HPS&ST Newsletter
April 2024
Vol.37 (3)
ISSN: 2652-2837

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Introduction

The HPS&ST Newsletter is sent monthly to about 11,000 emails of 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/or interests in the promotion of innovative, engaging and effective teaching of the history and philosophy of science. The newsletter 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 40+ years.

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

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.

Contributions (publications, conferences, Opinion Piece, etc.) are welcome and should be sent direct to the editor: Michael R. Matthews, UNSW, **m.matthews@unsw.edu.au** .

AAAS *Science* Editorial*:* 'Teach Philosophy of Science'

H. Holden Thorp,

Science 11 April 2024, vol.384, no. 6692, p.141

https://www.science.org/doi/10.1126/science.adp7153

DOI:10.1126/science.adp7154

Much is being made about the erosion of public trust in science. Surveys show a modest decline in the United States from a very high level of trust, but that is seen for other institutions as well. What is apparent from the surveys is that a better explanation of the nature of science—that it is revised as new data surface—would have a strong positive effect on public trust. Because scientists are so aware of this feature, it is often taken for granted that the public understands this too. A step toward addressing this problem would be revising

undergraduate and graduate curricula to teach not just theories and techniques but the underlying philosophy of science as well.

As Pew studies have shown, trust in scientists and medical scientists in the US is higher than for all other institutions surveyed except the military. There was a modest decline over the past 4 years, but a similar decrease was seen for other professions. In absolute terms, trust in scientists is at 73%, whereas trust in most other institutions is far lower, with business leaders at 35% and elected officials at 24%.

Despite this relatively high level of trust, Lupia *et al*. found ways that it could be enhanced. Most prominently, the study showed that 92% of respondents felt it important that scientists show they are "open to changing their minds based on new evidence," which is of course what they must do.

Many scientists would be surprised to find that this idea needs to be reinforced. Science is, after all, a work in progress that changes as new findings cause revision and refinement of held interpretations. The history of science is a powerful narrative of this culture of self-correction, and it is the essence of science to attempt to make discoveries that change the way scientists think. But whenever science becomes important in the public eye, as with climate change and the pandemic, the continuous revision can become a target for those who wish to undermine scientific knowledge.

French sociologist Pierre Bourdieu coined the term "scholastic fallacy" to describe the tendency of academics to assume that everyone thinks about problems in the way that scientists do. As Bourdieu points out, most people do not have the time and effort to spend thinking about these issues in the same way as those for whom this is a full-time job. Academics often fail to recognize this and are mystified when the public doesn't understand that interpretations are continually revised in light of new data, as has happened across history.

Such revisions are the most reliable way for a scientist to get published in high-profile journals and gain scientific recognition, such as when footprints are found that change our idea about when humans were present in the US or when a diabetes drug is found to have many other uses.

The scientific community has generally done a poor job of explaining to the public that science is what is known so far. There are many reasons that make this difficult. The way scientific findings are reported in the media, particularly outlets that do not specialize in science journalism, is often highly simplified without the caveats that would give a more realistic picture while making the stories seem less compelling to some readers.

Another obstacle is that, because of the scholastic fallacy, scientists tend to take for granted that their findings could be updated and forget to explain this to the public. And when scientists talk to each other, they tend to be passionate about their ideas and disagreements. When those conversations are processed by the public, they can easily be misinterpreted.

Resetting the public's understanding of how science works will be a big job, but a good place to start is with students who get science degrees. Unfortunately, most programs are full of didactic classes about scientific principles, with few if any requirements on the history and philosophy of science. Because many undergraduate science majors pursue careers outside of science, including medicine, a shift in curricula would ultimately produce a public that is more literate in the way that science works.

This means making hard decisions about how to fit a broader, deeper perspective into curricula that are already jammed tight with the necessary basics. However, it's urgent for scientists to make compromises in the way they teach for the greater good.

 # 17th International History, Philosophy and Science Teaching Conference
2-6 September 2024 - Buenos Aires, Argentina

Conference e-mail: ihpst2024@gmail.com

Conference Theme: **Trusting school science again**

Conference Chair: Agustín Adúriz-Bravo, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires

Invited Speakers

2024 Springer Lecturer: **Cyrus Mody,** Maastricht University, The Netherlands
HERE

2024 Latin-American Lecturer: **Olimpia Lombardi,** CONICET, Argentina
HERE

Important Dates

Submission of proposals: Until 20th May 2024

Early registration: Until 30th June 2024

Ordinary registration: From 1st July 2024 until the first day of the Conference

Registration fee:
IHPST members: early (till June 30) USD165; after July 1, USD200
Non-members: USD260 & USD320
Argentina participants: USD20 discount on above.

