HPS&ST NEWSLETTER

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DECEMBER 2019

The HPS&ST NEWSLETTER has been published for about 30 years in print or electronic form. It began during the editor's 25-year period (1990-2014) as editor of Springer's *Science & Education: Contributions from History and Philosophy of Science* journal and his term as president of the International History, Philosophy and Science Teaching Group and later as president of the Inter-Divisional Teaching Commission of the DLMPST & the DHST.

The NEWSLETTER seeks to serve the diverse international community of HPS&ST scholars and teachers by disseminating information about events and publications that connect to concerns of the HPS&ST community.

The contents page of the HPS&ST NEWSLETTER is emailed monthly to about 8,400 individuals who directly or indirectly have an interest in the contribution of history and philosophy of science to theoretical, curricular and pedagogical issues in science teaching and teacher education; and/or interests in the promotion of innovative, engaging and effective teaching of the history and philosophy of science.

Contributions to the NEWSLETTER (publications, conferences, opinion pieces, &.) are welcome and should be sent direct to the editor: Michael R. Matthews, UNSW (m.matthews@unsw.edu.au).

The NEWSLETTER, along with RESOURCES, OBITUARIES, OPINION PIECES and more, are available at the website: http://www.hpsst.com/

ISSN: 2652-2837

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Brazilian Oil Spill, Federal University of Bahia Response

Fishing villages in the northeast shore of Brazil keep suffering due to the crude oil contamination, one of the worst environmental accidents in the history of Brazil.

Journalist Michael Fox made an outstanding work in documenting the current situation, both in text and video, which you can find here and here.

In the video you can see one of the fishing villages where my research team work, Siribinha, and also Ceudes dos Santos, one of the fishermen there who most work of us in our strategic participatory planning efforts. As in the attached video, he is quite clear about what they are passing through.

As researchers working with them in conservation and education in this amazing estuary, we could not fail them, and, thus, we organized a crowdfunding campaign to support them with protection equipment for their voluntary work in cleaning the oil, supplies for their survival during these difficult times, and support for their travel to public hearings on the responsibilities for this disaster.

More information can be found here.

If you want to donate, please access here.

Charbel El-Hani
Institute of Biology, Federal University of Bahia, Brazil

Linda Hall Library 2020 Fellowships

The Linda Hall Library Kansas City is now accepting applications for its 2020-21 fellowship program. These fellowships provide graduate students, postdoctoral researchers, and independent scholars with financial support to make use of the Linda Hall Library's outstanding science and engineering collections.

The Linda Hall Library holds over half a million monograph volumes and more than 48,000 journal titles documenting the history of science and technology from the 15th century to the present. Its collections are exceptionally strong in

the engineering disciplines, chemistry, and physics. The Library also boasts extensive resources related to natural history, astronomy, environmental and earth sciences, aeronautics, life sciences, infrastructure studies, mathematics, and the history of the book.

The Linda Hall Library is pleased to offer three types of fellowships this year:

- Travel fellowships, lasting between one and three weeks, support brief, exploratory visits to the Linda Hall Library. Funding is available for up to $750 per week to defray the costs of travel and living in Kansas City.
- Residential fellowships, lasting between one and four months, support scholars conducting more extensive research using the Library's collections. Fellowship funding is offered up to $3,000 per month for doctoral students and up to $4,200 per month for postdoctoral scholars.
- A new History of Science and Medicine fellowship, sponsored by the Linda Hall Library and the Clendening History of Medicine Library at the University of Kansas Medical Center, will provide a doctoral student with a $3,000 stipend to conduct research in both libraries' collections for one month.

All Linda Hall Library research fellows participate in a vibrant intellectual community alongside scholars from nearby libraries and universities, including the University of Missouri-Kansas City, the University of Kansas, and the Clendening History of Medicine Library. Fellows may also attend the Library's many lectures and public programs.

I encourage you to share this information with graduate students, colleagues, or anyone else who might be interested in the Linda Hall Library's fellowship program. All application materials are due no later than January 17, 2020. For further information, please visit here or e-mail fellowships@lindahall.org.

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Fourth International Conference on History of Physics, Trinity College, Dublin, 17-19 June 2020.

This conference is the fourth in the series following the first three, which were held at Trinity College, Cambridge UK in 2014, Pöllau, Austria in 2016 and San Sebastian, Spain in 2018. It will be the first to be formally overseen by an International Advisory Committee which is recognised by the Institute of Physics and the European Physical Society.

The aim is to bring together physicists interested in the history of their subject and professional historians of science in the belief that proponents of the two disciplines, with their different perceptions and methodologies, can benefit from interaction and discourse.

Student attendance and participation will be encouraged in the firm belief that a study of the history of the subject can inspire future generations by informing them about the lives and work of great scientists, and also facilitate a better understanding of topics that present conceptual problems today just as they did to their discoverers.

Inspired by the recent centenary of two major landmarks in modern physics – nomination of the proton as a fundamental nuclear particle and discovery of the bending of light in a gravitational field – the leading theme of the present conference will be:

'On the Road to Modern Physics'

Presentations on the history of particle physics, general relativity, cosmology and astrophysics will be particularly welcome. However, *papers on any topic related to physics history will be considered for inclusion*.

We are very fortunate in having the conference venue at Trinity College Dublin. Many significant figures in the history of physics have been associated with Trinity. Richard Helsham wrote the first undergraduate textbook, published in 1739, on Newton's natural philosophy: for an account of those who followed, Eric Finch's *Three Centuries of Physics at Trinity College Dublin* is to be recommended.

The Commission for the History of Physics of the International Union for the History of Science, Technology and Medicine are offering a limited number of bursaries of up to 400 Euros to help early career scholars to present papers at this conference. Please click here to find out more information.

Society for Philosophy of Science in Practice (SPSP) Eighth Biennial Conference, Michigan State University, USA, 7-10 July 2020

In collaboration with the Consortium for Socially Relevant Philosophy of/in Science and Engineering (SRPOISE) biennial meeting (see details below).

Keynote speakers: Karen Barad, University of California at Santa Cruz; Till Grüne-Yanoff, Royal Institute of Technology (KTH) Stockholm

Keynote MSU panel on "Epistemologies of Science": Kristie Dotson (Philosophy and African American and African Studies); Sean A. Valles (Lyman Briggs College and Philosophy); Kyle Whyte (Philosophy and Community Sustainability)

Online submission site for paper or session proposals is here.
Abstract submission deadline: 10 January 2020
Main Contact: Alan C. Love, aclove@umn.edu

SPSP is an interdisciplinary community of scholars who approach the philosophy of science with a focus on scientific practice and the practical uses of scientific knowledge.
For further details on our objectives, see our mission statement here.

SPSP welcomes both proposals for individual papers, and also strongly encourage proposals for whole, thematic sessions with coordinated papers, particularly those which include multiple disciplinary perspectives and/or input from scientific practitioners. You may wish to involve other members of SPSP (a listing is available on our website) or post a notice to the SPSP mailing list describing your area of interest and seeking other possible participants for a session proposal. (To post to this list or to receive updates on the conference, please subscribe via this link).

Alan C. Love
Minnesota Center for Philosophy of Science
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Journal Special Issue: "Idealization, Representation, Explanation Across the Sciences", *Studies in History and Philosophy of Science*

Call for Papers: "Idealization, Representation, Explanation Across the Sciences"
Special Issues: *Studies in History and Philosophy of Science Part A*
Guest editors: Elay Shech, Melissa Jacquart, Martin Zach
Information available here.

One goal of the scientific endeavour is to explain phenomena. Often, scientists attempt to explain a phenomenon by way of representing it in some manner (such as with mathematics, models, or theory), which allows for an explanation of the phenomenon under investigation. However, in developing scientific representations, scientists often deploy simplifications and idealisations. As a result, scientific representations often provide only partial, and often distorted, accounts of the phenomenon in question. Philosophers have analysed the nature and function of how scientists construct representations, deploy idealisations, and provide explanations.

While the topics of idealisation, representation, and explanation have been thoroughly discussed in the literature separately, they deserve further analysis in terms of the connections among themselves, across different scientific disciplines, and in relation to other central issues in philosophy of science such as the realism debate and confirmation theory.

