thursday 2 July

14.00-17.00  
**Opening registration and check-in**  
Faraday Building Foyer

14.30-16.30  
**Postgraduate meet and greet**  
JC’s bar, second floor, Fulton House

15.15-15.45  
**Richard Burton Archives Tour**  
Level 1, Library & Information Centre

17.00-18.30  
**Opening Plenary Public Lecture: Prof Iwan Morus, ‘The Day the BAAS Came to Swansea: 1848 and All That’**  
Faraday Lecture Theatre

19.00–20.00  
**Buffet Dinner**  
Refectory, first floor, Fulton House

20.15–22.00  
**Film showing: À nous la liberté (Rene Clair, 1931)**  
Lecture Room A, third floor, Fulton House

JC’s bar, on the second floor of Fulton House, will be open to delegates from 17.00 until 23.59 throughout the conference. Please ask bar staff for plastic ‘glasses’ if you intend to consume your beverages outside of JC’s.

Friday 3 July

07.30–09.00  
**Breakfast**  
Refectory, first floor, Fulton House

09.00–10.30  
**Academic sessions**  
(Details below, under ‘Full Listing of Academic Sessions’)

**Tours and drop-in sessions**  
(Details below, under ‘Tours and Special Events’)

10.30–11.00  
**Break**  
Taliesin Annexe

11.00–13.00  
**Academic sessions / Tours and drop-in sessions**

13.00–14.00  
**Lunch**  
Refectory, first floor, Fulton House

14.00–16.00  
**Academic sessions / Tours and drop-in sessions**

**HSTM Wikipedia Edit-a-thon**  
Training Room 3, Level 4, Library & Information Centre
16.00–16.30  Break  
Taliesin Annexe

16.30–18.00  **Prize-Giving Ceremony for the Pickstone and Dingle Prizes**  
Faraday Lecture Theatre  
(Details below, under ‘Tours and Special Events’)

18.00–20.30  **National Waterfront Museum Reception & Guest Lecture**  
National Waterfront Museum, Oystermouth Road, Maritime Quarter, SA1 3RD  
(Details below, under ‘Tours and Special Events’; for directions, see ‘How to get to the National Waterfront Museum’, in your conference pack)

**Saturday 4 July**

07.30–09.00  **Breakfast**  
Refectory, first floor, Fulton House

09.00–10.30  **Academic sessions**

10.30–11.00  **Break**  
Taliesin Annexe

11.00–13.00  **Academic sessions / Tours and Trips**

13.00–14.00  **Lunch**  
Refectory, first floor, Fulton House  
**BSHS Extraordinary General Meeting**  
13.30 Faraday Lecture Theatre

14.00–16.00  **Academic sessions**

16.00–16.30  **Break**  
Taliesin Annexe

16.30–18.00  **Academic sessions**

18.15–19.30  **Presidential Address: Prof Greg Radick, ‘Experimenting with the Scientific Past’**  
Faraday Lecture Theatre

20.00–21.30  **Conference Dinner**  
Refectory, first floor, Fulton House

21.45 onward  **Whisky Tasting**  
Room West, first floor, Fulton House
**Sunday 5 July**

07.30–09.00  **Breakfast**  
Refectory, first floor, Fulton House

09.30–11.00  **Academic sessions**

11.00–11.30  **Break**  
Fulton House Foyer

11.30–13.00  **Academic sessions**

13.00–14.00  **Boxed Lunch**  
Fulton House Foyer

14.00–16.00  **River Cruise**  
(Details below, under ‘Tours and Special Events’)

Tours and Special Events

Thursday 2 July

14.30–16.30

Postgraduate Meet and Greet
(JC’s bar, second floor, Fulton House – building 17 on campus map)

An opportunity for postgraduate students to meet one another before the official opening of the conference, in an informal setting.

Hosts: Elizabeth Jones (UCL) and Alice White (University of Kent)

15.15–15.45
Repeated Friday at 14.15–14.45 and at 15.15–15.45

Richard Burton Archives Tour
(Level 1 West, Library and Information Centre - building 7 on campus map)

A brief behind-the-scenes tour of Swansea University’s archives and research collections centre.

Advance sign-up required: http://bshs15archivesthursday.eventbrite.co.uk

20.15–22.00

Film showing: À nous la liberté (Rene Clair, 1931)
(Lecture Room A, third floor Fulton House – building 17 on campus map)

Introduced by: Dr Tim Boon (Science Museum, London)

A joyful romp of a film, directed by one of the masters of French cinema, that at the same time compellingly satirises all the issues of industrial culture in the interwar years. As an early sound film, it also comes from a key moment in the development of cinematic technology. In this case, with its sure-footed adoption of asynchronous sound – it has a score by Georges Auric, one of Les Six - it exemplifies one of the possibilities thrown up by sound-on-film. In both senses it is an important text for historians of twentieth-century science and technology.

Clair recalled: ‘At that time I was rather extreme Left Wing, and I wanted to fight the machine that was enslaving man instead of contributing to his happiness ... [the film is directed against] ... the idea of the sanctity of work when it is uninteresting and non-individual. ... In order to avoid everything that might make it look like a problem picture, I retained the operetta formula. I wanted to get to the audience, and I thought that the bitter pill I was preparing would be more easily swallowed if it was coated in amusing music.’

You will come out singing the songs.
Friday 3 July

10.00–13.30
Repeated at 14.15-16.00

**Richard Burton Archives Drop-in Session**  
(Level 1 West, Library and Information Centre - building 7 on campus map)

An opportunity to see a display of archival materials and rare books relating to the history of science, technology, and industry, in the reading room of Swansea University’s archives and research collections centre.

11.30–12.00
Repeated Saturday at 11.30-12.00

**National Waterfront Museum Tour**  
(Oystermouth Road, Maritime Quarter, SA1 3RD – see ‘How to get to the National Waterfront Museum’, in your conference pack)

The National Waterfront Museum tells the story of industry and innovation in Wales, now and over the last 300 years; in addition to the material in its permanent galleries, it is currently exhibiting ‘From Pithead to Sick Bed and Beyond: The Buried Story of Disability in the Coal Industry Before the NHS’, part of the Wellcome Trust-funded project, *Disability and Industrial Society: A Comparative Cultural History of British Coalfields, 1780-1948*. Join Waterfront Curator Steph Mastoris for a brief tour and introduction to the museum, after which he will remain available to answer questions about the museum and its collections.

Advance sign-up: [http://bshs15waterfrontfriday.eventbrite.co.uk](http://bshs15waterfrontfriday.eventbrite.co.uk)

14.00–16.00

**HSTM Wikipedia Edit-a-thon**  
(Training Room 3, Level 4, Library and Information Centre – building 7 on campus map)

Organiser: James Stark

An afternoon of communal updating of Wikipedia entries on subjects related to the history of science, technology and medicine. Wikipedia is one of the most high-profile and frequently consulted public reference sources, and we want to make sure that the content is as high-quality as it can be. With well over 100 leading experts in the history of science heading to Swansea, it is the perfect time to bring along your ideas for Wikipedia pages which need creating from scratch, updating or expanding. We are especially keen for contributions on marginal, forgotten or missing figures or places, and some of the edited pages will be featured on the BSHS website. We will provide tutorials for beginner Wikipedians, so now is your chance to get involved!

Advance sign-up: [www.bshswikipedia15.eventbrite.co.uk](http://www.bshswikipedia15.eventbrite.co.uk)
14.15–14.45
Repeated at 15.15-15.45

**Richard Burton Archives Tour**
(Level 1 West, Library and Information Centre - building 7 on campus map)

A brief behind-the-scenes tour of Swansea University’s archives and research collections centre.

Advance sign-up required: [http://bshs15archivesfriday1.eventbrite.co.uk](http://bshs15archivesfriday1.eventbrite.co.uk)

14.15–16.00

**Richard Burton Archives Drop-in Session**
(Level 1 West, Library and Information Centre - building 7 on campus map)

An opportunity to see a display of archival materials and rare books relating to the history of science, technology, and medicine, in the reading room of Swansea University’s archives and research collections centre.

14.15–15.00

**Swansea Museum Tour**
(Victoria Road, SA1 1SN)

A brief introduction to the Swansea Museum, founded by the Royal Institution of South Wales and the oldest museum in Wales. The Museum’s collections include historic maritime vessels, fine Swansea porcelain, works of art, books, Greek and Egyptian artefacts (including Hor the Mummy), local archaeological finds, and stuffed animals.

Advance sign-up required: [http://bshs15swanseamuseum.eventbrite.co.uk](http://bshs15swanseamuseum.eventbrite.co.uk)

15.15–15.45

**Richard Burton Archives Tour**
(Level 1 West, Library and Information Centre - building 7 on campus map)

A brief behind-the-scenes tour of Swansea University’s archives and research collections centre.

Advance sign-up required: [http://bshs15archivesfriday2.eventbrite.co.uk](http://bshs15archivesfriday2.eventbrite.co.uk)

16.30–18.00

**Pickstone and Dingle Prize Presentations**
(Faraday Lecture Theatre)

16.30-17.15
The BSHS John Pickstone Prize 2014 for the best scholarly book in the history of science that was first published in English in 2012 or 2013. Awarded to Graeme Gooday and

**17.15-18.00**


**18.00–20.30**

**Reception and Guest Lecture**
National Waterfront Museum, Oystermouth Road, Swansea, SA1 3RD

Sponsored by the College of Arts and Humanities, Swansea University, and the Learned Society of Wales.

Reception in the Upper Foyer, Marina Balcony, and Warehouse Gallery of the National Waterfront Museum from 6 pm for us and delegates attending the Technologies of Daily Life in Ancient Greece conference. From 6.30 pm, wine, soft drinks, and canapés will be served. At 7 pm, delegates will have a chance to hear Prof Mike Edmunds, of Cardiff University, speak on the remarkable Antikythera Mechanism, the ancient Greek mechanical calculating device – or, if they prefer, to continue to enjoy the view from the Marina Balcony.

After the Reception and Lecture, delegates will find it easy to access restaurants in the city centre for their evening meal, or travel further afield if they choose, before returning to their on-campus accommodation and/or JC’s bar.

For dining suggestions and reservations: [http://bshs15fridaydinner.eventbrite.co.uk](http://bshs15fridaydinner.eventbrite.co.uk)

**Saturday 4 July**

**11.30–12.00**

**National Waterfront Museum Tour**
(Oystermouth Road, Maritime Quarter, SA1 3RD – see 'How to get to the National Waterfront Museum', in your conference pack)

The National Waterfront Museum tells the story of industry and innovation in Wales, now and over the last 300 years; in addition to the material in its permanent galleries, it is currently exhibiting 'From Pithead to Sick Bed and Beyond: The Buried Story of Disability in the Coal Industry Before the NHS', part of the Wellcome Trust-funded project, *Disability and Industrial Society: A Comparative Cultural History of British Coalfields, 1780-1948*. Join Waterfront Curator Steph Mastoris for a brief tour and introduction to the museum, after which he will remain available to answer questions about the museum and its collections.

Advance sign-up: [https://bshs15waterfrontsaturday.eventbrite.co.uk](https://bshs15waterfrontsaturday.eventbrite.co.uk)
12.00-14.00
Repeated Sunday at 14.00-16.00

**Copper Jack River Cruise**
(Swansea Marina, next to the National Waterfront Museum)

Board *Copper Jack*, the Swansea Community Boat Trust vessel, for a trip up the River Tawe to the historic copper works sites at Hafod and Morfa. Leaving from the Swansea Museum Historic Vessels pontoon in the Tawe Basin, next to the National Waterfront Museum, the boat passes through the Marina and swing bridge into Swansea Marina Lock. From there it proceeds upriver, under the Sail Bridge, and passes the site of the Cambrian Pottery works. The boat travels to the historic Copper Works sites, turning just before the Liberty Stadium at Morfa, and then returning by the same route to Swansea Marina. The trip takes 1.5 to 2 hours.

This is a public sailing (not restricted to BSHS conference participants); you will need to purchase your tickets on boarding at £8 adult / £5 children / £6 concessions.

Advance sign-up: [http://bhs15rivercruisesaturday.eventbrite.co.uk](http://bhs15rivercruisesaturday.eventbrite.co.uk)

20.00-21.45

**Conference Banquet**
(Refectory, first floor, Fulton House)

21.45 onward

**Whisky Tasting**
(Room West, first floor, Fulton House)

A guided whisky tasting featuring malts from around the world. This annual staple of the BSHS conference will include some refreshing Welsh whisky to coincide with the location of this year’s conference. Please note, there will be a £5 charge for this event, to be paid at the conference registration/information desk.

The tasting will begin after the conference banquet; it is not restricted to those attending the banquet, but participants who are dining elsewhere should note that the start time is approximate.

Organiser: Sam Robinson (University of Manchester)

Advance sign-up required: [http://bhs15whisky.eventbrite.co.uk](http://bhs15whisky.eventbrite.co.uk)
Sunday 5 July

14.00-16.00

**Copper Jack River Cruise**  
(Swansea Marina, next to the National Waterfront Museum)

Board *Copper Jack*, the Swansea Community Boat Trust vessel, for a trip up the River Tawe to the historic copper works sites at Hafod and Morfa. Leaving from the Swansea Museum Historic Vessels pontoon in the Tawe Basin, next to the National Waterfront Museum, the boat passes through the Marina and swing bridge into Swansea Marina Lock. From there it proceeds upriver, under the Sail Bridge, and passes the site of the Cambrian Pottery works. The boat travels to the historic Copper Works sites, turning just before the Liberty Stadium at Morfa, and then returning by the same route to Swansea Marina. The trip takes 1.5 to 2 hours.

This is a public sailing (not restricted to BSHS conference participants); you will need to purchase your tickets on boarding at £8 adult / £5 children / £6 concessions.

Advance sign-up: [http://bshs15rivercruisesunday.eventbrite.co.uk](http://bshs15rivercruisesunday.eventbrite.co.uk)
Full Listing of Academic Sessions

Please arrive early to ensure that you secure a seat, as some sessions may be over-subscribed.

Thursday 2 July
Opening plenary lecture
17.00–18.30
Faraday Lecture Theatre

"The Day the BAAS Came to Swansea: 1848 and All That"
Iwan Morus (Aberystwyth University)

Friday 3 July
Academic session 1
09.00–10.30

Early Modern Science
Faraday C

Chair: John Henry (University of Edinburgh)

“The cosmographic mystery of Johannes Kepler's Mysterium cosmographicum (1596).”
Adam Mosley (Swansea University)

“The early modern Stammbuch as the book of common scientific discourse.”
Maria Avxentevskaya (Freie Universität Berlin)

“Leibniz’s mathematico-ontological method: transfiguring the infinite into the finite.”
Audrey Borowski (University College London)

Evolution and Darwinism
Faraday D

Chair: Peter Bowler (Queen’s University, Belfast)

“Disability, inheritance and evolution: Medieval observation and nineteenth-century speculation.”

Science and the Tories
Faraday Lecture Theatre

Chair: Colin Hempstead (Independent scholar)

“Forgotten modernisers: science, technology and the Conservatives 1960-64.”
Stuart Butler (University of Manchester)

“Contracting science advice: from Next Steps to Realising our Potential – the influence of the Rothschild Report on government and policy making in the Thatcher and Major years.”
Miles Parker (University of Cambridge)

“And you call yourself technology-neutral! Technology agnosticism, telecommunications, and the powers that be.”
Advait Deshpande (The Open University)
Global Science
Faraday E

Chair: James Poskett (University of Cambridge)

"Enlightenment ethnobotany: plants, print and practice in the late-eighteenth-century Pacific."
Geoff Bil (University of British Columbia)

Mujeeb Khan (University of Cambridge)

"East is East and West is West: Directors and directions of science museums in the 1920s."
Jia-Ou Song (University of Manchester)

Biography as History of Science – The Case of Statisticians, c. 1860-1960 (Part I)
Faraday G

Organiser: Jochen F. Mayer (Technische Universität Darmstadt)

Chair and Commentator: Heinrich Hartmann (University of Basel)

"Collective biographies – the BBI database – biographical background information."
Wolfgang Karl Härdle (Humboldt-Universität zu Berlin, Singapore Management University), Chen Huang (Humboldt-Universität zu Berlin), Alla Petukhina (Humboldt-Universität zu Berlin), Annette B. Vogt (Humboldt-Universität zu Berlin, Max Planck Institute for the History of Science Berlin)

"Biography, prosopography, field analysis, and the advent of the modern Italian statistician (1900-1945)."

Jean-Guy Prévost (Université du Québec à Montréal)

Jean-Pierre Beaud (Université du Québec à Montréal)

Friday 3 July
Academic session 2
11.00–13.00

Biography as History of Science – The Case of Statisticians, c. 1860-1960 (Part II)
Faraday C

Organiser: Jochen F. Mayer (Technische Universität Darmstadt)

Chair and Commentator: Heinrich Hartmann (University of Basel)

“‘The cruel contrast between what exists in society and what ought to exist’: Hendrick Quack, a statistical life in 19th-century Netherlands.”
Ida Stamhuis (Vrije Universiteit, Amsterdam)

“Measuring the uncountable? Paul Fluskämper and the reinterpretation of statistics in Germany, c. 1910-1955.”
Jochen F. Mayer (Technische Universität Darmstadt)

Lecturing and Science Education
Faraday D

Chair: Frank James (Royal Institution)

“Scientific lectures in nineteenth-century Manchester: constructing civic identity and professional science in the industrial city.”
Sarah Hanks (St Catherine’s College, Oxford)
“A family business: Walker’s Eidouranion, and the rise and decline of private astronomy lecturing in Britain, 1780-1860.”
Hsiang-Fu Huang (University College London)

“Science education, clear thinking, and the problem of transfer.”
Michelle Hoffman (American University of Central Asia)

“Composite engineers: Frank Aydelotte, composition training and the liberal education of engineers in early twentieth-century America.”
Don Leggett (Nazarbayev University)

Audible Matters: Hearing Technologies through the Twentieth Century
Faraday Lecture Theatre

Chair: Karen Sayer (Leeds Trinity University)

“Normalizing hearing: an audacious history of the audiometer.”
Graeme Gooday (University of Leeds)

“Ringing the changes: the construction of deafness in the telephone system.”
Coreen McGuire (University of Leeds)

“Telephonic technocracy: tracing connections between telephony, hearing aids and deafness in the mid-twentieth century.”
Sean McNally (University of Leeds)

“Control, comfort, consistency: the development of in-ear monitoring systems for on-stage performance.”
Annie Jamieson (University of Leeds)

Technology and Invention
Faraday E

Chair: Ben Marsden (University of Aberdeen)

“Technoscience, crime and Crippen in early 20th-century Britain.”
Alison Adam (Sheffield Hallam University)

“Of spirits and streetcars: the Mandalay electric tram-way through the eyes of a Burmese nat.”
Allegra Giovine (University of Pennsylvania)

“The nationalised telegraphs in Ireland, 1870-1912.”
Adrian James Kirwan (National University of Ireland)

“Industrial 'property': law and the culture of invention in Greece, 1900-1940.”
Stathis Arapostathis (University of Athens)

Developing New Techniques in the Sciences: Instruments, Maps, and Methods
Faraday G

Chair: Rebekah Higgitt (University of Kent)

“Causal cartographies: maps and the investigation of yellow fever and Burkitt’s lymphoma in Uganda, 1936-1979.”
Julia Cumminskey (Johns Hopkins University)

“The mobilisation of modernity: instruments in the construction of exploration.”
Jane Wess (University of Edinburgh)

“Methods and discovery: Hevesy’s adventures in radioisotope research.”
Karin Tybjerg (University of Copenhagen)
Friday 3 July

Academic session 3
14.00–16.00

New Techniques in the Biological Sciences
Faraday C

Chair: Amanda Rees (University of York)

“‘Tipping the balance’: Karl Friedrich Meyer, scientific networks, and the birth of disease ecology.”
Mark Honigsbaum (Queen Mary University of London)

Matthew Holmes (University of Leeds)

“The history of ancient DNA research is a history of celebrity science.”
Elizabeth Jones (University College London)

“Giving a face to our ancestors: an historical approach to facial reconstruction.”
Abigail Nieves Delgado (National Autonomous University of Mexico)

International Science
Faraday E

Chair: Ida Stamhuis (Free University of Amsterdam)

“Crowd-sourced science in the nineteenth century: Eleanor Ormerod’s Injurious Insects.”
Berris Charnley (University of Oxford)

Arik Clausner (University of St Andrews)

“Geophysics, the Geological Survey and scientific internationalism in the 1920s.”
Katherine Anderson (York University, Canada)

“Alternative frontiers: oceans, space, and the politics of exploration in the 1960s.”
Sam Robinson (University of Manchester)
Historicising Humans in Nineteenth-Century British Sciences
Faraday G

Chair: Gregory Radick (University of Leeds)

"Contemporaries of the cave bear and the woolly rhinoceros: historicising prehistoric humans and extinct beasts, 1830-1900.”
Chris Manias (University of Manchester)

"Edward Burnett Tylor and the evolution of religion: historicising religious belief in nineteenth-century British anthropology.”
Efram Sera-Shriar (York University, Canada)

“‘The Bible and the geologists are agreed’: the historicisation of humans in John William Dawson's Archaia.”
Nanna Katrine Lüders Kaalund (York University, Canada)

“Historicising the future in Victorian evolutionary narratives.”
Ian Hesketh (University of Queensland)

Friday 3 July
16.30–18.00

Presentation Ceremony for the Pickstone Prize and the Dingle Prize
Faraday Lecture Theatre

16.30-17.15
The BSHS John Pickstone Prize 2014 for the best scholarly book in the history of science that was first published in English in 2012 or 2013. Awarded to Graeme Gooday and Stathis Arapostathis for Patently Contestable: Electrical Technologies and Inventor Identities on Trial in Britain (Cambridge, MA: MIT Press, 2013).

17.15-18.00

Pathways to Impact (Round Table)
Faraday Lecture Theatre

Organiser: Aileen Fyfe (University of St Andrews)

Chair: Sally Shuttleworth (St Anne’s College, Oxford)

Participants:
Aileen Fyfe (University of St Andrews)
Julie McDougall-Waters (University of St Andrews)
Katherine McAlpine (National Maritime Museum)
Stephanie Snow (University of Manchester)

Friday 3 July
19.00–20.00

Guest Lecture (courtesy of Technologies of Daily Life in Ancient Greece): Mike Edmunds (Cardiff University), on the Antikythera Mechanism
National Waterfront Museum

See 'How to get to the National Waterfront Museum’, in your conference pack.
Saturday 4 July
Academic session 4
09.00–10.30

Physics and Mathematics in the Age of Newton
Faraday C

Chair: Adam Mosley (Swansea University)

“The Royal Mathematical School of Christ’s Hospital, 1673-1703.”
Jason Grier (York University, Canada)

“Newton’s pursuit of making homogeneous light.”
Yoshimi Takuwa (Tokyo Institute of Technology)

Biology, Culture, and Ancestry in the Post-Genomic Era
Faraday D

Organiser: Jon Røyne Kyllingstad
(Norwegian Museum of Science and Technology)

Chair: Abigail Nieves Delgado
(National Autonomous University of Mexico)

“Cultures, ethnic groups and populations in Scandinavian prehistory.”
Jon Røyne Kyllingstad (Norwegian Museum of Science and Technology)

“Who are the Greeks? Rethinking biology, culture, and ancestry in the post-genomic era.”
Ageliki Lefkaditou (University of Leeds/University of Oslo)

“Past transgressions and future consequences: the responsibilities engendered by a conceptual scheme”
Hallvard Fossheim (University of Bergen)

Periodicals and Science
Faraday E

Chair: Aileen Fyfe (University of St Andrews)

“Henry Burdett, The Hospital and the ‘Semi-Medical’ Journal.”
Sally Frampton (University of Oxford)

“Participating in Victorian science through the illustrated periodical.”
Geoffrey Belknap (University of Leicester)

“Capturing enthusiasms: Scientific American and the shaping of amateur scientists.”
Sean Johnston (University of Glasgow)

Industry, Memory, Locality: Sites, Spaces and Communities in Industrial History and Heritage Interpretation
Faraday G

Organiser: James Sumner
(University of Manchester)

Chair: Karin Tybjerg (University of Copenhagen)

“Interpreting a space of industrial heritage: Liverpool Road Station and the Museum of Science and Industry.”
James Sumner (University of Manchester) [in collaboration with Erin Beeston (University of Manchester)]

“Archives, augmented reality and the industrial heritage of steel towns: Middlesbrough and Port Talbot compared.”
Tosh Warwick (HLF Tees Transporter Bridge Visitor Experience Project) and Louise Miskell (Swansea University)
The local history of ICT: aims, methods and case studies.
John V. Tucker (Swansea University)

Meet the Editors (Round Table)
Faraday Lecture Theatre

Chair: Jennifer Rampling (Princeton University)

Participants:
Jon Agar (Editor of BJHS Themes)
Don Leggett (Book Reviews Editor, BJHS)
Ben Marsden (Editor of Notes and Records: The Royal Society Journal of the History of Science)
Greg Radick (Editor of Studies in History and Philosophy of Biological and Biomedical Sciences)
Charlote Sleigh (Editor of BJHS)
Jia-Ou Song (BSHS Web Editor)
Ida Stamhuis (Editor of Centaurus)
Alice White (Editor of Viewpoint)

Science and Religion
Faraday D

Chair: David Beck (University of Warwick)

"Between city and cloister: the place of alchemy in pre-Reformation England."
Jennifer Rampling (Princeton University)

"Evangelicals and extraterrestrials: the plurality of worlds debate in Scotland, 1815-55."
Bill Jenkins (University of Edinburgh)

"Science versus superstition? Problems in the historiography of psychical research."
Andreas Sommer (University of Cambridge)