Details of online registration and payment will be given soon.

European Society for History of Science Conference, Barcelona, 4-7 September 2024

The 11th ESHS conference will take place in Barcelona (Spain), from 4 to 7 September 2024. The theme will be **Science, Technology, Humanity, and the Earth**. Science is the primary means by which mankind understands, represents and intervenes in the world. Humanity is facing challenges that can threaten its future and the future of the planet where it lives. As historians of science, we are committed to understand how epidemics, wars and climate change are connected. We invite the community of European historians of science to look at the object of their historical research with a view to the great challenges that humanity has been facing both nowadays and throughout its history. The aim is to distance the conference from a specific methodological approach, and to establish a dialogue between different historiographies, perspectives and topics.

The main venue of the conference will be the Campus Ciutadella of the Pompeu Fabra University (UPF).

More details can be found **HERE** .

27th International Congress of History of Science and Technology, Dunedin, June 2025

The 27th International Congress of History of Science and Technology will be held from **29 June - 5 July 2025** at the University of Otago in Dunedin, New Zealand.

Symposium Proposals due by 1 May 2024.
Standalone Papers due by 1 December 2024.

The International Congress of History of Science and Technology (ICHST), held every four years, is the world's premier meeting for history of science and technology. The 27th Congress will be held as a hybrid in-person and online event at the University of Otago's Dunedin campus in June-July 2025. Delegates registered for virtual participation will be able to both present and attend online. The Congress will bring together a diverse group of the world's leading scholars and students in the fields of history of science, technology, and medicine as well as related disciplines. It will be the first time the Congress has been held in Australasia and only the second time in the Southern Hemisphere.

The **theme** of the 27th ICHST is "Peoples, Places, Exchanges, and Circulation."

Details **HERE**

2024 Du Châtelet Prize in Philosophy of Physics

Submissions are invited for the 2024 Emilie Du Châtelet Prize in Philosophy of Physics

Submissions are invited on the writings of women in the nineteenth century that discuss or otherwise engage with the concepts, foundations, or methods of any area of physics, or with the nature and scope of physics itself. The topic should be construed broadly to include: any genre in which the women were writing; "physics" as understood then and/or now; both the experimental and the theoretical; and physics in relation to other areas of inquiry. Submissions may address the work of a single figure or multiple figures.

The winner will receive $1000, an invitation to participate in a workshop on the topic of this year's prize, and an invitation to have their paper considered for publication in *Studies in History and Philosophy of Science*. The prize is open to graduate students and to scholars within 5 years of PhD as of the submission deadline. Submissions should not exceed 10,000 words.

Deadline for submissions is September 8th, 2024. For more details of the prize and of submission requirements, see below.

The Du Châtelet Prize in Philosophy of Physics is supported by Duke University and *Studies in History and Philosophy of Science*.

Committee

The members of this year's prize committee are:
Katherine Brading, Professor of Philosophy, Duke University
Joshua Eisenthal, Research Assistant Professor of Philosophy, California Institutue of Technology, and 2020 Du Châtelet Prize winner
Samuel C. Fletcher, Associate Professor of Philosophy, University of Minnesota, Twin Cities; from Sept. 1, Professor of Philosophy of Physics, University of Oxford
Lydia Patton, Professor of Philosophy, Virginia Tech
Jennifer Whyte, Postdoctoral Associate in Philosophy, Duke University

Workshop

A workshop honoring this year's prize winner, and including talks by members of the committee, will be held at Duke University on November 9-10, 2024. If you would like to join the mailing list to receive registration information for this workshop, please email Katherine Brading at katherine.brading@duke.edu.

Submission requirements

- Submissions must be in English.
- Submissions must be prepared for blind review.

- Submissions must be no longer than 10,000 words in length, including footnotes and references.
- Submitted work must be unpublished and must not be under consideration for publication.

The Du Châtelet Prize in Philosophy of Physics celebrates excellence in philosophy of physics and promotes breadth across the field both historically and philosophically. Each year, a prize committee of scholars in the field invites submissions on a particular topic. The prize winner receives feedback and support from the committee, and the paper is considered for publication in *Studies*. The goals of the prize are to support young scholars working in philosophy of physics, to strengthen the historical and philosophical breadth of the field, and to promote some of the very best work being done by students and junior scholars.

