HPS&ST Note

February 2019

Introduction

This HPS&ST monthly note is sent direct to about 7,450 individuals who directly or indirectly have expressed an interest in the contribution of history and philosophy of science to theoretical, curricular and pedagogical issues in science teaching, and/or interests in the promotion of innovative and more engaging and effective teaching of the history and philosophy of science. The note is sent on to different international and national HPS lists and international and national science teaching lists. In print or electronic form it has been published for 20+ years.

The note 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.

Contributions to the note (publications, conferences, opinion pieces, etc.) are welcome and should be sent direct to the editor:

Michael R. Matthews, UNSW, m.matthews@unsw.edu.au.

The Note, along with RESOURCES, OBITUARIES, OPINION PIECES and more, are lodged at the website:

http://www.hpsst.com/

International Congress on the History of Science in Education, May 30 – June 1, 2019, Vila Real, Portugal

The International Congress on the History of Science in Education is a joint organization of the University of Trás-os-Montes and Alto Douro (UTAD), University of Porto (UP), University of Coimbra (UC) and University of S. Paulo (USP), and it will take place on May 30, 31 and June 1, 2019, at Polo 1 of the School of Human and Social Sciences of UTAD, Portugal.

The 1ICHSE rises following the 1st Meeting of History of Science in Teaching and 2nd Meeting of History of Science in Teaching held at UTAD and UC, in 2015 and 2017, respectively, and it will take place every two years alternating between the universities involved.

The 1ICHSE aims to bring together researchers, professors and students, interested in the history and teaching of Biology, Geology, Chemistry, Physics and Mathematics, as well as Educational Sciences, Engineering, Medicine, Pharmacy, Biochemistry, Anthropology, Astronomy, Psychology, Economics, Sociology, Ecology, Molecular Biology and Nanosciences, among others, in a multi-centered and multidisciplinary debate.

In addition to works focused on teaching, education, didactics and dissemination of sciences, 1ICHSE seeks to bring together reflections and studies of a more general, disciplinary or interdisciplinary nature, in the history of culture, technology and industry, as well as epistemological, historiographic, biographical or prosopographic. Other topics relevant to the history of science and teaching, such as gender studies, the teaching of science in a foreign language and, in general, the various aspects of the interactions between science, technology and the humanities are very important welcome to the dialogue space that 1ICHSE seeks to create.

Plenary Speakers:

- Carlos Fiolhais, Physics, Universidade de Coimbra

- Jorge Varanda, Anthropology, University of Coimbra
- Maria Elice Prestes, Biology, Universidade de São Paulo
- Michael Matthews, Education, University of New South Wales

Abstract submission: January 31, 2019

Full text submission; March 31, 2019

Conference Chair:

- Isilda Rodrigues, isilda@utad.pt

  Depart. Education and Psychology,

  University of Trás-os-Montes e Alto Douro, UTAD, Vila Real, Portugal.

Information available here.

15th International History, Philosophy and Science Teaching Group (IHPST) Biennial Conference, Thessaloniki, July 15-19, 2019

12th Cent. White Tower

School of Education, Aristotle University

The conference will take place at the Aristotle university of Thessaloniki which was founded in 1925 and occupies an area of 33 hectares in the city centre.

The conference will open on Monday afternoon with registration, an opening session and a welcome reception. On Tuesday, Wednesday and Thursday there will be full-day presentations. There will be scheduled opportunity to visit cultural sites and events in Thessaloniki.

Important Dates:

Abstract submission: January 20, 2019

Final paper submission: March 20, 2019

Full conference information available here.

Conference Chair: A/Professor Fanny Seroglou: ihpst2019@eled.auth.gr

IHPST Elections: Call for Nominations

Nominations are invited for a number of positions on the IHPST Council and the IHPST Nominating Committee for 2019-2021. The positions include: President-Elect, Secretary, Treasurer, Director (2), Teacher Representative, Student Representative, Nominating Committee Members (4).

IHPST members are invited to nominate other members, or themselves, for one of these positions. Each nomination should include the following items:

1. The name of the nominee and for what position,
2. A brief statement on what makes the nominee an ideal candidate for this position, and
3. A brief comment on the nominee's level of involvement with the IHPST Group (e.g., participation in biennial or regional meetings, publications, reviewing or editorial work for Science & Education).

Nominations will be accepted until February 15, 2019. Please send your nomination that includes the requested information to Zoubeida Dagher, Nominating Committee Chair, at IHPSTnominations@gmail.com.

Royal Society *Notes and Records* Early Career Essay Award

Notes and Records reports on current research and archival activities throughout the field of history of science, technology and medicine. The Essay Award is open to researchers in the history of science who have completed a postgraduate degree within the last five years. The previously unpublished essay of up to 8,000 words should be based on original research and it may relate to any aspect of the history of science, technology and medicine in any period.

The winning entry is chosen using the journal's standard criteria for selection (i.e. excellence and interest to a wide audience) and will be published in the journal.