The focus of this special issue is to address, among others, the following topics:

- How can one account for the practice of employing assumptions that are strictly false but that nevertheless tell us something important about the world?
- Can idealisations facilitate or aid in developing representations or offering explanations of phenomena? If so, how? If not, why not?
- Is there always a conflict between idealisation and accurate representation?
- If explaining requires representing difference-makers responsible for the phenomenon in question, what happens if the difference-makers are misrepresented?
- Are there any important differences for the role of idealisation and representation in offering explanations in the context of modelling verses theory development?
- Do idealisations and misrepresentations afford understanding (in addition to or instead of providing explanations)?
- How are we to make sense of distinctively mathematical explanations of physical phenomenon that appear in science?
- Should mathematical explanations in science be thought of as inaccurate representations or do they latch on to the ostensible mathematical nature of the natural world?
- Assuming that there are indispensable idealisations in science, can realists make sense of such state of affairs? Or does the presence of such idealisation support empiricism?
- More generally, do our practices of scientific representation support realism or empiricism?

We invite original contributions that address any (but are not necessarily limited to) these questions.

The deadline for submitting manuscripts is January 15, 2020.

Submissions must not be under consideration for publication elsewhere. Submissions must be prepared for anonymous review and should not exceed 10,000 words, including abstract, footnotes, and references. Manuscripts should be submitted online via the EVISE system, here, by selecting the Idealization, Representation, Explanation Special Issue (SI) from the list. Manuscripts must be prepared according to the instructions for authors available here.

Further questions should be addressed to guest editors:
Elay Shech (eshech@auburn.edu)
Melissa Jacquart (melissa.jacquart@uc.edu)

British Society for History of Science Annual Conference, Aberystwyth University, 8-11 July 2020

The British Society for the History of Science invites proposals for individual papers and organised symposia for its 2020 Annual Conference, which this year will be held in Aberystwyth, home of the National Library of Wales and Aberystwyth University, from Wednesday 8 July to Saturday 11 July.

Individual paper proposers should submit a title and abstract for a paper of 20-25 minutes to the conference's Paper Proposal site at Oxford Abstracts. If accepted, these papers will be arranged into themed sessions by the BSHS.

Symposium organisers should submit details of their proposed session to the conference's Symposium Proposal site at Oxford Abstracts.

A symposium may take the form of:

- an organised panel (three papers in 90 minutes, with (optionally) a predetermined chair)
- a roundtable (three or more discussants initiating a conversation with the audience)
- a workshop (one or more facilitators leading other delegates in an activity).

The deadline for receipt of paper and symposia proposals via the Oxford Abstracts system is Monday 6 January 2020. The BSHS will inform applicants of the outcome by Friday 14 February 2020.

For further information about the annual conference, please see the BSHS Annual Conference 2020 Website.

Science, Religion and Big Questions Conference, University of Oxford, 22-23 June 2020

The Learning about Science and Religion (LASAR) Research Centre at Canterbury Christ Church University and the Oxford Argumentation in Religion and Science (OARS) project at the Department of Education at the University of Oxford invite abstracts for papers and seminars that explore Big Questions in the context of education and the science-religion dialogue.

Papers and seminars are invited which will help to characterise, expand and progress the science-religion dialogue in relation to Big Questions. This could be by discussing ways to relate science and religion in general or in the context of a selected Big Question, for example, how science and religion can help us understand what it means to be a person; mapping issues explored in the science-religion dialogue onto contemporary contexts such as the question of personhood in the context of artificial intelligence; or by identifying 'wicked problems' in contemporary life that can be examined through a framework of Big Questions, such as by examining the intersection of mental health and the science-religion dialogue.

Papers should introduce language and constructs that will help educators to understand the terrain. Terms could include epistemic insight, argumentation, theory of knowledge, knowledge domains, sufficient truth, conundrum, apparent contradiction, conflict, ways of relating, interdisciplinary relationships, cross-disciplinary questions, multidisciplinary arenas.

We hope that the conference will provide a compendium of Big Questions that can engage stu-

dents' and young adults' interest, with explanations for teachers and tutors about their educative value and the importance of giving students access to a range of views about how science and religion relate.

Abstract submissions are invited for either individual short papers (300-500 words) or seminar proposals (600-1000 words). For short papers, speaker(s) will have a maximum of 20 minutes presentation time, followed by up to 10 minutes for questions and discussion.

For seminars, authors are asked to propose three or four presentations that link together with a shared time for questions and discussion.

Please email abstracts as a Word document to Professor Berry Billingsley, lasar@canterbury.ac.uk by 1st February 2020. Abstracts will be considered on receipt.

Visit http://www.epistemicinsight.com for more information about the Epistemic Insight Initiative.

Objects of Understanding: Historical Perspectives on Material Artefacts and Practices in Science Education, Europa-Universität Flensburg (Germany), 29 June – 3 July 2020

We invite the submission of paper and poster abstracts for a five-day conference on the history of objects and practices in science education. Understanding the history of science education is essential if we want to understand the generation, reproduction and circulation of scientific knowledge, practices, practitioners, and objects.

While history of science education has moved from the periphery to the focus of history of science in recent decades, the central role of instruments, demonstrations and models in teaching has barely been explored. Particularly with respect to the analysis of scientists' formation in different periods, the role of objects and of practices in laboratories appears to be crucial. Moreover, with respect to the political and social function that was ascribed to science, the role and purpose of objects in school science education needs a more thorough reflection.

In this conference, we will discuss objects that were explicitly designed for the purpose of science education such as teaching demonstrations and students' experiments, models and collections of specimens. Moreover, we want to address the re-

lationship between teaching and research instruments and collections, and the practices associated with them. We explicitly want to bring together objects and practices from the different contexts and periods of science teaching in schools and technical training institutes, the formation of future scientists at universities, and teaching a general audience about and through science.

Following the conference Learning by Doing hosted in 2009 at the University of Regensburg, we invite historians of science as well as scholars from neighbouring fields such as material culture studies, history of education and science museums to present their work on the historical development and role of objects that were intended to represent, present and transfer knowledge within the scientific disciplines.

We invite proposals for presentation of individual papers of 20 minutes as well as posters. Please submit an abstract of no more than 250 words to OoU-conference@uni-flensburg.de. The deadline for submission of abstracts is 6 January 2020, notification about acceptance will be sent by 1 February 2020.

Organizers: Peter Heering, Europa-Universität Flensburg, Germany, and Roland Wittje, Indian Institute of Technology Madras, Chennai, India

Alternative Approaches to Scientific Realism, Munich Center for Mathematical Philosophy, April 16-17, 2020

There has been a recent move in philosophy of science towards views that in some sense reject the strict dichotomy between realism and anti-realism, or otherwise situate themselves between these two extremes. These include varieties of structuralism, perspectivalism, and pluralism/relativism, and have been applied across various scientific domains, including physics, mathematics, biology, cognitive science, and computer science. It seems plausible that each of these views might share some motivations and have in mind a similar target, i.e. the idea that there is an attitude we could hold towards our scientific theories that is somehow 'less' demanding than full-blown realism, and yet somehow 'more' rigorous than full-blown anti-realism.

This conference will bring together representatives of each of these viewpoints, in order to compare the respective progress made by each approach, and to develop a shared foundation for the future development of alternatives to traditional scientific realism and anti-realism.

Confirmed Speakers

James Ladyman, University of Bristol
Michela Massimi, University of Edinburgh
Martin Kusch, University of Vienna
Natalie Alana Ashton, University of Stirling
Ana-Maria Cretu, University of Edinburgh
Fiona Doherty, University of Stirling
James Read, University of Oxford

Call for Abstracts

We welcome submission of 500 word abstracts from early career researchers on any topic related to the themes of the conference. Possible topics include (but are not limited to):

- What is the common ground between structuralist, perspectivalist, pluralist, and relativist approaches to scientific theory and practice?

- What are the major differences between these approaches?
- How might insights from each approach be applied to problems faced by the others?
- Should we take a different approach (qua realism) to scientific theorising in distinct fields or domains?
- Could one (or more) of these approaches be collapsed into a single shared approach?
- Are these approaches all 'stable', or do they risk collapsing into either full-blown realism or anti-realism?
- Are these approaches merely provisional, until we reach a 'completed' science, or should we adopt an 'in-principle' structuralist, perspectivalist, or relativist approach towards science?

We will be able to cover all travel and accommodation expenses for accepted speakers from Europe, and to subsidise travel expenses from further afield (enabled by a generous grant from the DFG). Abstracts should be suitably blinded, and submitted here. **The deadline for submissions is December 15, 2019**. Questions should be directed to Joe Dewhurst (J.Dewhurst@lmu.de).