Saturday 4 July
Academic session 5
11.00–13.00

The Politics of Psychology
Faraday C

Chair: Alice White (University of Kent)

"'Even the most hopeless may learn in the end': conditioning reflexes in Interwar Britain."
Oliver Hill-Andrews (University of Sussex)

"Shall we collaborate and if so, with whom? Economics and psychology during the early years of the Behavioral Sciences Movement, 1950-56."
Catherine Herfeld (Munich Center for Mathematical Philosophy)

Let's Talk About...: ‘Collaborative Team-based Research’ (Round Table)
Faraday Lecture Theatre

Organiser and Chair: Aileen Fyfe (University of St Andrews)

Participants:
Graeme Gooday (University of Leeds)
Noah Moxham (University of St Andrews)
Stathis Arapostathis (University of Athens)
Public Health I  
**Faraday E**

Chair: Matthew Eddy (University of Durham)

“Quantifying the health of the Empire: the beginnings of large-scale comparative medical statistics in the British imperial army of the 19th century.”  
*Anna Mohr (ETH, Zurich)*

“Reading skin in Victorian newspapers: an analysis of British news coverage of dermatology, 1840-1860.”  
*Diana Garrisi (University of Westminster)*

“Aging in the city: public health and the politics of the urban street.”  
*Cara Kiernan Fallon (Harvard University)*

“Analyse and survive? British scientific and medical experts and uncertainty about the effects of nuclear war in the 1980s.”  
*Christoph Laucht (Swansea University)*

Science Futures, Science Fictions  
**Faraday G**

Organiser: Amanda Rees (University of York)

Commentator/Chair: Iwan Morus (Aberystwyth University)

“Engineering fiction: science and literature in Interwar Britain.”  
*Charlotte Sleigh (University of Kent)*

“Unlawful experiments: science, crime and movie censorship in the 1930s and 1940s.”  
*David Kirby (University of Manchester)*

“Filming ‘The Predatory Transition’: technology, violence and species difference in 2001: A Space Odyssey and post-war palaeoanthropology.”  
*Seán McCorry (University of Sheffield)*

“Neanderthals and narrative: othering the brother (sic) in the 20th century.”  
*Amanda Rees (University of York)*

Saturday 4 July  
**Academic session 6**  
14.00–16.00

Public Health II  
**Faraday C**

Chair: James Stark (University of Leeds)

“Sexual health and the state: state-supported healthcare provisions for venereal diseases in England, 1918-1939.”  
*Anne Hanley (University of Leeds)*

“The development of blood transfusion services during the Spanish Civil War (1936-1939).”  
*Linda Palfreeman (Universidad Cardenal Herrera CEU)*

“From resignation to non-conformism: the Association Movement, family and learning disability during the Franco Era.”  
*Mercedes Del Cura González (University of Castilla-La Mancha & IDINE)*
Scientific Institutions
Faraday D

Chair: Sean Johnston (University of Glasgow)

"Founding the Medical Pneumatic Institution, 1794-1798."
Frank James (Royal Institution)

"Pietro Blaserna and the Rome Physic Institute."
Miriam Focaccia (University of Bologna)

"Kew Observatory and the origins of the National Physical Laboratory."
Lee T. Macdonald (University of Leeds)

"Visions of the Observatory: toward a popular iconography of the Royal Observatory, Greenwich."
Rebekah Higgitt (University of Kent)

Is There Such a Thing as Welsh Science?
(Round Table)
Faraday Lecture Theatre

Organiser and Chair: Iwan Morus (Aberystwyth University)

Participants:
Mary-Ann Constantine (University of Wales)
James Moore (Open University)
Iwan Rhys Morus (Aberystwyth University)
Amanda Rees (University of York)
John Tucker (Swansea University)

Saturday 4 July
Academic session 7
16.30–18.00

Anatomy and Physiology
Faraday C

Chair: Chiara Ambrosio (University College London)

"Vesalius, Putti and courtly ambition: the role of the historiated capitals in Andreas Vesalius’s De humani corporis fabrica."
Richard Bellis (University College London)

"The limits of body, philosophy and credulity: hysteria, spontaneous generation and amphibians."
Sean Dyde (Max Planck Institute for the History of Science, Berlin)

Science and Literature
Faraday D

Chair: Don Leggett (Nazarbayev University)

"The limits of the natural: the representation of human desire in the early eighteenth century."
David Beck (University of Warwick)

The Travelling Rat, 1850-1950
Faraday E

Organiser: Karen Sayer (Leeds Trinity University)

Chair: Elizabeth Neswald (Brock University)

"From foreign invader to subterranean fiend: sewer rats, sanitary modernity and Victorian underworlds."
Neil Pemberton (University of Manchester)

"Rattus-homo-machine: rats as seafarers in the nineteenth century."
Kaori Nagai (University of Kent)

"The ‘modern’ management of rats moving across farm and field: 1900-1940."
Karen Sayer (Leeds Trinity University)
“Calculating women: Mrs Galilee and the figure of the scientist in Wilkie Collins’s *Heart and Science*.”
Ben Marsden (University of Aberdeen)

“The inventive authorship of Junius Redivivus.”
Matthew Paskins (University of Leeds)

**The Contradictions of Health and Having to Work for a Living**
*Faraday E*

Chair: Graeme Gooday (University of Leeds)

Matthew J. Hoffarth (University of Pennsylvania)

“Finance, speculation, and mental disorder in the Victorian age.”
Sally Shuttleworth (St Anne’s College, Oxford)

“New Power in whose hands? Psychological science at the coalface.”
Alice White (University of Kent)

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**Science goes to the Movies**
*Faraday Lecture Theatre*

Chair: Jeff Hughes (University of Manchester)

“The cinematic sound of industrial modernity: first notes.”
Tim Boon (Science Museum, London)

“Fitting the Job to the Man: a film about a scientific discipline.”
Roland Edwards (University of Manchester)


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**BSHS Presidential Address**
18.15-19.30
*Faraday Lecture Theatre*

“Experimenting with the Scientific Past.”
Greg Radick (University of Leeds)

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**Codifying Knowledge in Early Computer Programming**
*Faraday G*

Organiser: David Nofre (Independent Scholar)

Chair: Jon Agar (University College London)

“‘Mathematical objects in action’: implementation and epistemology in early computer mathematics.”
Stephanie Dick (Harvard University)

“‘Much less of an art, much more of a scientific technique’: making the computer a scientific tool.”
Mark Priestley (University College London)

David Nofre (Independent Scholar) and Edgar Daylight (University of Utrecht)
Sunday 5 July
Academic session 8
09.30–11.00

Food and Nutrition
Faraday C

Chair: James Sumner (University of Manchester)

“Clinicians, activists and the 'stony-faced god of numbers': the UK Medical Research Council vitamin study controversy, 1980-84.”
Salim Al-Gailani (University of Cambridge)

“Visions of health and the eating body: food and the 1884 International Health Exhibition.”
Lisa Haushofer (Harvard University)

“The material culture of experimentation in late 19th-century nutritional physiology.”
Elizabeth Neswald (Brock University)

Illustrating Science
Faraday D

Chair: Tim Boon (Science Museum, London)

“Composite photographs and the quest for generality: themes from Peirce and Galton.”
Chiara Ambrosio (University College London)

“‘Quite extraordinarily irresponsible’: BBC2’s Controversy series and the televising of expert disagreement, 1971-1975.”
Rupert Cole (University College London / Royal Institution)

“When artifice becomes evidence: looking at the origins of the wildlife MOD genre.”
Jean-Baptiste Gouyon (University College London)

Science in Islam
Faraday E

Chair: John Henry (University of Edinburgh)

“The philosopher’s Euclid: Ibn Sina and his epitome of Euclidean geometry.”
Gregg De Young (The American University in Cairo)

“Modern optics in the Ottoman Empire.”
Sena Pekkendir (Medeniyet University, Istanbul)

“Rentier Science: History of Biology and Evolution in the Arab Gulf States.”
Jörg Matthias Determann (Virginia Commonwealth University in Qatar)

Scientific Correspondence
Faraday Lecture Theatre

Organiser: James Poskett (University of Cambridge)

Chair: Geoffrey Belknap (University of Leicester)

“Edward Belcher and the archival event: letter writing and record keeping in the Hydrographic Office, c. 1830-1850.”
Megan Barford (University of Cambridge)

“Eighteenth-century vegetables and letters: understanding Sir Hans Sloane’s botanical collections.”
Victoria Pickering (Queen Mary, University of London)

“Phrenology on the plantation: correspondence, character and the abolition of slavery.”
James Poskett (University of Cambridge)
Sunday 5 July
Academic session 9
11.30–13.00

Science and Race
Faraday C

Chair: Bill Jenkins (University of Edinburgh)

“The history of ‘Red People’: William Bollaert and the geography of native Americans.”
Maurizio Esposito (University of Santiago, Chile)

“For the betterment of mankind: ideas about selective breeding in French and German enlightenment thinking.”
Maren Lorenz (Ruhr-Universität Bochum)

“The end of racial science? Measuring difference in the Torres Straits, 1898-1899.”
Elise Smith (Wellcome Unit for the History of Medicine, Oxford)

Modern Physics: From Ohm’s Law to Quantum Theory
Faraday G

Chair: Hasok Chang (University of Cambridge)

“The man behind Ohm’s law.”
Charlotte Connelly (University of Cambridge / Science Museum, London)

“From measurement to Maxwell: French mathematics and the metaphysics of electrical metrology.”
Daniel Jon Mitchell (University of Cambridge)

“What Can Science Communication Bring to the History of Science, Technology and Medicine? (Round Table)
Faraday Lecture Theatre

Organiser and Chair: James Sumner (University of Manchester)

Participants:
Rebekah Higgitt (University of Kent)
Sally Horrocks (University of Leicester)
Katherine McAlpine (National Maritime Museum)
Leucha Veneer (Independent Scholar)
Abstracts

Plenary Lecture

The Day the BAAS Came to Swansea: 1848 and All That

Iwan Morus (Aberystwyth University)

In August 1848 the British Association for the Advancement of Science held its annual meeting in Swansea – the first time the association had met in Wales. The previous two decades had been ones of enormous political and economic turmoil in Wales as towns like Swansea expanded and industrialized and new elites came to dominate the local and national stage. When the BAAS came to Swansea, they came to a town in transition. In this lecture I want to look at that meeting from a number of perspectives, exploring what it meant to different people. 1848, of course, was a year of revolutions and almost revolutions across Europe. Did the BAAS's visit to a provincial Welsh town mark some sort of revolution too?

Presidential Address

Experimenting with the Scientific Past

Greg Radick (University of Leeds)

Historians of science concern themselves with the scientific past as it actually unfolded. But in small ways and large, implicitly and explicitly, they also concern themselves with that past as it might have unfolded but didn’t: the so-called "counterfactual" history of science. In the year marking the 150th anniversary of Gregor Mendel's lectures on pea hybrids, this lecture will report on a novel teaching experiment in genetics conducted in order to throw light on the question of what biology now -- and what students of biology now -- might be like had the debate over Mendel’s work gone differently ca. 1900-1910. Along the way the lecture will address some more general puzzles about historical understanding and the pasts that never were.
Abstracts for Themed Sessions
(alphabetical by title)

Audible Matters: Hearing Technologies through the Twentieth Century
Organiser: Sean McNally (University of Leeds)
Chair: Karen Sayer (Leeds Trinity University)
Presenters: Graeme Gooday, Coreen McGuire, Sean McNally, Annie Jamieson

The overall theme of the session is the cross-fertilisation of technologies in relation to communication, hearing and deafness. The session will begin with the invention of the telephone as a device designed to help the deaf to speak and its subsequent adaptation into audiometers and electrical hearing aids. A key component is the role of audiometers in deconstructing the strict dichotomy of deaf vs. hearing; the subsequent normalisation of hearing and the pathologisation of hearing loss as a deviation from this norm. We will look at the co-construction of users and technology through the connections between hearing loss, telephony and electrical hearing aids in the early twentieth century. Finally we will explore the further development of technologies related to hearing by examining the connections between telephony, hearing aids and in-ear monitors in the late twentieth and early twenty-first centuries.

Biography as History of Science – The Case of Statisticians, c. 1860-1960
Organiser: Jochen F. Mayer (Technische Universität Darmstadt)
Chair and Commentator: Heinrich Hartmann (University of Basel)
Presenters: Jean-Pierre Beaud, Chen Huang, Jochen F. Mayer, Martine Mespoulet, Alla Petukhina, Jean-Guy Prévost, Ida Stamhuis

The main aim of this double session is to explore the validity and usefulness of more recent theoretical and methodological innovations in the study of scientific lives, specifically in the context of the historiography of statistics, c. 1860-1960. During this period, it is argued the modern ‘statistician’ both emerged as a scientific person and as a historical category and underwent various dramatic transformations. Methodologically, this session contributes to the recent explorations into the complex interactions between biography, scientific culture and modern statistical lives. In this respect, participants are encouraged to discuss and critically reflect upon their biographical methodologies. By presenting exciting case studies on the birth and transformations of modern statistical personae across Russian, Italian, Canadian, Dutch, German and British scientific cultures, this session develops and challenges existing social and institutional histories on the topic.

Biology, Culture, and Ancestry in the Post-Genomic Era
Organiser: Jon Røyne Kyllingstad (Norwegian Museum of Science and Technology)
Chair: Abigail Nieves Delgado (National Autonomous University of Mexico)
Presenters: Hallvard Fossheim, Jon Røyne Kyllingstad, Ageliki Lefkaditou

Genetic research has gone through a technological revolution during the last two decades. This has, among other things, led to a boom in research on human genetic variation, including research on the genetic makeup, ancestry and prehistoric migrations and settlement of ethnically, linguistically, or geographically defined human populations. This session turns attention towards the notions of ‘ethnicity’, ‘race’, and ‘ancestry’ that scientists use when producing knowledge about human genetic variation. The three papers will engage with questions such as: how are these concepts defined by science, to what extent do they reflect social, cultural, or political ideas about ancestry, ethnicity, race and nationhood, and what are the social, cultural and/or political implications of their use?
**Bodies of Knowledge: Children’s Education, 1700-2000**

Organiser: Melanie Keene (Homerton College, Cambridge)
Chair: Jia-Ou Song (University of Manchester)
Presenters: Matthew Eddy, Hannah Elizabeth Kershaw, Melanie Keene

How have children thought about and been taught about their bodies? This session uses three distinct case studies from the eighteenth, nineteenth and twentieth centuries, and a variety of sources, from notebooks and textbooks to artefacts and television, to explore themes across the history of science and education. Approaching the child’s body and agency as objects of historical investigation, participants will illuminate the changing and enduring role of the classroom and scientific knowledge in shaping identities, emotions, and embodiment in childhood.

**Codifying Knowledge in Early Computer Programming**

Organiser: David Nofre (Independent Scholar)
Chair: Jon Agar (University College London)
Presenters: Edgar Daylight, Stephanie Dick, David Nofre, Mark Priestley

Coding is cool again. And not only for young people who dream of hitting it big in Silicon Valley. Scholars from a variety of emerging academic fields, like digital media and software studies, are also taken by the apparently mystifying nature of software. Historians of computing are shifting their attention to software, probing the gender assumptions and professional insecurities that have shaped the culture of programming. And yet, despite much talk of users, practices, and identities, few historians of science have turned their attention to the epistemological roots of programming itself. This session will begin to address this lack by calling attention to the following questions. What kind of knowledge ought to be needed to programme? What kind of knowledge is generated when programming a computer? Does the act of programming impose new ways of thinking about a scientific problem? On a different level: what kind of knowledge is shared? How should it be codified? And, how subordinate to the actual computer should this knowledge be?

**Historicising Humans in Nineteenth-Century British Sciences**

Organiser: Efram Sera-Shriar (York University, Canada)
Chair: Gregory Radick (University of Leeds)
Presenters: Chris Manias, Efram Sera-Shriar, Nanna Katrine Lüders Kaalund, Ian Hesketh

The historicisation of humans was a big issue in nineteenth-century Britain. Within the context of British science these discussions centred on the issue of human origins. What emerged from these heated dialogues were different types of explanatory models that aimed to describe both the physical and cultural history of humans, and to explicate the causes that created racial diversity. Some of the key questions that emerged were as follows: did the various races living throughout the world develop from a single location or were their physical and social differences evidence for their separate genesis? Was it even possible to trace the development of humans or had too much time passed since the dawn of their emergence? How did new types of evolutionary theories transform nineteenth-century understandings of human ancestry? The papers in this session aim to examine these core questions about human history through a transnational multidisciplinary perspective.

**HSTM Wikipedia Edit-a-thon**

Organiser: James Stark (University of Leeds)

Wikipedia is one of the most high-profile and frequently used reference tools available today. It is often the first destination for information on an unfamiliar topic and has expanded exponentially by sourcing content from the wider community on an open-source model. However, because Wikipedia content is generated from the ground up, this has led to certain disparities in the quality, completeness and scope of articles. Recent efforts to redress this imbalance have focused, for example, on including greater detail.
and coverage for entries of female scientists. This edit-a-thon will allow anyone the opportunity to update an existing Wikipedia entry or create a brand new one for their particular area or person of interest, with a special focus on current or recently completed research projects.

This session, supported by the BSHS Outreach and Education Committee, will be chaired by James Stark, with substantial input from external guest Robin Owain from Wikimedia UK, an organisation which promotes and enables public participation in Wikipedia. Robin will provide some background on Wikipedia and its use and also give a short tutorial on getting started as an editor. Individual participants will then be invited to provide brief (2-3 minute) introductions to the topic/person whose entry they will be editing or creating, before individual editing begins, with Robin available for further support and to answer queries. We will confirm a core group of participants by advertising through mailing lists, social media and so on in advance of the conference, but leave open the option for attendees to bring their laptops spontaneously and take part in the editing. This session will not only improve the quality and depth of current articles on Wikipedia but also raise the profile and awareness of the resource for researchers, provide new skills in editing online open-source repositories and bring recent research in HSTM to wider public audiences.

**Industry, Memory, Locality: Sites, Spaces and Communities in Industrial History and Heritage Interpretation**

Organiser: James Sumner (University of Manchester)  
Chair: Karin Tybjerg (University of Copenhagen)  
Presenters: Louise Miskell, James Sumner, John V. Tucker, Tosh Warwick

This session ties together several growth areas for research – historical geographies of science and industry, collaborative historical research with industrial partners and public engagement through museums and community venues – to assess the opportunities for telling connected stories about industry and its legacies through case studies based on present and former sites of manufacturing and freight. Projects may reveal otherwise undocumented features of former working practices, the affective character of sites and the social and domestic lives surrounding the workplace. Can this evidence be meshed successfully with data from industrial archaeology or economic history? And what are our options for recovering details of lived experience from the period before living memory? We will also consider how historical professionals should deal with communities’ own sense of heritage and historical identity and how the physical terrain of industrial working can itself be used for education and engagement.

**Is There Such a Thing as Welsh Science?**

Organiser and Chair: Iwan Morus (Aberystwyth University)  
Discussion Panel: Mary-Ann Constantine, James Moore, Amanda Rees, John Tucker

Looking at the relationship between science, place and identity has become an increasingly important preoccupation for historians of science in recent years and the relationship between science and national identity has been a recurring theme. Is there such a thing as British science, French science or German science? In thinking about these sorts of categories, whilst it is by now common to come across discussions of Irish or Scottish science, Welsh science remains relatively absent. In this session we want to use our discussion of Welsh science as a way into a broader interrogation of science and national cultures. Did historical actors ascribe such an identity to themselves, for example – and does that matter for our own descriptions of them? How have assertions of national identity in the past served to define individual scientific status and how have claims about science played roles in forging national identities? Each participant will give a brief, five-minute introduction to their perspective on the topic before a general discussion. Questions and interventions from the audience will be taken during the final thirty minutes of the session.
Let’s Talk About…: ‘Collaborative Team-based Research’

Organiser and Chair: Aileen Fyfe (University of St Andrews)
Discussion Panel: Graeme Gooday, Noah Moxham, Stathis Arapostathis

Historians are traditionally lone scholars but our university managers and research councils seem keen on team-based or collaborative research these days. Our panellists will discuss this phenomenon from their different perspectives: Graeme Gooday has worked with several students, postdocs and industrial collaborators; one of these was Stathis Arapostathis, and together, they won the inaugural BSHS Pickstone Prize for a co-authored book; Noah Moxham has worked on the News Networks project and now works on the Philosophical Transactions project which is run by Aileen Fyfe. Thus, our two PI-postdoc pairs will compare notes on their experiences. How does (or should) team-based research work in our field? Is it easier/better with PhD students or with postdocs? Can historians of science be effective project managers? How should co-authorship be understood and credited? What are the career prospects for the increasing numbers of project-based postdocs? This panel discussion will provide an opportunity to address these questions frankly.

Let’s Talk About…: ‘Pathways to Impact’

Organiser: Aileen Fyfe (University of St Andrews)
Chair: Sally Shuttleworth (University of Oxford)
Discussion Panel: Aileen Fyfe, Julie McDougall-Waters, Katherine McAlpine, Stephanie Snow

Write a grant application to one of the Research Councils these days and you’ll be expected to trace out ‘Pathways to Impact’, a set of plans which will – you hope – lead to your project having demonstrable ‘impact’. But can you really plan to make impact happen? Does it take too much time away from the research? Is it worth it? Is it ‘impact’ or ‘public engagement’? Which sorts of plans are most effective? This panel discussion will provide an opportunity to address these questions frankly. The panellists represent a variety of experiences with research projects and impact plans: Sally Shuttleworth runs the recently started ‘Citizen Science’ project and is planning what her team will do; Julie McDougall-Waters is a postdoc on the Philosophical Transactions project which has been trying hard to capitalise on the relevant anniversary year in 2015; Katherine McAlpine is the outreach officer for the ‘Longitude’ project, based in a national museum; and Stephanie Snow has led a number of projects which have specifically linked history and policy, and produced outputs tailored to the needs of the particular organisation.

Meet the Editors

Chair: Jennifer Rampling (Princeton University)
Participants: Jon Agar (Editor of BJHS Themes), Don Leggett (Book Reviews Editor, BJHS), Ben Marsden (Editor of Notes and Records: The Royal Society Journal of the History of Science), Greg Radick (Editor of Studies in History and Philosophy of Biological and Biomedical Sciences), Charlotte Sleigh (Editor of BJHS), Jia-Ou Song (BSHS Web Editor), Ida Stamhuis (Editor of Centaurus), Alice White (Editor of BSHS Viewpoint)

In which, for example, Charlotte Sleigh, the new editor of BJHS, will introduce her vision for the journal and give tips and advice for those considering submitting papers; Don Leggett will discuss how the BJHS commissions books reviews and offer advice on writing a fair and balanced review; and the editor of Viewpoint, Alice White, will discuss magazine-friendly writing, pictures and permissions. Editors outside the BSHS family will be on hand to offer their perspectives and where and how best to get published.
Science Futures, Science Fictions

Organiser: Amanda Rees (University of York)
Commentator/Chair: Iwan Morus (Aberystwyth University)
Presenters: David Kirby, Seán McCorry, Amanda Rees, Charlotte Sleigh

The panel will focus on the historiographical, intellectual and pragmatic uses to which historians of science have put, and might put, science fiction. Despite its ostensive focus on the future, the science fiction enterprise has much in common with the history of science. Like history, it is committed to the (re)construction and exploration of an unfamiliar world; it is focused on the impact that scientific, medical and technological developments have on political, economic and cultural relationships; and it is intensely and critically aware of the different ways in which the social (class, gender, race, sex, species) has inflected the experience of the scientific in the past, present and future. The various contributors to this panel examine the ways in which SF writers and film-makers have portrayed and used science in their work and how their fictions may have influenced the way that science and scientists have been perceived during the twentieth century.

Scientific Correspondence

Organiser: James Poskett (University of Cambridge)
Chair: Geoffrey Belknap (University of Leicester)
Presenters: Megan Barford, Victoria Pickering, James Poskett

From Joseph Banks to Charles Darwin, correspondence has played a major role in both the history and the historiography of the sciences. However, archival collections of letters are too often treated only as sources of information rather than repositories of material culture or examples of scientific practice. This panel brings together new work on the history of science and correspondence. Letters were used to think with and to rehearse arguments that might later appear in print. They allowed naturalists in the Pacific and India to imagine they were having a conversation with a gentleman in Europe or America. But letters could also be lost or damaged, contributing to a sense of distance. Together, these papers demonstrate the merits of treating letter-writing as a practice and correspondence as part of material culture.

The Travelling Rat, 1850-1950

Organiser: Karen Sayer (Leeds Trinity University)
Chair: Elizabeth Neswald (Brock University)
Presenters: Karen Sayer, Neil Pemberton, Kaori Nagai

Rats have entered history: archaeologists and historians of medicine have addressed the complex relationship of the black and the brown rat with the history of plague; used in the lab, they have become subjects within the history of science; yet, humanity, involuntarily sharing its food stores, sewers, farms and ships, has come to see the rat with a jaundiced eye, as observed by cultural studies. In this panel we propose to look at the emerging study of the rat's passage, excursions and returns, attempts to control its movements, and categorization and shifts in knowledge of the place, role and control of rats as boundary animals ('wild', yet sharing and moving within human landscapes of farms and farmland, towns and cities, waterways and rivers, ports and ships). We will explore the issues raised by the passage of rats, to address the historically and spatially specific conceptualisations of the rat in nineteenth- and twentieth-century Britain and, via its ships, the British Empire.
What Can Science Communication Bring to the History of Science, Technology and Medicine?