The award consists of:

A cash prize of £500

Publication of the winning entry in Notes and Records

A year's subscription to Notes and Records

The deadline for submission of an essay is 28th February 2019 at 23.59 GMT. Entries received after this time will not be accepted.

How to enter:

The essay should be no more than 8000 words in length, including references, and should reflect the style guidelines of the journal.

The submission must be accompanied by a covering message confirming the post-graduate degree title and where and when it was awarded.

notes@royalsociety.org.

Eligibility

The award is open to all researchers in the history of science who have completed a postgraduate degree within the last five years, except employees of the Royal Society, their families, agents or any third party directly associated with administration of the award.

In entering the award, you confirm that you are eligible to do so and eligible to claim any prize you may win. The Royal Society may require you to provide proof that you are eligible to enter the award. The essay should not be under consideration for publication elsewhere. It must be written in English. Only one entry per person is permitted. The Royal Society reserves all rights to disqualify you if your conduct is contrary to the spirit or intention of the award.

Full terms and conditions are here.

Professor Anna Marie Roos

Editor, Notes and Records: The Royal Society Journal of the History of Science

Philosophy of Science with Children

A growing number of science educators are doing philosophy with children as they learn science. Philosophical questions can ignite students' interests in science and expand their perspectives on science, reality and society. The philosopher Matthew Lipman observed that philosophical inquiry stimulates critical and creative thinking among students, and recent research has found a positive impact of doing philosophy on a range of outcomes for children. In the context of science education, philosophical dialogue may contribute to the discussion of big ideas such as substance, classification, the nature of science and ethically or culturally sensitive issues arising in the science class such as the theory of evolution or sexuality.

On 18th - 19th March 2019 the National STEM Learning Centre (UK), will host a 2 day event to explore philosophical dialogue in science education. The aim of the meeting is to share and reflect on approaches to doing philosophy in science education, and research on doing philosophy in science education.

To find out more please click here or contact Lynda Dunlop at York University at lynda.dunlop@york.ac.uk.

To contribute a paper, workshop or philosophical provocation, complete the form here.
(deadline 20th December).

Opinion Page

Between Scientism and Relativism: Epistemic Competence as an Important Aim in Science and Philosophy Education

Bettina Bussmann & Mario Kötter

Bettina Bussmann, Professor for Philosophy Education at the University of Salzburg, Austria

Mario Kötter, Member of the Center for Biology Education at the WWU Muenster, Germany

Steven Pinker recently contributed an opinion page to the monthly HPS&ST Note, warning against the dangers of an intellectual war on science. He identifies the educational system to be an important battleground in that war, criticizing US-American university liberal-arts curricula for poisoning students against science rather than instilling in them an appreciation for science as a major human achievement. In Pinker's view, the clash between humanities and science is a disaster not

only for science and for society but also for the humanities themselves which, due to their lack of a progressive agenda, face an increasing loss of importance. He therefore advocates a consilience of the humanities with science from which "both sides would win".

A consilience of humanities and science indeed is an urgent task. This applies particularly to the educational context. We recently proposed an interdisciplinary approach on science and philosophy education (for further publications on the issue see references in the RISTAL-paper linked above). Our approach takes into account both the necessity to inform philosophy education by the findings and methods of empirical science and to alter science education by the application of philosophical insights and standards of reflection.

We believe that discussions of societal controversies should play an important role in secondary and higher education. This is so, because school and university are perhaps the only places where young people can be initiated to the practice of empathetic and rational discourse with peers whose backgrounds are quite different from their own. The above-mentioned war on science, which in fact is a struggle for sovereignty in interpreting the scope and limits of scientific insight, the role of science in society and especially the relevance of scientific knowledge in the area of societal decision-making, seems to be one of the most pressing controversial issues of today. It therefore appears necessary that all students at the upper level of secondary education should develop an informed view on the dispute sketched above. However, the controversy on the scope and limits of science needs to be addressed in an appropriate manner. We assert that this cannot be done in separated subjects but requires an interdisciplinary approach.

The problem in current science education is that philosophy of science either is largely absent (as it is the case at least in Germany) or is dominated by concepts which seem to imply (or, at least can easily be understood as) predominantly pessimistic views on science. In both cases the controversy is covered up. This may cause negative effects. At least there are empirical findings indicating that both lead to naïve views: naïve-optimistic if philosophy is omitted and naïve-pessimistic if reflection is reduced to a social-constructivist approach to science.

In philosophy education, at least in countries like Germany, Italy or Spain, we can observe a still too dominant engagement in the teaching of "the great philosophers". As the hermeneutic orientation continues to prevail, the findings and methods of modern science are utilized (or even noticed) only rarely, if ever. Instead, a profound prejudice against letting scientific knowledge inform philosophical discourse is widespread. Confronted with the claim that philosophy must integrate the findings of the sciences to fulfill the standards of problem-based, lifeworld-oriented and learner-centered lessons, teachers and teacher educators usually respond in the same way: "But then we will lose our subject". While these resistances and the underlying concept of Philosophy need to be investigated in greater detail, the *metaphilosophical* answer seems to be far less controversial. Philosophy education that ignores current scientific knowledge and corresponding controversies around science not only runs the risk of losing life-world relevance, it also runs the risk of becoming poor philosophy.