The submission portal will open in August. For details of the submission process, and for any other questions, please contact Katherine Brading (katherine.brading@duke.edu)

[Editor: For sections of two texts of Du Châtelet, and an Introduction to her life and contributions to physics and philosophy, see M.R. Matthews (ed.) *The Scientific Background to Modern Philosophy*, Chap. X.]

Opinion Page: *Touching Reality: Philosophical Lessons from Contemporary Cosmology*

David Merritt, formerly Rochester Institute of Technology

David Merritt received his PhD in Astrophysical Sciences from Princeton University in 1982 and was a professor at the Rochester Institute of Technology until 2017. His more than 400 publications include the monograph Dynamics and Evolution of Galactic Nuclei (Princeton), the award-winning A Philosophical Approach to MOND (Cambridge), and together with Zuzana Parusnikova the edited volume Karl Popper's Science and Philosophy (Springer). He is currently retired and living in Rochester, New York with his wife.

Scientific realism

The universe is vast, and the longer we observe it, the more we learn about its composition and structure. Additions to knowledge of this sort are what the popular science writers usually have in mind when they talk about 'scientific discoveries.'

But historians of science tell us that periods of steady growth in science tend to last only so long: they are interrupted by revolutions during which the old assumptions are thrown out and a radically new set are brought in. The initial decades of the twentieth century witnessed a number of such episodes. Classical mechanics and electromagnetism were replaced by quantum electrodynamics, Newton's theory of gravity and motion was replaced by Einstein's. The changes in these theories were so radical that even basic concepts like mass and time acquired fundamentally new meanings.

But it has been rather a long time since a major shift of this sort took place, and it is natural to wonder whether scientific revolutions are a thing of the past. Some philosophers seem to think so. For instance, John Worrall wrote in 2007 that "it is reasonable to believe that the successful theories in mature science–-the unified theories that explain the phenomena without ad hoc assumptions . . . are, if you like, approximately true."

Worrall's view, which is one aspect of what is now called '(critical) scientific realism', is widely held among the current generation of philosophers. Scientific realists do not just postulate a mind-independent reality. They believe in addition that the central claims of our best scientific theories are probably, or approximately, true, even when it comes to claims about entities that are not directly observable—what philosophers call 'theoretical entities.' In the words of Stathis Psillos, scientific realism entails that "the entities posited by [mature theories], or, at any rate, entities very similar to those posited, do inhabit the world".

The current, standard theory of cosmology—the so-called **Λ**CDM model—postulates the existence of just such an entity: dark matter. (CDM stands for 'cold dark matter.') Dark matter is not a *minor* component of the standard model; in fact, *most* of the matter in the universe is said to be dark. And while the detailed properties of the dark matter are not specified, cosmologists almost universally assume that it is composed of some kind of elementary particle. Considerable effort (and money) have been expended over the last four decades in attempts to detect the dark particles, so far without success. Absolutely none of this dark matter, which supposedly constitutes most of what exists, has ever been observed.

Two cosmological paradigms

But there is an alternate cosmological theory, called MOND, that does not postulate the existence of dark matter. Observations that are explained under **Λ**CDM using dark matter are explained under MOND by postulating a modification to Newton's (or Einstein's) theory of gravity. (MOND stands for 'MOdified Newtonian Dynamics'.) It has become clear over the last few years that MOND is at least as successful as **Λ**CDM at explaining our observations of the universe, including those data that are believed by standard-model cosmologists to require the existence of dark matter.

Indeed a compelling case can be made that MOND is the *preferred* theory, in the sense that MOND has a stellar record of successfully *predicting* new facts in advance of their observational discovery (as documented here). The **Λ**CDM theory has rarely, if ever, managed to do that; its 'successes' are almost all successes of post-hoc accommodation, not prior prediction.

One might suppose that philosophers of science would be fascinated by this state of affairs, since it has all the earmarks of an incipient paradigm shift. But to the puzzlement of many scientists, the philosophers have mostly declined to engage with the issue. I think that a partial explanation can be found in their ideological commitment to 'scientific realism':

1. The existence of *empirical equivalents* to existing theories—that is, theories that differ in important ways from accepted theories but that make the same, or nearly the same, predictions about observable phenomena—is difficult to reconcile with a belief in scientific realism. Realist philosophers tend to assume that such equivalents (in this case, MOND) must be contrived or artificial, if they exist at all.

2. Scientific realists acknowledge that the descriptions of the unobserved entities that appear in scientific theories tend to change over time. To maintain their commitment to realism, they are motivated to search for *referential continuity*: to argue that the 'same' entities are present in a theory, even if the detailed descriptions of those entities, or the detailed manner in which the entities are related to observable phenomena, should change over time. But this is clearly not going to be the case if the standard model is replaced by MOND, since the latter contains no component that could plausibly be related to the dark matter of **Λ**CDM.