24th Conference of the International Society for the Philosophy of Chemistry (ISPC 2020), Buenos Aires, Argentina, July 21-July 23, 2020

The 24th Conference of the International Society for the Philosophy of Chemistry (ISPC 2020) will be held from Tuesday July 21 till Thursday July 23, 2020 in Buenos Aires, Argentina, at the CAECE University.

The ISPC 2020 aims at providing a forum for discussion about foundational, epistemological, methodological and ontological problems of chemistry and its subfields, by bringing together leading researchers and young scholars from all over the world.

Issues debated in the philosophy of chemistry emerge from three communities: the chemists, reflecting on the foundations of their science, the philosophers of science, investigating the nature and specifics of chemistry, and the historian of chemistry, making sense of the pathways to discoveries and the practices of chemistry in the past.

For more information see here.

For all further queries, please do not hesitate to send us an email at
ispc2020.buenosaires@gmail.com

European Society for History of Science Biennial Conference, Bologna, August 31-September 3, 2020

The 9th International Conference of the European Society for the History of Science (ESHS), hosted by the Centre for the History of Universities and Science at the University of Bologna (CIS) and by the Italian Society for the History of Science (SISS), will take place in Bologna, from the 31st of August to the 3rd of September 2020.

The theme of the 2020 meeting is Visual, Material and Sensory Cultures of Science, a very broad and inclusive topic. Sessions and talks might ad-

dress the history of the sensory approaches to scientific objects, their material culture, as well as the building of scientific practices based on the use of the senses (vision, hearing, touch and smell), with particular attention to the history of the relationship between the visual arts and the sciences across nations, periods, and historiographies; visual epistemologies and the cultural practice of thinking scientifically with images; and the relationship between different media (print, photography, digital imaging, etc.) and scientific disciplines in various social, political, and economic contexts.

Given the developments of the discipline in the past twenty years, we see this theme as particularly topical and capable of generating broad historical questions at the same time. This theme will provide ample opportunity to take stock and reflect on "sensory cultures" and on the "visual turn", to assess their strengths and weaknesses, but also to explore their relationship with competing or overlapping historiographical trends such as the material and global history of science, medicine and technology.

Submission date: 15 December 2019 Details available here.

World Logic Day, January 14

The proclamation of January 14 as the World Logic Day has been adopted by the Executive Council of UNESCO. The proposal was presented by the Brazilian Ambassador at UNESCO, Maria Edileuza Fontenele Reis. The 1st World Logic Day was celebrated in about 60 locations all over the world on January 14, 2019

This was described in the paper "1st World Logic Day: 14 January 2019" which was the basic document that was used to build the proposal.

Everybody is welcome to organise a celebration. Info about all the celebrations will be gathered in a single webpage with links to all the celebrations in the world.

Jean-Yves Beziau
Editor-in-Chief *Logica Universalis*
President of the Brazilian Academy of Philosophy

Association for History of Scientific Knowledge in Central, Eastern and South-Eastern Europe

We are delighted to be able to share with you the new online platform HPS.CESEE, which aims to facilitate the exchange of information about the history of scientific knowledge in Central, Eastern and Southeastern Europe. Our aim is to serve as a resource for the history of scientific knowledge in the region stretching from Prague to Perm and from Tallinn to Tirana, or from (present) Albania and Austria to (former) Soviet Union and Yugoslavia. We will keep you updated about conferences, events, new publications, journals and positions in our field - via our blog (https://hpscesee.blogspot.com/), newsletter, and social media: Facebook (https://www.facebook.com/groups/hps.cesee/ and Twitter (https://twitter.com/hpscesee).

As HPS.CESEE is a community project, inspired by H-Net and H-Soz-u-Kult, we will rely on the information we receive from our members and followers - so please forward this information to colleagues, students and other members of the History of Science community broadly construed.

Please read our blog, subscribe to our newsletter, and follow us on social media, and send us information you would like to be circulated. And please contact us if you are interested in joining our editorial team.

To learn more about HPS.CESEE and the editorial team, please visit https://hpscesee.blogspot.com/p/about-us.html

You can contact the editors of HPS.CESEE here: hps.cesee@gmail.com

4th International Conference on Science and Literature, University of Girona, Spain, 2-4 July 2020

Following the successful three International Conferences on Science and Literature which took place in Athens, Poellau and Paris, this Conference is the fourth to be organized under the aegis of the Commission on Science and Literature DHST/UHPST. The fourth International Conference will be organised by the Càtedra Dr. Bofill de Ciències I Humanitats (Dr Bofill Chair on Science and the Humanities) integrated at the University of Girona (UdG) with the technical support of the Commission on Science and Literature. The Conference will be organised along thematic sessions. Those proposed by the Organising Committee are:

- Science in Western Art
- Literature and Medicine
- Science and Religion
- Poetry and Science
- Scientific Genres in Science Fiction
- Mathematics, Physics and Literature
- Women in the History of Science, Philosophy and Literature

Other themes, according to the papers accepted by the Scientific Committee, can be organised.

Proposals for individual papers or panels of three or four papers should be submitted by February 29th, 2020. They must include the title of the paper (or the theme of the panel), name and affiliation of the author(s), an abstract of no more than 350 words and a short CV.

Proposals and inquiries about practical matters may be sent to gvlahakis@yahoo.com and cgamez@unav.es. Juan Ortega will be the chair of the Local Organising Committee.

Further information available here.

Sixth European Advanced School in the Philosophy of the Life Sciences (EASPLS), Klosterneuburg (Austria), September 7-11, 2020

Directors: Guido Caniglia (KLI) & Marcel Weber (University of Geneva)

The European Advanced School in the Philosophy of the Life Sciences (EASPLS) consortium will hold its sixth biennial summer school on "Dealing with Complexity in the Life Sciences" at the Konrad Lorenz institute for Evolution and Cognition Research (KLI) in Klosterneuburg near Vienna. Young scholars (PhD students and early post-doctoral researchers) in the history, philosophy and social studies of the biological, biomed-

ical, and environmental sciences are invited to apply. The registration fee is €350. The summer school will cover lunches and the opening dinner at the KLI. Participants will take care of their own accommodation and travel expenses. For updates and more details see here.

Applications should be sent to the following email address: easpls2020@kli.ac.at.
Please send a single pdf file (labelled: LastName-Firstname-easpls2020.pdf) containing:

- Letter of motivation (max 500 words)
- Title and Abstract (max 500 words) for a poster
- Short Curriculum Vitae (max 3 pages)

The deadline for applications is **February 28, 2020**. Applicants will be notified of decisions by late May 2020.

Instructors at EASPLS 2020 will come from all the institutions of the Consortium:

Guido Caniglia (co-director)
John Dupré
Philippe Huneman
Maël Lemoine
Sabina Leonelli
Thomas Reydon
Isabella Sarto-Jackson
Jon Umerez
Marcel Weber (co-director)

In addition to instructors from the consortium, we are delighted to announce that Sara Green (University of Copenhagen) and Federica Russo (University of Amsterdam) will be joining the summer school as Invited Guest Lecturers.

Opinion: *Science + Religion*

Tom McLeish, Department of Physics, University of York

Tom McLeish is a professor of natural philosophy in the Department of Physics at the University of York in the UK.

His broadly interdisciplinary research ranges from the theoretical physics of soft and biological matter to the medieval history of science, and the theology, sociology and philosophy of science.

See here for more information.

To riff on the opening lines of Steven Shapin's book *The Scientific Revolution* (1996), there is no such thing as a science-religion conflict, and this is an essay about it. It is not, however, another rebuttal of the 'conflict narrative' – there is already an abundance of good, recent writing in that vein from historians, sociologists and philosophers as well as scientists themselves. Readers still under the misapprehension that the history of science can be accurately characterised by a continu-

ous struggle to escape from the shackles of religious oppression into a sunny secular upland of free thought (loudly expressed by a few scientists but no historians) can consult Peter Harrison's masterly book *The Territories of Science and Religion* (2015), or dip into Ronald Numbers's delightful edited volume *Galileo Goes to Jail and Other Myths about Science and Religion* (2009).