We therefore claim that there is a strong need both for philosophically informed reflection on science in science education and for scientifically informed discourse in philosophy education. An adequate treatment of the issue sketched above requires both an interdisciplinary approach in science and philosophy education and it requires interdisciplinary lessons in school.

We propose that 'textitepistemic competence–the ability to understand and critically reflect on aspects of the methods, results, history and relevance of scientific knowledge in relation to other forms of knowledge–should be a goal of science education as well as philosophy education. We explore what kind of skills, knowledge and dispositions a person should learn in order to master this ability. For example, an epistemically competent person should be aware and should accept that reflection on science requires some tolerance of ambiguity, that "scientifically proven" does not mean "true for evermore", that both in science and in philosophy indeterminacies (and aporia) sometimes are unavoidable, and that controversy as well as rationality are indispensable principles.

It is important to note that some prerequisites are a matter of course in philosophy education, but they are alien to science education, and vice versa. The principle of

controversy for example, which is essential to world-view issues, is fundamental in philosophy education, but it is largely unknown in science education. In philosophy education, on the other hand, the discussion of the principle of controversy often neglects to include descriptive empirical findings. Often engaging in normative considerations, philosophers and philosophy teachers either are blind to the need to include and reflect upon empirical evidence, or they simply don't know how to go about it (with the exception of applied ethics and empirically informed metaethics, up to a certain degree). And indeed only those who work in the area of philosophy of science are familiar with the various questions and problems of the sciences. However, philosophers of science do not represent the majority of the philosophical community.

But there is another, relatively recent, philosophical discipline that focuses on the role of scientific knowledge: Social Epistemology. New research in this field has brought a broader focus on the age-old question "What is a competent knower?", by discussing issues like the role of scientific experts, the epistemic effects of social interactions on beliefs, and various other aspects that address the role of scientific knowledge in belief-building contexts. Democratic societies are dependent on the participation of competent knowers in social decision-making processes to an ever greater extend. To strengthen the individuals' autonomy means to strengthen their epistemic competence. We believe that this goal is best and most efficiently put into practice in an interdisciplinary way.

A detailed version of this contribution appeared in RISTAL 01/2018.

Invitation to Submit Opinion Piece

In order to make better educational use of the wide geographical and disciplinary reach of this HPS&ST Note, 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 editor. 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 Note.

They will be archived in the OPINION folder at the HPS&ST web site:

http://www.hpsst.com/.

Previous HPS&ST Note Opinion Pieces at http://www.hpsst.com/

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

Dhyaneswaran Palanichamy & Bruce V. Lewenstein, School of Integrative Plant Science, Cornell University, How History can Enable Better Teaching of Statistics in Introductory Biology Courses (December 2018)

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)

Cormac Ó Raifeartaigh, Waterford Institute of Technology, Ireland, History of Science in Schools (July 2018)

Hugh Lacey, Philosophy Department, Swarthmore College, Appropriate Roles for Ethics and Social Values in Scientific Activity (June 2018)

Gerald Holton, Physics Department, Harvard University, Tracing Tom Kuhn's Evolution: A Personal Perspective (April/May 2018)

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).

Nicholas Maxwell, University College London, The Crisis of Our Times and What to do About It (April 2017).

Eric Scerri, UCLA, Bringing Science Down to Earth (March 2017).

Robert Nola, University of Auckland, Fake News in the Post-Truth World, (February 2017).

Michael D. Higgins, President of Ireland, The Need to Teach Philosophy in Schools (December 2016).

Philip A. Sullivan, University of Toronto, What is wrong with Mathematics Teaching in Ontario? (July 2016).

Gregory Radick, Leeds University, How Mendel's legacy holds back the teaching of science (June 2016).

Matthew Stanley, New York University, Why Should Physicists Study History?

PhD Theses in HPS&ST Domain

This is a new section of the monthly HPS&ST Note. The Note is the ideal medium for publicizing 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
- Supervisor
- 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

Bhakthavatsalam, S. (2019) The Value of False Theories in Science Education. *Science & Education*, 1-19.. doi:10.1007/s11191-019-00028-2

Bruner, J. P., & Holman, B. (2019) Self-correction in science: Meta-analysis, bias and social structure. *Studies in History and Philosophy of Science Part A*, 1-5. doi:10.1016/j.shpsa.2019.02.001 online first

Bunge, M. (2019) Inverse Problems. *Foundations of Science*, 1-43. doi:10.1007/s10699-018-09577-1 online first

Cellucci, C. (2019) Diagrams in Mathematics. *Foundations of Science*, 1-22. doi:10.1007/s10699-019-09583-x online first