3. If current theories are assumed to accurately describe the physical universe, it follows that the methods scientists use to arrive at those theories must be reliable. This leads realist philosophers to favor a gradual, typically *inductivist*, model for scientific progress—as opposed to progress via bold new conjectures, like the conjectures that led to quantum mechanics or relativity (or MOND).

Gradual change or bold leaps?

Number three is, I think, the most interesting. So let me elaborate:

The model of scientific methodology that dominated in the early twentieth century was called 'logical positivism', and it was based on the old idea that scientists proceed inductively: i.e. that they make (hopefully valid) generalizations from finite data. But it soon became obvious that scientists like Einstein, Bohr and Schrödinger had *not* proceeded inductively; rather, they made bold conjectures that went far beyond the data that were available at the time.

Starting around 1930, the philosopher Karl Popper argued convincingly that inductive inference simply does not exist, and so could not possibly serve as the basis for a scientific method. He proposed an alternative methodology, which he called 'conjectures and refutations': one makes proposals and accepts them only if they stand up to rigorous testing–-that is: if they make novel predictions that turn out to be correct.

Popper argued (contrary to the claims of the inductivists) that it did not matter in the slightest how a scientific hypothesis was arrived at. All that mattered was how well it stood up to critical appraisal. And he argued that *bold* hypotheses–-which go far beyond any available data-–were preferable to ad hoc ones that did little more than address a known anomaly.

The attitude of the modern scientific realist is, apparently, "That was then, this is now." Since they maintain that fundamental changes to our 'mature' theories are no longer to be expected, scientific realists have little use for a methodology that encourages bold theorizing. They are motivated instead to favor methodologies that never take theories very far beyond their current (presumed nearly correct) forms.

To find a satisfactory methodology, realist philosophers have had to reach back in time—to the mid 19th century at least, before the time of Karl Popper. And their currently favored stand-in for Popper is the American philosopher Charles Sanders Peirce (1839 – 1914).

Peirce operated in a world that had not yet experienced the early twentieth century revolutions due to Einstein and Bohr that so strongly influenced philosophers like Popper and Kuhn. Peirce argued that one could claim correctness of a hypothesis simply on the basis that it explains whatever data it was designed to explain. Peirce called this methodology 'abductive inference.'

Even admirers of Peirce have acknowledged Popper's point that *multiple* hypotheses will always be consistent with any finite set of data, and hence that there is a need to select between them. But rather than follow Popper's advice (bold conjectures followed by critical testing), they have chosen to modify Peirce's abduction into what is usually called *inference to the best explanation*, or IBE. Roughly speaking, IBE tells the scientist to accept the 'best' explanation among the many possible ones. And (this is the key point) 'best' is usually defined as the explanation that requires *as little change as possible to accepted theories*.

It is easy to see how a methodology like abduction or IBE fits hand-in-glove with scientific realism, which posits that major changes to accepted theories are no longer to be expected. And indeed, promoters of abductive inference, like philosopher Ilkka Niiniluoto, have explicitly stated that dark matter is a better explanation than MOND simply because "the theory [of gravity] is kept constant". Inference has seemingly been reduced, here, to the uncritical acceptance of whatever the majority of scientists believe; Niiniluoto gives no weight to MOND's enormously greater success at anticipating the data – at making successful, new predictions.

All of this smacks of putting the cart before the horse, epistemologically speaking. Fortunately, it is quite possible to be a realist—in the sense of accepting the existence of a mind-independent, objective reality—without signing on to the additional ism's that are currently lumped together under the rubric of 'scientific realism'. Popper, a lifelong realist, argued that the existence of a falsifiable, i.e. testable, theory implies the existence of a reality with which it can clash: "Our falsifications thus indicate the points where we have touched reality". Perhaps 'touching reality' ought to be the most we expect from our theories.

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, and downloadable, in the OPINION folder at the HPS&ST web site **HERE**.