Likewise, assumptions that theological and scientific methodologies and truth-claims are necessarily in philosophical or rational conflict might be challenged by Alister McGrath's book *The Territories of Human Reason* (2019) or Andrew Torrance and Thomas McCall's edited *Knowing Creation* (2018). The late-Victorian origin of the 'alternative history' of unavoidable conflict is fascinating in its own right, but also damaging in that it has multiplied through so much public and educational discourse in the 20th century in both secular and religious communities. That is the topic of a new and fascinating study by the historian James Ungureanu, *Science, Religion, and the Protestant Tradition* (2019). Finally, the concomitant assumption that scientists must, by logical force, adopt non-theistic worldviews is roundly rebutted by recent and global social science, such as Elaine Eklund's major survey, also published in a new book, *Secularity and Science* (2019).

All well and good – so the history, philosophy and sociology of science and religion are richer and more interesting than the media-tales and high-school stories of opposition we were all brought up on. It seems a good time to ask the 'so what?' questions, however, especially since there has been less work in that direction. If Islamic, Jewish and Christian theologies were demonstrably central in the construction of our current scientific methodologies, for example, then what might such a re-assessment imply for fruitful development of the role that science plays in our modern world? In what ways might religious communities support science especially under the shadow of a 'post-truth' political order? What implications and resources might a rethink of science and religion offer for the anguished science-educational discussion on both sides of the Atlantic, and for the emerging international discussions on 'science-literacy'?

I want to explore here directions in which we could take those consequential questions. Three perspectives will suggest lines of new resources for thinking: the critical tools offered by the discipline of *theology* itself (even in an entirely secular context), a reappraisal of ancient and pre-modern texts, and a new way of looking at the unanswered questions and predicament of some postmodern *philosophy* and *sociology*. I'll finish by suggesting how these in turn suggest new configurations of religious communities in regard to science and technology.

The humble conjunction 'and' does much more work in framing discussions of 'theology and science' than at first apparent. It tacitly assumes that its referents belong to the same category ('red' and 'blue'), implying a limited overlap between them ('north' and 'south'), and it might already bias the discussion into oppositional mode ('liberal' and 'conservative'). Yet both science and theology resist boundaries – each has something to say about everything. Other conjunctions are possible that do much greater justice to the history and philosophy of science, and also to the cultural narratives of theology. A strong candidate is 'of', when the appropriate question now becomes: 'What is a theology of science?' and its complement, 'What is a science of theology?'

A 'theology of…' delivers a narrative of *teleology*,

a story of purpose. A 'theology of science' will describe, within the religious narrative of one or more traditions, what the work of science is for. There have been examples of the 'theology of…' genre addressing, for example, music – see James Begbie's *Theology, Music and Time* (2000) – and art – see Nicholas Wolterstorff's *Art in Action* (1997). Note that working through a teleology of a cultural art by calling on theological resources does not imply a personal commitment to that theology – it might simply respond to a need for academic thinking about purpose.

For example, Begbie explores the role that music plays in accommodating human experience to time, while Wolterstorff discovers a responsibility toward the visual aesthetics of public spaces. In both cases, we find that theology has retained a set of critical tools that address the essential human experience of purpose, value and ethics in regard to a capacity or endeavour.

Intriguingly, it appears that some of the social frustrations that science now experiences result from missing, inadequate or even damaging cultural narratives *of* science. Absence of a narrative that delineates what science is *for* leave it open to hijacking by personal or corporate sectarian interests alone, such as the purely economic framings of much government policy. It also muddies educational waters, resulting in an over-instrumental approach to science formation. I have elsewhere attempted to tease out a longer argument for what a 'theology of science' might look like, but even a summary must begin with examples of the fresh (though ancient) sources that a late-modern theological project of this kind requires.

The cue for a first wellspring of raw material comes from the neo-Kantian Berlin philosopher Susan Neiman. In a remarkable essay, she urges that Western philosophy acknowledge, for a number of reasons, a second foundational source alongside Plato – that of the Biblical *Book of Job*. The ancient Semitic text offers a matchless starting point for a narratology of the human relationship of the mind, and the experience of human suffering, with the material world. Long recognised as a masterpiece of ancient literature, *Job* has attracted and perplexed scholars in equal measures for centuries, and is still a vibrant field of study. David Clines, a leading and lifelong scholar of the text, calls *Job* 'the most intense book theologically and intellectually of the Old Testament'. Inspiring commentators across vistas of centuries and philosophies, from Basil the Great to Emmanuel Levinas, its relevance to a theology of science is immediately apparent from the poetic 'Lord's Answer' to Job's complaints late in the book:

> Where were you when I founded the earth?
> Tell me, if you have insight.
> Who fixed its dimensions? Surely you know!
> …Have you entered the storehouses of the snow?
> Or have you seen the arsenals of the hail?

The writer develops material from the core creation narrative in Hebrew wisdom poetry – as found in Psalms, Proverbs and Prophets – that speaks of creation through 'ordering', as well as bounding and setting foundations. The questing survey next sweeps over the animal kingdom, then finishes with a celebrated 'de-centralising' text that places humans at the periphery of the world, looking on in wonder and terror at the 'other' – the great beasts Behemoth and Leviathan.

The text is an ancient recognition of the unpredictable aspects of the world: the whirlwind, the earthquake, the flood, unknown great beasts. In today's terms, we have in the Lord's Answer to Job

a foundational framing for the primary questions of the fields we now call cosmology, geology, meteorology, astronomy, zoology…We recognise an ancient and questioning view into nature unsurpassed in its astute attention to detail and sensibility towards the tensions of humanity in confrontation with materiality. The call to a questioning relationship of the mind from this ancient and enigmatic source feeds questions of purpose in the human engagement with nature from a cultural depth that a restriction to contemporary discourse does not touch.

Drawing on historical sources is helpful in another way. The philosophy of every age contains its tacit assumptions, taken as evident so not critically examined. A project on the human purpose for science that draws on theological thinking might, in this light, draw on writing from periods when this was an academically developed topic, such as the scientific renaissances of the 13th and 17th centuries. Both saw considerable scientific progress (such as, respectively, the development of geometric optics to explain the rainbow phenomenon, and the establishment of heliocentricity). Furthermore, both periods, while perfectly distinguishing 'natural philosophy' from theology, worked in an intellectual atmosphere that encouraged a fluidity of thought between them.

An instructive and insightful thinker from the first is the polymath Robert Grosseteste. Master to the Oxford Franciscans in the 1220s, and Bishop of Lincoln from 1235 to his death in 1253, Grosseteste wrote in highly mathematical ways about light, colour, sound and the heavens. He drew on the earlier Arab transmission of and commentaries on Aristotle, yet developed many topics well beyond the legacy of the ancient philosopher (he was the first, for example, to identify the phenomenon of refraction to be responsible for rainbows). He also brought a developed Christian philosophy to bear upon the reawakening of natural philosophy in Europe, whose programmes of astronomy, mechanics and above all optics would lead to early modern science.

In his *Commentary on the Posterior Analytics* (Aristotle's most detailed exposition of his scientific method), Grosseteste places a sophisticated theological philosophy of science within an overarching Christian narrative of Creation, Fall and Redemption. Employing an ancient metaphor for the effect of the Fall on the higher intellectual powers as a 'lulling to sleep', he maintains that the lower faculties, including critically the senses, are less affected by fallen human nature than the higher. So, re-illumination must start there:

> Since sense perception, the weakest of all human powers, apprehending only corruptible individual things, survives, imagination stands, memory stands, and finally understanding, which is the noblest of human powers capable of apprehending the incorruptible, universal, first essences, stands!

Human re-engagement with the external world through the senses, recovering a potential knowledge of it, becomes a participation in the theological project of healing. Furthermore, the reason that this is possible is because this relationship with the created world is also the nexus at which human seeking is met by divine illumination.

The old idea that there is something incomplete, damaged or 'out of joint' in the human relationship with materiality (itself drawing on traditions such as *Job*), and that the human ability to engage a question-based and rational investigation of the physical world constitutes a step towards a reversal of it, represents a strand of continuity between medieval and early modern thinking. Francis Bacon's

theologically motivated framing of the new 'experimental philosophy' in the 17th century takes (though not explicitly) Grosseteste's framing as its starting point. As framed in his *Novum Organum*, the Biblical and medieval tradition that sense data are more reliable than those from reason or imagination constitutes his foundation for the 'experimental method'.

