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Introduction

The HPS&ST Newsletter is sent monthly to about 12,000 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** .

IHPST 18th Biennial Conference, Lisbon, Portugal, July 6-10, 2026.

Scientific Literacy: Contributions from the History and Philosophy of Science

Scientific literacy refers to the ability to understand, apply, and evaluate scientific information and concepts in everyday life. It also includes the skills to think critically, communicate effectively about scientific issues, make well-informed decisions and being prepared to act on science, technology, society, and environment issues (Sjöström, 2024).

About three decades ago, the journal *Science & Education* was created to encourage research into the role of history and philosophy and sociology of science in promoting science and mathematics education (Matthews 1992).

Hundreds of articles, books and a Handbook have developed our views on these issues. Building on this research program, the question arises as to what knowledge about the past of science can be useful or even necessary for scientific literacy.

If so how can it be integrated into science and engineering courses or communicated to the public? What is the history of science or technology that can serve as a model for informed decision-making? Which arguments from this history are particularly suited for promoting critical thinking?

To explore these and other questions, we invite contributions from historians, philosophers, sociologists, and science educators.

The deadline for submitting proposals is **March 1st, 2026.**

Conference Chair: Cláudia Faria; Conference Co-Chair: Ricardo L. Coelho
Conference website: HERE

IHPST Biennial Conferences function as a forum of academics, researchers, PhD students and teachers coming from a variety of disciplines: history of science, philosophy of science, sociology of science and science education.

IHPST conferences follow a tradition of almost 40 years in the Americas, Europe and Asia (http://ihpst.net). We are now seeking proposals to host the 2028 IHPST Biennial Conference in the Americas or in regions outside Europe—such as the Global South—where new perspectives and emerging voices can enrich the dialogue. Hosting this event is an exceptional opportunity to create an inspiring environment for exchange among leading scientists and scholars.

We welcome proposals for hosting the next IHPST Biennial Conference from academics and research groups from universities and academic institutions.

Proposals should be submitted to Prof.

Zuraya Monroy-Nasr (IHPST President) at the following email address: zuraya03@gmail.com

Deadline for proposals: March 9th, 2026.

Remembering Bill Brock: Chemistry and Culture

10 April 2026, Maison Française d'Oxford, 2-10 Norham Road, Oxford, OX2 6SE

This meeting of the Society for the History of Alchemy and Chemistry (SHAC) is being held to commemorate the life, work and legacy of William Hodgson Brock (1936-2025), who spent his entire career at the University of Leicester. Sometime chair of SHAC and editor of its journal *Ambix*, Brock was one of the leading historians of chemistry in his time, writing the Fontana/Norton *History of Chemistry*, as well as biographies of William Crookes, Justus von Liebig and Henry Edward Armstrong.

The twelve papers to be presented at this meeting take their starting point from Brock's work and historical interests.

There is no charge for the meeting, but please let Frank James (frank.james@ucl.ac.uk) know if you wish to attend.

William Brock on History and Science Teaching

Brock, W.H.: 1973, *H.E. Armstrong and the Teaching of Science 1880-1930*, Cambridge, Cambridge University Press.

Brock, W.H.: 1977, 'Founding Fathers of Science Education: James Maurice Wilson (1836-1931), *New Scientist* 8th September.

Brock, W.H.: 1989, 'History of Science in British Schools: Past, Present and Future'. In M. Shortland & A. Warwick (eds.), *Teaching the History of Science*, Oxford, Basil Blackwell, pps.30-41.

Brock, W.H.: 1996, *Science for All: Studies in the History of Victorian Science and Education*, Variorum Press, Aldershot, UK.

Brock, W.H. & Jenkins, E.W.: 2014, 'Frederick W. Westaway and Science Education: An Endless Quest'. In M.R. Matthews (ed.) *International Handbook of Research in History, Philosophy and Science Teaching*, Springer, Dordrecht, pp.2359-2382. Available **HERE**

An extended, informative, and poignant obituary of Brock can be found **HERE**.

Francis Bacon 1626–2026: Four Centuries of Thought, New Horizons for Research. University of Technology Nuremberg, 12–13 June 2026

On the occasion of the four-hundredth anniversary of the death of Francis Bacon (1561–1626), this international conference aims to reassess Bacon's philosophical, scientific, literary, and cultural legacy, as well as the complexity of his reception across early modern Europe.

The conference is organized by Dana Jalobeanu and Rodolfo Garau at the University of Technology Nuremberg (UTN), thanks to the generous support of a grant from the **Thyssen Stiftung**.

The conference brings together scholars working in Bacon studies and related fields, including early modern philosophy, the history of science, and literary studies, among them:

Peter Anstey, Claudia Dimitru, Mordechai Feingold, Daniel Garber, Vera Keller, Silvia Manzo, Alan Stewart, Claire Crignon, Richard Serjeantson, Oana Matei, Angus Vine, Grigore Vida, and Cesare Pastorino.