Varia

- Vale, Frans De Vall (1948-2024) **HERE**
- Royal Society Publishing *Philosophical Transactions B* : *Human socio-cultural evolution in light of evolutionary transitions* articles can be freely accessed: www.bit.ly/PTB1872
- HPS&ST books, downloadable files **HERE**
- *Science & Education* Open Access articles (138) **HERE**
- History of *Nature* magazine **HERE**

Recent HPS&ST Research Articles

Archila, P.A., Ortiz, B.T. & Truscott de Mejía, AM. (2024). Beyond the Passive Absorption of Information: Engaging Students in the Critical Reading of Scientific Articles. *Sci & Educ*, 1-35. https://doi.org/10.1007/s11191-024-00507-1

Barbosa, S.H. (2024). Diversification or sensory unification? Controversies around the senses in fin de siècle culture. *HPLS*, 1-17. https://doi.org/10.1007/s40656-024-00615-9

Boucher, S.C., Forbes, C. (2024). The pragmatic turn in the scientific realism debate. *Synthese*, 1-23. https://doi.org/10.1007/s11229-024-04528-9

Brock, R., Tsourakis, N. & Kampourakis, K. (2024). Using Text Mining to Identify Teleological Explanations in Physics and Biology Textbooks: An Exploratory Study. *Sci & Educ*, 1-22. https://doi.org/10.1007/s11191-024-00513-3

Canac, S., Crepin-Obert, P. & Roux-Goupille, C. (2024). Cross-Referenced Perspectives on Three Science Teachers' Practices Incorporating the History of Science in their Classrooms. *Sci & Educ*, 1-34. https://doi.org/10.1007/s11191-024-00501-7

Carpentieri, M.A., Domenici, V. (2024). Introducing UV–visible spectroscopy at high school level following the historical evolution of spectroscopic instruments: a proposal for chemistry teachers. *Found Chem*, 1-25. https://doi.org/10.1007/s10698-024-09501-5

Cheung, K.K.C., Long, Y., Liu, Q. *et al.* (2024). Unpacking Epistemic Insights of Artificial Intelligence (AI) in Science Education: A Systematic Review. *Sci & Educ*, 1-31. https://doi.org/10.1007/s11191-024-00511-5

Clucas, P., Sjöström, J. (2024). Traces of *Bildung* in Upper Secondary Science Education: A Critical Investigation of Chemistry Teachers' Orientation Towards Promoting Bildung in Chemistry Education. *Sci & Educ*, 1-26. https://doi.org/10.1007/s11191-024-00510-6

Dais, P. (2024). Josiah Willard Gibbs and Pierre Maurice Duhem: two diverging personalities, and scientific styles. *Annals of Science*. https://doi.org/10.1080/00033790.2024.2332884

Henne, C., Tomczyk, H. & Sperber, C. (2024). Physicists' views on scientific realism. *Euro Jnl Phil Sci*, 1-27.. https://doi.org/10.1007/s13194-024-00570-z

Herman, B.C., Poor, S., Clough, M.P., Rao, A., Kidd, A., De Jesús, D.,& Varghese, D. (2024). It's not just a science thing: Educating future STEM professionals through mis/disinformation responsive instruction. *Journal of Research in Science Teaching*, 1-50. https://doi.org/10.1002/tea.21934

Kragh, H. (2024). A New Literary Style of Science: The Rise of Acronyms in Physics and Astronomy. *Phys. Perspect.* 1-24. https://doi.org/10.1007/s00016-024-00306-9

Kragh, H. (2024). Chemical Terms in History: Polysemy and Meaning Transfers. *Substantia*, 1-25. https://doi.org/10.36253/Substantia-2444

Kupczynski, M. (2024). My Discussions of Quantum Foundations with John Stewart Bell. *Found Sci*, 1-20. https://doi.org/10.1007/s10699-024-09946-z

Montuschi, E. & Bedessem; B. (2024). Understanding What in Public Understanding of Science. *Perspectives on Science*; 32(2),

207–229. https://doi.org/10.1162/posc_a_00603

Pereira, B.B., Ha, S.(2024). Reconceptualized Family Resemblance Approach to the Nature of Science in Middle-School Science Textbooks from Brazil and South Korea Regarding Environmental Issues. *Sci & Educ*, 1-29. https://doi.org/10.1007/s11191-024-00514-2

Rigotti, L., Bertozzi, E. (2024). Identifying and Understanding Historical Scientific Instruments: The Case of the Physics Cabinet of the University of Bologna. *Phys. Perspect.*, 1-28. https://doi.org/10.1007/s00016-024-00308-7

Schindler, S. (2024). Normal science: not uncritical or dogmatic. *Synthese*, 1-22. https://doi.org/10.1007/s11229-024-04527-w

Recent HPS&ST Related Books

Baggott, J., & Heilbron, J. L. (2024). *Quantum Drama: From the Bohr-Einstein Debate to the Riddle of Entanglement*. Oxford, UK: Oxford University Press. ISBN: 9780192846105

"In 1927, Niels Bohr and Albert Einstein began a debate about the interpretation and meaning of the new quantum theory. This would become one of the most famous debates in the history of science. At stake were an understanding of the purpose, and defense of the integrity, of science. What (if any) limits should we place on our expectations for what science can tell us about physical reality?