González-García, F.J., Blanco-López, Á., España-Ramos, E. et al. (2019) The Nature of Science and Citizenship: a Delphi Analysis. *Res Sci Educ*, 1-28. doi:10.1007/s11165-018-9817-5 online first

Causton, E. (2019) Bringing Inferentialism to Science Education. *Science & Education*, 1-19. doi:10.1007/s11191-019-00027-3 online first

Fasce, A. & Picó, A. (2019) Science as a Vaccine: The Relation between Scientific Literacy and Unwarranted Beliefs. *Science & Education*, 1-17. doi:10.1007/s11191-018-00022-0 online first

Gasparatou, R. (2018) Understanding the sciences: a quasi-Wittgensteinian note on NOS. *Cult Stud of Sci Educ*, 1-10. doi:10.1007/s11422-018-9892-y

Lederman, J. et al. (2019) An international collaborative investigation of beginning seventh grade students' understandings of scientific inquiry: Establishing a baseline. *Journal of Research in Science Teaching*, 1-30. doi:10.1002/tea.2151 online first

Minenna, D.F.G., André, F., Elskens, Y. et al. (2019) The traveling-wave tube in the history of telecommunication, *The European Physical Journal H*, 1-36. doi:10.1140/epjh/e2018-90023-1 online first

Salvia, S. (2019) Embattled Cooperation(s): Peaceful Atoms, Pacifist Physicists, and Partisans of Peace in the Early Cold War (1947–1957). *Physics in Perspective*, 1-20. doi:10.1007/s00016-019-00236-x online first

Scerri, E.R. (2019) Five ideas in chemical education that must die. *Foundations of Chemistry*, 1-9. doi:10.1007/s10698-018-09327-y online first

Summers, R. & Abd-El-Khalick, F. (2019) Examining the Representations of NOS in Educational Resources: An Analysis of Lesson Plans Aligned with the Next Generation Science Standards. *Science & Education*, 1-21. doi:10.1007/s11191-

018-0018-4 online first

Vaesena, K., & Katzav, J. (2019) The National Science Foundation and philosophy of science's withdrawal from social concerns. *Studies in History and Philosophy of Science Part A*, 1-10. doi:10.1016/j.shpsa.2019.01.001 online first

Wallach, E. (2018) Historiographic narratives and empirical evidence: a case study. *Synthese*, 1-21. doi:10.1007/s11229-018-02065-w online first

Recent HPS&ST Related Books

Becker, Adam, (2018) *What is Real?: The Unfinished Quest for the Meaning of Quantum Physics*. New York: Basic Books. ISBN 978-0-465-09605-3

> "Every physicist agrees quantum mechanics is among humanity's finest scientific achievements. But ask what it means, and the result will be a brawl. For a century, most physicists have followed Niels Bohr's Copenhagen interpretation and dismissed questions about the reality underlying quantum physics as meaningless. A mishmash of solipsism and poor reasoning, Copenhagen endured, as Bohr's students vigorously protected his legacy, and the physics community favored practical experiments over philosophical arguments. As a result, questioning the status quo long meant professional ruin. And yet, from the 1920s to today, physicists like John Bell, David Bohm, and Hugh Everett persisted in seeking the true meaning of quantum mechanics. What Is Real? is the gripping story of this battle of ideas and the courageous scientists who dared to stand up for truth." (From the Publisher)

More information available here.

Cahan, David (2018) *Helmholtz: A Life in Science*. Chicago: University of Chicago

Press, ISBN 978-0-226-48114-2

> "Hermann von Helmholtz was a towering figure of nineteenth-century scientific and intellectual life. Best known for his achievements in physiology and physics, he also contributed to other disciplines such as ophthalmology, psychology, mathematics, chemical thermodynamics, and meteorology. With *Helmholtz: A Life in Science*, David Cahan has written a definitive biography, one that brings to light the dynamic relationship between Helmholtz's private life, his professional pursuits, and the larger world in which he lived.
>
> "Utilizing all of Helmholtz's scientific and philosophical writings, as well as previously unknown letters, this book reveals the forces that drove his life–a passion to unite the sciences, vigilant attention to the sources and methods of knowledge, and a deep appreciation of the ways in which the arts and sciences could benefit each other. By placing the overall structure and development of his scientific work and philosophy within the greater context of nineteenth-century Germany, Helmholtz also serves as cultural biography of the construction of the scientific community: its laboratories, institutes, journals, disciplinary organizations, and national and international meetings. Helmholtz's life is a shining example of what can happen when the sciences and the humanities become interwoven in the life of one highly motivated, energetic, and gifted person." (From the Publisher)

More information available here.