The rise of experimentation in science as we now know it is itself a counterintuitive turn, in spite the hindsight-fuelled criticism of ancient, renaissance and medieval natural philosophers for their failure to adopt it. Yet the notion that one could learn anything general about the workings of nature by acts as specific and as artificial as those constituting an experiment was not at all evident, even after the foundation of the Royal Society. The 17th-century philosopher Margaret Cavendish was among the clearest of critics in her *Observations upon Experimental Philosophy* (1668):

> For as much as a natural man differs from an artificial statue or picture of a man, so much differs a natural effect from an artificial…

Paradoxically perhaps, it was the theologically informed imagination of the medieval and early modern teleology of science that motivated the counterintuitive step that won against Cavendish's critique.

Much of 'postmodern' philosophical thinking and its antecedents through the 20th century appear at best to have no contact with science at all, and at worst to strike at the very root-assumptions on which natural science is built, such as the existence of a real world, and the human ability to speak representationally of it. The occasional explicit skirmishes in the 1990s 'science wars' between philosophers and scientists (such as the 'Sokal-affair' and the subsequent public acrimony between the physicist Alan Sokal and the philosopher Jacques Derrida) have suggested an irreconcilable conflict. A superficial evaluation might conclude that the charges of 'intellectual imposture' and 'uncritical naivety' levied from either side are simply the millennial manifestation of the earlier 'two cultures' conflict of F R Leavis and C P Snow, between the late-modern divided intellectual world of the sciences and the humanities. Yet in light of the long and theologically informed perspective on the story that we have sketched, the relationship of science to the major postmodern philosophical themes looks rather different.

Søren Kierkegaard and Albert Camus wrote of the 'absurd' – a gulf between the human quest for meaning and its absence in the world. Levinas and Jean-Paul Sartre wrote of the 'nausea' that arises from a human confrontation with sheer, basic existence. Derrida and Ferdinand de Saussure framed the human predicament of desire to represent the unrepresentable as différance. Hannah Arendt introduces *The Human Condition* (1958) with a meditation on the iconic value of human spaceflight, and concludes that the history of modernism has been a turning away from the world that has increased its inhospitality, so that we are suffering from 'world alienation'. The first modern articulation of what these thinkers have in common, an irreconcilable aspect of the human condition in respect of the world, comes from Immanuel Kant's *Critique of Judgment* (1790):

> Between the realm of the natural concept, as the sensible, and the realm of the concept of freedom, as the supersensible, there is a great gulf fixed, so that it is not possible to pass from the former to the latter by means of the theoretical employment of reason.

Kant's recognition that more than reason alone

is required for human re-engagement with the world is echoed by George Steiner. *Real Presences* (1989), his short but plangent lament over late-modern literary disengagement with reference and meaning, looks from predicament to possible solution:

> Only art can go some way towards making accessible, towards waking into some measure of communicability, the sheer inhuman otherness of matter…

Steiner's relational language is full of religious resonance – for *re-ligio* is simply at source the reconnection of the broken. Yet, once we are prepared to situate science within the same relationship to the humanities as enjoyed by the arts, then it also fits rather snugly into a framing of 'making accessible the sheer inhuman otherness of matter'. What else, on reflection, does science do?

Although both theology and philosophy suffer frequent accusations of irrelevance, on this point of brokenness and confusion in the relationship of humans to the world, current public debate on crucial science and technology indicate that both strands of thought are on the mark. Climate change, vaccination, artificial intelligence – these and other topics are marked in the quality of public and political discourse by anything but enlightenment values. The philosopher Jean-Pierre Dupuy, commenting in 2010 on a Europe-wide project using narrative analysis of public debates around nanotechnology, shows that they draw instead on both ancient and modern 'narratives of despair', creating an undertow to any discussion of 'troubled technologies' that, if unrecognised, renders effective public consultation impossible.

The research team labelled the narratives: (1) Be careful what you wish for – the narrative of desire; (2) Pandora's Box – the narrative of evil and hope; (3) Messing with nature – the narrative of the sacred; (4) Kept in the dark – the narrative of alienation; and (5) The rich get richer and the poor get poorer – the narrative of exploitation. These dark and alienated stories turn up again and again below the surface of public framings of science, yet driving opinion and policy. The continuously complex case of genetically modified organisms is another example. None of these underlying and framing stories draws on the theological resources within the history of science itself, but all do illustrate the absurd, the alienation and the irreconcilable of postmodern thinking.

Small wonder, perhaps, that Bruno Latour, writing in 2007 on environmentalism, revisits the narrative of Pandora's Box, showing that the modernist hope of controlling nature through technology is dashed on the rocks of the same increasingly deep and problematic entangling with the world that prevents our withdrawal from it. But Latour then makes a surprising move: he calls for a re-examination of the connection between mastery, technology and *theology* as a route out of the environmental impasse.

What forms would an answer to Latour's call take? One is simply the strong yet gentle repeating of truth to power that a confessional voice for science, and evidence-based thinking, can have when it is resting on deep foundations of a theology that understands science as a gift rather than a threat. One reason that Katharine Hayhoe, the Texan climate scientist, is such a powerful advocate in the United States for taking climate change seriously is that she is able to explicitly work through a theological argument for environmental care with those who resonate with that, but whose ideological commitments are impervious to secular voices.

There are more grassroots-level examples that demonstrate how religious communities can support a healthy lay engagement with science. Local movements can dissolve some of the alienation and fear that characterises science for many people. In 2010, a group of local churches in Leeds in the UK, decided to hold a community science festival that encouraged people to share their own and their families' stories, together with the objects that went with them (from an ancient telescope to a circuit board from an early colour TV set that was constructed by a resident's grandfather). A diverse movement under the general title 'Equipping Christian Leadership in an Age of Science' in the UK has discovered a natural empathy for science as a creative gift, rather than a threat to belief, within local churches (see here for examples).

At a national level, the past five years have seen a remarkable project engaging senior church leaders in the UK with current scientific issues and their researchers. In a country with an established Church, it is essential that its voices in the national political process are scientifically informed and connected. Workshop participants, including scientists with no religious background or practice, have found the combination of science, theology and community leadership to be uniquely powerful in resourcing discussions of ethical ways forward, in issues from fracking to artificial intelligence.

A relational narrative for science that speaks to the need to reconcile the human with the material, and that draws on ancient wisdom, contributes to the construction of new pathways to a healthier public discourse, and an interdisciplinary educational project that is faithful to the story of human engagement with the apparently chaotic, inhuman materiality of nature, yet one whose future must be negotiated alongside our own. Without new thinking on 'science and religion', we risk forfeiting an essential source for wisdom today.

This essay originally appeared in *Aeon Magazine* who are thanked for giving permission for its reproduction here.

Themes in this essay are developed in McLeish *Faith and Wisdom in Science* (2014), *Let There Be Science* (2016) and *The Poetry and Music of Science*.

Invitation to Submit Opinion Piece

In order to make better educational use of the wide geographical and disciplinary reach of this HPS&ST NEWSLETTER, invitations are extended for readers to contribute opinion or position pieces or suggestions about any aspect of the past, present or future of HPS&ST studies.

> Contributions can be sent direct to Michael Matthews or Nathan Oseroff-Spicer.

Ideally, they might be pieces that are already on the web, in which case a few paragraphs introduction, with link to web site can be sent, or else the pieces will be put on the web with a link given in the NEWSLETTER.

They will be archived in the OPINION folder at the HPS&ST web site: `http://www.hpsst.com/`.