"Our protagonists slowly disappeared from the vanguard of physics, as its centre of gravity shifted from a war-ravaged Continental Europe to a bold, pragmatic, post-war America. What Einstein and Bohr had considered to be matters of the utmost importance were now set aside. Their debate was regarded either as settled in Bohr's favour or as superfluous to real physics.

"But the debate was not resolved. The problems of interpretation and meaning persisted, at least in the minds of a few stubborn physicists, such as David Bohm and John Bell, who refused to stop asking awkward questions. The Bohr-Einstein debate was rejoined, now with a new set of protagonists, on a small scale at first. Through their efforts, the debate was revealed to be about physics after all. Their questions did indeed have answers that could be found in a laboratory. As quantum entanglement became a real physical phenomenon, whole new disciplines were established, such as quantum computing, teleportation, and cryptography. The efforts of the experimentalists were rewarded with shares in the 2022 Nobel prize in physics.

"As *Quantum Drama* reveals, science owes a large debt to those who kept the discussions going against the apathy and indifference of most physicists before definitive experimental inquiries became possible. Although experiment moved the Bohr-Einstein debate to a new level and drew many into foundational research, it has by no means removed or resolved the fundamental question. There will be no Nobel prize for an answer. That will not shut off discussion. Our *Drama* will continue beyond our telling of it and is unlikely to reach its final scene before science ceases or the world ends." (From the Publisher)

More information HERE

Baker, D. P., & Powell, J. J. W (2024). *Global Mega-Science: Universities, Research Collaborations, and Knowledge Production*. Redwood City, California: Stanford University Press. ISBN: 9781503637894

"Never has the world been as rich in scientific knowledge as it is today. But what are its main sources? In accessible and engaging fashion, *Global Mega-Science* examines the origins of this unprecedented growth of knowledge production over the past hundred and twenty years. David P. Baker and Justin J.W. Powell integrate sociological and historical approaches with unique scientometric data to argue that at the heart of this phenomenon is the unparalleled cultural success of universities and their connection to science: the university-science model. Considering why science is so deeply linked to (higher) educational development, the authors analyze the accumulation of capacity to produce research—and demonstrate how the university facilitates the emerging knowledge society.

"The age of global mega-science was built on the symbiotic relationship between higher education and science, especially the worldwide research collaborations among networked university-based scientists. These relationships are key for scholars and citizens to understand the past, future, and sustainability of science." (From the Publisher)

More information HERE

Bates, David W. (2024). *An Artificial History of Natural Intelligence: Thinking with Machines from Descartes to the Digital Age*. Chicago, IL: The University of Chicago Press. ISBN: 9780226832104

"We imagine that we are both in control of and controlled by our bodies—autonomous and yet automatic. This entanglement, according to David W. Bates, emerged in the seventeenth century when humans first built and compared themselves with machines. Reading varied thinkers from Descartes to Kant to Turing, Bates reveals how time and time again technological developments offered new ways to imagine how the body's automaticity worked alongside the mind's autonomy. Tracing these evolving lines of thought, *An Artificial History of Natural Intelligence* offers a new theorization of the human as a being that is dependent on technology and produces itself as an artificial automaton without a natural, outside origin." (From the Publoisher)

More information HERE

Bud, R. (2024). *Applied Science: Knowledge, Modernity, and Britain's Public Realm*. Cambridge: Cambridge University Press. ISBN: 9781009365260

"For almost two centuries, the category of 'applied science' was widely taken to be both real and important. Then, its use faded. How could an entire category of science appear and disappear? By taking a *longue durée* approach to British attitudes across the nineteenth and twentieth centuries, Robert Bud explores the scientific and cultural trends that led to such a dramatic rise and fall. He traces the prospects and consequences that gave the term meaning, from its origins to its heyday as an elixir to cure many of the economic, cultural, and political ills of the UK, eventually overtaken by its competitor, 'technology'.