In addition to these invited contributions, we invite **submissions for up to four additional papers**, to be selected through this Call for Papers.

We welcome proposals related (but not limited) to themes such as Francis Bacon beyond the philosophical/literary divide; the relationship between method, metaphysics, and natural history in Bacon's thought; Bacon's engagement with early modern experimental philosophy; his connections with medicine, law, politics, and rhetoric; the European reception of Bacon in the seventeenth and eighteenth centuries; Bacon and empiricism, including comparative perspectives;

and Bacon's influence on later philosophy, science, and literature.

Applicants are asked to submit, **by February 20**, 2026:

- An abstract of no more than 500 words
- A short biographical note

Submissions should be sent using the following form: **HERE**

For further information, please contact the organizers at rodolfo.garau@utn.de or daniela.jalobeanu@utn.de

 # Karl Popper in China, Hong Kong University of Science & Technology, 29-31 May 2026

Karl Popper (1902-1994) is widely considered as one of the most influential philosophers of science and one of the most prolific thinkers in the 20th century. His work heavily influenced the development of philosophy of science in China, especially in the late 1970s and early 1980s. Many renown Chinese philosophers of science were first attracted to the field because of their reading of Popper.

In 1987, there was a conference on Popper's philosophy at Wuhan University, sponsored by George Soros, Popper's former student. It featured talks by leading Popper scholars and philosophers of science (e.g. Ian Hacking and Alan Musgrave) and leading Chinese philosophers (e.g. Fan Dainian and Jiang Tianji) at the time. The proceedings of the conference were published as an edited volume by Routledge in 1992 (Newton-Smith, W.H. & Jiang Tianji eds.).

Recently there was a revival of interest in the work of Karl Popper in China. This conference aims to examine the influence of Popper's work on the development of philosophy of science in China and assess and explore his legacy on contemporary philosophy of science in China.

Keynote Speakers
Adam Chmielewski (University of Wroclaw);
Zhilin Zhang (Fudan University)

Funder
The Karl Popper Charitable Trust

Please submit a 500-word abstract for blind review to Oxford Abstract<https://app.oxfordabstracts.com/stages/80087/submitter>s by **5 March 2026.**

Selected papers will be published in an edited volume.

Website: **HERE**

If you have any questions, please contact Qiyue Zhang (qiyue.zhang@connect.ust.hk<mailto:qiyue.zhang@connect.ust.hk>).

 # 29th Conference of the International Society for the Philosophy of Chemistry, UCLA 29-31 July 2026

The 29th annual conference of the International Society for the Philosophy of Chemistry (ISPC 2026) will be held from **29-31 July 2026**, at the University of California Los Angeles (UCLA) under the auspices of the UCLA Department of Chemistry & Biochemistry and the International Society for the Philosophy of Chemistry (ISPC). https://philosophyofchemistry.com/

We invite proposals addressing a diverse range of contemporary questions in the epistemology and metaphysics of chemistry, in addition to historical and educational aspects of chemistry.

Keynote speakers:
Prof. Pieter Thyssen, Liège University, Belgium,
Prof. Guillermo Restrepo, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany,

Deadline for abstract submission: 31st March 2026
Notification of acceptance: 20th April 2025
Further details regarding the venue, program, and registration process will be provided in due course at the website for the International Society for the Philosophy of Chemistry. https://philosophyofchemistry.com/symposia-2/

Please direct any inquiries to Dr. Eric Scerri, UCLA, scerri@g.ucla.edu

Philosophy of Biology at Madison (POBAM) August 12-14, 2026

The POBAM Workshop showcases new, innovative, interdisciplinary and collaborative work in the philosophy of biology. Submissions can be on any topic in the philosophy of biology, biologically oriented philosophy of science, or philosophically-informed biology. POBAM 2026 will be held at the University of Wisconsin-Madison, August 12-14.

Keynote speakers include Yasmin Haddad (Université du Québec à Montréal), Rose Novick (University of Washington) and Anne Pringle (UW Madison, Botany).

For 2026, you may submit a proposal for either a long talk (40 min talk, 20 min Q&A), short talk (20 min talk, 10 min Q&A), or a poster.

Abstract submissions may be up to 500 words and must be prepared for blind review. Please indicate in your submission whether you are applying for a long talk, short talk, or lightning talk + poster.

We also welcome submissions of proposals for professional development sessions. These might include any number of topics related to pedagogy, community, or our profession. Please indicate in your proposal whether you would be willing to lead a session of this type. We particularly encourage junior scholars to suggest professional development session topics, without the expectation that they will organize them.

The deadline for submissions is **Feb 23, 2026**.