Organiser and Chair: James Sumner (University of Manchester)
Presenters: Rebekah Higgitt, Sally Horrocks, Katherine McAlpine, Leucha Veneer

Researchers in the history of science, technology and medicine (STM) work increasingly with public audiences. This activity has developed partly through science communication networks and resources, including science festivals, science centres and broadcast media opportunities. This round-table session looks at the opportunities and challenges of collaboration, with themes including:

- professional science communicators often focus on engaging audiences who would not think of themselves as ‘interested in science’: how can history help? Are there reciprocal opportunities to connect with STM-minded audiences not ‘interested in history’?
- are historians of STM ahead of other historians in responding to the ‘engagement’ and ‘impact’ agendas because of their connection to science communication networks? If so, is it appropriate to extend the lessons learned to academic history more generally?
- how can the global and cross-cultural approaches developed in writing the histories of major scientific, technical and healthcare changes and controversies feed into present-day communication?
- how can historians’ experience in surveying and archiving memories (particularly through oral history), sites and practices help in explaining what ‘doing science’ is really like?
- what can a historical sensibility bring to science-art interactions?
- much STM communication is explicitly STM advocacy and the field is strongly amenable to simple stories and hero narratives. Does this create unavoidable clashes with contextual history – or can it help in realistic engagement with audiences?
- how can we apply research on the history of science communication itself? Beyond its obvious role as an aid to reflecting on the aims, values and policy direction of the field, history might also serve more directly as a resource for methods and practices: communication approaches developed to suit past aims and audiences may again become relevant as policies and constraints change.

This session complements ‘What Can History Bring to Science Communication?’ a discussion session at the British Science Association Science Communication Conference in Manchester in June 2015.
Abstracts for Individual Papers  
(alphabetical by presenter)

**Alison Adam**  
*Sheffield Hallam University*  
"Technoscience, crime and Crippen in early 20th-century Britain"

At the start of the twentieth century there was considerable interest in enrolling science in the fight against a perceived rising tide of crime resulting in a push towards the development of scientific detection and policing in Britain. This paper illustrates how a range of scientific ideas and new technologies, effectively 'technoscience', was enrolled in the developing approach to scientific policing, by using the notorious Crippen murder case of 1910 as a paradigm example. Here, a broad spectrum of technologies and scientific ideas was marshalled by scientists, press, police and public in apprehending and condemning the criminal. These included an appeal to physiognomy by police, public and press in order to criminalize Crippen's appearance and reinforce his perceived guilt. The use of wireless telegraphy in apprehending Crippen was widely hailed as the first example of its central role in an arrest. The innovative media technologies of the *Daily Mail*, including its use of half-tone photographs and its publication of a 'continental' edition, made possible by telegraph and telephone, demonstrated the paper's vital role in capturing Dr Crippen, as it made sure its readers knew in its breathless admiration for science and technology. Finally, the way that the physical evidence was handled and presented at trial would propel Bernard Spilsbury to celebrity status as a forensic pathologist, almost unchallengeable, for the next three decades. Press, public, police and pathologists combined to ensure that Crippen was hanged by technoscience.

**Salim Al-Gailani**  
*University of Cambridge*  
"Clinicians, activists and the 'stony-faced god of numbers': the UK Medical Research Council vitamin study controversy, 1980-84"

This paper uses a case study from 1980s' Britain to explore the roles of various lay and expert actors in negotiations over credibility in clinical research. In 1981, the UK government requested the Medical Research Council (MRC) to conduct a randomised clinical trial to test a hypothesis then attracting interest among child health experts and epidemiologists. By the late-1970s, there was growing consensus about the importance of folate in fetal development. A small-scale study had suggested that women could lower their risk of having a child with spina bifida, a relatively common developmental defect of the brain and spinal cord, by taking a daily vitamin pill during pregnancy. Experts disagreed about the need for a double blind, placebo-controlled trial; epidemiologists thought the MRC had a 'social responsibility' to put inconclusive evidence to the test, where many clinicians considered it unethical to withhold a beneficial vitamin from some trial participants. When disagreements spilled into public view, lay activists—specifically maternity consumer organisations claiming increasing authority to be heard on matters concerning the medical management of pregnancy and birth—intervened by contesting the ethics of the MRC trial and politicising the research. This paper analyses activists', clinicians', and medical researchers' conflicting assessments of scientific certainty and their different strategies for asserting credibility.

**Chiara Ambrosio**  
*University College London*  
"Composite photographs and the quest for generality: themes from Peirce and Galton"

Along with being a visual method of scientific investigation in its own right, the process of composite photography was often invoked, in the late nineteenth and early twentieth century, as a powerful philosophical metaphor. I investigate an early chapter in the life of this metaphor: its reception and use by the American philosopher, logician and scientist Charles S. Peirce. I show how Peirce's use of composite photography was rooted in his sophisticated understanding of the composite process itself, which had been originally developed by Sir Francis Galton in the late 1870s. I highlight substantial
differences in the ways Peirce and Galton drew on the composite process to advance broader epistemological claims, especially those concerning the nature and reliability of scientific generalisations. I argue that Peirce and Galton’s respective approaches to the issue of generalisation and generality condense deeper epistemological tensions that deserve renewed philosophical and historiographical consideration. I conclude arguing that the material dimension of photography as a mode of representation in its own right, and in particular the limitations of the photographic process as an ‘objective’ mode of representation, were ultimately of crucial importance for the ways in which Peirce adopted and articulated the metaphor of composite photography in his philosophical works.

Katharine Anderson
York University, Canada

“Geophysics, the Geological Survey and scientific internationalism in the 1920s”

In the late 1920s, new methods in geophysical survey – gravitational, magnetic, and electrical – were investigated by the scientists of the Geological Survey, prompted in part by the rapid adoption of these instruments in the oil industry. Despite their notorious difficulty, considered simply as discipline-building devices, these were highly successful instruments. The cluster of new instruments and techniques helped establish geo-physics in the late 1920s and 1930s as a field in which observational skill, theoretical knowledge, and mathematical calculations were each important. Yet their introduction also gives us stories of competing versions of scientific internationalism. After lab and field work in England and Scotland, efforts to test the British instruments shifted to Australia in the form of the Imperial Geophysical Experimental Survey (IGES) 1928-30. Simultaneously, the Canadian Dominion Observatory declined to ‘buy British’, and sought instruments instead from Potsdam and Budapest. For the Dominion Observatory, geophysical instruments established the international connection between Canadian and European scientists and expressed a vision of the genealogical relationship between the strongholds of European experimental physics to a powerful new field of applied science. The IGES promoted a vision of Commonwealth scientific research, led by the British experts who would pull together instruments and men from other colonial contexts to transplant in ‘representative’ terrains. These projects indicate the complications of global science in this era, from tariffs and protectionism, to relationships within Commonwealth and continental scientific communities, to pressure from commercial prospecting operations.

Stathis Arapostathis
University of Athens

“Industrial ‘property’: law and the culture of invention in Greece, 1900-1940”

The paper focuses on the co-construction of industrial ‘property’ law and the culture of invention in Greece in the years from 1900 to 1940. It traces the legislative changes for the first half of the twentieth century focusing on the early legislative changes in Greece as they occurred most prominently from the first patent law of 1920 to WWII. In the paper I unravel the political and industrial context that provided the setting of the emergence of the first patent law. I focus on the performance and role of engineering figures as key actors in framing the intellectual ‘property’ as privilege provided to the inventors and in pressing towards new legislation. Analytically the paper is influenced by the approach of Mario Biagioli (2007) who argues that by the 1790s there had started in western economies and societies a process of their transformation and transition from a system of patents as privileges to a system of patents as rights. In this framework I argue that in the case of Greece the process was an ongoing socio-political process that started in 1920 with the new patent law which resulted in a fragmented and incomplete attempt to introduce a regime of representation and of patents as rights. The law was built as a hybrid entity to contribute in the ideologial pressures from homogenization while in the same time allowing space to the local actors to innovate through imitation. The paper argues that during the period of the study there was continuous pressure toward the delineation of Greece with European IP developments that under various conditions and different contexts were linked with the rhetoric of national ‘progress’ and ‘growth’. The research is based mainly on published archival material most importantly on technical and legal journals, public press, and legal books of the period.
Maria Avxentevskaya
Freie Universität Berlin

“The early modern Stammbuch as the book of common scientific discourse”

My paper will focus on the sample of the early modern German Stammbuch tradition that originated from the homes of early modern natural philosophers and gentry interested in collecting curiosities. This significant part of the Stammbuch legacy can be identified as historical evidence of private scientific networking. The early modern connoisseurs of nature copied their freshly acquired knowledge on to the pages of Stammbücher, bringing together the micro-context of capturing the experiential ‘particulars’ and the macro-context of common scientific discourse. Stammbuch contributors featured a wide range of social diversity and the genre encouraged them to display ingenuity and diagrammatic vividness of representation, allowing for multiple inclusions of drawings and narratives. The genre of Stammbuch represented a variation of the Renaissance ‘commonplace book’ and promoted poetic and illustrative ways of expressing polemical pleas. In my paper, I will analyze the early modern scientific Stammbücher for the employment of Ramist and Lullist dialectical and rhetorical techniques, such as loci communes, which were instrumental for presenting novelties. The Ramist dialectic outlined the well-known regions of knowledge, without specifying their actual content, and thus made them into the partitioned ‘scenes’ of discovery. My paper will consider the genre of Stammbuch as a lens for observing the relationship between the practices of dialectical inventio and scientific invention in early science. The proposed paper relies on my research funded by the Herzogin Anna Amalia Bibliothek in Weimar, which hosts one of the largest collections of early modern Stammbuch items.

Megan Barford
University of Cambridge

“Edward Belcher and the archival event: letter writing and record keeping in the Hydrographic Office, c. 1830-1850”

This paper examines letter writing and record keeping practices in the Hydrographic Office of the Admiralty in the 1830s and 1840s. It looks particularly at the correspondence of Edward Belcher, a surveying captain whose commands proved so controversial that his writing figured heavily in the archive of the office and, moreover, the uses of his writing also figured there. What makes Belcher’s such an interesting case is that he not only serves as a micro-historical normal exception, but that he himself became an archival event in the history of the Hydrographic Office. Record keeping practices in the Hydrographic Office shifted following a fight which took place between Hong Kong and London, both in and also about correspondence. Since the visible products of hydrographic work were always intended to form an archive, the ways in which these disputes were managed as exercises in record keeping is one of the main considerations. The episode suggests how sensitive and indeed reflexive actors were in the earlier nineteenth century – itself, in terms of British governmental activity, a period of archival expansion and reconceptualization – regarding issues of archive formation and organisation.

Jean-Pierre Beaud
Université du Québec à Montréal

“Canadian statisticians: 1860-1960”

The first Canadian bureau of statistics appeared in the mid-nineteenth century. But it is only in 1918 that a permanent office is set up by R. H. Coats. Different types of Canadian statisticians can be distinguished from 1860 onwards. If we call ‘gentlemen-statisticians’ were common at the beginning of the period, a professionalization slowly occurred after that. Up to 1960, Canadian Chief Statisticians’ (or their equivalents’) academic background moved from humanities to economics and mathematics. Biographies of statisticians will be analyzed from a diachronic point of view so as to detect the main points of inflection. For instance, the implementation of sampling, which is partly due to the work of some Canadian statisticians in connection with American academics and statisticians, did have an impact on the image of what should be the formation of a new statistician (and consequently of a Chief Statistician). A typology of Canadian statisticians will thus be established.
David Beck  
*University of Warwick*

“The limits of the natural: the representation of human desire in the early eighteenth century”

In 1727 Grub Street hack and bookseller Edward Curl was fined £43 and placed in the pillory for an hour for selling *Venus in the Cloister*, an act which was found to be a common-law misdemeanour as it had the potential ‘to corrupt the morals of the King’s subjects and [was] against the peace of the King’. This paper, drawing on medical, philosophical and erotic literature from the early eighteenth century, asks whether that potential corruption constituted the perversion of man from his natural state; or his return to a baser, but distinctly natural, existence. It will speak more broadly to the relationship between the literary and scientific discussion of human nature and human potential in the early enlightenment – a period in which the understanding of the physical and moral limits of what it was to be human was in constant and productive flux. Was morality innate, or acquired – and in either case, how might it be challenged and changed, perverted or perfected, by encounters with explicit literature?

Geoffrey Belknap  
*University of Leicester*

“Participating in Victorian science through the illustrated periodical”

The practice of illustrating Victorian scientific periodicals was widespread throughout the century. Yet the value, meaning and intent of these illustrations as objects of scientific evidence within an essential site of scientific communication is little understood. Focusing on the particular genre of the natural history journal between 1840 and 1890, this talk will evaluate the role of illustrations in offering an access point for the amateur naturalists to participate within the knowledge community of the Victorian periodical. A key aspect in this analysis will be to differentiate between authors and readers of competing periodicals in order to evaluate whether there is an overlap between contributors and consumers of the Victorian periodical. In this way, this paper will pay particular attention to the category of the non-professional author and illustrator in order to understand better the role of the periodical in giving access to a wide audience to the sites of production and reproduction of nineteenth-century natural history.

Richard Bellis  
*University College London*

“Vesalius, Putti and courtly ambition: the role of the historiated capitals in Andreas Vesalius’s *De humani corporis fabrica*”

Andreas Vesalius’s *De humani corporis fabrica* is seen as a landmark text in the history of science and medicine in large part due to the striking and beautiful anatomical diagrams that adorn its pages. Surprisingly, little scholarly attention has been paid to one class of images in the book, namely the historiated capitals or initial letters that begin each volume and chapter of the book. The capitals, which were specially cut for the book, depict scenes involving dissection and are acted out by putti. During this period putti were playful symbols of subversion of their surroundings, so their inclusion may seem to be at odds with Vesalius’s goal of improving medicine by embracing anatomy. However, this paper argues that the capitals demonstrate another ambition that Vesalius had for his book: as a patronage strategy to help him join the court of Charles V, Holy Roman Emperor. Taken in this context I shall demonstrate how the presence of putti both emphasises Vesalius’s wide knowledge and also indicates humour and ambition. The putti reveal Vesalius’s ability to present his knowledge in an elegant and nonchalant manner of the kind valued in the imperial court.

Geoff Bil  
*University of British Columbia*

“Enlightenment ethnobotany: plants, print and practice in the late-eighteenth-century Pacific”

The delocalizing, expropriatory intent behind the Linnaean taxonomical enterprise is well known. Among other things, Linnaeus rejected indigenous plant names in favour of names that decontextualized plants
and reinserted them into a European classificatory framework for the purposes of categorizing, acclimatizing and exploiting them. What has been largely overlooked, however, is the extent to which late-Enlightenment Linnaean botanists themselves continued not only to rely on indigenous knowledge and guidance in their colonial fieldwork, but also actively to cultivate a knowledge of indigenous languages – especially indigenous plant names – for themselves. One reason for this omission, I suggest, is that historians of botany have formed a more or less totalizing impression of the discipline’s late eighteenth-century cultural significance from published flora and other writings in which Linnaean binomial species names predominate. My own line of inquiry, on the other hand, contrasts the marginality of indigenous plant names in published texts with their far greater prominence in unpublished materials. For the purposes of this paper I draw particularly on Daniel Solander’s *Plantae Otaheitensis*, a manuscript virtually ignored by historians. The intention is threefold: to draw attention to a heretofore underutilized resource for Cook voyage historians; to augment a growing scholarly awareness of indigenous knowledge-making contributions to Enlightenment botany; and finally, in highlighting the disjuncture between exoteric print conventions and esoteric plant-collecting practices, to shed further light on the oft-observed correlation between botany and early Romantic epistemology.

Tim Boon

*Science Museum, London*

“*The cinematic sound of industrial modernity: first notes*”

If noise was a key index of industrial modernity in the interwar period, as we know it was, then – in addition to studying noise abatement and celebration – we should also look to how the new communications media of the age represented the issue. It will be particularly interesting to consider how sonic technologies used sound itself to represent problems of modernity. Whereas gramophone and radio are highly suggestive examples to investigate, this paper is concerned with cinema in the first decade of routine sound-on-film after ‘The Jazz Singer’ of 1927, the first feature-length film with synchronised dialogue sequences. Specifically I consider the sound-on-film practice embodied in two films that, in one way or another, are concerned with the nature of industrial modernity, one documentary and one feature. My examples are Paul Rotha’s 1935 documentary ‘The Face of Britain’ and Rene Clair’s 1931 feature, ‘À Nous la Liberté’, one British and one French. I mean by taking these wildly diverse examples to suggest a field of study that could be populated with many further examples. What will become clear in the presentation is that each of these self-conscious cinematic auteurs had highly engaged views on how sound should work within the cinema, and that their views revolved around the creative possibilities of asynchronous use of the soundtrack. The implications for the sonic representation of modernity from this reflexive use of a new medium are highly significant.

Audrey Borowski

*University College London*

“*Leibniz’s mathematico-ontological method: transfiguring the infinite into the finite*”

Leibniz famously described the problem of the composition of the continuum which made up the contingent world as one of the ‘two famous labyrinths’. For how was man to understand reality, reconfigured as dynamic and infinitely unfolding, from his finite standpoint? To solve this problem, Leibniz formulated his mathematical Law of Continuity most clearly in his *Cum Prodiisset* in 1701: ‘In any supposed continuous transition, ending in any terminus, it is possible to institute a general reasoning, in which the final terminus may also be included.’ In his 1702 letter to French mathematician Pierre Varignon, Leibniz reiterated the idea that ‘the rules of the finite are found to succeed in the infinite’. The aim and genius - of this mathematical method lay in the possibility it offered through the recourse to fictions of transfiguring and expressing the infinite into the finite thereby making it accessible to man. Leibniz’s work on calculus and infinitesimals are some of the most striking examples of this. Leibniz did not confine his newly founded methodology to the realm of mathematics, but turned it into a general epistemological formalism applicable to a broad array of fields, eventually culminating in his projects for *Scientia Generalis* and a Universal characteristic. Ultimately, such a methodology found its justification in the very structure of contingent reality itself. According to Leibniz, the contingent world unfolded logically and therefore ‘homogeneously,’ in a process of continuous change whereby one species naturally ‘vanished’ into its opposite whilst upholding ‘the permanence of the same reason’. 
Stuart Butler  
*University of Manchester*

"Forgotten modernisers: science, technology and the Conservatives 1960-64"

The Conservative governments of Harold Macmillan and Alec Douglas-Home are most often characterised as Edwardian, out-of-date and out of touch with contemporary science and technology. Such characterisations were in part started, and in part utilised, by the Labour Party whose concentration on ideas of technocracy, modernity and the rapid development of science and technology reshaped political debates. Labour’s subsequent success in the election and headline-grabbing policies, such as the creation of the Ministry of Technology, have largely overshadowed the attempts of Conservatives to encourage the development of science and technology in this period. The examination of projects begun under the Macmillan and Douglas-Home governments will highlight the scale of pressure from a small number of Conservative MPs and Ministers which translated into the development of a large number of scientific and technological projects such as satellite launchers, and hovercraft, and the serious consideration of 150ft high elevated motorways, and the demolition of most of Whitehall. Whilst these projects were in a number of ways innovative, even radical, neither government is remembered for a dedication to science. Poor decision-making, due to the number of forceful characters involved, fostered poor public perception of key Conservatives’ commitment to large science projects. Characterisations of the Conservative governments as out of touch with new developments are inadequate to explain the sizeable investments and interest in science and technology between 1960-64.

Berris Charnley  
*University of Oxford*

"Crowd-sourced science in the nineteenth century: Eleanor Ormerod’s *Injurious Insects*"

Eleanor Ormerod (1828-1901) worked as honorary entomologist for the Royal Horticultural Society and the Royal Agricultural Society of England in the second half of the nineteenth century. Her advice on insects was solicited by governments and individuals from Canada to New Zealand. In the male-dominated world of Victorian science she was a singularly successful female scientist. Much of her success was due to Ormerod’s skill in organising large groups of participants in entomological surveys which challenge our contemporary notions of disciplinarity and participation. The most famous of these, *Notes of Observations of Injurious Insects*, was published as a yearly serial from 1878-1901. Each year’s report drew together sightings of insects and advice on how to deal with them drawn from Ormerod’s network of correspondents. The results of Ormerod’s entomological surveys, and concurrent meteorological and geographical surveys, along with the individuals involved in producing observations, were collected together to produce large-scale pictures (or mappings) of the Victorian world - ones which escape a discipline-specific approach. Furthermore, Ormerod, a member of the social elite, unpaid and self-supporting throughout her career, stands apart from the professionalization thesis, which supposes gentleman (or woman) naturalists were a group whose power was on the wane in the period. Likewise, the participants that Ormerod enthused to produce observations of insects, bringing to bear their expertise in animal husbandry, agriculture or any of a thousand practical areas, do not fit neatly into any story of professionalization, specialisation and a restriction of participation in science in the period.

Arik Clausner  
*University of St Andrews*

"Building a Commonwealth of science: networks of applied entomology in the Interwar British Empire"

This paper will examine the interwar development of networks of applied entomology in the British Empire. Particular emphasis will be placed on the connections between the Imperial Bureau of Entomology and colonial departments of agriculture. These links will serve as a case study with which to analyse both imperial scientific network development and the spread of personnel and ideas across these networks of imperial entomology. In the aftermath of the First World War, social, political, and economic conditions helped raise the profile of applied entomology both domestically and in the colonies. Increasing interwar reliance on agricultural science as a tool of economic development fostered the emergence of new journals, organisations and opportunities. Closely tied to this process of discipline-
building were efforts by both officials and scientists to develop a unique ‘British’ global science. The deliberate institutionalisation of imperial science aimed to coordinate scientific work in order to harness science fully as a ‘tool of Empire’. Formal structures, including the Imperial Bureau of Entomology, regular imperial conferences and specialised publications helped shape the growth of inter-colonial scientific networks. Key questions this paper will seek to address include the interwar development of inter-colonial scientific cooperation, government-funded scientific research and science as a tool of economic development. Ultimately, this paper aims to assess how officials and scientists helped shape the development of imperial research networks and how the emergence of these networks shaped local and imperial scientific identities.

Rupert Cole
University College London / Royal Institution

“Quite extraordinarily irresponsible': BBC2’s Controversy series and the televising of expert disagreement, 1971-1975”

Launched on BBC2 in August 1971, Controversy was a novel form of science television that staged a series of debates, hosted by the Royal Institution, between disagreeing scientists and other experts on controversial topics in ‘science and society’ – as the Radio Times phrased it. Over the five series, issues debated included the social responsibility of the scientist, racial differences in intelligence, lead pollution, genetic research, soviet science and working mothers. This paper will present an argument that Controversy should be viewed as a response by public elite communicators of science (the Royal Institution and the BBC) to perceived changing cultural attitudes towards science and scientists that arose in the late 1960s.

Charlotte Connelly
University of Cambridge / Science Museum, London

“The man behind Ohm’s law”

In a classic underdog tale Georg Simon Ohm, the mathematically talented son of a humble locksmith, overcame terrible odds and great opposition eventually to gain both the credit he deserved and the university position he desired. At least, this is the story that many history books present when they sketch an outline of the life of the German mathematician and physicist. This paper will present some of the challenges to that received story and ask why Ohm, the author of one of the most famous and fundamental laws describing the behaviour of electricity in circuits, is so little studied by historians of physics, at least in the English language. Instead, Ohm typically appears more as a bookend than as a key figure in his own right: his arrival in a discussion often marks the end of one era or the beginning of another. Some historians have argued that Ohm, who first published his law in 1826, was simply before his time. This, they argue, explains the slow take up of his ideas and perhaps also accounts for the little attention paid to him by historians. In contrast, this paper will describe Ohm’s work with cutting-edge scientific and mathematical ideas within a network of physicists and mathematicians.

Julia Cummiskey
Johns Hopkins University


In 1961 Denis Burkitt, a surgeon in Kampala, Uganda, consulted Alexander Haddow, an entomologist with the East African Virus Research Institute (EAVRI) in Entebbe, Uganda, on the interpretation of his map of the incidence of a new tumour syndrome in Africa. Comparing that map with existing maps of yellow fever produced at the EAVRI, Haddow proposed a vector-borne viral etiology for the tumour. This conversation was invoked a number of times as researchers reflected on subsequent investigations of the syndrome’s etiology. But little attention has been paid to the set of circumstances that led to the existence of these two maps, as well as the expectation that comparing them would be useful. Both maps were the products of arduous field, clinic, and laboratory investigation. The yellow fever map was produced as part
of an effort to understand the epidemiology of yellow fever and the factors that prevented its expansion eastward. Entomology, zoology, and virology all left impressions on the map. Similarly, the map of the tumour distribution was an exercise in demarcation – Burkitt’s attempt to ‘biopsy the [tumour] belt’ by identifying as precisely as possible the boundaries of its distribution. This paper will consider the reasons that geography and cartography featured so centrally in the study of two very different diseases and the circumstances that led Haddow and Burkitt to compare them. It will argue that these maps were instrumental in shaping scientists’ understanding of the interaction between viruses, natural environments and human cultures.

Mercedes Del Cura González
University of Castilla-La Mancha & IDINE

"From resignation to non-conformism: the Association Movement, family and learning disability during the Franco Era"

The association movement related to learning disability started in Spain during the second part of Franco’s dictatorship. Its appearance was rather late with respect to other countries, where associations of families and defenders of people with learning disabilities had been going on for some time and were forming larger groups, first European-wide then internationally. Spanish parents were the principal actors of this social movement. They demanded the right of their children to receive a decent education and also to have a more secure future beyond that of childhood, that is, into adolescence and adulthood. From 1959 (the year that the first association –ASPRONA-- was created in Valencia) till the end of Franco’s regime more than one hundred family associations were created all over the country. Additionally, in 1964, the Spanish Federation of Societies for the Protection of the Subnormal (FEAPS) was created to liaise with the public administration and be in charge of promoting and helping the other associations. The paper aims to highlight how international and national circumstances led to the appearance of this family movement, the goals that families went after, their achievements, the problems they had to face and, finally the effects that these associations had on the lives of people with learning disabilities. In order to answer all these questions the author will use as main sources bulletins and reports published by some of these associations, as well as press articles and specialised literature.