Dardashti, Radin, Dawid, Richard, & Thébault, Karim (Eds.) (2019) *Why Trust a Theory? Epistemology of Fundamental Physics*. Cambridge, UK: Cambridge University Press. ISBN: 9781108470957

> "Do we need to reconsider scientific methodology in light of modern physics? Has the traditional scientific method become outdated,

> does it need to be defended against dangerous incursions, or has it always been different from what the canonical view suggests? To what extent should we accept non-empirical strategies for scientific theory assessment? Many core aspects of contemporary fundamental physics are far from empirically well-confirmed. There is controversy on the epistemic status of the corresponding theories, in particular cosmic inflation, the multiverse, and string theory. This collection of essays is based on the high profile workshop 'Why Trust a Theory?' and provides interdisciplinary perspectives on empirical testing in fundamental physics from leading physicists, philosophers and historians of science. Integrating different contemporary and historical positions, it will be of interest to philosophers of science and physicists, as well as anyone interested in the foundations of contemporary science. (From the Publisher)

More information available here.

Dean, Cornelia (2019) *Making Sense of Science: Separating Substance from Spin*. Cambridge, MA: Harvard University Press. ISBN 9780674237803

> "'I'm not a scientist' is a familiar refrain among people asked to evaluate scientific claims they feel are beyond their ken. Most citizens learn about science from media coverage, and even the most conscientious reporters sometimes struggle to offer a clear, unbiased explanation to readers. Politicians, activists, business spokespersons, and religious leaders with their own agendas to pursue also influence the way science is reported and discussed. Meanwhile, anyone seeking factual information on climate change, vaccine safety, risk of terrorist attack, or other topics in the news must sift through an avalanche of bogus assertions and self-interested spin.
>
> "Making Sense of Science seeks to equip nonscientists with a set of critical tools to evaluate the scientific claims and controversies that

shape our lives. Cornelia Dean draws on thirty years of experience as a science journalist with the New York Times to expose the flawed reasoning and knowledge gaps that handicap readers with little background in science. Shortcomings in K–12 education are partly to blame, but so too is the public's indifference to the way science is done and communicated. Dean shows how venues such as courtrooms and talk shows become fonts of scientific misinformation. She also calls attention to the conflicts of interest that color scientific research, as well as the price society pays when science journalism declines and government funding for research dries up.

"Timely and provocative, *Making Sense of Science* warns us all that we can no longer afford to make a virtue of our collective scientific ignorance." (From the Publishers)

More information available here.

Delbourgo, James (2019) *Collecting the World: Hans Sloane and the Origins of the British Museum*. Cambridge, MA: Harvard University Press. ISBN 9780674237483

"In 1759 the British Museum opened its doors to the general public–the first free national museum in the world. James Delbourgo's biography of Hans Sloane recounts the story behind its creation, told through the life of a figure with an insatiable ambition to pit universal knowledge against superstition and the means to realize his dream.

"Born in northern Ireland in 1660, Sloane amassed a fortune as a London society physician, becoming a member of the Whig establishment and president of the Royal Society and Royal College of Physicians. His wealth and contacts enabled him to assemble an encyclopedic collection of specimens and objects–the most famous cabinet of curiosities of its time. For Sloane, however, collecting a world of objects meant collecting a world of people, including slaves. His marriage to the heir

> of sugar plantations in Jamaica gave Sloane access to the experiences of planters and the folkways of their human property. With few curbs on his passion for collecting, he established a network of agents to supply artifacts from China, India, North America, the Caribbean, and beyond. Wampum beads, rare manuscripts, a shoe made from human skin–nothing was off limits to Sloane's imagination. "This splendidly illustrated volume offers a new perspective on the entanglements of global scientific discovery with imperialism in the eighteenth century. The first biography of Sloane based on the full range of his writings and collections, Collecting the World tells the rich and complex story of one of the Enlightenment's most controversial luminaries." (From the Publishers)

More information available here.

Farber, Paul Lawrence (2019) *Finding Order in Nature: The Naturalist Tradition from Linnaeus to E. O. Wilson*. Baltimore, MD: John Hopkins University Press. ISBN: 9780801863905

> "In this exciting and innovative book, Paul Farber provides a sweeping synthesis of the development of natural history over the previous two and a half centuries. Anyone hoping to come to terms with the meaning and place of natural history in the modern world will definitely want to start with this book." – Mark V. Barrow, Jr., Virginia Tech
>
> "Broadly charts the intellectual, epistemological, aesthetic, and cultural work of the naturalist tradition–from the great eighteenth-century systematic nomenclators Linnaeus and Buffon, through the nineteenth-century evolutionary theorists Darwin and Wallace, to contemporary American entomologist Edward O. Wilson. It reflects a generalist sensibility and is valuable precisely because its scope is broad and its story compelling." – Michael P. Branch – Isle

More information available here.

Gibson, Susannah (2019) *The Spirit of Inquiry: How One Extraordinary Society Shaped Modern Science*. Oxford: Oxford University Press. ISBN: 9780198833376.

> "Despite its modest size the Cambridge Philosophical Society has played a monumental role in the history of science. To mark the bicentenary of its founding in 1819, Susannah Gibson gives a vivid account of the illustrious (and sometimes eccentric) members of the society, their breakthrough discoveries, and the forging of modern science." (From the Publisher)

More information available here.