"Bud examines how 'applied science' was shaped by educational and research institutions, sociotechnical imaginaries, and political ideologies and explores the extent to which non-scientific lay opinion, mediated by politicians and newspapers, could become a driver in the classification of science." (From the Publishers)

More information HERE

Case, S. & Verburgt, L. M. (Eds.) (2024). *The Cambridge Companion to John Herschel*. Cambridge, UK: Cambridge University Press. ISBN: 9781009237727

"It has been said that being scientific in Victorian England meant to be as much like John Herschel as possible. This volume shows readers what it meant to be John Herschel (1792-1871), one of England's most prominent polymaths. Drawing on his published oeuvre and recent scholarship, as well as an immense amount of surviving archival material and correspondence, these essays present the first ever comprehensive account of Herschel's life, work, and legacy. From mathematics and astronomy, to philosophy and politics, the volume sheds new light on his crucial role in the history of Victorian science and explores a wide array of issues in the history of nineteenth-century culture, philosophy, mathematics, and beyond." (From the Publisher)

More information HERE

Cole, Jonathan R. (2024). *Smoother Pebbles: Essays in the Sociology of Science*. Columbia, NY: Columbia University Press. ISBN: 9780231212601

"Until the middle of the twentieth century, few thought of science as a social system, instead seeing scientific discovery as the work of individual geniuses. Columbia University's Department of Sociology played a pivotal role in advancing the social study of science. Researchers of the "Columbia Program"

analyzed how science works as a social institution, exploring its norms, values, and structure.

"*Smoother Pebbles* presents a collection of essays authored or coauthored by Jonathan R. Cole, a leading Columbia Program figure, that trace the development and institutionalization of the sociology of science. Spanning from the 1960s to the 2020s and including both empirical and theoretical studies of science, the book is at once wide-ranging and united by core questions. Are scientists rewarded for the merits of their work or for other reasons? How does the system of social stratification in science operate? Has the funding of scientists been the result of an "old boys' network"? How fair is the peer review process? In what ways does science fall short of its universalistic ideals? What factors have constrained opportunities for women in science? How has science fared amid attacks on academic freedom and free inquiry at universities? Cole's introduction contextualizes both individual essays and the major concerns of the Columbia Program. *Smoother Pebbles* is essential reading for those interested in the growth and crucial questions of the sociology and social studies of science" (From the Publisher)

More information HERE

De Rham, Claudia (2024). *The Beauty of Falling: A Life in Pursuit of Gravity*. Princeton, New Jersey: The Princeton University Press. ISBN: 9780691237480

"Claudia de Rham has been playing with gravity her entire life. As a diver, experimenting with her body's buoyancy in the Indian Ocean. As a pilot, soaring over Canadian waterfalls on dark mornings before beginning her daily scientific research. As an astronaut candidate, dreaming of the experience of flying free from Earth's pull. And as a physicist, discovering new sides to gravity's irresistible personality by exploring the limits of Einstein's general theory of relativity. In *The Beauty of Falling*, de Rham shares captivating stories about her quest to gain intimacy with gravity, to understand both its feeling and fundamental nature. Her life's pursuit led her from a twist of fate that snatched away her dream of becoming an astronaut to an exhilarating breakthrough at the very frontiers of gravitational physics.

"While many of us presume to know gravity quite well, the brightest scientists in history have yet to fully answer the simple question: what exactly is gravity? De Rham reveals how great minds—from Newton and Einstein to Stephen Hawking, Andrea Ghez, and Roger Penrose—led her to the edge of knowledge about this fundamental force. She found hints of a hidden side to gravity at the particle level where Einstein's theory breaks down, leading her to develop a new theory of "massive gravity." De Rham shares how her life's path turned from a precipitous fall to an exquisite flight toward the discovery of something entirely new about our surprising, gravity-driven universe." (From the Pulisher)

More information HERE

Höhl, Anna E. (2024). *Scientific Understanding: What It Is and How It Is Achieved*. Columbia, NY: Columbia University Press. ISBN: 9783837672626

"Understanding is an ability manifested by grasping relations of a phenomenon and articulating new explanations. Hence, scientific understanding is inextricably intertwined with and not possible without explanation, and understanding is not a type of propositional knowledge. Anna Elisabeth Höhl provides a novel philosophical account of scientific understanding by developing and defending necessary and sufficient conditions for the understanding that scientists achieve of the phenomena they are researching. This account of scientific understanding is based on and supported by a detailed investigation of an episode from scientific practice in biology." (From the Publisher)

More information HERE

Potochnik, A., Colombo, M., Wright, C. (2024). *Recipes for Science: An Introduction to Scientific Methods and Reasoning* (2nd Edition). Milton Park, Abingdon: Routledge. ISBN 9781032290966

"Scientific literacy is an essential aspect of any undergraduate education. *Recipes for Science* responds to this need by providing an accessible introduction to the nature of science and scientific methods appropriate for any beginning college student. The book is adaptable to a wide variety of different courses, such as introductions to scientific reasoning, methods courses in scientific disciplines, science education, and philosophy of science.