Submissions via:
https://easychair.org/conferences/?conf=pobam2026
Details at:
https://sites.google.com/view/pobam2026
Email the organizers: pobam2026@gmail.com

Workshop: New Directions in Law-Based Explanations in the Sciences, 14–15 September 2026, Centre for Philosophy of Natural and Social Science, London School of Economics

When we look at current research across the natural and social sciences dealing with explanations of phenomena in their respective fields, the word 'explanation' is often modified with an adjective: causal, non-causal, mechanistic, nomological/law-based, topological, mathematical, and narrative are some of the non-mutually-exclusive modifiers that one may encounter. It is generally accepted that fields such as physics rely more on laws for their explanatory practices than disciplines such as cell biology, which are, for the most part, concerned with mechanistic explanations, for example. In the philosophy of science, particularly since the advent of the New Mechanism literature in the 1990s, barring some exceptions, there has been relatively little sustained work on the pragmatic side of law-based explanations as opposed to other explanatory modalities, and the interest that law-based explanations have garnered has mostly focused on the metaphysics of laws.

This workshop aims to bring the philosophy of law-based explanations, with particular attention to their pragmatic dimensions, back into focus. Moreover, while being historically informed, the hope is to discuss new directions within this strand of the philosophy of explanation.

Confirmed Speakers

Sepehr Ehsani (LSE): 'can modelling the content of laws aid in their explanatory use?'
Amir Feizi (Gero AI): 'laws of ageing and longevity'
Alexander Gebharter (Marche Polytechnic University): *preconditions for causal inference and non-causal laws'
José Antonio Pérez Escobar (Universidad Nacional de Educación a Distancia): 'mathematical explanations in the sciences: principles, laws, or rules?'
Bryan Roberts (LSE): 'do laws of symmetry explain or ground the dynamical laws?'

Deniz Sarikaya (Vrije Universiteit Brussel & Universität zu Lübeck): ‘laws and theories in precision medicine’
Hamed Tabatabaei Ghomi (King's College London): ‘laws in medicine and psychology’
Philip H Thonemann (LSE): ‘pedagogical aspects of laws in physics explanations’
Jidong Wang (Fudan University & LSE): ‘laws in linguistics’

Submissions

Please send abstracts (maximum 500 words) to the organizer, Sepehr Ehsani (S.Ehsani@lse.ac.uk), by *31 March 2026*. Talks will be for 20 minutes followed by a 10-minute Q&A. Please indicate if your preference is for a poster rather than a talk. Funding to partially offset travel expenses may be available; details TBC.

Details: HERE

Reflections on 50 Years of the Strong Programme in the Sociology of Scientific Knowledge

2026 marks the 50th anniversary of the Strong Programme in the sociology of scientific knowledge (SP), assuming its start in 1976 with *Knowledge and Social Imagery* by David Bloor. It became a prominent trend-setter in 20th-century Science Studies. Although it originated in a specific socio-political and epistemological context, its ideas have remained relevant ever since: they continue to frame discussions and define the conceptual language of social and historical studies of science, as well as of epistemology and the philosophy of science and technology in general.

In this issue, we aim to present contemporary interpretations and critiques of the SP, evaluations of its relevance for epistemology and the philosophy of science and technology, and its influence on historical and sociological approaches to science.

Among the authors of the issue are Finn Collin, Steve Fuller, William Lynch, Andrew Pickering, Stephen Turner.

We invite abstracts for further submissions focusing on questions that include, but are not limited to:

- Historical roots of SP: How to overcome Mannheim and Merton?
- The interdisciplinary context of SP: psychology, anthropology and linguistics
- Sociological parallels to the Popper-Kuhn controversy
- Anti-Latour
- The new sociological object: technology
- Symmetry principle and the epistemology of non-scientific knowledge
- Is causality principle incommensurable with objectivity?
- Rational reconstruction and social construction of knowledge
- Sociological challenges of realism-relativism debates
- SP and the variety of explanations: sociological, historical, psychological, methodological
- The quest for a naturalistic SSK
- The Strong Programme in the era of “digital epistemology”: do model- and algorithm-produced knowledges imply a new kind of sociality, a new kind of authorship, and a new test for symmetry?
- New empirical fields as testbeds for the Strong Programme: risk modelling, biomedicine, AI models, digital humanities, and cybersecurity.
- The Strong Programme and the digital transformation of science: how do algorithms and platform infrastructures become “causes” of scientific belief and scientific acceptance?
- Symmetry and responsibility: can we preserve methodological impartiality without abandoning ethical commitments?
- Fifty years later: is the Strong Programme obsolete—or are we only beginning to understand its stakes?
- The Strong Programme and the crisis of expertise: does it help explain misinformation, or can it inadvertently contribute to it?
- Social causes in distributed knowledge: is the Strong Program's model still adequate for analysing digital scientific infrastructures?