Gupta, Anil (2019) *Conscious Experience: A Logical Inquiry*. Cambridge, MA: Harvard University Press. ISBN: 9780674987784

> "The role of experience in cognition is a central and ancient philosophical concern. How, theorists ask, can our private experiences guide us to knowledge of a mind-independent reality? Exploring topics in logic, philosophy of mind, and epistemology, Conscious Experience proposes a new answer to this age-old question, explaining how conscious experience contributes to the rationality and content of empirical beliefs.
>
> "According to Anil Gupta, this contribution cannot be determined independently of an agent's conceptual scheme and prior beliefs, but that doesn't mean it is entirely mind-dependent. While the rational contribution of an experience is not propositional–it does not, for example, provide direct knowledge of the world–it does authorize certain transitions from prior views to new views. In short, the rational contribution of an experience yields a rule for revising views. Gupta shows

> that this account provides theoretical freedom: it allows the observer to radically reconceive the world in light of empirical findings. Simultaneously, it grants empirical reason significant power to constrain, forcing particular conceptions of self and world on the rational inquirer. These seemingly contrary virtues are reconciled through novel treatments of presentation, appearances, and ostensive definitions.
>
> "Collectively, Gupta's arguments support an original theory: reformed empiricism. He abandons the idea that experience is a source of knowledge and justification. He also abandons the idea that concepts are derived from experience. But reformed empiricism preserves empiricism's central insight: experience is the supreme epistemic authority. In the resolution of factual disagreements, experience trumps all." (From the Publishers)

More information available here.

Jenkins, Edgar (2019) *Science for All: The struggle to establish school science in England*. London: UCL IOE Press. ISBN: 9781782772644

> "A superb, informative and rigorous book on the history of the science curriculum in England by an outstanding scholar. Professor Edgar Jenkins has produced an enormously helpful companion for anyone who wants to understand the dynamics of curriculum reform, including policymakers, curriculum developers, teacher educators, and educational researchers as well as teachers." – Professor Sibel Erduran, University of Oxford
>
> "A wonderfully comprehensive and informative account of the century of political, economic and educational arguments and struggles to provide science education for all students in England. Historians and educators will equally value this work, which has lessons for an international audience." – Michael Matthews, Honorary Associate Professor, School of Education, University of New South Wales, Australia

"In this most readable book, Edgar Jenkins takes us through the debates and struggles that have formed school science in England, with an eye for related developments and debates in other countries. The underlying questions are equally important now: What is science education for? Which sciences, for what purpose, for whom, and by which means? This well-documented historical and cultural account is a must for everyone who wants to understand how school science has been shaped through the past, and who wants to have an informed opinion on the future of science in schools." – Svein Sjøberg, Professor in Science Education, University of Oslo, Norway

"History is a complex, messy subject, so often over-simplified to a few specific events and key individuals. Focusing on the history of science education in Britain over the last 200 years, Edgar Jenkins has avoided the 'easy way' and instead shown the richness, complexity, and multi-stranded nature of the story. The quality, depth, and breadth of the research into primary documentation is exceptional. Equally laudable is the author's ability to construct a narrative from the "thickets and undergrowth" of the overwhelming quantity of source material. Through this narrative the reader encounters the long-forgotten pioneers of science education John Stevens Henslow and Richard Dawes. Jenkins discusses the impact of Henry Armstrong and his heuristic method, which has been periodically reborn as the discovery method. Multitudinous government reports have been succinctly discussed in the context of their times, especially as part of the recurring "process versus content" debates. In Jenkins's concluding 'Reflections', he points out not just what has been achieved but, more importantly, what is urgently yet to be accomplished. No one can truly understand science education in Britain until they have read this book." – Marelene and Geoff Rayner-Canham, Memorial University Grenfell Campus, Newfoundland

"Never has the need for such a comprehensive, thoroughly researched and critical account of how science education has developed in Eng-

land been greater than it is now." – Phil Ramsden, Chair of the Association for Science Education, 1993-94

More information available here.

Kragh, Helge & Longair, Malcolm (Eds.) (2019) *The Oxford Handbook of the History of Modern Cosmology*. Oxford, UK: Oxford University Press. ISBN: 9780198817666

"Scientific and popular literature on modern cosmology is very extensive; however, scholarly works on the historical development of cosmology are few and scattered. *The Oxford Handbook of the History of Modern Cosmology* offers a comprehensive and authoritative account of the history of cosmology from the late nineteenth century to the early twenty-first century.

"It provides historical background to what we know about the universe today, including not only the successes but also the many false starts. Big Bang theory features prominently, but so does the defunct steady state theory. The book starts with a chapter on the pre-Einstein period (1860-1910) and ends with chapters on modern developments such as inflation, dark energy and multiverse hypotheses. The chapters are organized chronologically, with some focusing on theory and others more on observations and technological advances. A few of the chapters discuss more general ideas, relating to larger contexts such as politics, economy, philosophy and world views." (From the Publisher)

More information available here.