Previous HPS&ST NEWSLETTER Opinion Pieces

Michael Corballis, Elizabeth Rata and Robert

Nola, University of Auckland, The Defence of Science and the Status of Māori Knowledge, (November 2019)

Maurice Finocchiaro, Philosophy, University of Nevada, Las Vegas, Galileo's Legacy: Avoiding the Myths and Muddles (October 2019)

Michael R. Matthews, Education, University of New South Wales, Feng Shui: Philosophical Appraisal and Educational Opportunity (September 2019)

Daniel J. Kennefick, Physics Department, University of Arkansas, The Problem of Scientific Bias: The 1919 Astronomical Confirmation of Einstein's Theory, (August 2019)

Nicholas Maxwell, Philosophy, University College, London, The Metaphysics of Science and Aim-Oriented Empiricism (May 2019)

Ron Good, Louisiana State University, The Two Darwins: Erasmus and Charles on Evolution, (June 2019)

Lucie Laplane, Paolo Mantovani, Ralph Adolphs, Hasok Chang, Alberto Mantovani, Margaret McFall-Ngai, Carlo Rovelli, Elliott Sober, and Thomas Pradeu: Why Science Needs Philosophy (April 2019)

Thomas J.J. McCloughlin, School of STEM Education, Innovation & Global Studies, Dublin City University, Ireland, Beware the Greeks: Sources for the History of Gravity in Science Teaching (March 2019)

Bettina Bussmann, University of Salzburg, Austria & Mario Kötter, University of Muenster, Germany Between Scientism and Relativism: Epistemic Competence as an Important Aim in Science and Philosophy Education (February 2019)

Robin Attfield, Philosophy Department, Cardiff University, Climate Change and Philosophy (January 2019)

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Frederick Grinnell, Biology Department, University of Texas, Teaching research integrity – Using history and philosophy of science to introduce ideas about the ambiguity of research practice (November 2018)

New York Times, Creeping Bias in Research: Negative Results Are Glossed Over (October 2018)

Michael Matthews, School of Education, UNSW, An Occasion to Celebrate: Mario Bunge's 99th Birthday (September 2018)

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Monica H. Green, History Department, Arizona State University, On Learning How to Teach the Black Death (March 2018).

Stephen Pinker, Psychology Department, Harvard University, The Intellectual War on Science

(February 2018).

Michael Ruse, Philosophy Department, Florida State University, Does Life Have Meaning? Or is it Self-Deception at Best and Terrifyingly Absurd at Worst? (January 2018).

Mario Bunge, Philosophy Department, McGill University, In Defence of Scientism (December 2017).

Susan Haack, Philosophy and Law Departments, University of Miami, The Future of Philosophy, the Seduction of Scientism (November 2017).

Nicholas Maxwell, University College London, What's Wrong with HPS and What Needs be Done to Put it Right? (June 2017).

Heinz W. Drodste, An Interview with Mario Bunge (May 2017).

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The HPS&ST NEWSLETTER is the ideal medium for publicising and making known submitted and awarded doctoral theses in the HPS&ST domain.

The following details should be submitted to the editor at m.matthews@unsw.edu.au:

- Candidate's name and email
- Institution
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- Thesis title
- Abstract of 100-300 words
- Web link when theses are required to be submitted for open search on web.

Recent HPS&ST Research Articles

Science & Education (Vol. 28, Issue 8, October 2019). Thematic Issue; Scientific Practices, Epistemic Aims, and Learning Progressions. Guest Editors: Ashlyn Pierson, Douglas Clark, Gregory Kelly

Perspectives on Science (Vol. 27, N. 5, 2019) Special Issue: Debates on Experience in Nineteenth Century: At the Interface between Philosophy, Science, and History Guest Editors: Silvia Manzo and Delphine Antoine-Mahu

Ageitos, N., Puig, B. & Colucci-Gray, L. (2019). Examining Reasoning Practices and Epistemic

Actions to Explore Students' Understanding of Genetics and Evolution. *Science & Education*, 1-25. doi:10.1007/s11191-019-00086-6 online first

Bächtold, M., Cross, D. & Munier, V. (2019). How to Assess and Categorize Teachers' Views of Science? Two Methodological Issues. *Research in Science Education*, 1-13. doi:10.1007/s11165-019-09904-x online first

Bardapurkar, A. (2019) Scientific temper and education: virtues of science in the early 20th century India. *Current Science*. 117(10), 1571-1573. Available here.

Brock, R. & Hay, D. (2019). Keeping Students Out of Mary's (Class)room: Approaches to Supporting Students' Acquisition of Non-propositional Knowledge in Science Education. *Science & Education*, 1-16. doi:10.1007/s11191-019-00079-5 online first

Fuselier, L., McFadden, J. & King, K.R. (2019). Do Biologists' Conceptions of Science as a Social Epistemology Align with Critical Contextual Empiricism? *Science & Education*, 1-25. doi:10.1007/s11191-019-00084-8 online first

Guerrini, A. (2019). BJHS retrospective. *The British Journal for the History of Science*, 1-11. doi:10.1017/S0007087419000669 online first

Joas, C., Krämer, F., Nickelsen, K. (2019) Introduction: History of Science or History of Knowledge? *Berichte zur Wissenschaftsgeschichte*, 42, 117-125. doi:10.1002/bewi.201970021

Leden, L., Hansson, L., & Ideland, M. (2019). The mangle of school science practice: Teachers' negotiations of two nature of science activities at different levels of contextualization. *Science Education*, 1-22. doi:10.1002/sce.21553

Ma, Y., Wang, T., Wang, J. et al. (2019) A comparative study on scientific inquiry activities of Chinese science textbooks in high schools. *Research in Science Education*, 1-21. doi:10.1007/s11165-019-09902-z

Ochiai, H. (2019) Overcoming skepticism about molecular structure by developing the concept of affordance. *Foundations of Chemistry*, 1-10. doi:10.1007/s10698-019-09349-0 online first

Park, W., Yang, S. & Song, J. (2019) When Modern Physics Meets Nature of Science: The Representation of Nature of Science in General Relativity in New Korean Physics Textbooks. *Science & Education*, 1-29. doi:10.1007/s11191-019-00075-9 online first

Peters-Burton, E.E., Parrish, J.C. & Mulvey, B.K. (2019) Extending the Utility of the Views of Nature of Science Assessment through Epistemic Network Analysis. *Science & Education*, 1-27. doi:10.1007/s11191-019-00081-x online first

Pourciau, B. (2019) The Principia's second law (as Newton understood it) from Galileo to Laplace. *Archive for History of Exact Sciences*, 1-60. doi:10.1007/s00407-019-00242-y online first

Rutt, A. & Mumba, F. (2019). Developing Preservice Teachers' Understanding of and Pedagogical Content Knowledge for History of Science–Integrated Science Instruction. *Science & Education*,1-27. doi:10.1007/s11191-019-00089-3 online first

Trautman, A. & Salisbury, D. (2019) Memories of my early career in relativity physics. *EPJ H*, 1-23. doi:10.1140/epjh/e2019-100044-5 online

first

Recent HPS&ST Related Books

Brown, Robin Gordon, & Ladyman, James (2019). *Materialism: A Historical and Philosophical Inquiry*. Abingdon, UK: Routledge.
ISBN: 978-0-367-20134-0

"The doctrine of materialism is one of the most controversial in the history of ideas. For much of its history it has been aligned with toleration and enlightened thinking, but it has also aroused strong, often violent, passions amongst both its opponents and proponents. This book explores the development of materialism in an engaging and thought-provoking way and defends the form it takes in the twenty-first century.

"Opening with an account of the ideas of some of the most important thinkers in the materialist tradition, including Epicurus, Lucretius, Hobbes, Hume, Darwin and Marx, the authors discuss materialism's origins, as an early form of naturalistic explanation and as an intellectual outlook about life and the world in general. They explain how materialism's beginnings as an imaginative vision of the true nature of things faced a major challenge from the physics it did so much to facilitate, which now portrays the microscopic world in a way incompatible with traditional materialism. Brown and Ladyman explain how out of this challenge materialism developed into the new doctrine of physicalism.

"Drawing on a wide range of colourful examples, the authors argue that although materialism does not have all the answers, its humanism and commitment to naturalistic explanation and the scientific method is our best philosophical hope in the ideological maelstrom of the modern world." (From the Publisher)

More information available here.

Cummings, Warren D. (2019) *Evolving Theories on the Origin of the Moon*. Cham: Springer.
ISBN: 978-3-030-29118-1

"This book follows the development of research on the origin of the Moon from the late 18th century to the present. By gathering together the major texts, papers, and events of the time, it provides a thorough chronicle of the paradigmatic shift in planetary science that arose from the notion that the Earth-Moon system was formed from two colliding planetary bodies.

"The book covers pre-Apollo ideas, the conceptual evolution during and subsequent to the Apollo explorations of the Moon, and the development of the Earth-Moon system consensus. A plethora of excerpts from key publications are included to demonstrate the shift in scientific focus over the centuries.

"Through its comprehensive review of lunar science research and literature, this book shows how new technologies and discoveries catalyzed the community and revolutionized our understanding of the Moon's formation.

More information available here.