- Symmetry under epistemic inequality: how should the Strong Programme address asymmetries of power, resources, and access that structure contemporary knowledge production?
- From communities to infrastructures: can SSK shift from explaining belief by "social groups" to explaining belief by standards, protocols, metrics, and audit regimes—without losing explanatory traction?
- Objectivity without "God's-eye view": what forms of scientific realism (structural, perspectival, entity) are most compatible with Strong Programme insights about practice and social causation?

Important Dates and Submission Details

The submission deadline for abstracts (250 words): March 15, 2026 (please, send your abstracts to journal@iphras.ru and to itkasavin@gmail.com with "Special Issue" in the title).
Notification of acceptance: March 30, 2026.
The submission deadline for manuscripts: August 1, 2026.
Abstracts and submissions are welcome in English or Russian. The length of the manuscript should not exceed 8000 words. General guidelines are available on the website (https://journal.iphras.ru/forcontributors).
All manuscripts will undergo peer review.

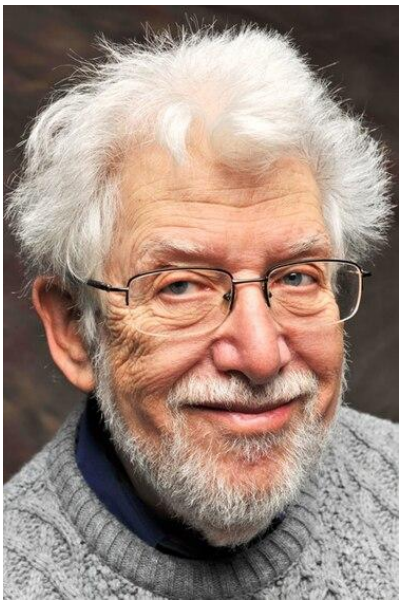
For further details, please contact the Editor:
Prof. Dr. Ilya Kasavin, Russian Academy of Sciences Institute of Philosophy, itkasavin@gmail.com

Opinion Page.

In Praise of Fallibility: Why Science Needs Philosophy

PAUL BRATERMAN, Glasgow University

Paul Braterman is an Honorary Senior Research Fellow at Glasgow University, and former Regents Professor at the University of North Texas. His research has involved chemistry related to conditions on the early Earth and to the origins of life, and collaborations with Scripps Institution of Oceanography, Sandia National Laboratories, and NASA's Astrobiology Institute.



His earlier book, *From Stars to Stalagmites*, discusses aspects of chemistry in their historical and everyday contexts, and he is now working on a book exploring the links between creationism, climate change denial, conspiracy theories, and right-wing politics.

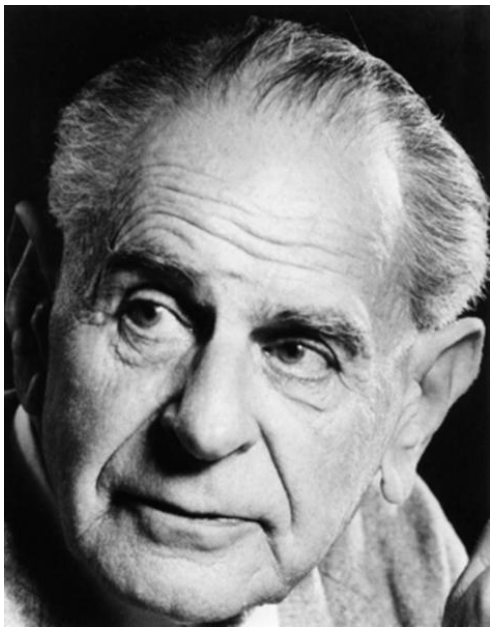
More recent strata lie on top of older strata, except when they lie beneath them. Radiometric dates obtained by different methods always agree, except when they differ. And the planets in their courses obey Newton's laws of gravity and motion, except when they depart from them.

As Isaac Asimov reportedly said, "The most exciting phrase to hear in science, the one that heralds new discoveries, is not 'Eureka!' [I have found it], but 'That's funny ...' " And there is nothing that distinguishes so clearly between the scientific and the dogmatic mindset as the response to anomalies. For the dogmatist, the anomaly is a "gotcha", proof that the theory under consideration is, quite simply, wrong. For the scientist, it is an opportunity. If an idea is generally useful, but occasionally breaks down, something unusual is going on and it's worth finding out what. The dogmatist wants to see questions closed, where the scientist wants to keep them open. This is perhaps why the creationist

denial of science can often be found among those professions that seek decision and closure, such as law and theology.

The rights and wrongs of falsification

Dogmatists regularly invoke the name of Karl Popper, and the work he did in the 1930s. Popper placed heavy emphasis on falsifiability, denouncing as unscientific any doctrine that could not be falsified. Freud's theories, for example, were unscientific, because a patient's disagreement with its findings could be explained away as the result of repression. Marxism, likewise, he regarded as unscientific because when events failed to unfold as Marx had predicted, his followers could always say that the right historical conditions had not yet arisen. The theory that biological diversity is a product of Intelligent Design is also unscientific by this criterion, since its advocates can and do say[1] that any apparent failure of design may merely reflect our lack of insight into the motivations of the designer.