Krige, John (Ed.) (2019) *How Knowledge Moves: Writing the Transnational History of Science and Technology*. Chicago, IL: Chicago University Press. ISBN: 9780226606040

"This lively and innovative collection explores the diverse conditions that shape how–and whether–scientific knowledge travels across borders. It encompasses the full range of activities and circumstances, from the basic materiality of the everyday to the strictures of institutions, bureaucratic systems, and state structures, that define the transnational peregrinations of knowledge, 'knowledgeable bodies,' technologies, and scientific practices. *How Knowledge Moves* is an indispensable addition to the literature on science and transnationalism in the twentieth century." – Jessica Wang, University of British Columbia

"In this volume John Krige has approached transnational science from the darker side of globalization. He asks: what if the earth isn't flat, its surface not smooth, or travel not effortless? It is a very productive approach. Krige and his contributors write engagingly, often from a personal life experience of border crossings and shifts of nationalities about the friction of enduring territoriality, the intentional hegemonies of America as hub, of English as the lingua franca, and the monopolies of national curricula. He has seen the 'counter norms' that rule the world of scholarship in the regulatory state just as much as the Mertonian norms of openness and egalitarianism. Circulation of knowledge may still be the ideal; this book show that, in reality, circulation always comes at a cost." – Sverker Sörlin, KTH Royal Institute of Technology, Stockholm

More information available here.

Martynoga, Ben (2018) *Molecular Tinkering: The Edinburgh Scientists who Changed the Face of Modern Biology*. Kibworth: Matador. ISBN 978-1-78901-427-3

"During the 1960s Edinburgh became a hotbed for a forward-thinking group of biologists. This is the story of these innovators who saw that life's big mysteries were best tackled by studying its molecular

foundations. It introduces the eccentric thinkers, ingenious tinkerers and tenacious experimenters who broke down the cultural barriers between traditional scientific disciplines. They produced a series of transformative ideas and tools that wholly reoriented biology.

"Edinburgh scientists invented genetic engineering. They laid the foundations for DNA fingerprinting and the human genome project. They also cloned Dolly the sheep, purified the first gene and kick-started the now-influential fields of epigenetics and systems biology. Yet Edinburgh's leading role in most of these world-changing stories have not been told before. Ben Martynoga intertwines science, biography and anecdote to describe the roots and lasting significance of key biological concepts. He describes the crucial micro-details, the blind alleys, botched experiments, and chance encounters to give a rare insight into the way science really progresses.

"Now, in the 21st century, biology is increasingly a 'big science' endeavour. A deeper understanding of biology could deliver not only new drugs and diagnostics, but also improved ways to feed, clothe and fuel us. But the world still awaits the long-promised fruits of biology's molecular revolution. The successes of Edinburgh's unsung molecular pioneers remind us why it is crucial to carve out space for small-scale, curiosity-led research." (From the Publisher)

More information available here.

McLeish, Tom (2019) *The Poetry and Music of Science: Comparing Creativity in Science and Art*. Oxford, UK: Oxford University Press. ISBN: 9780198797999

"Where do creative ideas come from? There is an answer, and it is the same in art as in science. There is a hidden wellspring inside the human mind from which they arise continuously. Tom McLeish provides meticulous evidence by interrogating the greatest minds. The result is

a brilliant kaleidoscopic view of the history of imagination." – Uta Frith FBA FRS, UCL Institute of Cognitive Neuroscience

"Anyone who believes that imagination, inspiration and creativity are the preserve of the arts should read this beautifully crafted ode to the enterprise of scientific discovery." – Jim Al-Khalili OBE FRS, Professor of Theoretical Physics, University of Surrey

"Within the short compass of this subtle and elegant exposition, McLeish tackles one of the most disabling narratives of our time. Creativity is neither a luxury nor a disqualification in a world whose survival requires all our imaginative resources, and it infuses the arts and sciences in uncannily similar ways. The author has also created a rare and beautiful thing: few could embrace such a range of artistic and scientific endeavour with such an uplift." – Marilyn Strathern DBE, Professor of Social Anthropology, Cambridge University

More information available here.

Mindell, David A. (2019) *Between Human and Machine: Feedback, Control, and Computing before Cybernetics*. Baltimore, MD: John Hopkins University Press. ISBN: 9780801880575

"A rare historian who insightfully understands both the creators of technology and the technology they create, David Mindell engagingly tells a story of technological change in an organizational context. In Between Human and Machine, he provides a revealing account of a search for controls in a twentieth-century world of complex systems." – Thomas P. Hughes, author of Rescuing Prometheus and American Genesis: A Century of Invention and Technological Enthusiasm, 1870-1970

"David Mindell's Between Human and Machine successfully takes on the daunting task of exploring the machines behind the cybernetic

decades of mid-century. It is a book of range and depth, moving from the sophisticated new weapons systems of World War II to the technologies, including the computer, that so marked the postwar era. By digging deep into the machines themselves, into the problems of feedback and stability–but also into management and political context– Mindell brings us a real sense of this transformative moment in the history of technical culture. The implications of this alteration in the concept of a machine will be with us for a long time to come, and this book is a first-rate place to understand its origins." – Peter L. Galison, Harvard University

More information available here.