Gilsdorf, Janet R. (2019). *Continual Raving: A History of Meningitis and the People Who Conquered It*. Abingdon, UK: Oxford University Press.
ISBN: 978-0-190-67731-2

"*Continual Raving* tells the combined stories of how scientists across the 19th and 20th centuries defeated meningitis – not through flawless scientific research, but often through a series of serendipitous events, misplaced assumptions, and flawed conclusions. The result is a story of not just a vanquished disease, but how scientific accomplishment sometimes occurs where it's least expected.

"Although symptoms of meningitis were recorded as early as Hippocrates and the ancient Greeks, our understanding of the disease's origins and mechanisms remained obscure for most of human history. That changed in 1892, when German physician Richard Pfeiffer observed and isolated bacteria ultimately shown to cause meningitis in children – and concluded that those bacteria cause influenza. *Haemophilus influenzae*, as the meningitis-causing bacteria have been erroneously named ever since, continued their strange journey to discovery in the decades that followed.

"*Continual Raving* traces the disease's strange encounters with science, including:

- Heinrich Quincke, the German internist who first used a needle to draw spinal fluid from between a patient's back bones
- Simon Flexner's management of American meningitis epidemics using immune serum from a horse
- American bacteriologist Margaret Pittman's discovery (during the Great Depression, no less) of a sugar overcoat that protects the bacteria from white blood cells
- Pediatrician Ashley Weech, who gave the first antibiotic used in America (based on instructions written in German) to a young patient sick with meningitis
- Microbiologist Hattie Alexander, who learned why these antibiotics sometimes fail in such patients
- Four scientists, in two teams, as they vied to be the first to create the right vaccine to prevent meningitis in infants

"In each of these deeply human stories, variables of chance, circumstance, and incorrect assumptions intervene to shape not just the arc of the scientists' lives, but the trajectory of how humans have come to understand one of our most pernicious diseases. Continual Raving is a mosaic tale of how science conquered meningitis – and a larger story of the sometimes winding road to discovery."

More information available here.

Johnson, Curtis N. (2019). *Darwins Historical Sketch: An Examination of the 'Preface' to the Origin of Species*. Abingdon, UK: Oxford University Press. ISBN: 978-0-190-88293-8

"Charles Darwin's "Historical Sketch" has appeared as a preface to nearly every authorized edition of Darwin's *Origin of Species* since the second English edition was published in 1860. The "Historical Sketch" provides a brief history of opinion about the species question as a prelude to Darwin's own independent contribution to the subject, but its provenance is somewhat obscure. While some previous thinkers anticipated portions of Darwin's theory long before he did, none of them saw the complete picture as clearly as Darwin. As such, he was able to claim originality and priority for the idea that has transformed our understanding of nature. His "Historical Sketch" was written as an attempt to address these issues. Some things are known about its production, such as when it first appeared and what changes were made to it between its first appearance in 1860 and its final form in 1866. Other questions remain unanswered. How did it evolve in Darwin's mind? Why did he write it at all? What did he think he was accomplishing by prefacing it to *Origin of Species*? Curtis Johnson approaches these questions, offering some clarity on the originality of Darwin's work.

"Darwin's "Historical Sketch" is the first comprehensive study of Darwin's "Preface" to Origin of Species. Johnson conveys the pressure Darwin felt from friends and other correspondents to showcase the originality of his theory, and he tackles questions of originality by carefully examining the 35 authors Darwin referenced in this monumental text." (From the Publisher)

More information available here.

Kampourakis, Kostas, & McCain, Kevin (2019). *Uncertainty: How It Makes Science Advance*. Abingdon, UK: Oxford University Press.
ISBN: 978-0-190-87166-6

"Scientific knowledge is the most solid and robust kind of knowledge that humans have because of the self-correcting character inherent in its own processes. Nevertheless, anti-evolutionists, climate denialists, and anti-vaxxers, among others, question some of the best-established scientific findings, making claims that are unsupported by empirical evidence. A common aspect of these claims is the reference to the uncertainties in these areas of research, which leads to the conclusion that science is uncertain about evolution, climate change, and vaccination, among others. The truth of the matter is that while the broad picture is clear, there exist–and will always exist–uncertainties about the details of the respective phenomena. In this book Kampourakis and McCain show that uncertainty is an inherent feature of science that does not devalue it. In contrast, uncertainty actually makes science advance because it motivates further research.

"The first book of its kind, Uncertainty draws on philosophy of science to explain what uncertainty in science is and how it makes science advance. It contrasts evolution, climate change, and vaccination, where the uncertainties are exaggerated, to genetic testing and forensic science where the uncertainties are usually overlooked. Kampourakis and McCain discuss the scientific, psychological, and philosophical aspects of uncertainty in order to explain what it is really about, what kind of problems it actually poses, and why it ultimately makes science advance. Contrary to the public representations of scientific findings and conclusions that produce an intuitive but distorted view of science as certain, we need to understand and learn to live with uncertainty in science." (From the Publisher)

"This is a wonderfully clear and engaging book on a very important and topical issue: How can science contribute to solving the problems society faces today? The cases are well chosen and the philosophical chapters do a great job in synthesizing many insights from recent philosophy of science into a coherent whole. The book succeeds admirably in showing the societal relevance of philosophical reflection on science." – Henk de Regt, Professor of Philosophy of Science, Vrije Universiteit Amsterdam

More information available here.

Massimi, Michela, & McCoy, Casey D. (Eds.) (2019). *Understanding Perspectivism: Scientific Challenges and Methodological Prospects*. (Open Access). Abingdon, UK: Routledge.
ISBN: 978-1-138-50306-9

"It's an impressive collection of essays providing careful answers to questions about how to make sense of multiple, sometimes conflicting, perspectives in science. Ten chapters from outstanding scholars address a slew of implications of scientific perspectivism for classic positions in philosophy of science, primarily scientific realism, pluralism, and pragmatism …Professionals and graduate students would benefit from reading the book, as it should inspire ideas for philosophical questions to be addressed about their own areas of expertise." – Notre Dame Philosophical Reviews

"This impressive collection is essential reading for appreciating the inevitable contextualities of scientific knowledge. It explores of how notions of "perspective" can illuminate the epistemic upshot of the sciences and how they are situated in their history, practices, representations, and sometimes competing aims, provocatively advancing debates about realism, pragmatism, explanation, and modeling in the process, all through a wealth of cases from physics, biology, neuroscience, and medical science." –

Anjan Chakravartty, University of Miami

"An excellent collection of essays on a topic rapidly establishing itself as an important interpretive programme in philosophy of science. One of the volume's many merits consists in showing the diversity and versatility of perspectivism while illustrating common features among its different varieties. The reader is thus provided an enormously rich foundation for evaluating the role of perspectivism in understanding science and its practices." – Margaret Morrison, University of Toronto

"Perspectivism is a fruitful metaphor for imagining alternatives to traditional realism in philosophy of science. Massimi and McCoy have gathered ten essays which show how perspectivism is illuminating in areas such as molecular biology and measurement theory, and also explore the relationships between perspectivism and other recent accounts including pragmatism, structural realism, pluralism, and scientific modelling. There is an excellent balance of established and emerging scholars in the field. This volume is a superb, cutting-edge text to use in an advanced graduate seminar." – Miriam Solomon, Temple University

More information available here.

More books and articles from the author here.

Rowbottom, Darrell P. (2019). *The Instrument of Science: Scientific Anti-Realism Revitalised*. Abingdon, UK: Routledge. ISBN: 978-0-367-07745-7

"The book is a welcome and timely addition to the literature. It will certainly help the anti-realist cause, as it provides a number of serious challenges to realism …It will also be a valuable starting point for others interested in developing a new instrumentalism in philosophy of science." – Notre Dame Philosophical Reviews

"This accessible and engaging defence of instrumentalism is essential reading for all those interested in the debate between realism and instrumentalism in the philosophy of science." – Jon Williamson, University of Kent, UK

"Analyzing fascinating examples from the history of science, this book builds a compelling and carefully argued case for cognitive instrumentalism: that is, for a philosophy of science that takes seriously what we can understand, and do, with science in the world as we experience it." – Axel Gelfert, Technical University of Berlin, Germany

More information available here.

Review by K. Brad Wray, Aarhus University, at NDPR here.