Karl Popper

But what about theories that almost all of us would agree to regard as scientific, such as the theory of planetary motion, or atomic theory, or the theories of geology, or of the origin of species by evolution? Here, current thinking can be and at various times has been falsified by observation. But what, precisely, was falsified?

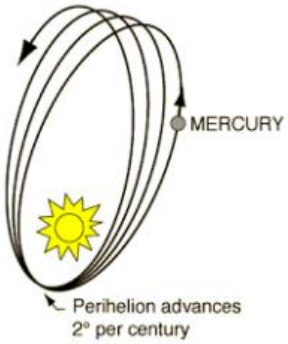
No theory exists on its own, as the philosopher-scientist Duhem pointed out over a century ago,[2] and when a theory fails an observational test there are two kinds of possible explanation. The fault may lie with the theory itself, or with the assumptions we make while testing it. More specifically, as Lakatos pointed out in 1970,[3] every application of a theory involves *ancillary hypotheses*, which can range from the grandiose (the laws of nature are unchanging) to the trivial (the telescope was functioning correctly). When a theoretical prediction fails, we do not know if the fault is in one of these, rather than the core theory itself. Much of the time, we are not even aware of our ancillary hypotheses, which is one reason why we need philosophers of science.

Lakatos goes further. To simplify one of the most subtle and influential papers in the philosophy of science, *every* scientific theory gives rise to anomalies, as revealed by observation. But there is no such thing as a pure observation, because observation is nothing without interpretation, and every interpretation is theory-laden.

That last statement is not, as it might seem, a weakness of observational science, but a hidden strength. It implies that, when we use observations to test a theory, we are also as a bonus testing the implicit assumptions that we use to interpret our results. No scientific theory is rejected simply on the basis of its anomalies. It is rejected only when a superior theory is put forward, and the new theory is superior if it explains as much as the old theory, and more besides.

Thus we should not even see theories as existing in isolation, but as part of a sequence or *research programme*. You are bound to be wrong, but don't let that worry you unduly, because error is opportunity, and the way science progresses is by being less wrong about more things. I find this viewpoint liberating.

Example 1: the dynamics of the Solar System



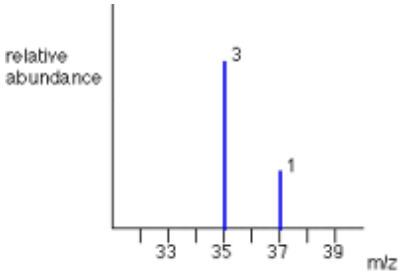
Take as our first example the motion of planets in the Solar System. According to Kepler's Laws, which follow from Newton's laws of gravity and motion, these should follow elliptical orbits, as a result of the gravitational attraction between each planet and the Sun, slightly perturbed by the attraction of the planets for each other. In the mid-19th-century, accurate observations showed that the orbits of two planets, Mercury and Uranus, were anomalous. The anomaly in the orbit of Uranus could be explained by the gravitational influence of an additional planet, whose position could be calculated, leading to the discovery of Neptune.

The anomaly in the orbit of Mercury, however, could not be resolved in this way, and remained unexplained until the formulation of Einstein's General Theory of Relativity. In the case of Uranus, the anomaly was associated with the ancillary hypothesis that we had a complete list of planets, and it was this ancillary hypothesis that was overthrown. In the case of Mercury, however, the shortcoming was in the theory itself.

It is worth remembering that the anomaly of Mercury was known for some fifty years before Einstein explained it. During that period, physicists did not reject Newton's theory of planetary motion, despite this evident failure. It did, after all, make correct predictions to within the limits of experimental testing in every other case, and so it was assumed that there was some good reason why the anomaly affected just the one planet. And so there is. The deviation from Newton's laws is associated with the curvature of space-time by the Sun's gravitational field, and the orbit of Mercury is the only case where this field is strong enough for the resulting deviation to be observable by early 20th century techniques. (But higher precision makes greater demands on theory. If you want to steer a tractor by GPS, you will need the relativistic correction to keep it out of the ditch.)

Example 2: Prout's theory of atomic weights

Consider now another example, also discussed by Lakatos. In 1816, the Scottish physician William Prout conjectured that all chemical substances were condensates of hydrogen, thereby explaining the fact that in the case of gases, their densities (and we would now say[4] molecular weights), relative to hydrogen, were whole numbers. In rebuttal, Stas pointed out that the relative density of chlorine was 35.5. So Prout was wrong. This is the story that I learnt at school, as an edifying tale of how an over-ambitious theoretician was given his comeuppance by a scrupulous experimentalist.