Advait Deshpande
The Open University

"And you call yourself technology-neutral! Technology agnosticism, telecommunications, and the powers that be"

With their ‘let the market pick the winners’ approach, the UK regulators for the telecommunications industry (Oftel, Cable Authority, Radiocommunications Agency, and now Ofcom) have consistently taken a technology-neutral approach to governing the markets. Combined with the aim of encouraging the introduction of next-generation technologies for the benefit of the end-users, technology-agnosticism has remained a key plank of UK regulatory policy. The aim of this paper is to understand how the approach to remain technology-neutral on part of the policy-makers has shaped the telecommunications industry in the UK from the 1980s. The paper discusses the challenges of effectively remaining technology-neutral in practice and balancing it with an interest in accelerating the introduction of new technologies. The paper examines how the policy of technology-neutrality influenced the decisions made by operators such as BT, Mercury (Cable & Wireless), the cable operators, and the wireless/mobile operators. Whether the intent to remain technology-neutral truly aligned with the goals of ensuring a thriving competitive market and the extent to which it served the interests of the end-users is also discussed. The paper argues that a technology-neutral approach for regulatory oversight needs to be constantly adapted in order to foster market-led innovation. The paper shows how a number of factors including disruptive innovation, the emergence of unforeseen technology trends and the unpredictability of how the markets function influence the choices about technology, and in turn the intent to remain technology-agnostic on part of the powers that be.
"Rentier science: history of biology and evolution in the Arab Gulf States"

Many scholars, including the authors of the United Nations Arab Human Development Report 2003, have considered rentier states as obstacles to science and innovation. Rents from oil and gas, they argue, enable the purchase of foreign expertise and create a mentality that discourages hard work and risk taking. How can we then explain the development of innovative research in the paradigmatic rentier states, the Arab Gulf countries? This development has taken the shape of Saudi Arabia's King Abdullah University of Science and Technology, Qatar's Education City and smaller research centers. This paper argues that oil wealth allowed for the parallel creation both of less efficient institutions and scientific islands of efficiency. While government ministries have supervised most universities in a bureaucratic fashion, individual princes have patronized and protected specific research centers that employed highly skilled and motivated experts. Under royal patronage and protection, scientists have been able to investigate sensitive areas with few financial and social constraints. This paper demonstrates the emergence of islands of efficiency within rentier science by focusing on the modern history of biology in the Gulf. Many religious scholars in the region have challenged the theory of evolution by arguing that it contradicts the Koran. As a result, ministries of education and universities have removed the theory from curricula and textbooks. However, princes protected certain research centers from the dual pressures of ideology and bureaucracy and allowed them to research evolutionary adaptations to the desert environment and discover fossilized primates and human ancestors.

"The philosopher's Euclid: Ibn Sina and his epitome of Euclidean geometry"

The Kitāb al-Shifā', a massive philosophical compendium composed by Ibn Sīnā (Avicenna), included a summary of Euclid's Elements. As a philosopher, what features of Euclid's treatise did Avicenna consider important? I begin with an overview of Ibn Sina's mechanics of summarizing. On the linguistic level, he uses several verbal techniques, combining enunciation, setting out, and specification sections of the formal Euclidean proof and reducing repetitions to a minimum. On an intellectual level, he drastically condenses demonstrations that do not contribute to his philosophical goals. These stringent summarizing techniques are most evident in book X where Euclid's long and convoluted demonstrations about families of irrational lines are reduced to only a few lines. We then argue that the epitome is based on the now-lost Hajjāj transmission and so is important on a textual and historical level, allowing us to situate the epitome within the complex landscape of the Arabic transmission of Euclidean geometry. Ibn Sīnā's Kitāb al-Shifā' was not translated into Latin and therefore did not directly influence geometrical ideas in Europe. Its mix of Platonism and Aristotelianism did, however, have a long-lasting effect in the Eastern Mediterranean. Naṣîr al-Dīn al-Ṭūsī, for example, although better known to many historians as a mathematician than as a philosopher, seems to adopt a similar philosophical viewpoint in his influential thirteenth-century Taḥrīr (redaction) of the Elements, emphasizing the same aspects of the Euclidean text as had Ibn Sīnā.

"Mathematical objects in action': implementation and epistemology in early computer mathematics"

There is no automation without invention. Especially in the early decades, actually getting programs to run on computers was no small feat. Models and algorithms had to be translated into a form that computers could execute. Significant hurdles related to the allocation and management of memory had to be overcome. The affordances of computing machines had to be accommodated. Models and algorithms had to be implemented. The work of implementation spans multiple media - from paper to transistor - and involves many practices – from diagramming to coding. In implementing programs practitioners had to craft many new tools, both abstract and material. Implementation is where abstraction and materiality meet. It is the site where we see practitioners rethinking their objects of interest, their disciplines, their
theories, their questions, through the lens of computing machines. And yet, where histories of software even exist, their implementation is seldom a focus. Historians have, for the most part, emphasized high level description over low-level detail, taking for granted the complex division between hardware and software. This paper focuses on implementation. In particular, I track how one logician – Chinese American Hao Wang – took a highly abstract piece of mathematical logic and translated it into an actionable set of computer tools for mathematical research. I propose that in doing so, Wang introduced new materials and practices to mathematics. The resulting program, ‘The Program P’ developed in the late 1950s, also reveals the epistemological significance of implementation: in making it, Wang came to know new things about logic and to know them in quite new ways.

Corina Doboș
University College London

"Underground psychoanalysis: a story of success across the Iron Curtain"

By focusing on the destiny of a small community of six psychoanalysts from communist Romania, as reflected by archival documents and testimonies, I argue that the ‘underground’ conditions for psychoanalytical practice existing in their native country helped them to develop a creative therapeutic attitude, that decisively contributed to their professional success abroad, in the ‘free world’. Fiercely banned for ideological reasons by the Communist regime at the beginning of the 1950s, psychoanalysis became somehow tolerated by the regime in the 1970s. For almost ten years, during the so-called period of ‘liberalization’, the secret police allowed some psychiatrists and psychologists in Bucharest to carry out psychoanalytical experimentation, while some works of psychoanalysis were published and a course of psychoanalysis was taught at the University of Bucharest. The ‘underground’ conditions created special opportunities for the psychoanalysts, as no dogmatic rivalries or orthodox interpretations divided them. The access to contemporary psychoanalytical literature was rather fragmented, so that the practitioners adopted a more case-oriented attitude, creatively adapting their curative possibilities and resources to each case, combining alternative psychotherapies, and not giving much attention to the dogmatic loyalties existing in the divided (Western) world of psychoanalytical movements and orientations. Most of the six practitioners left (Communist) Romania, and managed to become successful psychotherapists in the ‘free world’. The non-dogmatic, creative and case-based therapeutic attitude, acquired during the years of ‘underground’ training, prepared them to cope with the challenges raised by the composite world of contemporary psychoanalytical practice.

Sean Dyde
Max Planck Institute for the History of Science, Berlin

“The limits of body, philosophy and credulity: hysteria, spontaneous generation and amphibians”

A quiet revolution seems to have occurred in studies of hysteria. Instead of focusing on former great names – Charcot, Breuer, Freud, and Janet – in light of contemporary concerns, historians now examine the fluctuating social, political and intellectual trends that influence the construction and form of such a diagnosis. This presentation brings this historiography to bear upon a curious medical case study from the early nineteenth-century German lands. After suffering abdominal pains for over a decade, a woman from Hesse claimed to have removed the source of her ailment: a three-inch-long lizard. Contemporaries drew upon various resources with which to explain this incident: high physiological theories postulating the unity of Creation, physicians’ discussions on the nature of disease in general and hysteria in particular, gynaecologists on femininity, and folk-healers on the existence of a spirit animal whose distress causes disease. Through examining nineteenth-century medical and scientific texts, twentieth-century novels and ethnographic studies, as well as twenty-first-century websites, this talk will discuss notions of credibility, narrative forms, and rhetorical tropes and their role in distinguishing normal from abnormal, truth from rumour.
Matthew Eddy  
*University of Durham*

“Filthy Scribble Scribble’: children, inscription and the emotional therapy of pictures”

In 1710 Scottish teenager James Dunbar opened his notebook and began to inscribe a table. The task proved to be difficult and he failed to draw straight lines across the page. His disorderly hand rendered his last two columns useless and led him to write: ‘I am angry that I left a blank [space] here and wrote filthy Scribble Scribble’. What factors motivated an adolescent like Dunbar to have an emotional reaction to such a simple act of writing? We still know very little about the ways in which Enlightenment children were taught to value the systems of knowledge that they were asked to iterate on the page. We know even less about how the experience of learning affected the ways in which they were encouraged to express or control their emotions through repeated and ordered acts. In this paper I argue that there was a strong experiential link between the perceived order of educational ephemera and the inculcation of moral virtues. By focusing on inscription as a form of anger management, I reveal that anger was seen as a problematic passion or sentiment: acts of inscription were treated as psychiatric therapy. Early modern inscriptions were graphic pictures that inculcated order in the mind through the therapeutic act of writing – an order that then could be used to resist an emotional reaction like anger. Drawing from marginalia, notebooks, drawings, scribbles and more, I use ephemera made by Scottish children during the long eighteenth century to explore the links between morality, embodiment and inscription. Dunbar’s ‘Filthy Scribble Scribble’ made the pursuit of knowledge an emotionally embodied activity that contributed to the larger order of society.

Roland Edwards  
*University of Manchester*

“Fitting the Job to the Man: a film about a scientific discipline”

The British Productivity Council (BPC) was one of the largest post-war sponsors of documentary film yet its work has remained poorly appreciated, due largely to the dearth of information on its activities. From 1953 to 1975 it sponsored over 100 films aimed at promoting the acceptance of technical change and innovation and stimulating productivity at the workplace. The films predominantly addressed work study and industrial relations and were aimed at educating and informing managers and operatives alike. The BPC also sponsored films on scientific topics such as critical path analysis, training and ergonomics. The film ‘Fitting the Job to the Worker’, released in 1958 was aimed specifically at demonstrating to middle managers, designers and engineers how the application of ergonomics at the work place would benefit the well-being, efficiency and productivity of the shop floor and office workforce. But the film also fulfilled a number of other purposes. It socialised an emerging scientific discipline amongst those who would be expected to apply ergonomic knowledge and principles at the workplace. It promoted research undertaken at the DSIR Research Associations and as propaganda to advertise the benefits of mechanisation and automation to both workers and management. Finally, it also introduced the notion of performing human experimentation at the workplace. This paper, illustrated by short excerpts from the film will analyse its content and form and how and where it situates ergonomics in Rabinbach’s concept of labour, fatigue and modernity.

Maurizio Esposito  
*University of Santiago, Chile*

“The history of ‘Red People’: William Bollaert and the geography of native Americans”

Among many British explorers who arrived to the Americas during the nineteenth century, the case of William Bollaert (1807-1876) is particularly interesting. Although his works are little-known within the English-speaking world, he is widely recognized in South America as one of the leading experts in Native American cultures, including archeology and anthropology. The paper presents Bollaert’s thoughts on the origins, distribution, differences, and similarities among Native Americans (which he dubbed the ‘red species’) and the political implications such knowledge entailed for British imperialism. The paper also shows how Bollaert’s concerns about Native Americans were not only connected with the academic debates at the Anthropological Society of London, but were essentially linked to profitable opportunities.
for British entrepreneurs overseas. All Bollaert’s trips in the Americas, from Texas to Chile, were largely motivated by assessing potential British investments aiming to profitable ventures and future European migration. (He was, among other things, one of the founding members of the Ecuador Land Company.) More generally, the talk invites reflection on how nineteenth-century ideas of racial difference intermingled with some specific extra-academic concerns: i.e. the immigration of the Europeans in the Americas, the politics of colonial expansion and the supposed consequences of miscegenation for the emerging independent states in the ‘New World’.

Cara Kiernan Fallon
Harvard University

“Aging in the city: public health and the politics of the urban street”

This paper explores the changes made to New York City streets and sidewalks alongside changes to pedestrian safety from 1880 to 2014. As streets and sidewalks were cleared for traffic flow, children and the elderly emerged as both dangerous to traffic but also newly visible in city planning. Drawing on historical maps, photographs, and Department of Transportation records, this paper considers the conflicts between the aging body and the modern city that emerged with the systematic clearing of city streets. In the early twentieth century, excitement over the automobile ushered in a new era of high-speed transport and mobility. Safety pamphlets described the ‘art of walking’ to free the roadway for cars, street vending was restricted, and traffic lights were timed for automobile circulation. As traffic statistics highlighted the growing number of fatal accidents in children and the elderly, concerns rose with projections of a rapidly-expanding elderly population. In 1990, the World Health Organization called for ‘age-friendly’ cities to accommodate aging populations, while densely populated New York City developed ‘Safe Streets for Seniors’, lengthening crossing times and widening sidewalks at the expense of automobile traffic. How did elderly pedestrians, construed as dangerous and disruptive, become politically powerful in urban planning? How did conflicts between the modern city and aging body emerge and how did public health secure change? By examining the alterations made to New York City streets and sidewalks, this project offers insight into the intersection of public health and urban planning through the problem of the aging body in modern society.

Sam Fellowes
Lancaster University

“The 1950s’ origin of autism as low social skills and intellectual deficiency”

Recent histories have argued the symptomatology of those diagnosed with autism has undergone radical changes. They argue that two central concepts of modern autism – autism as primarily a social impairment and autism as often co-occurring with intellectual deficiency – were established around the late 1970s and early 1980s. I show these concepts of autism have much earlier origins in the 1950s. These historians often argue autism has undergone radical changes by comparing Kanner’s initial 1943 descriptions of autism and 1980s’ autism, correctly showing those two central concepts were absent from Kanner’s 1943 paper. I argue these historians have overlooked important evidence. Kanner modified his notion of autism in the early 1950s, emphasising low social skills and intellectual disability in a manner that closely resembles those diagnosed as autistic in the 1980s. Additionally, the much more commonly diagnosed childhood schizophrenia (which Kanner believed autism was a subtype of and many other child psychiatrists thought was on a continuum with autism) also produced clinical pictures greatly resembling 1980s’ autism. Drawing upon Kanner’s post-1940s publications and on other leading child psychiatrists I show that concepts of autism as social impairment and concepts of autism as often co-occurring with intellectual disability were present, widely employed and very important from the early 1950s, at least two decades earlier than other historians place them.
Miriam Focaccia  
*University of Bologna*

“Pietro Blaserna and the Rome Physic Institute”

This paper aims to explain the first steps of the organization of Rome Physics Institute, especially considering the biography of Pietro Blaserna, its creator and first director. Blaserna, who graduated in Vienna with Andreas von Ettingshausen then worked with Henri-Victor Regnault in Paris, from 1863 held the experimental physics chair at Palermo University. In 1872 he was called to Rome: since then he devoted himself to the creation of the new Institute, based on the centrality of the laboratory and experimentation. Blaserna, who was informed about the developments that experimental physics had reached in the most advanced laboratories in Europe (he was in touch with Helmholtz and Thomson, for example), gave birth to the first ’Practical School’ of Physics in Italy, where he realized his project through a tight organization of the research and teaching programmes. The Institute’s activity did not end, however, in the Practical School because Blaserna programmed a series of side events: in 1887 he obtained the establishment of the Ufficio Centrale del Corista Internazionale; in 1891 the Circolo Fisico was born; in 1897 the Italian Physical Society was founded. This was possible thanks to the numerous scientific and institutional charges (Kingdom senator, President of National Academy of Lincei) that he covered during his career and his work as a protagonist in the organization of national research policy of the time. The Rome Institute became an inescapable reference point for the most advanced Italian physics research, till the time of Enrico Fermi’s group ‘I ragazzi di via Panisperna’.

Hallvard Fossheim  
*University of Bergen*

“Past transgressions and future consequences: the responsibilities engendered by a conceptual scheme”

Today’s researchers for the most part present themselves as agreeing with the intent of both 1950s’ UNESCO declarations: that scientific results do not support discrimination in terms of race; and with the thesis of the first one, that racial categories are not useful scientific concepts. However, as the two previous presentations (see Jon Røyne Kyllingstad and Ageliki Lefkaditou) exemplify, concepts and methodologies in current and more recent usage can nevertheless be suspected of functioning in ways that are importantly similar to the earlier terminology. Both the notion of a population and that of an ethnic group may thus have inherited problematic features from the seemingly defunct racial conceptual scheme. While there is no reason to suspect the earnestness of individual researchers asserting the non-racist nature of their worldview and intentions, this complex situation should still leave us, and them, with some concerns and questions. In my contribution to the session, I will take as my point of departure the fact that there is an ethically salient difference between intention and consequences, which in this case can best be spelled out in terms of a difference between the specialized terminology and methodology of researchers contributing to population studies, on the one hand, and the reasonably interpreted impact of their statements when communicated to policy-makers and the public in a broader sphere, on the other. I will argue that this difference generates a three-fold responsibility on the part of any researcher in the relevant fields, concerning the dimensions of (1) discrimination, (2) veracity, and (3) representativeness.

Sally Frampton  
*University of Oxford*

“Henry Burdett, The Hospital and the ‘Semi-Medical’ Journal”

In 1886, businessman, philanthropist and hospital reformer Henry Burdett (1847-1920) launched *The Hospital*. Burdett, medically educated but not medically qualified, ambitiously sought to make the journal accessible to a wide readership of doctors, nurses, medical students and hospital managers, as well as convalescents and their networks of friends, family and clergy. The late nineteenth century is usually associated with the consolidation of medicine’s professional status, and the emergence of the specialist medical journal. But *The Hospital* was just one of a number of titles which appeared in the 1880s and 1890s that carved out a new space in the marketplace for medical periodicals. Often inclusive of scientific terminology and frequently containing content authored by doctors, they were nonetheless aimed
towards various groups on the periphery of the profession, including nurses, first aiders and the philanthropically minded public. Their existence troubled the medical profession, because such journals were seen to inhabit a borderland between the medical and lay worlds. With doctors under increasing scrutiny for any practices that might be construed as advertising their services to the public, these ‘semi-medical’ journals, as they were sometimes described, were thought to encourage an unpalatable permeation of professional boundaries, blurring hard-won distinctions between doctors and laypeople. This paper traces the debate precipitated by these publications, which would eventually come to rest in the hands of the Royal College of Physicians Censors’ Board.

Diana Garrisi  
University of Westminster

"Reading skin in Victorian newspapers: an analysis of British news coverage of dermatology, 1840-1860"

'The skin, it’s a lucky subject', pointed out the *Eclectic Magazine* in 1846, with reference to the then newly published book of dermatology by English surgeon Erasmus Wilson, *Healthy Skin*; ‘For all we have skin and our health greatly depends upon its health’. In the nineteenth century in Europe new printing technologies, together with the establishment of the first specialized hospitals, accelerated the development of dermatology as a specific branch of medicine. Not only were the first skin diseases textbooks and atlases widely disseminated in print, but also popular books and newspapers started to talk about skin care to the lay public. This paper argues that Victorian newspapers played a key role in disseminating public knowledge of dermatology. The peculiarity of the role played by periodical publications containing news lies in the fact that the discourse of skin was incorporated with social campaigns in support of the poor. By using as a case study the news coverage of three notorious stories of workhouse inmates who died from bed-sores between the 1840s and 1860s, this paper will show how the lay press used the medical analysis of the bed-sores found during post mortem examinations for two aims. On the one hand they enhanced their readers’ understanding of a type of wound called decubitus ulcer, still common and fatal today; on the other hand, they used the bed-sore as a symbol of the poor conditions in which bed-ridden patients were kept in workhouses, and ultimately as a visual referent for the failures of the New Poor Law.

Allegra Giovine  
University of Pennsylvania

"Of spirits and streetcars: the Mandalay electric tram-way through the eyes of a Burmese nat"

In 1904, Lieutenant Governor of Burma Sir Hugh Barnes opened the first electric tram-way in Mandalay to much public celebration. The new tram-cars were only the latest in a series of modernizing technologies to reach the former seat of the Burmese throne after the Kingdom’s final surrender to British annexation in 1886. An icon of the city’s increasing westernization, the Mandalay tram held promise to rehabilitate an urban landscape that now paled in comparison to Rangoon, the thriving urban centre of colonial Burma. But the story of the Mandalay electric tram-way was not written by the pens of colonial demographers alone. In this talk, I focus on an alternative story of the Mandalay tram as it was told by a Burmese nat (spirit) to a local audience. In Saya Thet’s 1904/1905 pamphlet, the figure of the Burmese nat is channelled to describe the tram-way to Mandalay residents and negotiate their reactions to the newest addition to the cityscape. I describe the role that this spirit genre plays in mediating matters of science and technology in colonial Burma, and by focusing on this text in particular, aim to show another dimension of public reception to Mandalay’s new tram-way.

Graeme Gooday  
University of Leeds

"Normalizing hearing: an audacious history of the audiometer"

Historical research in telecommunication history and disability history has started to uncover the diversity of human hearing capacities throughout the industrial era. These differential capacities were brought to focus by first encounters with the telephone in the late 1870s. This device only allowed for aural communication (stripping out all visual elements) and revealed a diversity of facility that had
hitherto been masked by the starkly dichotomous language of deaf vs. hearing. So amongst all this diversity when and why was the notion of ‘normal hearing’ then created? This contested notion of normalization was eventually canonized in the regular use of the audiometer in the 1920s, although it was a device that had been around in various forms as long as the telephone. My paper will start with Benjamin Richardson’s analysis in The Lancet, 1879, proposing the audiometer to determine ‘perfect’ hearing for certain key professions, and attempting to define relative deviation from ‘perfect’ hearing. Showing instead how other methods of comparing hearing capacities were long preferred by physicians and telephonic engineers, I conclude by looking at C.M.R. Balbi’s attempt in The Lancet, 1925, in his reinvention of the audiometer to analyse the drug-related variability of hearing loss independently of patients’ own testimony. It was through such instrumentalisation of hearing tests that the audiometer could be used both in the clinic and laboratory to pathologize certain forms of hearing capacity as somehow less or greater than a new stipulated norm.

Jean-Baptiste Gouyon
University College London

“When artifice becomes evidence: looking at the origins of the wildlife MOD genre”

The making-of documentary (MOD) is now a regular appendage to any ‘blockbuster’ natural history television series. This paper examines the emergence of this genre of natural history documentary. This took place in the early 1960s, bringing to the fore the essential tension between artifice and evidence at the heart of the documentary genre, and proposing to resolve it. In the early 1960s’ context, natural history television broadcasting at the BBC was being turned into a profession. In this context, the emerging MOD was instrumental for natural history broadcasters to distinguish their profession from the earlier practice of amateur naturalist cameramen, and to fashion their identity in relation to that of scientists. The paper first discusses four attempts at producing MODs in relation to wildlife film-making at the BBC, between 1963 and 1984. The four instances emphasise the materiality of the film-making process, bringing forward the various pieces of equipment and techniques employed by film-makers. In all four cases artifice is presented as appropriate, and even necessary for the nature film to perform its evidential role. Natural history television is thus contradistinguished from the ethic of non-intervention that prevailed in earlier amateur natural history film-making. Then, at the end of the 1980s, a second theme is introduced in the genre, the relationship between film-makers and field scientists. These MODs serve to support the claims to cognitive authority associated with natural history broadcasts. In fine, MODs participate in the fashioning of natural history film-making as a reliable practice of knowledge production.

Jason Grier
York University, Canada

“The Royal Mathematical School of Christ’s Hospital, 1673-1703”

Following the election in 1695 of Samuel Newton as the mathematical master at the Royal Mathematical School of Christ’s Hospital, John Flamsteed wrote a disgruntled letter to Isaac Newton (no relation to Samuel) complaining about the choice. Isaac Newton and Flamsteed had preferred a university-educated candidate and considered Samuel Newton to be deficient. The election exemplified what Flamsteed saw as the anti-intellectualism of the school’s governors. He related a story of the school’s treasurer asserting to him that a university man led to the students being proud and troublesome when they were apprenticed out to sea. In its early years, the school had a great deal of difficulty finding a suitable mathematical master. That has been the primary focus of the scholarship on the school; however, historians have taken the perspective of Flamsteed and Newton. Expert astronomers as Flamsteed and Newton were, they had no experience with the sea; therefore, it is necessary to recognize that they were not actually in touch with the needs of seamen. Taking advantage of the student registers and its substantial institutional records, I re-evaluate the 1695 election from the opposite perspective. Thus, I take seriously the statement regarding the preferences of the seamen so derided by Flamsteed. The disagreement between elite natural philosophers like Flamsteed and the practitioners at sea as to what was appropriate education makes the example of the Royal Mathematical School an ideal site to consider tensions between elite and practical mathematics at the end of the seventeenth century.
“Scientific lectures in nineteenth-century Manchester: constructing civic identity and professional science in the industrial city”

During the second half of the nineteenth century, the sciences formed the foundation of much of Manchester’s industrial success. The demonstration, on the public stage, of how science contributed to the city’s economic power, also helped to form its civic identity. I argue that public scientific speech – lectures, addresses, public demonstrations – played a fundamental role in constituting the city’s identity at local, national, and international levels. Simon Gunn has argued that ritualistic public display was an important way in which the middle classes strengthened their relationship with each other and with other classes. Nowhere was such ritualised behaviour so important than in the ranks of the British Association for the Advancement of Science (BAAS). When the BAAS met in Manchester in 1861, they found a city built for this display. How did civic spaces, such as the Free Trade Hall, influence the reception of the Association’s addresses beyond Manchester? I then turn to the Manchester Science Lectures for the People (1866-1880), lectures for working people established by the chemist Henry E. Roscoe. I consider whether the apparently straightforward educational aims of the series were in fact part of a more complex negotiation within the city’s professional classes, to establish the authority of professional scientists. For each performance, I consider a range of textual evidence, including newspapers, pamphlets, and books. These different textual versions of the same events represent and interpret the tone, authority, and argument of their speakers in markedly different ways, reminding us that an understanding of a dynamic civic identity is contingent on different surviving accounts.