Prebble, John N. (2019) *Searching for a Mechanism: A History of Cell Bioenergetics*. Oxford, UK: Oxford University Press. ISBN: 9780190866143

"*Searching for a Mechanism* traces the history of cell bioenergetics from the early notions of science in the Enlightenment through to the end of the twentieth century. Author John N. Prebble's treatment of this history falls into five periods, from the 1600's to the present day. The "bioenergetics revolution" has long been overlooked because it occurred simultaneously as the other major biological revolution of the twentieth century: the development of molecular biology. This book aims to provide the first thorough history of bioenergetics. The story of cell bioenergetics is primarily concerned with the synthesis of ATP (adenosine triphosphate), sometimes referred to as the energy currency of the cell. In fact the term 'bioenergetics' was probably not introduced into the field until Albert Szent-Gyorgyi published a small book under that title in 1957.

"Despite the twentieth century focus of the subject matter, the history of this field commences with the work of those in the seventeenth century who sought to understand the process of breathing and passes

> through metabolic biochemistry concluding with the elucidation of the molecular mechanisms of key enzymes in bioenergetics. Although the story of metabolic biochemistry (which is often taken to include bioenergetics) essentially belongs to the twentieth century, progress in this area cannot be understood without recourse to previous centuries. Thus from the seventeenth century onwards it is possible to trace a path of early thinking which eventually laid the ground work for the dramatic success of twentieth century studies." (From the Publisher)

More information available here.

Rowbottom, Darrell P. (2019) *The Instrument of Science: Scientific Anti-Realism Revitalised*. London, UK: Routledge. ISBN: 9780367077457

> "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.

Authors of HPS&ST-related papers and books are invited to bring them to attention of the Note's assistant editors, Paulo Maurício at paulo.asterix@gmail.com or Nathan Oseroff at nathanoseroff@gmail.com for inclusion in these sections.

Coming HPS&ST Related Conferences

February 25-27, 2019, Third International Conference of the German Society for Philosophy of Science (GWP.2019), Cologne, Germany.
More information available here.

March 29-30, 2019, The Philosophy of Ian Hacking. Institute of Philosophy, Research Centre for the Humanities, Hungarian Academy of Sciences
Inquiries to Dr. Akos Sivado, akos.sivado@gmail.com

March 31 – April 3, 2019, NARST Annual Conference, Baltimore, USA
Details at: https://www.narst.org/

April 1-4, 2019, Evolution Evolving: Process, Mechanism and Theory, Churchill College, University of Cambridge, UK
Details at: https://evolutionevolving.org/

April 11-13, 2019, Formal Methods and Science in Philosophy III, Dubrovnik, Croatia
Details at: https://www.iuc.hr/conference-details.php?id=326

April 24-26, 2019, British Society for the History of Philosophy Annual Conference, King's College London. Strand Campus, London, UK.
Details available here.

May 13-16, 2019, Second Hermann Minkowski Meeting on the Foundations of Spacetime Physics, Albena, Burgaria
Details available here

May 27-29, 2019, Eddington Conference, Paris, France.
Details at: https://www.eddingtonstudies.org/

May 29-31, 2019, Plastics Heritage: History, Limits and Possibilities. Museu da Famácia (Pharmacy Museum) in Lisbon, Portugal
Details available here

July 7-12, 2019, International Society for the History, Philosophy and Social Studies of Biology meeting (ISHPSSB), Oslo, Norway.
Abstracts deadline: 18 January 2019
Details available here

July 10-13, 2019, British Society for the History of Science meeting, Edinburgh, UK.
Details at: http://www.bshs.org.uk

July 15-19, 2019, International History, Philosophy and Science Teaching Group, Biennial Conference, Thessaloniki, Greece.
Details from conference chair, Fanny Seroglou, fannyseroglou@gmail.com

July 25-27, 2019, Learning From Empirical Approaches to HPS 2019 (LEAHPS 2019), Leibniz University, Hannover, Germany
Details at: https://leaphs2019.wordpress.com/

July 22-26, 2019, The 46th Annual Hume Society Conference, University of Nevada, Reno, NV, USA.
Details available here.

July 26-28, 2019, 4th International Periodic Table Conference: 'Mendeleev 150', ITMO University, St Petersburg, Russia
Details available here.

August 5-10, 2019, 16th Congress of Logic, Methodology and Philosophy of Science and Technology (CLMPST), Prague, Czech Republic.
For updates and details see here.

September 2-4, 2019. European Conference for Cognitive Science (EuroCogSci 2019), Ruhr-Universität Bochum, Germany.
More information: EuroCogSci2019@rub.de.