Not so. In this particular case, Stas had used all means at his disposal to purify the chlorine, and therefore assumed (a key theoretical assumption) that he was dealing with a pure substance. In terms of the present discussion, we would say that Stas's experiment did not disprove Proust's conjecture, but, rather, the conjunction of that conjecture with the *ancillary hypothesis* that his chlorine was a pure single substance.

It was not until much later that it became clear that the atomic weight of 35.5 arises because chlorine is in fact a 3:1 mixture of two different kinds of atom, chlorine-35 and chlorine-37. *Isotopes*, separate substances differing in weight, but with virtually indistinguishable chemical properties, and therefore occupying the same place (Greek, *isos*, same, *topos*, place) in the Periodic Table. So, the mismatch between Prout's prediction and Stas's observation results from the failure of the ancillary hypothesis, while the relative densities of the two separate isotopes, 35 and 37, are indeed whole numbers, to within the limits of measurement at that time, just as Prout's conjecture requires.

Example 3: the anomalous density of atmospheric nitrogen

Even when Prout's conjecture appeared to have been disproved, it remained a focus of interest. After all, many elements, including carbon, nitrogen, oxygen, fluorine, sodium, aluminium, an even platinum and gold, have atomic weights very close to a whole number.[5] This is, to say the least, suggestive, so much so that in 1888 Lord Rayleigh, one of the UK's most distinguished scientists, decided to redetermine the density of nitrogen as accurately as he could.

He used two separate methods to obtain nitrogen. One method was decomposition of ammonia, which is a compound of nitrogen and hydrogen. The other was from air, by removal of water vapour, oxygen, and carbon dioxide. To his surprise, the densities did not agree; "atmospheric" nitrogen was slightly but measurably denser than "chemical" nitrogen. The difference was only one part in a thousand, but there was no reason to expect any difference at all.

Vanity Fair caricature of Ramsay lecturing on the Periodic Table. He is pointing to Group VIII, the noble gas elements, that he and Rayleigh discovered and of which argon (here labelled A rather than Ar) was the first member to be identified as such. Click for larger image.

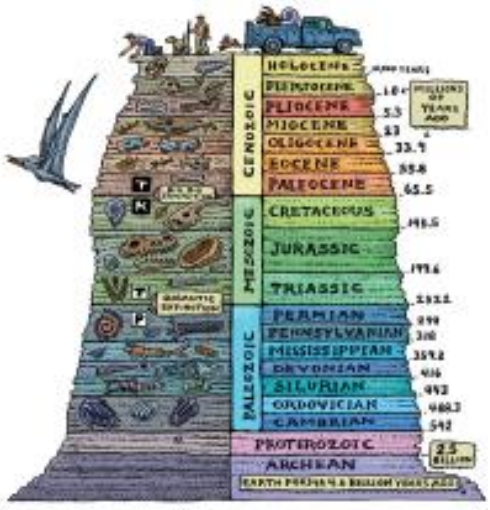
Unable to resolve this anomaly, Rayleigh appealed publicly for assistance, and got it from William Ramsay, Chemistry Professor at University College London, who happened to know of an earlier anomalous finding involving air. In 1785, Henry Cavendish had sparked together air and oxygen and found that they reacted together to give products that were soluble in water,[6] but a small fraction of the air, around 1%, failed to react.

This led Ramsay to suggest that air contained an extra, hitherto unidentified, constituent. Removal of oxygen and nitrogen[7] did indeed leave behind a relatively dense, highly unreactive, gas which Ramsay and Rayleigh christened *argon*, "the lazy one".

From the perspective of this essay, Rayleigh's initial thinking included the ancillary hypothesis that all the components of air had been identified. This was not true, and (as readers with our knowledge of chemistry will be aware) the additional component was to play a vital role in explaining chemical bonding.

Example 4: Superposition and overthrusts.

Superposition



It is more than 350 years since Steno (who eventually became a bishop) proposed that strata consisted of layers of rock laid down one on top of another, newest on top. We have known for over two hundred years that both the London and Paris basins are filled with relatively recent

sediment, on top of marine deposits (chalk or limestone) that emerge in hills to the North and South, that these in turn rest on an older basement, and that the more recent sediments were laid down in layers.

The familiar geological column, Precambrian upwards (click to enlarge), was established in something like its present form before 1860, although it was not until the 20th Century that it was recognised that the Precambrian occupied far more of the Earth's history than everything since that time.

Yet there are a number of places where sediments are out of order, and CreationWiki offers a partial list of these as a reason for doubting the overall accuracy of the geological column. (The motivation, as always with such sources, is to discredit evolution science. Specifically, if there were real uncertainty as to the order in which the rocks were laid down, then we would not be able to use the sequences in the fossil record as evidence for evolution.)