“Sexual Health and the state: state-supported healthcare provisions for venereal diseases in England, 1918-1939”

The historical narrative of twentieth-century healthcare is one of supposed discontinuity between older draconian provisions and the emergence in 1948 of an unprecedented and enlightened system of state-supported care. This paper will show that the early NHS was not such a radically new venture but one of continuity that built upon existing state-supported provisions. It will do this by examining the unprecedented series of recommendations for the diagnosis, treatment, and prevention of venereal diseases following the Royal Commission on Venereal Diseases in 1916. The emerging network of diagnostic and therapeutic facilities for venereal diseases was the first universally available healthcare system in the UK that was free at the point of use. Yet with the exception of Roger Davidson’s work on the social history of venereal diseases in interwar Scotland, this important network of health provisions has not formed the subject of extended and detailed historical study. This paper undertakes this study, examining how legislative changes and diagnostic and therapeutic developments were transforming medical education, general practice, hospital practice, and the new national network of treatment clinics designed for the treatment of venereal diseases. By establishing a richer sense of diversity in past healthcare provisions (and the accessibility of these past provisions), this paper aims to identify more sophisticated ways of interpreting good health practices, along with a wider range of options in current debate over the direction of healthcare in the UK.

“Collective biographies – the BBI database – biographical background information”

The goal of our talk is to introduce the project on collective biographies ‘BBI – biographical background information’ realized at the Ladislaus von Bortkiewicz Chair of Statistics at the Humboldt University Berlin. BBI is a special dictionary created for dedicated use, especially for teaching activities. The database BBI stores biographical information and scientific contributions of more than 100 statisticians and mathematicians; it covers the period from the sixteenth century until the current time. The database
is a work in progress, the number of biographies is constantly growing, and the information on scientific contributions is updated regularly. In our talk we will explain the different criteria and principles for creating this database. We will demonstrate a few examples of the BBI dataset application in teaching and different quantitative courses as well as in conference talks. For more than six years now members of the LvB chair of statistics have been creating this uniform, easily readable interface of the BBI database which makes it possible to demonstrate the connections between different scientists and their contributions in a modern style and available for any teaching model.

Lisa Haushofer
Harvard University

"Visions of health and the eating body: food and the 1884 International Health Exhibition"

Food played a central role in late nineteenth-century approaches to health. For instance, food formed the first and largest category of the International Health Exhibition held in London in 1884. Yet perhaps as a result of the historiographical preoccupation with eugenics and the mortality decline of infectious diseases, or perhaps because of the marginalized position of nutrition in contemporary medicine, this centrality of food has largely been overlooked. This paper examines the role of food exhibited at the International Health Exhibition in articulating a particular vision of individual and national health, and of a new eating citizen. Whereas the Great Exhibition of 1851 had showcased foods with a focus on their role as raw materials whose supply was negotiated and optimized by nation states, the International Health Exhibition of 1884 sought to educate the individual about how to optimize national and individual health and digestion through the choice of the right kinds of foods. Using the case study of 'Benger's Food', one of several 'artificially digested foods' of the period, I argue that food products reflected the exhibition's faith in the collaboration of science and industry, and highlighted its concern with optimizing the health and productivity of the nation by reducing losses through child mortality and worker sickness. Artificially digested foods also communicated a conception of the eating body that represented an extension of the exhibition's concern with efficiency. A focus on food reveals unexpected continuities between visions of individual healthcare and of public health in Victorian Britain.

Catherine Herfeld
Munich Center for Mathematical Philosophy

"Shall we collaborate and if so, with whom? Economics and psychology during the early years of the Behavioral Sciences Movement, 1950-56"

This paper sheds new light on the relationship between economics and the so-called 'behavioural sciences movement' that emerged during the second half of the twentieth century in the United States. I concentrate on the development of rational choice theory and compare its development in economics with that in other behavioural sciences. In particular, I show that the separation between economists and other behavioural scientists was not as clear-cut as it has frequently been argued. Focusing on the early years (1952-1967) of the Center for Advanced Study in the Behavioral Sciences at Stanford University and, more specifically, on the development of rational choice theory at the Center, I argue that the relationship between behavioural sciences and economics was characterized by a protracted tension that originated in attempts by economists to bridge the gap between the 'logic of choice' underlying the highly formal theory of rational choice and the psychologically more sophisticated conceptions of human behaviour that were being developed in the behavioural sciences during that time. By showing that this tension among economists derived from their focus on mathematical modelling on the one hand and their increasing interest in psychologically enriched accounts of human behaviour on the other, my analysis weakens the claim that economists categorically turned away from other behavioural sciences by joining the 'behavioural sciences movement'. Thereby, this paper contributes to understanding better the roots of the profound changes that the economics profession underwent in the 1950s and 1960s at large.
Ian Hesketh  
*University of Queensland*

“Historicising the future in Victorian evolutionary narratives”

In Victorian Britain, as the discovery of vast timescales were thrusting human history deep into the past, many historians, anthropologists, archaeologists, biologists and popularizers of science sought to situate that history within an overarching evolutionary framework. Such ‘evolutionary epics’ formed a genre of science writing that explained human history within the larger evolutionary story of all life, thereby combining the historical insights of the natural and human sciences. While much recent work has examined how the evolutionary epic genre worked to popularise an array of evolutionary theories of history, little has been said about the important futuristic visions that were implicitly and often explicitly implied by the grand evolutionary narratives. This paper proposes to examine the futuristic evolutionary narratives of three Victorian natural historians, namely the travel writer Winwood Reade, the biologist Edwin Lankester and the polymath Francis Galton. From their different disciplinary approaches, all three spent considerable space considering the place of human history within overarching evolutionary schemes of life; and, moreover, they all promoted particular visions for the future of human life based on their evolutionary narratives. This paper therefore seeks to contribute to the growing literature on the historicisation of humans in Victorian Britain as well as to recent studies on the evolutionary epic by showing that we can only understand late Victorian theories of human history by recognising the way they were shaped not just by conceptions of the past but by visions of the future as well.

Rebekah Higgitt  
*University of Kent*

“Visions of the Observatory: toward a popular iconography of the Royal Observatory, Greenwich”

Histories of the Royal Observatory in Greenwich (ROG), Britain’s first government-funded scientific institution, have focused on the people who worked there, the buildings they inhabited, the programmes of work they followed, the instruments they used and the connections they developed with other institutions, astronomers, mathematicians, observers and instrument makers. The view from outside has been much less studied. Drawing on visual and written sources, this paper will attempt to address the question of what lay publics made of the ROG, contrasting this with, on the one hand, images and accounts presented to them by popularisers of astronomy and, on the other, commentary circulated among more expert and interested audiences. Questions to be considered include: did the ROG, in particular, inform views of what, in general, an observatory should be like? Were stargazing or fortune-telling more commonly associated with the Observatory than painstaking observation and calculation? When and in what contexts was the ROG linked to nation, navy and empire? Was there a widespread sense of the ROG’s public utility, as emphasised by the Astronomers Royal? What was the interplay between lay conceptions of the role of the ROG and popular representations of things (e.g. telescopes) and people (e.g. Newton) that have already been the focus of scholarly attention? As well as exploring an under-studied aspect of the history of an iconic scientific building, this preliminary work will investigate the extent to which we can reveal popular views distinct to those put forward by popularisers.

Oliver Hill-Andrews  
*University of Sussex*

“Even the most hopeless may learn in the end’: conditioning reflexes in Interwar Britain”

In 1927, Ivan Pavlov’s *Conditioned Reflexes: An Investigation of the Physiological Activity of the Cerebral Cortex* was published in Britain. This was the first full account of Pavlov’s work to appear in English and, though Britain was generally unreceptive to behaviourism in the first decades of the twentieth century, socialists in particular were enthusiastic about the implications of Pavlov’s dogs. This talk will consider how H.G. Wells and a less familiar figure, J.G. Crowther, interpreted Pavlov’s research. Crowther, in his capacity as a technical and science books representative of Oxford University Press, helped organise the translation into English of *Conditioned Reflexes* and his subsequent articles on the topic reveal an explicitly political motivation. Like Wells, Crowther rejected the theory of the inheritance of acquired characteristics, on which the likes of William Morris had pinned their hopes of ‘making socialists’. If
lifestyle changes were not inherited, as August Weismann implied, human nature could not evolve towards socialism. Pavlov offered a solution, because he indicated that behaviour was pliable, that the mind could adapt and learn. This insight came at an opportune moment for Crowther, as it allowed him to remain optimistic in the face of the failure of the 1926 General Strike: Pavlov gave 'encouragement ... for those who are inclined to get fed up with mankind, seeing it follow Baldwins and Churchills and Birkenheads so persistently'. The pen, Crowther concluded, could be stronger than the sword, so he devoted his life to Scientific Journalism and the attempt to condition reflexes.

Matthew J. Hoffarth  
University of Pennsylvania

"Burnout, Incorporated? Testing work stress in the 1970s and 1980s"

In 1975, New York-based psychologist Herbert Freudenberger published the article, 'The Staff Burn-Out Syndrome in Alternative Institutions', in the journal Psychotherapy: Theory, Research, and Practice. By the early 1980s, burnout had become an American (and increasingly global) cultural phenomenon, talked about in the pages of People, Newsweek, Time and Good Housekeeping. This paper tracks the ways in which Freudenberger’s concept of burn-out, used to describe to his fellow psychoanalysts the enervation, lack of charisma, and loss of self that those in the helping professions were said to be experiencing in the 1970s, became mobilized in a more widespread expression of displeasure with the de-humanizing experience of work in the medical and educational professions and ultimately, with the corporatized workplace in general. In addition, this paper tracks the way in which the notion of burnout performed two seemingly opposite functions in the 1970s and 1980s: it was a mark of displeasure and cry for change in the structures of work, but it was simultaneously an idea capitalized upon by managers, executives, and human resource professionals to enrol workers in longer hours, in becoming more efficient and productive employees, and to see their personal goals as aligned with the goals of the organization. In becoming reconceived as a stress reaction precipitated by the drudgery and meaninglessness of work in the 1970s, burnout proved to be a two-headed concept: both a trenchant social critique, and a powerful tool for a new style of human resource management.

Michelle Hoffman  
American University of Central Asia

“Science education, clear thinking, and the problem of transfer”

In his campaign to elevate the status of science in British schools, Thomas Huxley famously stated in 1854 that science was ‘nothing but trained and organized common sense’. So began a long tradition of educators’ widespread claims that science, as a school subject, played a privileged role in disciplining young minds and training students in clear thinking. The thinking skills credited to the study of science included technical abilities such as accuracy in observation and exactitude in description, but more importantly, included virtues that were equated with good citizenship: equanimity, fairness, resistance to suggestion and sound judgement. These claims were challenged by turn-of-the-century research on transfer of training. Often-cited experiments by psychologist E. L. Thorndike suggested that learning in one subject did not reliably create generalized reasoning skills that could be transferred to other areas. This seemed to limit the role that science education could be expected to play in fostering democratic culture. This paper examines how science educators in both Britain and the United States grappled with the implications of the problem of transfer between 1900 and 1940, as Thorndike’s research was alternately challenged and extended by other psychologists. Drawing on education journals, textbooks and the work of educational psychologists, I argue that the problem of transfer dovetailed with broader pressures on schools, prompting educators to refashion programmes of study and educational ideals. In doing so, they redoubled their claims about science’s ability to instil civic virtues and clear thinking by forging direct connections between the science classroom and the science of everyday life.
“Theoretically elegant, but technically demanding’: somatic hybridisation and biotechnology, 1960-1995”

A key barrier to the development of new forms of biotechnology – the cell wall – was removed by plant scientist Edward C. Cocking in 1960, creating what is termed a protoplast. Protoplasts appeared to possess great potential in the breeding of new plant varieties, through the fusing of entire cells of completely different species, complete with their genomes. This technique, termed ‘somatic hybridisation’, was the particle collider of the biological world, fused protoplasts resulting from crosses containing a vast range of genetic data. Fused cells were used to create a tobacco plant in 1972, somatic hybridisation demonstrating its commercial viability. This paper will examine the development of somatic hybridisation from 1960 to 1995, disease-resistant tobacco formed by the process being commercially grown in Ontario by the latter date. Despite some successes, somatic hybridisation ultimately proved a low-key biotechnology, lacking the status and international uptake of recombinant DNA techniques. Using this comparison, this paper considers the limiting factors which restricted somatic hybridisation as a commercial technology, from ongoing technical difficulties to isolation from the biotech industry. Another context is relevant to this discussion, as recombinant DNA would go on to be an environmentally controversial technology by the 1980s, an outcome avoided by somatic hybridisation, despite higher risks of transmitting negative traits and genetic instability. The question will therefore be asked of why the same challenges were not faced by advocates of somatic hybridisation.

“Tipping the balance’: Karl Friedrich Meyer, scientific networks, and the birth of disease ecology”

The Swiss-born medical researcher Karl Friedrich Meyer (1884-1974) is best known as a ‘microbe hunter’ whose pioneering investigations of infectious disease outbreaks in California in the 1920s and 1930s helped break down the barriers between veterinary medicine and public health. In particular, historians have singled out Meyer’s influential 1931 Ludwig Hektoen Lecture in which he described the animal kingdom as a ‘reservoir of disease’ as a forerunner of ‘one health’ approaches to emerging infectious diseases. In so doing, however, scholars risk overlooking Meyer’s other intellectual contributions. Developed in a series of papers from the mid-1930s onwards, these were ordered around the concept of ‘latent infections’ and sought to link microbial behaviour to broader bi-ecological, environmental and social factors that impact upon host-pathogen interactions. In this respect Meyer, like the comparative pathologist Theobald Smith and the Australian immunologist Frank Macfarlane Burnet, can be seen as a pioneer of modern ideas of disease ecology. Drawing on Meyer’s private papers and correspondence, this paper shows how Meyer used his position at the George Williams Hooper Foundation in San Francisco to pioneer the integration of bio-ecological perspectives into medical microbiology, while forging close links with key international ecological thinkers. In particular, the paper draws on network theory and Fleck’s concept of thought collectives to chart Meyer’s exchanges with Burnet and Charles Elton, the director of the Bureau of Animal Population in Oxford, over plague and psittacosis. The paper concludes that these exchanges not only showed how environmental conditions could ‘tip the balance’ in favour of parasites, they also mutually transformed Meyer and Burnet’s thinking about disease ecology.

“Exploring diversity in British science: challenges and opportunities”

In recent years substantial efforts have been directed by the British government and leading scientific and technological organisations into increasing the diversity of the scientific workforce. These efforts have been justified primarily by the argument that this lack of diversity represents the loss of talent that might contribute to improving national economic competitiveness and by more general concerns about the lack of appropriate skills in the British workforce rather than by appeals to social justice. They have also highlighted just how little we know about this aspect of the history of the British scientific workforce,
with official statistics only available since the late 1990s and historical research yet to catch up with changes in the nature of the scientific workforce arising from migration since World War Two or to chart their historical development as the children and grandchildren of migrants have entered the labour force. This paper seeks to address this lacuna by drawing on a series of ten life story interviews undertaken by National Life Stories in conjunction with the Royal Society as part of its diversity programme to explore the careers and experiences of a group of scientists from minority ethnic backgrounds. While this sample is, of course, a very limited one, the findings of this project are suggestive of ways in which further research in this area might enrich our histories of recent British science and raise interesting questions about how individuals establish and negotiate their scientific identities.

Hsiang-Fu Huang
University College London

"A family business: Walker's Eidouranion, and the rise and decline of private astronomy lecturing in Britain, 1780-1860"

This paper intends to narrate the development of the astronomy lecturing trade from the perspective of a family: Adam Walker (1731-1821); two of his sons William Walker (c. 1766-1816) and Deane Franklin Walker (1778-1865). The Walkers were celebrated experimental philosophy and astronomy lecturers. The father and the eldest son, William, were the key figures who shaped onstage astronomy lectures in the 1780s, by introducing the 'Eidouranion; (the transparent orrery) into lectures inside theatres. This theatrical turn was commercially successful. Many imitators constructed their apparatus and competed with the Walkers in the market. Onstage astronomy lectures were then a fashionable novelty. This type of performance was a blend of informative instruction, religious reflections and sensational entertainment. The youngest brother, Deane Franklin, later inherited and revived the family business, which made the renowned reputation of Walker's Eidouranion continue until the mid-nineteenth century. The milieu of the astronomy lecturing trade changed significantly throughout the careers of the Walkers. Science and astronomy lecturing gradually transformed into institutionalized practices in Deane Franklin's time. He witnessed the decline of old-school private lecturers in his late years. The careers of the Walkers were a miniature of the development of public scientific lecturing from Enlightenment polite science to Victorian mass culture. A family business provides a specimen of the changing nature of science and its marketplace.

Frank James
Royal Institution

"Founding the Medical Pneumatic Institution, 1794-1798"

The paper will briefly discuss the early career of the radical physician Thomas Beddoes (1760-1808), his departure in 1793, because of his democratic politics, as Chemistry Reader at Oxford University and his links with midland industrialist families including the Watts, Wedgwoods and Boultons, among others, and with Whigs such as Georgiana, Duchess of Devonshire, and Lord Lansdowne (sometime Joseph Priestley's patron and Prime Minister). Settling in Bristol, and believing that chemistry was possessed of enormous potential medical benefit which could only be realised by establishing a research laboratory, Beddoes decided to found the Medical Pneumatic Institution (MPI) with the avowed aim of investigating the therapeutic possibilities of the various airs (gases) discovered during the eighteenth century. The founding of the MPI is usually portrayed, most recently in Mike Jay's study, as the constant goal of Beddoes from late 1794 when he began a public campaign to raise £4000 for this purpose. But when the tortuous routes in terms of individuals and groups with various interests who both supported Beddoes (the industrialists and Whigs) and opposed Beddoes (Joseph Banks and the London medical establishment) are examined in detail, together with Beddoes's tendency to undertake other activities, this view of the MPI's establishment is seen to be misleading. Nevertheless, in 1798 sufficient money had been donated to permit Beddoes to appoint Humphry Davy to oversee the opening of the MPI in Dowry Square. This story illustrates the necessity to understand in detail how scientific and medical activities started to be funded in the late eighteenth century.
Annie Jamieson  
*University of Leeds*

“Control, comfort, consistency: the development of in-ear monitoring systems for on-stage performance”

This paper will focus on the development of in-ear monitoring systems (IEMs), used in live performance to allow artists to hear themselves over a highly amplified performance, to illustrate the session theme of cross-fertilisation of technologies in relation to communication, hearing and deafness, in this case moving forward into the late twentieth and early twenty-first centuries. IEMs emerged in the mid-1980s, in response both to technical issues arising from increasing volume of amplified performance and to concerns about risks to artists’ hearing. In popular music, increasing amplification had led to ‘monitor wars’ whereby, in the bid to allow performers to hear their own voice or instrument over the combined sound level, each had a ‘monitor’ speaker reinforcing their own sound. However, as one monitor got louder, so the others would too, leading both to damaging sound levels on stage and to technical problems, such as feedback. The first IEMs were based on ‘Walkman’-style headphones but early designers rapidly saw the potential in hearing aid technology, especially micro-transducers, to improve the devices. In common use today, IEMs raise interesting issues in relation to the theme of this session: they incorporate technological advances rooted in telephony and hearing aids in ways that improve performance, overcome technical limitations of other monitoring systems, and protect and enhance artists’ hearing. However, they can equally damage hearing if used inappropriately and can create problems of isolation from the audience and other performers. Thus they demonstrate a further instantiation of the complex relationship between technology, hearing and communication.

Bill Jenkins  
*University of Edinburgh*

“Evangelicals and extraterrestrials: the plurality of worlds debate in Scotland, 1815–1855”

In the early nineteenth century the picture of the universe revealed by modern astronomy raised important theological issues for Christians. A remarkable group of Scottish Evangelicals set out to address the questions raised by the possibility of intelligent life on other worlds. These included reformer and political economist Thomas Chalmers (1780–1847), natural philosopher David Brewster (1781–1868) and geologist Hugh Miller (1802–1856). Their answer to the question of whether the existence of extraterrestrial life was compatible with their Evangelical faith was a resounding affirmative. All three concluded that only a universe where all planets were or would in the future be inhabited was compatible with the power and wisdom of the Deity. In addition, they applied analogical reasoning to suggest that other worlds, the similarity of which to the earth they greatly exaggerated, must logically also harbour life. However, this left them to struggle with the problem of how the incarnation and atonement of Christ related to intelligent beings on other planets. Chalmers considered the possibility that extraterrestrials may not have shared in the Fall, and therefore not required salvation, while Brewster and Miller both pondered models which would allow Christ’s atonement to apply also to other worlds. The writings of these three figures present us with a fascinating case study on how an important group of Evangelical thinkers attempted to meet the challenges posed by modern science, not by rejecting its findings, but by attempting to create a new synthesis between it and their religious beliefs.

Luciana-Marioara Jinga  
*Institute for the Investigation of Communist Crimes and the Memory of Romanian Exile, Bucharest*

“Fraud or science? Women chemists in communist Romania”

During my research in the field of Romanian communism in the second half of the twentieth century, I have noticed the great deal of interest historians give to the figure of Elena Ceausescu and at the same time the lack of any research on the feminine scientific contribution during the Romanian communist regime, even if the two subjects are closely linked. Despite the fact that she obtained a PhD in chemistry, signed important scientific studies and was awarded several distinctions from prestigious scientific institutions, in Romania, public opinion always considered her scientific career a total fraud. By extrapolation, all the measures taken by the communist state in order to increase the feminine presence in fields that required strong scientific skills, were considered forced, with no real representation in the
economic and academic Romanian reality. This rather superficial treatment made me look forward, in search of reliable information about the feminine real presence and activity in male-dominated scientific fields and I chose as case study the chemistry. What I want to show, having as support extensive research in the communist archives, the press and autobiographies, and oral interviews, is the much more complex picture of feminine presence in the Romanian scientific production during the communist regime: were scientific contributions and / or women's professional abilities less impressive than those of men? What was the real number of women involved in Romanian science during Nicolae Ceausescu's regime and what was the real impact of this presence?

Sean Johnston
University of Glasgow

“Capturing enthusiasms: Scientific American and the shaping of amateur scientists”

This paper traces the role of Scientific American magazine in the evolution of technical enthusiasms in America. Between the 1920s and 1970s, seminal editors Albert G. Ingalls and C. L. Stong shepherded generations of amateur scientists. Their columns and books popularised autonomous non-professional research and celebrated the frugal ingenuity and skills of inveterate tinkerers. Readership of Scientific American grew in a fertile economic and political context. Contributors' technical enthusiasms and confidences were seeded by training in electronics, optics and mechanics during the two World Wars. Post-war amateur activities flourished with the availability of war surplus stocks. Over the middle decades of the century, the Scientific American model challenged other, more hierarchical, templates of amateur practice. Science Service, a press organisation dedicated to promoting scientific literacy, notably promoted radio-building and telescope-making for adults, fostered science clubs and science fairs for adolescents, and enrolled the sponsorship of companies such as Westinghouse and CBS in seeking science talent. Wartime demands focused government attention, too, on marshalling the next generation of technical enthusiasts, and Cold War anxieties encouraged schools-based nurturing of scientific aptitudes in the national interest. Trading independence for mentored teamwork, these approaches had resonances with more recent ‘citizen science’. The paper argues that the Scientific American columnists produced a remarkably appealing and durable vision of amateur science, and explores how they championed curiosity-driven and self-directed research. Reasons for its apparent decline towards the end of the century will be discussed.

Elizabeth Jones
University College, London

“The history of ancient DNA research is a history of celebrity science”

In this paper, I argue that the history of ancient DNA research is a history of celebrity science. Ancient DNA research – the search for molecules in fossils – is a set of contemporary, interdisciplinary, and controversial scientific and technological practices. It emerged from the interface of palaeontology, archaeology, and molecular biology in the late twentieth and early twenty-first centuries. Over the last thirty years, ancient DNA research has evolved into a professional discipline under the influence of public interest and media exposure. Celebrity science is a type of science that has constant news value which results in consistent, sometimes intense, attention from media. Celebrity science is a distinctive category of science. Its presence in the media is so substantial that the science and scientists respond, positively or negatively, to the attention and even reinvent their reputation in response to these public portrayals. I show evidence for the interplay between science and media and how this relationship has driven and directed the formation of ancient DNA research as a technoscientific practice, specifically in the 1990s. I argue that ancient DNA research is a case study of a celebrity science, and I suggest to historians of science the opportunity to use this argument for ‘celebrity science’ as a perspective for asking questions and finding answers about the development of other sciences under the persistent publicity and pressures of media.
“Heads, shoulders, knees, and toes’: embodied anatomy for children in the nineteenth century”

Nineteenth-century children learned about their bodies from a variety of sources, including books, periodicals, objects, images, conversations and people. At the same time, educational philosophies increasingly emphasised embodied learning, converting the child’s body into a crucial pedagogic tool. In this talk I will focus on elementary juvenile works about human anatomy, to explore cases when the body was both the object and subject of investigation. This peculiarly self-referential educational strategy stressed that the body and senses were the ‘gateways to knowledge’, but also formed central parts of desired curricula themselves. In their lessons authors brought together explicatory prose, discussion, metaphor, illustrations, artefacts, and actions, to teach anatomy as a necessary counterpart and counterpoint to lessons on the natural world, common things, and to spiritual and moral training and discipline. Content ranged from basic knowledge of the names and arrangement of limbs and facial features, to the senses and their usage, to emotional and moral instruction. Objects from dolls to blackboards were frequently incorporated into lessons, or employed in illuminating analogies: buildings or machinery were common, from flesh and skin as bricks and mortar to tear-ducts and sewing-machine oil. Most encouraged their readers’ or students’ participation in embodied activities, putting the body to work when learning about its parts and senses. Analysing a selection of these works, particularly their literary and sensory strategies, can elucidate how children learned anatomy, as well as revealing changing attitudes towards children and their bodies, from head to toe.