"Special features of *Recipes for Science* include contemporary and historical case studies from many fields of physical, life, and social sciences; visual aids to clarify and illustrate ideas; text boxes to explore related topics; plenty of exercises to support student recall and application of concepts; suggestions for further readings at the end of each chapter; a glossary with helpful definitions of key terms; and a companion website with course syllabi, internet resources, PowerPoint presentations, lecture notes, additional exercises, and original short videos on key topics." (From the Publisher)

More information HERE

Stranges, Anthony N. (2024). *Petroleum from Coal: A Century of Synthesis*. Leiden, Netherlands: Brill. ISBN: 978-90-04-69091-2

"Petroleum from Coal shows why and how Friedrich Bergius and Franz Fischer and Hans Tropsch in 1913-26 invented and developed synthetic fuel processes; explains why and how Matthias Pier at BASF- IG Farben and Otto Roelen at Ruhrchemie successfully industrialized the syntheses during the Nazi-World War II years; and analyzes the pre- and post-World War II vicissitudes of the synthetic fuel industry. The research of Germany's scientists in the 1920s-40s made them world leaders in synthetic fuel studies. Information on the synthetic fuel processes has come from the Allied teams who went to Germany and Japan during World War II's closing months and from British, American, and Canadian synthetic fuel investigations." (From the Publisher)

More information HERE

Authors of HPS&ST-related papers and books are invited to bring them to attention of the Newsletter's assistant editor Paulo Maurício (**paulo.asterix@gmail.com**) for inclusion in these sections.

PhD Award in HPS&ST

We welcome publishing details of all PhDs awarded in the field of HPS&ST. Send details (name, title, abstract, supervisor, web link) to editor: m.matthews@unsw.edu.au

Coming HPS&ST Related Conferences

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May 16-18, 2024, Society for Philosophy of Science in Practice (SPSP) Tenth Biennial Conference, University of South Carolina, Columbia, SC USA
Details **HERE**

May 29-31, 2024, Italian Society for the History of Science, conference, Bari
Details **HERE**

June 13-15, 2024, XXXI Baltic Conference on the History and Philosophy of Science, Tartu
Details: **HERE**

June 26-28, 2024, Singapore National Institute of Education, STEM conference
Details **HERE**

July 1-5, History and Pedagogy of Mathematics Conference, University of New South Wales, Sydney.
Details: Jim Pettigrew, UNSW

July 4-14, 2024, International Congress on Mathematical Education, Sydney
Details HERE

July 8-10, 2024, Science in Public, annual conference, University of Birmingham.
Details: HERE

August 1-8, 2024, 25th World Congress of Philosophy, Rome
Details **HERE**

August 28-30, 2024, European Network for Philosophy of the Social Sciences (ENPOSS), 13th Conference, University of Bergen, Norway
Details: **HERE**

September 2-6, 2024, International History, Philosophy and Science Teaching Group
Details: ihpst2024@gmail.com

September 16-20, 2024, Eighth International Conference on the History of Mathematics Education (ICHME-8), Warsaw
Details: Organiser Karolina Karpinska

September 17-19, 2024, Forum on Philosophy, Engineering and Technology, Karlsruhe Institute of Technology
Details: **HERE**

October 28-30, 2024, Conference on Philosophy of Technology, Maastricht University, the Netherlands
Details: either darryl.cressman@maastrichtuniversity.nl or massimiliano.simons@maastrichtuniversity.nl

March 6-10, 2025, US Philosophy of Education Society, PES, annual conference, Baltimore.
Details: **HERE**

September 4-7, 2024, 11th European Society for History of Science conference, Barcelona
Details **HERE**

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
FHPP APS - Forum on History and Philosophy of Physics of the American Physical Society
HAD AAS - Historical Astronomy Division of the American Astronomical Society.
ACS HIST – American Chemical Society Division of the History of Chemistry
GWMT - Gesellschaft für Geschichte der Wissenschaften, der Medizin und der Technik
ISHEASTME – International Society for the History of East Asian History of Science Technology and Medicine
EASE - East-Asian Association for Science Education
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
BAHPS - Baltic Association for the History and Philosophy of Science
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 at: **HERE**

HPS&ST related organizations wishing their web page to be added to the list should contact assistant editor Paulo Maurício: paulo.asterix@gmail.com

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