One such major disruption of the usual order occurs in the northwest of Scotland, where older rocks lie above younger along a 200 km front. The resulting confusion (the "Highlands Controversy", fuller account here) was not resolved until the 1880s, with the recognition of what is now known as the Moine Thrust.

This was the first established example of an *overthrust*, where compression has forced one layer of rock over the top of another, as in the diagram to the left. In time, no doubt, the uppermost yellow and brown layers will be eroded, leaving the orange directly above the much younger brown, to the confusion of geologists. The Moine Thrust belt provides extreme examples of this.

Thus at the location illustrated below the upper rock is Precambrian gneiss (igneous rock that has undergone extensive change when buried at depth), while the well-bedded rock beneath it is Cambrian quartzite (compressed sandstone), at least a billion years younger.

The Glencoul Thrust at Aird da Loch, Assynt in Scotland, part of the Moine Thrust belt; the irregular grey mass of rock is formed of Archaean or PaleoproterozoicLewisian gneisses thrust over well-bedded Cambrianquartzite, along the top of the younger unit.

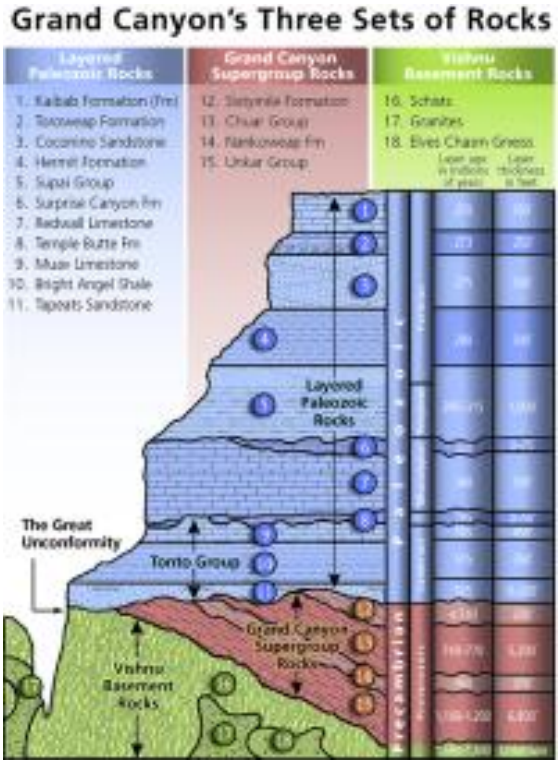
The Moine Thrust region was described, and interpreted invoking thrust faults, between 1888 and 1907. At that time, there was no known mechanism to generate the relevant forces, but this illustrates the general thesis that historical science trumps physical science. We know what happened, even if we don't know how it could have.

On current thinking, the thrust zone was generated during the process that gave rise to the mountains of Northwest Scotland, when Baltica (now part of Eurasia) drove west into Laurentia (roughly, North America and Greenland), 425 – 400 million years ago. But when the overthrusts in this region were first recognised, plate tectonics was still decades in the future.

I would also mention here another famous overthrust; the Lewis Overthrust in Montana, where Precambrian limestone rests on top of Cretaceous shales. Chief Mountain , one of North America's most photographed, is a product of this thrust. where the upper layers of eastward-moving island arcs were forced over the existing continental crust. The mountain itself what is known as a klippe; a surviving portion of the overthrust material, left isolated where neighbouring material has been eroded away.

Example 5: The Grand Canyon date discordancies

One of the clearest displays of superposition is provided by the Grand Canyon. The strata there have been described many times, for example in Prothero's *Evolution: What the Fossils Say*, in David Montgomery's *The Rocks Don't Lie*, as chief witness in *Grand Canyon, Monument to an Ancient Earth*, and at length in the beautiful Geological Society of America 2012 Special Paper collection, *Grand Canyon Geology*.



The Grand Canyon runs across the Colorado Plateau, which was lifted up as a block, without tilting, during the mountain-forming processes that gave rise to the Rockies. Thus the uppermost exposures give an unusually rich collection of more or less horizontal strata, including limestones, desert and marine sandstones, and shales, deposited in a range of environments and dating (with some gaps) from the Permian to the Cambrian (270 to 525 million years before present).

So far, everything is quite straightforward. We have unambiguous radiometric dates, a record of changing deposition of environments, and fossils in the appropriate sequence.

Throughout much of the Grand Canyon, there is what is known as the *Great Unconformity*, below which lie a complex and much distorted mixture of sedimentary and igneous rocks, known as the Vishnu Formation. The Vishnu formation rocks are 1,700 million years old or more (this date will be important later), so the gap between them and the Cambrian rocks correspond to more than twice the length of time between those Cambrian rocks, and the present.