“Sex education is always trouble’: the representation of sex education and HIV-positivity on the BBC’s Grange Hill”

In 1990 the BBC broke new ground when EastEnders’ character Mark Fowler returned to the show much changed by his HIV-positivity. The storyline fostered intense media interest: research indicates that both HIV-awareness and HIV-antibody testing-rates increased as the storyline aired. Five years after Mark’s storyline began, another BBC series picked HIV as a plotline: the long-running children’s drama Grange Hill. The series’ 1995 HIV storyline followed the impact of the death of Lucy Mitchell’s mother from AIDS-related complications. This representation of HIV-positivity served as more than mere dramatic effect; over the course of five key episodes, Grange Hill presented its audience with some of the factual and emotional realities of the impact of HIV/AIDS on family and friends, deliberately situating the disease within a salient familial context. Throughout the same episodes, sex education lessons were also represented, with their potential to cause controversy used to provide a further source of drama. The resulting episodes provide the historian with unique texts. Not only are they rare examples of AIDS edutainment aimed at young adults, but, as I will argue, they also represent a critique of government sex education policy. This paper will explore and contextualise how HIV-positivity and sex education were represented in Grange Hill, revealing the didactic and political elements of the text, whilst demonstrating how the BBC deployed differing ideas of childhood and the child as vulnerable or a genetic to create compelling drama, empower its teenage audience, and critique government policy.

“Constructing Japanese science: Ishinpō and the history of Sino-Japanese medicine”

Ishinpō, the earliest extant Sino-Japanese medical work and compiled by Tanba no Yasuyori in 984, became an important text in Japan and China as it was composed almost entirely of excerpts and therefore preserved quotations of works no longer extant from China’s Han through Tang dynasties. However, Ishinpō’s historical value as a preserver of earlier Chinese medical works has drawn attention away from the text itself to its act of preservation. In order to reorient the study of Ishinpō, this paper investigates two aspects of Ishinpō: its use of Chinese sources and subsequent Sino-Japanese works, as Yasuyori lived during the rise of Japanese high culture. In other words, although Japan had encountered
Chinese medical learning centuries earlier, Ishinpō represents Japan’s earliest surviving local formulation of this tradition. Yasuyori’s construction of medicine can be discerned from his collation and coordination of sources. At the same time, Ishinpō’s establishment of a local Sino-Japanese medical tradition and influence on subsequent Japanese writers is seen in medical works of later centuries. Using these later treatises, often written and compiled by authors with access to both older and newer works from the continent and their Japanese counterparts, it is possible to trace the history of Ishinpō. In addition to medical works, popular works such as Yamai no sōshi, scrolls depicting illness, allow Ishinpō to be contextualized within popular imaginations of illness. In this way, this paper analyzes Yasuyori’s conceptualization of medicine and sheds light on Ishinpō’s historical place in the Japanese medical imagination.

David Kirby
University of Manchester

“Unlawful experiments: science, crime and movie censorship in the 1930s and 1940s”

From 1930 to 1968 movie studios sent their screenplays to Hollywood’s official censorship body the Production Code Administration (also known as the ‘Hays Office’) and the Catholic Church’s Legion of Decency for approval and recommendations for revision. One of the fundamental tenets of the Hays Office’s Production Code was a restriction against showing criminality in a positive light or allowing criminals to escape punishment. This paper explores how filmmakers tried to use science to tell cinematic stories and how these censorship groups modified film narratives when they believed that science was being used in morally inappropriate ways including what they considered to be for unlawful purposes. Censorship groups were concerned with the overt use of science in criminal endeavours, especially in films where characters used science to commit the ‘perfect crime’ as in Before I Hang (1940) or when scientist characters argued that scientific progress justified their illegal actions as in Doctor X (1932). But, the notion of what constituted a scientific crime was not always clear to the censors. Movies such as The Man in Half Moon Street (1944) and Lady and the Monster (1944) reveal an uncertainty amongst censors about whether the behaviours and experiments of fictional scientists were criminal or merely morally problematic ethical lapses. In addition, I will show how censors addressed questions of scientists’ legal responsibility for the consequences of their experiments as well as what constituted appropriate punishments for scientific crimes in films such as The Monster and the Girl (1941).

Adrian James Kirwan
National University of Ireland, Maynooth.

“The nationalised telegraphs in Ireland, 1870-1912”

In 1870 the United Kingdom’s inland telegraphs were nationalised under Post Office control. The Post Office envisaged a new telegraph network that would serve not just major urban, financial and trading centres but would bring telegraphy into small urban centres throughout the British Isles. It also proposed to introduce other significant improvements to the telegraph service, such as reduced rates for the transmission of public and press telegrams. This new system would standardise levels of service and lead to a significantly enhanced telegraph network. In Ireland telegraphy had been developing steadily since the connection of the island to Britain in 1853. However the system that was in place upon nationalisation was significantly inferior to that in existence in Britain. This paper shall endeavour to show how telegraph standards developed for the British core were transferred to Ireland and the impact that this had on the nationalised telegraph system in Ireland. Ireland without significant urbanisation, industrialisation and population, three central criteria for telegraph demand, would benefit enormously from the application of these standards. However the central question that this paper will seek to address is whether the significant upgrades that took place were justified from a financial perspective or did the transfer of telegraph standards from the British core to the Irish periphery lead to the construction of a superfluous telegraph infrastructure.
Jon Røyne Kyllingstad  
*Norwegian Museum of Science and Technology*

“Cultures, ethnic groups and populations in Scandinavian prehistory”

In the nineteenth and early twentieth centuries, archaeology was focused on the search for the origins of human populations. Prehistoric ‘cultures’ and ‘peoples’ were constructed through the study of the distribution in time and space of various types of cultural artifacts from archaeological findings. Such research was often closely related to physical anthropological studies that compared human skulls from archaeological excavations with contemporary populations and drew inferences about the prehistoric roots of contemporary national, ethnic and racial groups. The underlying assumption was that prehistoric ‘cultures’ could somehow be related to races with specific physical characteristics. Post-war archaeology saw a reaction against this search for ancestors, and has developed various approaches to the study of cultures, societies and ethnic groups as social constructions. However, the issue of ethnic groups’ biological ancestry was never abandoned, and at present a rapidly increasing number of studies of the distribution of DNA-markers in contemporary populations and ancient humans aim to link prehistoric ‘cultures’ to both past and present ethnic groups. Such studies, that often catch the attention of the media, are based on the assumption that archaeological ‘cultures’ are somehow related to specific biological populations. However, archaeological cultures are analytical constructions based on the study of the spacial and chronological distribution of cultural artifacts, and cannot in themselves tell us anything about the distribution of human populations. This paper directs the attention towards archaeological and genetic research on ethnic groups and ancestry in Scandinavian prehistory and discusses the relationship between archaeological concepts of culture and ethnicity and biological concepts of population and ancestry, and how these conceptualizations are related to public imaginations about ancestry, identity and roots.

Christoph Laucht  
*Swansea University*

“Analyse and survive? British scientific and medical experts and uncertainty about the effects of nuclear war in the 1980s”

In the aftermath of the NATO double-track decision that led to the deployment of cruise missiles to Britain, the early 1980s witnessed a resurgence in public concern and anxiety over nuclear war. Civil defence planners had long taken to ‘imagineering’ (David Monteyne) post-nuclear attack environments to train their staff, and scientists had studied the effects of radiation, especially fallout from nuclear testing. From the late 1970s onwards, however, a wave of studies by experts from various disciplinary backgrounds, including physics, geography, economics, political science and medicine, appeared that attempted to assess the anticipated effects of nuclear war on Britain. Often these analyses seemed to contradict the British government’s public discourse on the imagined effects of nuclear war and their containment as propagated through the Home Office’s *Protect and Survive* civil defence campaign. This paper explores the role that uncertainty played in these expert analyses of the anticipated impact of nuclear attack on Britain at a time of heightened tensions between the superpowers. On an epistemological level, this presentation examines how scientific and medical experts dealt with a lack of availability of precise and verifiable knowledge about the nature and consequences of nuclear war. In this, it also demonstrates how this uncertainty was instrumentalized for political purposes in debates over nuclear disarmament and the sense and sensibility of civil defence operations, for example.

Tom Lean  
*The British Library*

“Public inquiries, architecture, open days, and a train crash: the Central Electricity Generating Board and the public relations of nuclear power in Britain”

In July 1984 at a test track in the Midlands, the Central Electricity Generating Board (CEGB) crashed a train into an empty nuclear waste flask at 100mph. The enormous smash and miraculous survival of the nuclear flask has become an iconic moment in the history of nuclear safety. However, it was just the most dramatic spectacle of a long campaign by the CEGB to manage perceptions of nuclear power. In this paper
I use oral history interviews from CEGB nuclear power station managers, scientists, engineers, and planners collected by National Life Stories: An Oral History of the Electricity Supply Industry in the UK. Using this testimony I explore the various ways in which the CEGB sought to present nuclear power in a positive light and look at its motivations for doing so. I look at some of the ways in which good relations with local communities were encouraged to stress the benefits of nuclear power stations as good neighbours. I explain how the great care the CEGB took to preserve the environment around nuclear power stations, was part of a much larger effort to overcome objections at planning inquiries. Rather than simply a crude attempt to foist nuclear power on the public, I suggest this great attention was a more nuanced effort to safeguard the nuclear option as part of the CEGB’s public service of keeping the lights on. As time went on, objections to nuclear power became louder and so too did the industry response. I conclude with a discussion of the CEGB’s efforts to lay the groundwork for a new nuclear programme in the 1980s, through the great nuclear train crash and the year-long Sizewell B public inquiry, and how this was ultimately undone by industry privatisation.

Ageliki Lefkaditou
University of Leeds / University of Oslo

"Who are the Greeks? Rethinking biology, culture, and ancestry in the post-genomic era"

This paper takes its inspiration from the publication of the first semi-popular book on the genetic history of the Greeks to ask how our conceptions of collective identities such as nation, ethnic group, or population are challenged, reshaped or completely altered when adding genetics. In the absence of an established research tradition on human genetic variation and genetic diversity in Greece, such publications seem to perpetuate the sensational appeal of science and especially genetics. At the same time, however, they are part of debates over the categories of race and ethnicity both within and outside academia. The intensity of these discussions can only be understood when one considers how deeply engraved the idea of a historical, cultural, and even biological continuity between ancient and modern Greeks has been and the role it has played in establishing a national identity and the state’s claims to sovereignty over the last two centuries. Though these conceptions of Greekness have lately been openly challenged by Greek scholars, the country is currently experiencing a revival of purist ideologies, racist rhetoric and violence, as well as an acute rise in anti-immigration views and policies. By focusing on this recent publication and how it was featured in public press and discussions, my aim is twofold: a) to ask how the Greeks are constructed as a subject of genetic research, and b) to investigate how this kind of research deals with old racial categorizations and understand how it gains its legitimacy.

Don Leggett
Nazarbayev University

“Composed engineers: Frank Aydelotte, composition training and the liberal education of engineers in early twentieth-century America”

In the first few decades of the twentieth century American universities institutionalized composition classes as a fundamental component of the curriculum for engineers, employing English professors to teach writing skills. This training taught various composition skills, but, as any linguist knows, also a host of intellectual properties and cultural mentalities. ‘There is no profitable treatment of words that is not also a treatment of ideas’, Frank Aydelotte, Professor of English at MIT, wrote in his landmark pedagogical volume *English and engineering: a volume of essays for English classes in engineering schools* (New York, 1917). By examining the textual practices of leading Victorian scientists (T.H. Huxley and John Tyndall), essayists (John Ruskin, Matthew Arnold, Thomas Carlyle and John Henry Newman) and composition teachers (Arnold Bennett and George Henry Lewes), Aydelotte provided engineering students with lessons in style, usage, sincerity, disinterestedness, poetry and self-reliance that would be fundamental to shaping how engineers conducted themselves in their work and social relations. Aydelotte believed that such lessons were central to ‘the liberal, humanizing, and broadening element which is more and more fit to be a necessary part of an engineering education’. This paper examines Aydelotte’s *English and engineering*, its publication history and usage in the classroom of American universities to uncover an important part of the engineer’s education.
Nanna Katrine Lüders Kaalund  
*York University, Canada*

"The Bible and the geologists are agreed": the historicisation of humans in John William Dawson's *Archaia*

In 1860, the Canadian geologist John William Dawson (1820-1899) published the book, *Archaia*, which was the first of many publications he produced as a popularizer of science. While *Archaia* failed to reach the broad audience Dawson had intended, it is an illustrative example of how Dawson viewed the relationship between geology and theology, the limits of all three fields, as well as the development of the geological earth, its vegetation, animal life and man’s place in creation. In this paper, I will examine Dawson’s version of natural theology in *Archaia* to show how Dawson, as a strict anti-transformist, constructed his cosmogony in *Archaia* to prove that the advance of science and biblical exegesis would be mutually supportive, while positioning himself in the middle ground between what he perceived as narrow-minded theologians and infidel scientists. In doing so, I consider how Dawson historicised humans to fit with a modified biblical chronology in *Archaia* in relation to his popularizing strategies. Dawson believed that careful studies of science and the bible would help people in achieving an elevated moral stage in preparation for the future of humankind – or, the 8th day of creation. This was an important point for Dawson in particular when he wrote for a non-specialist audience. When Dawson historicised humans in *Archaia*, he did so both to discredit the theories of polygenism and developmentalism and to save the souls of his readers.

Hongjin Liu  
*University of Leeds*

"Robert Swinhoe and his role in Darwin's and Hooker’s China correspondence networks"

As major figures in their respective fields (zoology and botany) in Britain in the nineteenth century, Charles Darwin and Joseph Hooker communicated frequently with informants around the globe who provided them with information and specimens. This paper will consider how the China-based Robert Swinhoe's multiple identities as diplomat, ornithologist and botanist made him a valued member of both men's correspondence networks. A study of the correspondence reveals their 'China networks' themselves to have been rather different in character, with Hooker's being more formally organized and centred on his main deputy in China, Henry Hance, while Darwin's far more informal one was centred on himself. After introducing Swinhoe's life and work, the paper examines his relationship with Darwin and Hooker in turn, looking at, among other things, Darwin's use of Swinhoe's work in his 1872 book on emotional expression and at the role of funding in mediating both relationships. The paper will conclude with reflections on how the Swinhoe case can throw light more generally on the structure and functioning of Sino-British scientific communications in the nineteenth century.

William R. Macauley  
*University of Manchester*

"Faithful reproduction: the portrayal of pregnancy and reproductive medicine in Evangelical Christian films, 1975 – 2014"

Faith-based filmmakers in the US have used a variety of aesthetic practices and presentational styles to evangelize and engage in public debates on the role of science and religion in issues relating to human reproduction. Following the 1973 US Supreme Court *Roe v. Wade* decision supporting legal abortion, evangelical Christian theologian Francis Schaeffer adopted conventions associated with the documentary format to create a series of disturbing films. The film series *Whatever Happened to the Human Race?* (1979) portrayed abortion and other procedures associated with reproductive medicine and biomedical science as barbaric, evil, and morally reprehensible. In the 1980s and 1990s, Christian filmmakers emulated the cinematic style and aesthetics of Hollywood medical dramas and family melodramas to create films about unwanted pregnancy and reproductive medicine for screening in the church, cinema and home. This paper will trace the history of Christian entertainment films that focus on human reproduction and the application of medical science. I will explore ways in which faith-based films depict medical knowledge and clinical practices within a religious frame. How do Christian films delineate the
boundaries as well as the points of intersection between medical practice and acts of faith during pregnancy and interventions such as genetic counselling and abortion? I will argue that Christian films frame human reproduction as a sequence of moral choices and a divine gift. Faith-based filmmakers utilize and adapt conventional cinematic styles and aesthetics to align their films with religious and political 'pro-life' organizations that define abortion as unnatural, illogical and morally unacceptable.

Seán McCorry
University of Sheffield

"Filming 'The Predatory Transition': technology, violence and species difference in 2001: A Space Odyssey and post-war palaeoanthropology"

Stanley Kubrick's 2001: A Space Odyssey (1968) begins with an act of technological violence which secures the boundaries of the human species. Kubrick's hunching proto-humans discover that bone tools give them a competitive advantage over their rivals. The murder of one by another announces 'The Dawn of Man', in Kubrick's idiom, and enables the now-human victors to secure both meat and territory. My aim in this paper is to trace the relationship between this bloody origin myth and contemporary research in palaeoanthropology. Raymond Dart (1953), a key influence on Kubrick, tells a similar story of technologically abetted violence as a formative event in a process of hominization. Dart’s australopithecines were human not just in appearance, 'they were also human in [...] their love of flesh, in hunting wild game to secure meat and in employing implements [...] to kill during hunting' (p. 204). In this paper, I argue that Dart’s triumphal narrative of human origins becomes, in Kubrick's hands, an anxious meditation on the relationship between technology and species difference. The particular anxieties of the Cold War period intervene in Kubrick’s narrative discourse to modify his seemingly orthodox account of human ascendance with a more pessimistic inflection. The traumas of global war and nuclear stalemate that defined mid-twentieth-century geopolitics significantly complicated attempts to offer a heroic account of human technological transcendence, and 'the predatory transition' named by Dart is linked to the possibility of an apocalyptic declension which dissolves rather than confirms human supremacism.

Lee T. Macdonald
University of Leeds

"Kew Observatory and the origins of the National Physical Laboratory"

Standard histories of the National Physical Laboratory present its foundation in 1900 as a classic example of nineteenth-century laissez-faire attitudes towards the patronage of science giving way to recognition of the need for state-funded research laboratories. The same histories also argue that inspiration for the NPL owed much to anxiety in the 1890s that British industry was being overtaken by German and American competition – and in particular that the lavishly funded Physikalisch-Technische Reichsanstalt (PTR) in Berlin provided a model for the NPL. In this paper, I will argue that the existing historiography attaches too little importance to the role of Kew Observatory in creating the NPL. Kew was not only the NPL’s first home (from 1900 to 1902). A substantial proportion of the standardisation work that the NPL took over in 1900 had already been an important part of the programme at Kew for several decades – in the form of testing vast numbers of instruments for London instrument makers. I present evidence suggesting that as early as 1893, the NPL was conceived as an extension to the existing Kew Observatory. I also show how the idea of a central standardisation laboratory can be traced back to John Herschel’s 1830s’ writings on scientific methods. I thus argue that the NPL was not a clean break with nineteenth-century conceptions of the organisation of science and hence I present a case study that challenges traditional ideas of discontinuity in the history of the physical sciences between the nineteenth and twentieth centuries.
Coreen McGuire  
*University of Leeds*

"Ringing the changes: the construction of deafness in the telephone system"

The initial connection between telephony and hearing was complex and multifaceted: from the telephone's inception as a device based on the human ear designed to help the deaf to speak, to its appropriation as a hearing testing device in the form of the audiometer, to its eventual adoption as an electrical hearing aid. By the end of the nineteenth century the telephone was variously depicted as a cure for deafness, as a cause of deafness and, in a medical context, as a metaphor for how the ear worked. Mara Mills has shown that this connection was embedded into the telephone network itself by analysing the way that hearing loss comprised the linguistic and methodological framework used in AT&T's telephone systems. In this paper, I hope to show similarly the connections between hearing loss and telephony that were apparent in the British Post Office's telephone network in the early twentieth century. The link between telephony and hearing loss/aids was literally and metaphorically shown in their 1938 design for a coupler that would link their telephones to electrical hearing aids via induced currents. This also provides a succinct connection between my work on amplifying telephony and my CDA partner Sean McNally's work on the first NHS hearing aid, the Medresco. The Post Office attempted to design a telephone that would connect to the Medresco in 1947 and this case will form the focus of our presentations.

Sean McNally  
*University of Leeds*

"Telephonic technocracy: tracing connections between telephony, hearing aids and deafness in the mid twentieth century"

As my CDA colleague, Coreen McGuire, notes in the preceding paper, there has long been a complex connection between deafness, hearing aids and telephony. This connection is epitomised by hard-of-hearing users of state-controlled telephony – from initial exclusion from the technology, through attempts to adapt the technology to users through amplification and culminating in the design of a coupler to connect electrical hearing aids to the telephone. This paper will further explore this relationship through a case study of the Medresco – a state-sponsored hearing aid developed in the 1940s. The Medresco was designed by Post Office engineers who framed the treatment of hearing loss in terms of a problem of telephonic engineering. Post Office engineers sought to understand deafness in technical terms through the use of Speech Transmission Systems designed to test hearing and define the parameters from the new state hearing aid. This paper will explore the consequences of this technocratic approach and explore how the development of the Medresco was influenced by users once it had been distributed under the nascent NHS. The paper will conclude with a case study of a Post Office investigation into an acoustic coupler to link the Medresco to the telephone which serves as a physical embodiment of the complex relationship between telephony, hearing aids and hearing-loss.

Chris Manias  
*University of Manchester*

"Contemporaries of the cave bear and the woolly rhinoceros: historicising prehistoric humans and extinct beasts, 1830-1900"

One of the most significant developments in nineteenth-century ideas of the past was the establishment of deep time chronologies derived from geology and palaeontology. Particularly notable was the elaboration of a relatively recent Ice Age, when a frozen glacial Europe was inhabited by strange creatures such as mammoths, woolly rhinoceroses, cave-hyenas and also (following the establishment of human antiquity in the mid-nineteenth century) the earliest humans. The discovery of stone tools alongside extinct Pleistocene animals provided key evidence for human existence in deep geological periods, and was also crucial for conceptualizing the character of prehistoric Europeans. The bones of these animals were often located in prehistoric habitation sites, implying hunting, and artistic depictions of extinct creatures in Palaeolithic art (often on the bones, antlers and ivory of the animals themselves) provided eye-witness depictions and allowed human interaction with these beasts to be deduced. The
connections between prehistoric humans and Ice Age animals raised important questions: how had early humans survived alongside these creatures? Had they been the prey of cave bears and lions, or had they overcome them in an early example of mastery over nature? And why had these animals disappeared? Was this essential for the growth of civilization or had something important been lost? This paper will examine how these questions were debated by a range of scholars in Britain (including Richard Owen, William Boyd Dawkins and John Lubbock), considering how associations of prehistoric humans and animals both historicised human diversity and placed it within naturalistic frameworks.

Maren Lorenz
Ruhr-Universität Bochum

“For the betterment of mankind: ideas about selective breeding in French and German enlightenment thinking”

Unlike the common notion of eugenics as a phenomenon of the late nineteenth and early twentieth centuries, concepts of ‘human breeding’ were developed in Western Europe since the middle of the eighteenth century. Based on case studies and tracts dealing with ‘medical police’ and ‘medical hygiene’, scientific and economic experts discussed problems such as the hereditary transmission of disabilities and diseases, and the origins of so-called ‘degenerate’ peoples publicly in a variety of enlightened journals. In the forefront of the French Revolution especially French and German public servants developed concrete concepts for a strictly state-controlled marriage policy. ‘Female stud farms’ in the manner of livestock breeders to enhance not only the ‘quantity’ but also the ‘quality’ of their countries’ population were part of such plans as well as selective breeding to produce pain-resistant soldiers or robust agricultural labourers. My focus will be upon the reception and transformation of such ideas between French and German scholars of various professions, primarily surgeons, physicians, and the (new academic field of) governance (‘Cameralists’). In particular, the talk will address their utilitarian perspective and its religious/ethical limitations on the range of legitimate means to promote the welfare of their respective states. By examining scientific publications as well as literary contributions to non-scientific scholarly journals (‘Gelehrte Journale’) of the second half of the eighteenth century the paper explores the close entanglement of science, culture and nation building.