Scerri, Eric (2019). *The Periodic Table: Its Story and Its Significance*. (2nd Edition). Oxford, UK: Oxford University Press. ISBN: 978-0-190-91436-3

"The periodic table continues to generate new thoughts as the list of elements grows, its foundations are refined, and new portrayals are developed. Eric Scerri captures all these innovations in this timely updating of his very readable account of the origin, structure, and interpretation of the table." – Peter Atkins, University of Oxford

"The 2nd edition of Eric's Scerri's journey through the periodic table is up-to-date, readable, and intellectually enticing. This icon of chemistry has never had a better expositor!" – Roald Hoffmann, Cornell University

"This second edition is a revised and expanded take on the philosophical and historical aspects of the periodic table that made his first edition such a worthy successor to van Spronsen's classic history." – Carmen Giunta, Le Moyne College

"Written to a high standard of scholarship, The Periodic Table is the best book on this subject currently available. It gives both an historical and philosophical perspective to the development of this key to the elements, as well as in-

cluding all the recent additions to the table." – John Emsley, author of *Nature's Building Blocks*

"Since Eric Scerri's *The Periodic Table* was the definitive book on the topic when it first appeared, it is wonderful to see that status claimed anew by this second edition during the International Year of the Periodic Table. The story is still unfolding, thanks in large part to the ingenuity of today's element-makers, and the additions bring this volume right up to date. It remains as clear, balanced and thoughtful as ever, and is the best guide to this iconic formulation of nature's atomic building blocks." – Philip Ball, author of *Elements: A Very Short Introduction*

More information available here.

Shindell, Matthew (2019) *The Life and Science of Harold C. Urey*. Chicago, IL: The University of Chicago Press. ISBN: 978-0-226-66211-4

"One cannot understand the origins of nuclear power and weaponry, of planetary exploration, or of our modern ideas about earth history and climate change without knowing the contributions of Harold Urey. Shindell's meticulously researched and riveting account of Urey's life and work traces the intellectual, political, and spiritual struggles of a man whose career binds together many of the major scientific and political events of the twentieth century." – David Grinspoon, author of *Chasing New Horizons: Inside the Epic First Mission to Pluto*

"Harold Urey was simultaneously a towering figure in American science yet never quite fit into the categories imposed on him. Shindell vibrantly revives Urey's story of science, politics, religion, and humanity across the American century." – Michael D. Gordin, Rosengarten Professor of Modern and Contemporary History, Princeton University

"This is an elegantly written and smartly researched biography of a major figure whose contributions to twentieth-century science have been inexplicably understudied. As with the best of this sort of biographical exploration, Shindell here crafts a rich historical narrative in which the individual subject provides an opportunity to investigate and understand large-scale social and cultural developments in a fine-grained way. The book is a serious contribution to the field, as well as paradigmatic of how the history of chemistry can appeal to a wide audience." – Matthew Stanley, author of *Einstein's War: How Relativity Triumphed amid the Vicious Nationalism of World War I*

More information available here.

Authors of HPS&ST-related papers and books are invited to bring them to attention of Paulo Maurício or Nathan Oseroff-Spicer for inclusion in these sections.

Coming HPS&ST Related Conferences

January 3-6, 2020, epiSTEME 8, conference, Mumbai, India
Details available here.

January 8-9, 2020, 'Universals Locales', British Academy Sponsored, University of Edinburgh.
Details: http://mathglobal.org/locales.html

January 8-9, From Scientific Pluralism to Pluralism in HPS, University of Exeter, UK
Details: Alex Aylward (a.m.aylward@leeds.ac.uk) and Adrian Currie (a.currie@exeter.ac.uk)

January 17-17, 2020, How Quantum Mechanics Changed Philosophy, University of Wuppertal, Germany
Inquiries to vanstrien@uni-wuppertal.de

January 20-21, 2020, International Workshop on the Philosophy of Cancer Biology, University of

Bordeaux, France.
Details available here.

March 15-18, 2020, NARST Annual Conference, Portland OR, USA
More information available here.

March 30 – April 1, 2020, Rudolf-Carnap-Lectures & Graduate Workshop 2020. Ruhr-University Bochum. Germany.
More information available here.

April 3-4, 2020, Mid-South Philosophy of Science (MSPS) 2020 Meeting. Virginia Tech Blacksburg, VA, USA.
Inquiries to Justin Donhauser at jdonhau@bgsu.edu with "MSPS 2020" in the subject line.

April 17-18, 2020, Joint Atlantic Seminar for the History of East Asian Science, Technology, and Medicine. John Hopkins University, Baltimore, MD, USA.
Details at: https://jaseastm.org/

May 11-14, 2020, Sixth International Conference on the Nature and Ontology of Spacetime. Albena, Bulgaria.
More information available here.

June 16-17, 2020, International Workshop on Disciplinary Identity: Insights from the History and Philosophy of Chemistry. Hebrew University of Jerusalem, Israel.
Details available here.

June 17-19, 2020, Fourth International History of Physics Conference, Trinity College Dublin
Details available here.

June 29 – July 3, 2020, Objects of Understanding: Historical Perspectives on Material Artefacts and Practices in Science Education. Europa-Universität, Flensburg, Germany.
Inquiries at OoU-conference@uni-flensburg.de

June 29 – July 1, 2020, Measurement at the Crossroads 2020 – Measuring and Modeling. Milan, Italy.
More information available here.

June 30 – July 2, 2020, 7th annual conference of the International Association for Philosophy of Time. Barcelona, Spain.
Inquiries at iapt7barcelona@gmail.com

July 2-4, 2020, 4th International Conference on Science and Literature, University of Girona, Spain.
Details at: http://icscienceandliterature.com/

July 8-11, 2020, British Society for History of Science Annual Conference, Aberystwyth University, Wales.
Information at: http://bshsaberystwyth2020.info/

July 9-11, 2020, 6th International STEM in Education Conference, Vancouver, Canada.
Details at: www.stem2020.ubc.ca

July 15-17, 2020, 8th Integrated History and Philosophy of Science Conference (&HPS8). Virginia Tech, Blacksburg VA.
Information: Lydia Patton (critique@vt.edu) or Jutta Schickore (jschicko@indiana.edu)

July 21-23, 2020, 24th Conference of the International Society for the Philosophy of Chemistry. Buenos Aires, Argentina.
More information available here.

November 19-22, 2020, Twenty-Seventh Biennial Meeting of the PSA. Baltimore, Maryland.
Details at: https://psa2020.philsci.org/

August 10-14, 2020, Bayesian Epistemology: Perspectives and Challenges. MCMP, LMU Munich.
Details available here.

August 31 – September 3, 2020, European Society for History of Science Biennial Conference, Bologna.
Details available here.

July 4-8, 2021, IHPST 16th International Conference, University of Calgary, Canada
Details from Glenn Dolphin:
glenn.dolphin@ucalgary.ca.

July 25-31, 2021, 26th International Congress of History of Science and Technology (DHST), Prague
Information: https://www.ichst2021.org/

September 20-22, 2021, 'Developing Mario Bunge's Scientific-Philosophical Programme', Huaguang

Academy of Information Science, Wuhan, China Details from Zongrong LI 2320129239@qq.com.

July 24-29, 2023, 17th DLMPST Congress, University of Buenos Aires Information: Pablo Lorenzano, pablo@unq.edu.ar.

HPS&ST Related Organisations and Websites

IUHPST – International Union of History, Philosophy, Science, and Technology

DLMPST – Division of Logic, Mathematics, Philosophy, Science, and Technology

DHST – Division of History, Science, and Technology

IHPST – International History, Philosophy, and Science Teaching Group

NARST – National Association for Research in Science Teaching

ESERA – European Science Education Research Association

ASERA – Australasian Science Education Research Association

ICASE – International Council of Associations for Science Education

UNESCO – Education

HSS – History of Science Society

ESHS – European Society for the History of Science

AHA – American History Association

ISHEASTME – International Society for the History of East Asian History of Science Technology and Medicine

BSHS – British Society for History of Science

EPSA – European Philosophy of Science Association

AAHPSSS - The Australasian Association for the History, Philosophy, and Social Studies of Science

HOPOS – International Society for the History of Philosophy of Science

PSA – Philosophy of Science Association

BSPS – The British Society for the Philosophy of Science

SPSP – The Society for Philosophy of Science in Practice

ISHPSB – The International Society for the History, Philosophy, and Social Studies of Biology

PES – The Philosophy of Education Society (USA)

The above list is updated and kept on the HPS&ST website HERE.

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The font is Minion Pro.
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