Ben Marsden
University of Aberdeen

“Calculating women: Mrs Galilee and the figure of the scientist in Wilkie Collins's *Heart and Science*

This paper discusses the representation of a menagerie of scientific and medical practitioners in Wilkie Collins's late novel *Heart and Science* (1883). Previous studies of *Heart and Science*, including most recently that by Paul White, have tended to focus on the physiological, humanitarian and anti-vivisectionist themes and contexts of this curious work, looking especially at the domestically, professionally and intellectually dislocated outsider Benjulia – a vivisectionist akin to Wells's Dr Moreau. Of course, the novel tackles many other themes, not the least of which is the degree to which science advanced in 'extreme degree hardens the heart'. A more alarming, if less immediately vivid, character then Benjulia, I suggest, is Mrs Galilee, the anti-hero of the work who, through her calculating approach to the manipulation of relationships even within her own complex family, offers a chilling portrayal of the perceived consequences of female scientific obsession. The current paper further proposes that, in the figure and family of Mrs Galilee and her associates, *Heart and Science* offers a reflection on the more congenial social and marital dynamics of, for example, Jane Austen. Whilst Collins's vivisectionist Benjulia is, as an outsider and a social outlier, an easy target, Mrs Galilee may ultimately be the more alarming figure if her scientific accomplishments corrupt the very heart of the domestic sphere.
"Measuring the uncountable? Paul Fluskämper and the reinterpretation of statistics in Germany, c. 1910-1955"

This paper explores the interactions between the German 'philosophy of life' and statistics through a study of the social and intellectual trajectory of one Weimar and ‘Third Reich’ statistician: Paul Fluskämper (1886-1979), botanist, neo-vitalist, director of the statistical office and professor in Frankfurt from 1934 to 1955. The aim of this paper is twofold. First, to understand Fluskämper’s success in weaving together two rather distinct scholarly ‘fields’ – the natural philosophy of life and social statistics. Second, to contribute to more recent attempts that blur the distinction (see Foreman 1971) between the allegedly romantic and ‘irrational’ Lebensphilosophie and the progressive rationalism in Weimar science by adding a study in social statistics. Drawing on personal files and published material, the first section aims to reconstruct Fluskämper’s philosophical biologism in relation to the approaches of his contemporaries, most of whom were then en vogue philosophizing nature researchers. Combining biography with historical network research, the second section demonstrates his shift, from 1920 toward statistical causality and applied mathematics as an effect of both Fluskämper’s intellectual innovations and the socio-cultural and political characteristics of the scholarly fields he traversed. The paper argues that it was the compatibility of statistical notions, images and metaphors with organicist and historicist concepts prevailing in biology, sociology and national economy alike that enabled Fluskämper to adapt his intellectual outlook into this new role. To conclude, the paper considers both the expansion, nationalisation, and increasing anti-mathematical stance of German statistics in the wake of the Nazi seizure of power and Fluskämper’s ambiguous ‘organicist arithmetic’ to explain his rise to professor in 1941 and continual success in post-war West Germany.

Irina Metzler
Swansea University

“Disability, inheritance and evolution: Medieval observation and nineteenth-century speculation”

This paper has been inspired by a reading of Guy Deutscher’s ‘Through the Language Glass’, which drew my attention to the claims of nineteenth-century science that acquired characteristics are inherited. Originating with Jean-Baptiste Lamarck (1802), the idea that if animals use their bodies in certain ways, the individually acquired traits are passed on to successive generations, even Charles Darwin (1881) subscribed to similar notions in discussing injured fingers of father passed on to daughter. The concept of acquired ‘disability’, or mutilations and injuries being inheritable was still current until the early twentieth century. However, the scientifically much-maligned medieval period already saw the natural philosophers of the day observing that blind fathers can quite readily engender sighted children, or a crippled parent have an orthopedically intact child. The obverse question, how birth defects could arise even in the progeny of physically healthy parents, had bothered commentators since the days of the Hippocratic corpus, and in the Middle Ages attracted a number of contrasting and competing theories, which this paper will explore as a counterpoint to evolutionary theories.

Daniel Jon Mitchell
University of Cambridge

“From measurement to Maxwell: French mathematics and the metaphysics of electrical metrology”

It is well known to historians that the Committee on Electrical Units convened at the inaugural International Electrical Congress of 1881 endorsed the CGS electromagnetic system of units for practical electrical measurement. Narratives of processes of electrical standardization typically move on to describe the intricate measurements required to establish the magnitudes of the units, particularly the ohm, and the development of associated material standards, in the 1880s and beyond. Those that tackle a more extended time period typically structure their narrative around key decisions taken at international meetings, which informed subsequent experimental work at the local level. A congress-centric historiography, however, leaves much animated discussion about systems of electrical measurement and their scientific merits unexamined. This paper aims to familiarize historians and philosophers of science
with the issues that came to light as a wide range of established mathematical principles and empirical laws, novel mathematical notations and physical theories, plausible physical conceptions, and even the latest quantitative data concerning electrical and magnetic media became subject to scrutiny. Many of these issues remain unresolved or subject to debate today. The paper concentrates mostly on the French response to Maxwell's *Treatise*, which provided an essential touchstone for the many works on absolute electrical units that appeared during the 1880s. Through French eyes, it attempts to integrate Maxwell's concern with systems of electrical units, dimensional analysis, and methods of measurement in the *Treatise* into the familiar story about the development of field theory and the electromagnetic theory of light.

**Anna Mohr**

*ETH, Zurich*

"Quantifying the health of the Empire: the beginnings of large-scale comparative medical statistics in the British imperial army of the 19th century"

In the wake of the military disasters of the Crimean War and the Indian Rebellion in the late 1850s, Sanitary Commissions were set up to inquire into the reasons for the high (non-combat) mortality among the troops and to devise possible remedies. Florence Nightingale and her entourage most prominently helped this topic to receive great attention. One of their primary analytical tools were mortality and morbidity statistics, chronological and geographical comparisons of which were expected to yield an understanding of the health hazards faced by the soldiers in the course of their service. Although the topic of military health and the methods of medical statistics received unprecedented scholarly and public attention from around 1860, military doctors had been developing an epistemic framework of comparative medical statistics for several decades. Since the 1820s, private enthusiasm as well as collection schemes set up by medical services in the British Empire had created a substantial pool of quantitative data on military health. 'Imperial connections' guaranteed a nearly global scope of this data as well as an infrastructure for communication and exchange. During the second third of the nineteenth century, when statistical reasoning was on the rise in various fields of science and administration, these imperial 'statistical enthusiasts' made use of the emerging colonial state authorities especially in India to fashion large-scale quantitative comparisons as a new epistemic tool that would become installed as a standard procedure in the following decades.

**Adam Mosley**

*Swansea University*

"The cosmographic mystery of Johannes Kepler’s *Mysterium cosmographicum* (1596)"

In 1621, on the occasion of his publication of a second edition of the *Mysterium cosmographicum*, Johannes Kepler noted that his choice of title had led to the work being (mis)categorised by booksellers and catalogue compilers as a treatise in geography. Kepler’s idiosyncratic application of the term ‘cosmographic’ to his text has recently been valorized as the creation of a ‘neologism that combined the mathematical part of astronomy with a new sort of physics of the heavens’ (R. S. Westman, *The Copernican Question*, p. 325). But a less generous supposition would be that Kepler, in the mid-1590s, was simply unaware of the range of established meanings of ‘cosmography’. This paper will explore the depths and shallows of Kepler’s knowledge of the terms ‘cosmographic’ and ‘cosmography’, identifying the likely sources for his acquaintance with these words and positing an explanation for his poor understanding of the way it was used by his contemporaries: cosmography was not a category given particular emphasis in the textbooks of the Lutheran universities, unlike those produced and used in other parts of Europe. Kepler’s ignorance of established usage will be illuminated by comparisons of the *Mysterium cosmographicum* with two other cosmographic works produced at almost the same time: Galileo’s manuscript *Trattato della Sfera, ovvero Cosmografia*, and Mercator’s published *Atlas, sive cosmographicae meditationes de fabrica mundi et fabricati figura* (1595).
Kaori Nagai

*University of Kent*

“Rattus-homo-machine: rats as seafarers in the nineteenth century”

Rats are cosmopolitan, and nowhere could this be seen more clearly than in ships, which they boarded to accompany humans wherever they went. In particular, brown rats, which migrated en masse to Europe in the eighteenth century, as if to coincide with the advent of European colonialism, closely followed the coloniser’s global trajectory. This paper focuses on brown rats as sea-voyagers and seeks to re-conceptualise the British Empire in the nineteenth century as the rats’ networks, made possible by their full appropriation of ships and sea routes. On the one hand, rats figured as the metaphor and embodiment of the force of European migration and globalisation: they were, just like Europeans, the fittest to survive, replacing native species and devastating local wildlife in colonies and elsewhere; they were an important part of the emerging discourses on the effects of ‘invasive species’. On the other hand, rats as ‘vermin’ often caused significant damage to ships and cargos and posed health risks, thereby disrupting the smooth operation of modern capitalist and global networks. Drawing upon eye-witness accounts of rats on board, and the measures taken to combat rats’ invasions, this paper will characterise the ship as a hybrid space consisting of rats, humans and machines; it explores the nature of rats’ ‘hospitality’ as fellow passengers, and their ability and resourcefulness to utilise ships as the ‘homo-machine’, to make their own travel possible.

Elizabeth Neswald

*Brock University*

“The material culture of experimentation in late nineteenth-century nutritional physiology”

The specialist field of nutritional physiology began developing in the 1860s with the studies of Carl Voit and Max Pettenkofer in Germany. In particular from 1880 to the early twentieth century, physiologists in several countries developed a variety of apparatus to measure human and animal metabolism and techniques to deal with their living objects and the conditions of experimentation. This paper explores the material culture of nutrition experimentation to show how local conditions and the variability of apparatus and experimental subjects shaped not only the experimental process, but also the ways in which experiments and results from one laboratory could or could not be translated and compared with the results of other laboratories. Instruments and apparatus in this early phase depended greatly on the skill of individual investigators and technicians, who relied on bricolage and improvisation, as each lab built its own apparatus. Experimental subjects, for their part, often acted in unexpected or inconvenient ways, compelling investigators to engage with the materiality of their bodies and their excretions, their personalities and preferences in ways alien to the fields of physics and chemistry, from which they had taken their experimental models. By focusing on the material culture of nutrition experimentation in its early decades, this paper traces the uneven and incomplete process of methodological and apparatus standardization.

Abigail Nieves Delgado

*National Autonomous University of Mexico*

“Giving a face to our ancestors: an historical approach to facial reconstruction”

In 2013 a group of physical anthropologists and medical artists presented the facial reconstruction of King Richard III. The alleged ‘Real face of Richard III’ circulated profusely on the web. A documentary was broadcasted on Channel 4 and a display was organized at the British Museum. The case of Richard III is not isolated. Recently, a number of facial reconstructions have appeared and circulated across different domains receiving a considerable amount of attention in the UK and abroad. Despite the apparent novelty of these reconstructions, a closer look reveals a story that goes back to the nineteenth century. Focusing on two specific cases, i.e. Richard III and Villa de Guadalupe in Mexico, this presentation shows how ideals of objectivity, anatomical accuracy and resemblance have changed and influenced facial reconstruction from the onset. The experts on facial reconstruction have relied on anatomical knowledge assuming that anatomy is a source of objectivity and precision. These specialists have also deployed anthropometrical measurements to produce charts, averages and indexes describing human facial
variation in quantitative and comparable terms. Finally, the presentation tells how ideas of racial difference and sexual dimorphism have been translated into a growing set of standardized methodologies to produce ‘scientific’ facial reconstructions. It will be shown that giving a face to an ancestor is not an innocent move. Facial reconstructions are visual resources that invigorate national narratives and reify biological difference.

David Nofre and Edgar Daylight
Independent Scholar and University of Utrecht

“The absent machine abstraction and the making of computer science, 1950-1965”

In the 1960s computer science emerged as a discipline largely concerned with the study of abstract models of computation, rather than with the study of actual computers. This feature has since then aroused many debates on the nature of computer science. Yet we know very little about the historical origins of this preference for abstraction. Historians of computing assume that the mathematical background and academic affiliation of many of the early practitioners account for such predisposition. In this paper, however, we seek to show how the making of computer science involved much more than the simple application of mathematics to the study of computation. We will focus on a small group of computer programming specialists in the United States, like John Backus, John Carr, Saul Gorn and Alan Perlis. In the mid-1950s this group adopted research attitudes towards programming and started exploring ways to formalize programming by abstracting away from the physical machine. This was a response to the ascendance of industry in the computer world and the resulting increase in the variety of computers. Notions like Turing’s universal machine, Carnap’s concept of language, and the theory of recursive functions were appropriated from the work that mathematical logicians had developed in the 1930s. This was not, however, a straightforward process of appropriation. For such notions were made available in the work of a post-war generation of logicians, like Martin Davis and Stephen Kleene, who claimed a role for logic in computing.

Linda Palfreeman
Universidad Cardenal Herrera CEU

“The development of blood transfusion services during the Spanish Civil War (1936-1939)”

War is sometimes mistakenly construed as the chief impetus for medical innovation that has already had its basis in peacetime. Nevertheless, there is little question that conflict obliges the implementation of discoveries still at an experimental stage. Such is the case with the practice of blood transfusion during the Spanish Civil War, when massive demands for blood provoked immediate recourse to breakthroughs in transfusion medicine not yet integrated into standard medical practice. The Spanish Civil War marked a new era in blood transfusion medicine. Not only did physicians have to create transfusion services, almost from scratch, that were capable of supplying campaigning armies with blood in wartime conditions, they also had to struggle against the medical establishment and to convince their medical peers of the value (not to mention the scientific significance) of what they were doing. The Blood Transfusion Service of the Republic was a truly international effort, with medical volunteers from all over the world carrying out transfusion work in primitive and often dangerous conditions. All took their lead from one man – young Catalan haematologist, Frederic Duran Jordá, director of the Blood Transfusion Service of the Republican Army, indisputable pioneer of civil war blood transfusion medicine. From humble beginnings at the outbreak of war, blood transfusion services were created in Spain that would become crucial a short time later, in the treatment of casualties during the Second World War and, furthermore, that would shape the future evolution of blood transfusion medicine throughout the developed world.

Miles Parker
Cambridge University

“Contracting science advice: from Next Steps to Realising our Potential – the influence of the Rothschild Report on government and policy making in the Thatcher and Major years”
Having created an enormous disturbance in the science community on its publication in 1972, much of the controversy over the Rothschild Report had died down by the end of the 1970s (Gummet, 1980). Margaret Thatcher had been Secretary of State for education at the time, and had possibly had an epiphany in respect of the role of ‘contractorisation’ and markets (Agar, 2011). The arrival in power of Mrs Thatcher and a government dedicated to reducing the role of the State in 1979 led to dramatic changes in the organisation of science in support of government, through the Near Market Cuts (on industrially oriented research), the impact of the Next Steps programme on privatisation or ‘agencification’ of government laboratories, and reductions in Departmental in-house budgets for research. The back drop was provided by an extension of Rothschild’s Customer-Contractor principle, which subsequently received a formal re-endorsement in the 1993 White Paper on Science Realising our Potential, developed by William Waldegrave in John Major’s Government. The paper will explore the consequences of the re-invigoration of the Customer-Contractor principle, for relationships between Departments and Research Council Institutes as well as their own scientific services and laboratories, and between departmental policy makers and their Chief Scientists and scientific staff, and for the use of science in policy making.

Matthew Paskins
University of Leeds

“The inventive authorship of Junius Redivivus”

Throughout the 1830s, numerous periodicals in London published letters from a correspondent who signed himself ‘Junius Redivivus’. Junius wrote on topics ranging from a loathing of patenting to epic poems; the construction of carriage springs to the prospect of radical reform. His letters were aggressive, free-associative and rampantly inventive. They attracted lavish criticism and furious praise. The liberal philosopher John Stewart Mill exalted his style as an authentic working man’s radicalism; others mocked his pretensions to be so widely informed. The author of the Junius letters was a carriage-wright and railway engineer named William Bridges Adams. By the end of the decade, Adams had dropped the mask and began to publish, and to patent, in his own name. In this paper, I critically examine Adams’s writings of the 1830s, as a way to explore the connections between patenting, authorship and invention during this period. Existing accounts of this subject have focused variously on genealogies of intellectual property, the role of patenting in making claims of priority and productivity for the sciences, the connections between authorial copyright and inventors’ patenting, and the cultural significance of narratives of heroic achievement and failure. Adams’s inventive authorship was neither heroic nor doomed to failure; it was endlessly alert, improvisatory and wayward. As such, it offers a different way of thinking about the history of nineteenth-century invention, which is based on divisions of labour and how a skilled artisan might overcome them.

Sena Pekkendir
Medeniyet University, Istanbul

“Modern optics in the Ottoman Empire”

In history of science Alhazen (d. 1038-1040) is credited with the foundation of modern optics by combining physical and mathematical methods and in this way initiating a transition in optics. Scientists such as Qutb al-Din al-Shirazi (d. 1311), Kemal al-Din Farisi (d. 1319), Ali Qushji (d. 1474), Shirvani (d. 1486), Mirim Çelebi (d. 1525), and Hasan Dihlevi ve Taqi ad-Din Rasid (d. 1585) continued the studies of Alhazen and provided improvement to the science of optics. Chief instructor of the Imperial School of Military Engineering in Ottoman State Ishak Effendi (d. 1836) wrote a treatise in Turkish named Mecmuasi Ulum-i Riyaziye (Istanbul 1247-1250/1831-1834) using European resources. Mecmuasi Ulum-i Riyaziye is the first treatise to represent western European optical knowledge to Ottoman science properly. Ishak Effendi revealed the equivalents of a great many scientific terms in the Ottoman language and he pioneered the transfer of modern sciences to the Ottoman State. This study contains the entrance of modern optics to Ottoman science, the Ottoman intellectuals studying in the field of optics and the treatises which contributed to science in the Ottoman State especially Mecmuasi Ulum-i Riyaziye. The study begins with the publication of Mecmuasi Ulum-i Riyaziye in 1831 and ends with the proclamation of the republic in 1923.
"From foreign invader to subterranean fiend: sewer rats, sanitary modernity and Victorian underworlds"

During the nineteenth century the brown rat, while its status as a destructive, invading, pilfering species that feasted on grain lost some of its momentum, gained a new identity in a new era of public health as a subterranean species that feasted on waste. This paper explores rats as subterranean dwellers and how the Victorian project of the modernisation of the sewer – that is, the banishment of human filth to the underground through a vast and dense interconnected network of pipes, drains and tunnels – created new kinds of rodent habitats, networks and behaviours and opened up a new discrete cultural space for imagining rat-human relationships. Drawing upon contemporary social commentary and sanitary and natural history writings, I will explore how the sewer created a more cunning rodent species. For some, rats literally and figuratively embodied the sanitary power of the new sewer infrastructure: sewer rats’ appetite for putrefying matter, it was said, saved human inhabitants from ‘periodical plagues’, keeping at bay ‘deadly gases arising out of the putrefaction of animal and vegetable matter’; their status as ‘subterranean friends’, it was said, kept the animal out of the combatant ring of the capital city’s rat-pits (where grain-stealing farm rats were killed for sport). For others, the modern infrastructure of the sewer multiplied and democratised vermin intrusions, providing a convenient transportation network and habitat through which rats could enter the domestic interior, rich and poor alike, thereby destabilising the boundaries – for example, filth and cleanliness, upper and lower, darkness and lightness – on which Victorian practices of filth management and social respectability depended.

"Quantum myth-histories: the power of demarcation"

Recent scholarship in the history of quantum theory has challenged the mythology surrounding the establishment and dominance of the Copenhagen interpretation in the mid-twentieth century. While this corrective work is critical to our understanding of the process of discovery and innovation within the quantum physics community, as historians of science we are capable of more than myth-slaying. Why do many physicists persist with their mythologies even though these corrected narratives exist? This paper examines the operative value of what Richard Feynman termed ‘myth-stories’ and Leon Lederman later referred to as ‘myth-histories’. In his book, The God Particle, Lederman justifies his use of these myth-histories by claiming that they serve the purpose of ‘filtering out the noise of real life’. While this may seem anathema to a historian of science trying carefully to reconstruct and elucidate a particular real life context of discovery, it seems perfectly reasonable to someone like Lederman focused on physics pedagogy. This signal-to-noise conflict between historians and physicists is more than simply a matter of disciplinary perspective. There is an operative value of indoctrination when invoking mythological stories. This paper examines this normalizing dynamic through the interwoven narratives of David Bohm and John Stuart Bell. Both physicists stepped outside of their indoctrination and challenged the prevailing orthodox interpretation of quantum theory. In examining the cases of these two physicists we problematize simplistic notions of marginalization and innovation and elucidate the demarcative power of myth-history.

"Eighteenth-century vegetables and letters: understanding Sir Hans Sloane’s botanical collections"

Sir Hans Sloane (1660-1753) was a prominent physician in London and Fellow of the Royal Society who provided the founding collection for the establishment of the British Museum in 1753. Today, a vast number of Sloane’s objects can be found across a number of institutions including his correspondence at the British Library and items relating to natural history at the Natural History Museum, London. This paper will explore the use of Sloane’s surviving correspondence in helping to understand part of Sloane’s botanical collection, that which he named the ‘Vegetable Substances’ and consisted of 12,523 small glass boxes, sealed with decorative paper. Sloane described the contents of the ‘Vegetable Substances’ in a
three-volume handwritten catalogue and it indicates that more than 300 people contributed to this collection from all over the world. By establishing who contributed the most significant number of items to the 'Vegetable Substances', it has been possible to locate letters that were also sent from these correspondents to Sloane and which detail the different sorts of eighteenth-century contexts that the 'Vegetables' can be viewed in. As this paper will aim to show, Sloane's letters are crucial for exploring his extensive networks of exchange and how he created the 'Vegetable Substances'. They point towards the different sorts of relationships that Sloane had with certain people, how these may have influenced his botanical collecting practices, and how the 'Vegetable Substances' played a role in the production and exchange of natural knowledge.

James Poskett
University of Cambridge

"Phrenology on the plantation: correspondence, character and the abolition of slavery"

Charles Caldwell was a slave-owner and a phrenologist. Born in North Carolina in the 1770s, and lecturing across the American South in the 1830s, Caldwell was certain that phrenology had finally proved that Africans and Europeans 'differ in species'. The existing historiography has largely followed Caldwell in assuming that phrenology, as a nineteenth-century racial science, straightforwardly aided the proslavery movement. However, as this paper demonstrates, phrenology was equally popular amongst abolitionists, including a number of African American campaigners. Crucially, this only becomes clear once we examine archival collections of letters. For many, particularly the Edinburgh phrenologist George Combe, correspondence provided a relatively safe space in which to test out ideas and identities. As material objects, letters were also used to think with. Combe first noted down his own thoughts on abolition in the margin of an inflammatory letter he had received from Caldwell in 1839. Ultimately, in a period in which character played such a decisive role in reform debates, phrenology and correspondence together represented a powerful political practice.

Jean-Guy Prévost
Université du Québec à Montréal

"Biography, prosopography, field analysis, and the advent of the modern Italian statistician (1900-1945)"

This paper discusses the merits of combining biography, prosopography and field analysis to account for the advent of a new type of statistician in early twentieth-century Italy. Biography is inescapable, since personalities have shaped the development of Italian statistics as an academic discipline and as a practice of the State. I refer here not only to the success of scientific contributions but also to the emergence of a certain type of statistician and a distinctive 'style' in statistics. Prosopography is relevant if one wishes to trace how types and styles are replicated or challenged: here, the notions of generation, school, master, disciple, and follower come into play. Finally, the path of individual scientific lives and patterns drawn by collective trajectories are set against the larger picture of the field, defined as a structured and multidimensional set of positions. In the case of Italian statistics, this field emerges after a decade of methodological innovation (1905-15) and another of commitment to practical duties related to the war effort and post-war reconstruction (1915-25), before taking its durable shape as Fascism is firmly established. Bringing out the features of a field allows for connecting individual paths and the logic of group formation and behaviour with the possibilities and constraints laid down by the larger political and material context. Applying this three-level grid also allows for a better understanding of otherwise impersonal objects such as methodological controversies, institutional or disciplinary developments.

Mark Priestley
University College London

"Much less of an art, much more of a scientific technique’: making the computer a scientific tool”

In the mid-1940s, John von Neumann saw the electronic computer as a new type of scientific instrument that would give scientists and ‘trained mathematicians’ access to greatly increased computational power. But effective use of a scientific tool requires mastery of a body of often tacit knowledge and practices. This paper asks, what knowledge and training did von Neumann think scientists and mathematicians would
have to have in order to make use of these new instruments, and how would these new forms of knowledge be expressed? I will examine an unpublished manuscript of mid-1945, in which von Neumann developed a program to sort and merge decks of punched cards. In showing how this well-understood and already mechanized task could be translated into the new medium of the electronic computer, he modelled program development as a series of symbolic transformations using notations and styles of reasoning familiar to mathematicians. Instructions for previous automatic computers could be expressed symbolically but structuring a complete computation made essential reference to the machines’ physical properties. In von Neumann’s program, however, written for the first ‘stored-program computer’, the EDVAC, all the necessary information about the flow of computation could be expressed and understood symbolically. This ‘machine code’ - which has been at the base of all programming since 1945 - codified existing knowledge about the control of complex computations in a simple and practical symbolic formalism.

Jennifer Rampling
Princeton University

“Between city and cloister: the place of alchemy in pre-Reformation England”

Where was alchemy practised in late medieval England – and how do we know for sure? Many English alchemical treatises are attributed to monks and friars, yet there is little independent evidence to tell us what kind of alchemy was actually carried out within religious houses. The situation is reversed for town-based lay practitioners, whose attempts to transmute metals are typically attested in legal records rather than treatises. Yet the two groups were not always separate. In this paper, I shall present evidence of several alchemical collaborations between city and cloister, arguing that monastic/secular engagement was much more common than previously supposed. Religious houses offered secluded sites for alchemical practice (technically illegal in England since 1403), as well as opportunities for further funding and patronage which secular practitioners could exploit. Monks also stood to benefit from techniques ‘bought in’ from outside experts. Yet the consequences of such collaborations could be disastrous, as revealed by a series of trial records from the late fourteenth to the early sixteenth centuries, in which the promise of metallic transmutation is overshadowed by the threat of fraud, blackmail and counterfeiting. The result is the earliest surviving evidence to connect actual English practice (as testified by court records) to specific procedures described in treatises: a link that sheds new light on the little-known world of pre-Reformation alchemical practice and expertise.

Amanda Rees
University of York

"Neanderthals and narrative: othering the brother (sic) in the 20th Century"

The type skull for the Neanderthal species was discovered in 1856; over the next hundred and fifty years, further examples were identified at sites that stretched from Gibraltar in the West to Kurdistan in the East. From the outset, studies of this extinct hominid species nestled at the heart of the European homeland provoked considerable scientific controversy. Did they really belong to the genus Homo? Did they have language, or empathy, or religion? Were the first Europeans also cannibals? Or were they the victims of the first genocide committed by H. sapiens? They also attracted a great deal of public – and sometimes prurient – interest, not just in terms of the discoveries themselves, but in relation to the uses to which they were put by both scientists and novelists. This paper will explore the ways in which Neanderthals were presented in fiction over the course of the twentieth century, ranging from the depiction of their physical appearance to the structure of their social system, and including the representations of their mental and emotional capacities. It will consider how these characteristics were enlisted in the narratives to account for the eventual demise of the species – or to justify its cryptic survival and renaissance. By examining these different versions of the first of all murder/mysteries, the paper will show how the concept of ‘Neanderthal’ has been used both to support and suborn notions of human uniqueness in evolution, from H. G. Wells’s ‘The Grisly Folk’ (1921) to Robert Sawyer’s Hominids (2002).
Sam Robinson  
*University of Manchester*

"Alternative frontiers: oceans, space, and the politics of exploration in the 1960s"

From the launch of the Sputnik satellite in 1957 to the Apollo moon landings in 1969 it would appear that Space captured the imaginations not only of the public but also of governments; but few have considered alternatives. One was the oceans: a global space that could claim to be as little explored as the vacuum of Space. The parallel trajectories of ocean science and engineering to that of Space engineering during the period were stark. Whilst those looking to space were sending satellites into orbit, oceanographers were deploying drifting current meters that similarly beeped their way around the ocean as Sputnik had done in Space. As the first humans were sent into orbit, so early bathyscaphes (deep diving miniature submarines) carried humans down to the deepest depths of the oceans. And as the Apollo missions edged ever nearer to the moon, so the SEALAB project began to ask whether man could live in, rather than on, the ocean. In this paper I will argue that the oceans provided an alternative to Space for scientists, politicians and popular culture. The notion that it was predetermined that Space should be science's final frontier will be questioned through a study of the lobbying machine of ocean scientists during the 1960s. I will challenge the idea that Space was the frontier of late twentieth-century geopolitically motivated science, arguing that not only were the oceans a more dangerous political space for science, but ultimately the exploitation of the oceans was more beneficial to nations such as Britain.

Karen Sayer  
*Leeds Trinity University*

"The 'modern' management of rats moving across farm and field: 1900-1940"

Between 1900 and 1950, rat killing was 'modernised': official and county advisors drew on the work of population studies; the killing of rats on farms shifted from trapping and blocking, to the use of anticoagulants. New forms of costing quantified the damage done to farm buildings and machinery, the consumption, soiling and contamination of food, seed and fodder in store, and the risks posed to both animal and human health through disease. This shift paralleled the observation that country rats travel, and the case for a multi-disciplinary approach was made because of their itinerant habits. In 1919 Lord Aberconway framed his Rat Destruction Bill as crucial to post-war reconstruction and argued that scientists, bacteriologists, farmers and agricultural societies supported him because the tunnelling, nomadic rat undermined modern Britain. When it passed into law, the Rats and Mice (Destruction) Act 1919 covered ships in port, urban and rural environments. WWII saw a sharpening of this WWI perception and response. This paper will address the debate about farm rats at the national level from 1900 to c. 1950 and the science that those debates cited. It will consider in particular the work undertaken by Charles Elton and his team at The Bureau of Animal Population (established in 1932) at Oxford University, grounded in observations that demonstrated that rats will always return, and studies that included assessments of the potential value of predators, not just physical and chemical controls, the success of which depended entirely on the farm rats’ habit of returning to fill a newly created rat-free vacuum.

Adam R. Shapiro  
*Birkbeck, University of London*

"Darwinism immigrates to America: a transnational social history of ideas"

Recent historical studies have shed new light on the differences between German and English language interpretations of Darwinism in the late nineteenth and early twentieth centuries. These differences not only shaped scientific practice, they also influenced the ways different public audiences understood and reacted to Darwinism. This raises the question of which Darwinsms hybrid and transnational communities experienced, and whether their reactions to "Darwinism" ought to be understood differently from those of groups whose experience of Darwinism were rooted in a single linguistic and cultural framework. This paper looks at the particular experiences of German Lutheran immigrants and their descendants in the American prairies from 1870 to 1920. It looks at the way that these communities formulated reactions to Darwinism and their complex relationship to American varieties of
antievolutionism. Was it the case that these immigrants brought with them a Haeckelian interpretation of Darwinism and interpreted American debates over evolution’s role in education, eugenics and World War I in light of this? Or did German Lutheran seminarians and clergy encounter evolution as a part of their larger experience of adaptation and assimilation in a new national context? While these immigrants may have agreed with the conclusion that Darwinism was atheism, the grounds given for that conclusion were different than Fundamentalist ideas articulated in long established American denominations. Through this we can better understand the context of the America’s first evolution trial, a slander lawsuit that resulted from the removal of a “Darwinist” teacher from a Lutheran college in 1922.

Efram Sera-Shriar  
*York University, Canada*

"Edward Burnett Tylor and the evolution of religion: historicising religious belief in nineteenth-century British anthropology"

During the second half of the nineteenth century, Edward Burnett Tylor (1832-1917) was a figurehead for anthropology throughout the British Empire. His most famous work was *Primitive Culture* (1871). Tylor’s book was an evolutionary study that traced the developmental history of cultural attributes among the races of the world. One of the major theories outlined in the work was ‘animism’ – the idea that all religions evolved from a rudimentary belief in spirits animating the world. By locating the laws that governed the development of religion, Tylor plotted all forms of worship on to an evolutionary scale showing how religious beliefs transformed from basic understandings of the world being animated by spirits, to complex religious systems such as Christianity. In doing so he sought to naturalise all religions and explain their ontologies using scientific theories. He was not trying to reconcile science and religion, but bring religion under the domain of scientific understanding. Despite trying to explain religious beliefs using a type of evolutionary theory, Tylor’s work was not embroiled in any conflict with either the Church or a religious figure. This was a marked difference to how the writings of other scientific naturalists such as John Tyndall (1820-1893) and Thomas Henry Huxley (1825-1895) were received by religious communities during the same period. Why was this the case? This paper will attempt to answer this question by looking at how Tylor historicised religious belief in *Primitive Culture*, and how the book was received in the periodical press.

Sally Shuttleworth  
*St Anne’s College, Oxford*

"Finance, speculation and mental disorder in the Victorian Age"

Like our own era, the nineteenth century experienced great economic turbulence, with the failure of twenty-nine banks and with innumerable crashes on the stock exchange. Sudden loss of wealth became a staple of Victorian fiction, and medical writing developed new categories of mental pathology linked to a career in commerce or finance. In a popular book, *Brain-Work and Overwork* (1888, part of a series on ‘Long Life’), George Black painted in graphic terms the experience of a banker, caught ‘in the hoarse, surging crowd of a Black Friday’, suggesting that it would be months ‘before his nervous system recovers from the strain of that one day’. This paper will explore the emergence of medical and popular theories of overstrain, in the mind as in the markets, and the particular diseases associated with ‘speculation’ in its dual sense.

Charlotte Sleigh  
*University of Kent*

"Engineering fiction: science and literature in Interwar Britain"

C. S. Lewis disparagingly gave ‘the fiction of engineers’ as the lowest form of science fiction. In this paper I examine what that genre actually was, finding that it captures a particular generation of lower-middle class readers and writers, peripherally involved with engineering trades in the north of England, in the 1930s. Taking their fanzines as the principal archival source I reconstruct their ideas of science; its overlap with engineering, its entrepreneurial nature, its vaunting modernism – and its curiously Victorian
character. The paper moves towards challenging accepted narratives of twentieth-century science, and sheds new light on recent debates about the relative primacy of engineering and science.

Elise Smith
Wellcome Unit for the History of Medicine, Oxford

"The end of racial science? Measuring difference in the Torres Straits, 1898-1899"

The Cambridge Anthropological Expedition to the Torres Straits in 1898-1899 has been seen as an historical landmark in the development of field studies, heralding the shift from physical anthropology to socio-cultural anthropology as the dominant means of studying foreign populations in the twentieth century. However, the research team, led by renowned anthropologist Alfred Cort Haddon (1855-1940) set out with the traditional objective of gathering physical data as well as studying the cultural attributes of the Torres Strait Islanders. Haddon and his colleagues collected a vast amount of craniological data and anthropometric measurements, but they ultimately omitted information from their official reports and left the skulls they gathered to languish in museum collections, unmeasured for decades after their return. This paper thus examines how the Torres Straits expedition exemplified how the dominant paradigm in anthropological research shifted away from physical evaluations of racial variation and towards ethnological analyses of societies. However, the Torres Strait Expedition also reveals that the old interest in measuring races did not entirely disappear; instead researchers attempted to chart the psychological and physiological characteristics of the Islanders, including visual acuity, colour and spatial perception, hearing, smell, taste, muscular sense, and variations in blood-pressure and reaction times. By shifting the focus from external to internal attributes, the Cambridge Expedition ultimately suggested new paths for racial science in which behaviours were still subtly linked to biological traits. The Cambridge Expedition thus demonstrates that field ethnology employed new methods of studying ‘difference’ that still retained assumptions characteristic of Victorian racial anthropology.

Andreas Sommer
University of Cambridge

"Science versus superstition? Problems in the historiography of psychical research"

While there exists a wealth of sophisticated literature exploring historical intersections between early modern natural philosophy and occult practices and beliefs, historians of science have produced comparatively little work regarding the links between nineteenth- and early-twentieth-century sciences and elite psychical research, i.e. the radical empirical investigation of alleged occult phenomena associated with mesmerism and spiritualism through eminent intellectuals. On the other hand, there is no shortage of literature on nineteenth-century occult movements produced by general and cultural historians and scholars in literary, religious and gender studies, which, however, often tends to disregard basic primary sources and instead relies on problematic secondary accounts, simplistic notions of scientific practice, and outdated teleological historiographies of progress. Using the co-emergence of psychical research and professionalized psychology in the late nineteenth century as a prime example of how boundary disputes have created profound historiographical artefacts, this paper addresses the historicity of hostile attitudes towards empirical approaches to the occult and sketches the repudiation of the study of ‘marvellous’ phenomena from official science. It also raises some of the dilemmas faced by historians encountering instances when proponents of a supposed pseudo-science strikingly fail to display stereotypical characteristics such as tenacity, confounding metaphysical bias and methodological carelessness, but on the contrary exhibit remarkable intellectual virtues and conduct exemplary science.

Jia-Ou Song
University of Manchester

"East is East and West is West: Directors and directions of science museums in the 1920s"

This paper looks at the work of Zhang Jian and Sir Henry Lyons during the 1920s through a museological lens, and defines similarities and differences in their attitudes towards promoting their respective museums of scientific and technological collections following years of war at the end of the nineteenth and beginning of the twentieth century. This includes the social circumstances that affected their work.
The conception of Zhang Jian’s Nantong Museum (Nantong, China) and Henry Lyons’ takeover as director at the Science Museum (London, UK) share many similarities: each director’s work responded to the public need for reassurance following years of battle, and the need to reinforce trust in science that has proved itself capable of devastating wartime effects. Each of these directors also pioneered new ideas: Zhang Jian eschewed the Western missionaries’ examples of museums in Shanghai and travelled to Meiji Japan to seek inspiration for the improvement of life and education of young male scholars—the demographic norm of consumers of Chinese ‘science museums’ at the time. Henry Lyons took the Science Museum, which at the beginning of his directorship featured the same demographical norm as Nantong Museum, and made the site available to the masses, broadening the mission and scope of the museum through and alongside the range of visitors. Between Zhang’s affection for botanical gardens and Lyons’ first special exhibition on typewriters, the paper will consider the political and cultural circumstances that shaped these styles of leadership, and their effect on these two museums.

Ida Stamhuis
Vrije Universiteit, Amsterdam

“The cruel contrast between what exists in society and what ought to exist’: Hendrick Quack, a statistical life in 19th-century Netherlands”

The nineteenth century has by a contemporary been characterized as the “With Numbers Covered Century”. One of the ways to demonstrate how statistics became considered an indispensable part of modern society, is by studying a representative of that modern society and looking at his contributions to and his ideas on the importance of this new way of representing information. In my paper I will discuss Hendrick P.G. Quack (1834-1917). His governing role in the shaping of modern society is obvious. He worked to improve the wealth of the country. He was prominent in organizations that developed railways, trade, finances and steamers. He also saw the downside. Through urbanization the poverty issue was for once and for all placed on the political agenda. In his magnum opus The Socialists: Persons and Systems, he surveyed the ideas of those ‘whose souls were tormented by the cruel contrast between what existed in society and what ought to exist’. Although he became professor of statistics and president of the Dutch Society for Statistics, his incentive to develop this new field was limited. Nevertheless, to chart this modernisation and steer it in the right direction, he cherished great faith in the relevance of statistics: ‘in observing the facts of society and the mutual relationships in which people lived, statistics could adopt a most impartial and neutral character’ is only one of his sayings. In my paper I will discuss this life and conclude that similar people could be found in other countries, like England.

James Sumner [in collaboration with Erin Beeston]
University of Manchester

“Interpreting a space of industrial heritage: Liverpool Road Station and the Museum of Science and Industry”

Manchester’s Museum of Science and Industry (MOSI) stands on a site famed in railway history as the eastern terminus of the world’s first passenger railway of 1830. Closed to passengers in 1844, it continued as a rail freight centre, surrounded by transhipment and warehousing facilities, into the 1970s. Unusually, however, MOSI’s collections are mostly unconnected to the site, which is its second permanent home, and development policy has in recent years become concerned with the lack of a coherent site narrative. One outcome has been its sponsorship of a collaborative research project, using archives and oral history to flesh out the working life of the freight station, and the broader social and domestic lives of its surroundings. Our paper presents preliminary findings from this research, and considers how they may inform visitor interpretation materials to aid understanding of the site. The challenge of how best to marshal routes and viewpoints around a complicated historical narrative of rebuilding and repurposing is common to many such sites; one specific difficulty is that the once-unified historic site extends beyond the present-day boundaries of MOSI, and is liable to be radically reshaped by contemporary rail development during the course of the Museum’s own reinterpretation. Does ‘being in the place’ have a special role in bringing to life the traces of a site’s former existence? How important is it that the site should remain in (or be restored to) something like its former physical condition? And where this is impossible, what alternative approaches are available?
"Newton's pursuit of making homogeneous light"

Isaac Newton's new optical theory overturned the modification theory of colours, which was dominant from the times of ancient Greece to the seventeenth century. In this traditional understanding, colours are generated when light rays are modified by an external cause, such as the termination of light and shadow; thus, the colour of rays can be changed by refraction or another cause. However, if, as Newton explained, colour is a property of rays, the colour of rays cannot be changed by refraction, provided that we can make homogeneous light. When Newton published 'A New Theory about Light and Colours' in 1672, though, he did not reveal the manner by which he made homogeneous light. Consequently, scholars who denied his optical theory based on their experimental tests could not have known how to make homogeneous light. These scholars, including Anthony Lucas and Edme Mariotte, tested Newton's theory following the experimentum crucis which he presented in his 'New Theory' and reported that they could change the colour of rays with refraction. Newton likely did not initially reveal how he made homogeneous light as he found difficulty making homogeneous light. This study describes the improvements to optical experiments which Newton made to prove the immutability of homogeneous light and draws upon historical sources and simulations and replications of his experiments to demonstrate that his so-called experimentum crucis could never prove the immutability of colours.

"The local history of ICT: aims, methods and case studies"

I will report on my attempt over the past five years to lay the foundations for a technical and social history of computing in south Wales. First, I will discuss in general terms objectives, methods, uses, participants and audiences for local histories of computing. This introduces opportunities to study and reflect on:

- Research communities and their local impact;
- Social context and impact of technologies on lives of people;
- Interplay of academic technical and social histories – which are nationally and internationally facing – and local primary sources of artefacts, memories and testimonies;
- Engagement of people in the creation of a local collection and narrative;
- ICT Heritage: local collections, archives, knowledge, and awareness.

Secondly, I will report on some specific case studies that illustrate some of the general ideas above, including:

- Computers come to south Wales: the design of the new steel works in Port Talbot.
- Virtual engineering comes to south Wales: the development of the finite element simulation method.
- Big data comes to south Wales: the creation of the Drivers and Vehicles Licensing Centre in Swansea.
- World Wide Web comes to south Wales: particle physicists who like surf and computer scientists who like movies.

"Methods and discovery: Hevesy's adventures in radioisotope research"

This paper traces the work on radioisotopes by George de Hevesy. When Hevesy discovered that radioactive lead could be absorbed by plants and traced through their tissues in 1923 there were few uses of the technique. The applicability, however, rocketed when more biologically important isotopes were discovered in the 1930s. The area between nuclear physics and biology suddenly became a burgeoning field of research.
Hevesy worked on a broad range of questions in chemistry, physics, physiology and biology and his achievements have been called eclectic. It is often said he was bitter about being awarded the Nobel Prize for the radioisotopes rather than the discovery of Hafnium. This reveals the preference for discoveries and theory over methods in the evaluation of scientific achievements. It is, however, the claim of this paper that methods lie both at the heart of Hevesy's work and of interdisciplinary relations between physics and biomedicine.

Jane Wess
University of Edinburgh

"The mobilisation of modernity: instruments in the construction of exploration"

The Royal Geographical Society (RGS) was founded in 1830 with the aim of constructing and maintaining the authority of the new discipline of geography, and simultaneously to maintain the romance and heroism of exploration. One of the expressed ambitions was to create a collection of instruments to be loaned out with the explorers. In the early years the RGS purchased instruments sporadically, more usually loaning them from government departments. However, in 1860 the Society began to manage their collection; the instruments were numbered, listed and inscribed, and their travels were documented. A total of 1232 instruments were accounted for in this way between 1860 and 1932, providing historians with a picture of their use in terms of space, time and motivation. While actor network theory provides an excellent overview of the situation, immutable mobiles returning from the periphery to the centre of calculation, there are many divergences from this ideal. This paper will consider the instruments in three stages: what is embodied in them, how that can be mobilised, and the various agencies they exhibit. The embodied knowledge was both physical and intellectual, and was being refined by the RGS continuously. As well as the resource expended in this embodiment there was an over-arching belief in number, characteristic of 'Humboldtian' science, and the objectivity beloved of modernisers such as John Herschel and Charles Babbage. The mobilisation was problematic and involved costly training, transport and a reliance on local knowledge. The impediments were such that instruments were often producing numbers which were not based on rigorous practice. The paper will also consider the agency of these instruments; they dictated how they should be used, required resources in their transport and the training of the users, and supported and provoked hierarchies. Their numerical results in the form of data, maps and charts became matters of negotiation between the explorers and the RGS Council. The paper will address the question raised by Charles Withers: Why were instruments used if they were fallible?

Ruth Wainman
University of Kent

"Retiring to a life of science: examining scientists’ accounts of retirement from the British Library’s ‘An Oral History of British Science’"

Scientists’ working lives have proved to be an enduring fascination for historians and biographers alike. But oral history interviews with scientists for the British Library’s most recent National Life Stories project, ‘An Oral History of British Science’, draw our attention to the decisions that scientists also made about their working lives and identity as they entered into retirement. In this paper, I explore how scientists’ work and identity developed as they made the transition into formal retirement. Depending on the nature of scientists’ research and place of work, this could potentially lead to new work in consultancy roles and advisory positions. When this option was not always readily available, other scientists instead devoted more time to their hobbies and interest in science and beyond. But using long life story interviews with scientists presents an opportunity to delve more closely into the stories that scientists tell about retirement and to consider how their identification as scientists evolved during their life-course, especially as a vocation that could foster a distinct professional and personal identity. Moreover, as the most current element of scientists’ interviews about their life, looking at narratives about retirement also highlight the ways in which scientists actively (re)construct their past and present identities as they reflect back on their childhood and working lives.
Tosh Warwick and Louise Miskell
HLF Tees Transporter Bridge Visitor Experience Project and Swansea University

“Archives, augmented reality and the industrial heritage of steel towns: Middlesbrough and Port Talbot compared”

The reports and ledgers of Middlesbrough iron and steel firms might not seem the most obvious places to look when exploring Victorian and Edwardian civic and political life. Yet Teesside Archives’ British Steel Collection, which conserves the records of manufacturers such as Dorman Long, is central to the Heritage Lottery Fund-supported Tees Transporter Bridge Visitor Experience Project, drawing on the stories of long-lost ironmasters, steel magnates, buildings and institutions to explore Middlesbrough’s emergence as the ‘Ironopolis’, arguably the leading example of the Victorian ‘boom town’. The experience of the Teesside project has fed into a newer initiative, led by Swansea University, to improve researcher access to the records of the Welsh steel industry, with recent negotiations with Tata Steel opening opportunities to address important industrial stories. The planning and construction of the Abbey Steelworks, Port Talbot, which formed the cornerstone of the modernisation plan for Britain’s steel industry after the Second World War, offer a new perspective on a key phase of post-war reconstruction in which the town was re-shaped and re-branded a ‘steel city’. The heritage potential of Port Talbot’s steel story is still relatively unexplored, but several initiatives have begun to reveal its possibilities. This paper will highlight some of the different challenges faced in telling the story of steel in these two towns, and will consider how bringing together historic business records, existing histories and augmented reality technology can help to contextualise the social history and built environment of industrial areas.

Alice White
University of Kent

“New Power in whose hands? Psychological science at the coalface”

In post-war Britain, the government had expected that new technology would revolutionise the extraction of coal and bring many benefits to the newly nationalised industry. Much to their frustration, it did not. Social scientists from the Tavistock Institute were interested in applying theories developed working for the British Army in the Second World War to the mines. Despite nationalisation, researchers interested in studying problems of low morale, high absenteeism and low productivity were not welcome under the auspices of the National Coal Board. It was finally due to the network of connections of trainees at the Tavistock that they were able to make the coalface their new laboratory. They aimed ‘to include the technical as well as the social system ... and to postulate that the relations between them should constitute a new field of inquiry’. This paper discusses the challenges of establishing this new field of inquiry and the power struggles which took place, from negotiations with unions to struggles with publication and scientific legitimacy, and the importance of informal networks. Due to tempestuous labour relations, there were strict limits on publication of this research, but recent archival finds have revealed new details of the coal studies. I will also show footage from the Coal Board film New Power in Their Hands (1959), which detailed technological developments and how an extensive training and development programme had been implemented, in order to compare the public communication of new technology and new technological management to the private notes of the researchers.
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Dear BSHS members, present and potential,

Last year I introduced *BIHS Themes*, the exciting new project for the British Society for the History of Science. If you missed it, or need your memory jogging, *BIHS Themes* is a new open access journal, with each issue exploring a timely and important topic. Think of it as an edited collection of engaging scholarship, which will be free to read and, normally, free for the authors too.

There is one *BIHS Themes* each year, chosen through an open competition. We liked this model because we expected it to encourage not only a suitably high standard of history of science, but also because it offers an equality of opportunity.

I am very pleased to be able to report that, when we held the first competition last winter, the number and quality of the proposals were very strong, a fact that was very encouraging given that this was the first call for papers for a new, and somewhat experimental, journal.

The proposals on the shortlist were judged on the basis of criteria, published online and widely advertised, in the ‘Information for Proposals’, namely that we were looking for strength in the areas of focus (scope and depth), originality (how will the collection be different from past scholarship?), timeliness (why should this collection be published now?), and breadth of readership (who will want to read this collection?) In addition, we also asked whether there were advantages to a collection being available through open access.

The winner of the first competition was ‘Intersections: Science and Technology in Twentieth Century China and India’, which will be convened by historians Jahnvi Phalkey and Tong Lam, and will form *BIHS Themes* (2016) volume 1. I hope you find the topic as intriguing as we do.

Because the shortlist was so strong, and because we wanted to allow more time for future issues to be developed, we also identified a theme for the second issue. I plan to announce this second issue very shortly – keep your eyes and ears alert!

Like its sister publication, *BIHS, BIHS Themes* is a journal of the British Society for the History of Science, and we are delighted to be able to build on our Society’s relationship with Cambridge University Press. The competition for *BIHS Themes* (2018) volume 3 is now open, with details on the process available via the *BIHS Themes* CUP website. You can also receive early notification of *BIHS Themes* content (as well *BIHS*), via the Press’s journal alert system:

http://journals.cambridge.org/bshs/alerts

If you have any further questions, or perhaps are interested in putting together a proposal for the competition, please feel free to talk to me, either in Swansea or via my contact details below.

Yours sincerely,

Professor Jon Agar
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Credits and Acknowledgments

Local Organisation
Adam Mosley

Academic Programme
John Henry

Administration
Lucy Santos and Malcolm Noble

Student Helpers and Postgraduate Representatives
Gemma Almond, Amy Corkhill, John Fanning, Jonathan Keogh, Edwin Rose; Elizabeth Jones, Alice White

Our Thanks to
Tim Boon, Hasok Chang, Simon Chaplin, Richard Noakes, Greg Radick, Sam Robinson, Jia-Ou Song, James Stark

The College of Arts and Humanities and Research Institute for the Arts & Humanities, Swansea University; Terry Carter-Ingram (Estates); Helen Baldwin (RIAH); Bev Evans and Suzanne Oakley (Marketing); Karen Myles (Conference Services); The Richard Burton Archives; Ian Glen (Library & Information Centre); Steff Mastoris (The National Waterfront Museum); Garette El-Tawab (Swansea Museum); Tracey Rihill (Technologies of Daily Life in Ancient Greece)

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The British Society for the History of Science gratefully acknowledges the sponsorship of
The College of Arts & Humanities, Swansea University

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Information in this handbook is based on that available on 25 June 2015. Whilst every effort will be made to achieve the advertised programme, the Society reserves the right to change any aspect of the programme and other arrangements where good reason calls for this to be done.

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