During that interval, the Vishnu rocks were buried to depths of 25 kilometres, before being forced upwards again during the formation of the

continent of Laurentia and then weathered down to sea level before deposition of the Cambrian rocks described above. The heat and pressure of burial has done much to transform the rocks, but we can still detect cross-bedding in the sandstones, and the accumulation of coarser material at the bottom of the separate layers.

Exposed at some places in the Grand Canyon, In between the Vishnu formation and the Cambrian rocks, we have a succession of rocks known collectively as the Grand Canyon Supergroup. These lie parallel to each other, but tilted relative to the more or less horizontal rocks that lie above them. The upper formations (Chuar group and Nankoweap formation) span from 740 to around 840 Mybp (Million years before present), and were laid down on the edge of a then continental shelf, not far from the equator (as shown by magnetic measurements on the rocks), with sea level rising and falling in response to a changing climate. They are rich in microfossils, and display features such as ripple marks, cross-bedding, and filled-in cracks caused by exposed mud layers drying out.

The lower rocks, known as the Unkar group, are a total of 2 km thick, and record river and shallow sea sediments, fed by mountain-forming during the assembly of the long lost supercontinent of Rodinia, and subsequent erosion. It spans a period from around 1200 to 1100 Mybp, and lies on top of older granites and schists. It too contains microfossils, and includes such features as mud cracks and ripple marks.

In between we have a layer of igneous rock (the Cárdenas basalt), and there lies the anomaly. Early estimates gave an age, based on potassium-argon (K/Ar) dating , around 800 Mybp. But rubidium-strontium dates were around 1100 Mybp, and the theory of radiometric dating tells us that dates obtained using different clocks should agree.

The ancillary hypotheses associated with this theory were spelt out over a century ago. Essentially, they are three in number.

The first is that radioactive decay rates had not changed over time. Initially, this was an assumption, albeit a very plausible one (why, after all, should there have been a change?) But in 1928 George Gamow showed that radioactive decay was a quantum mechanical process, whose rate depended on the fundamental laws of physics and underlying values of physical constants. Had these been different in the past, so would the laws of physics and, especially, chemistry, and the composition of the rocks (if rocks had formed at all) would be completely different to what is observed.

The second ancillary hypothesis, in the early days, was that none of the decay product was initially present. But since the 1940s, we have had methods for estimating initial amounts, using a non-radioactive isotope as a kind of internal calibration.

The third ancillary hypothesis is that we are looking at a closed system. To these, as we shall see, we need to add a fourth; that we are agreed on what event the date refers to.

In the case of the Cárdenas basalt, the weakest ancillary hypothesis is that of a closed system. Argon, after all, is a gas that can readily escape, giving spuriously young apparent ages. Moreover, the argon age varied with the composition (and hence, perhaps, historical porosity) of the sample being examined. What was really needed, was a method to preferentially sample the least porous parts of the rock.

We now have such a method, argon-argon (Ar/Ar) dating combined with thermal desorption. The rock is bombarded with neutrons, which transforms a fraction (we measure what fraction, by including a reference sample) of the ^{40}K originally present to ^{39}Ar.[8] We then heat the rock, measure the ratio of ^{39}Ar to ^{40}Ar in the evolved gas, and infer from this the ^{40}K to ^{40}Ar originally in the rock, which is what we need to know. The beauty of this method is that more prolonged heating is selective, *both* for the most tightly held ^{40}Ar, *and also* for the ^{39}Ar derived from ^{40}K in *that same part of the rock*.

Applying this method to the Cárdenas basalt, we find that this ratio in the gas given off by gentle heating (i.e. from the regions where it is most loosely held) corresponds to an age of some 700 Mybp, but that incremental heating soon leads to a

consistent age of 1104 Mybp, in excellent agreement with the strontium-rubidium.

We can then ask further interesting questions. Like what led to the loss of argon. Not heating, because that would have erased tracks made by radioactive decays, so presumably some kind of chemical alteration. What kind, and does this tell us anything about the rocks (now missing) that initially covered the basalts? These remain questions for further investigation.

There is another, seemingly much more dramatic, dating anomaly in the Grand Canyon region. To the north of the canyon lie a string of recently active volcanoes, K/Ar age at most a few million years. Yet lead/lead (Pb/Pb) ages[9] are some 2.3 *billion* years, making the rock even older than the Vishnu formations. Why are geologists not worried by this? Because the two different dates refer to two completely different processes.

The K/Ar date refers to the eruption of the lava flow, which (in the simplest case) resets the clock by outgassing any argon present in the source rock. The Pb/Pb date refers to the separation from the convecting mantle of the semi-molten lithospheric material at the base of the crust, an ancient process and one that must have taken place even before the basement rocks were formed.

This distinction is clearly drawn in the original scientific literature, so much so that I wondered whether or not to regard the distinction as an anomaly at all. However, it is paraded as such in the creationist literature (see e.g. Grand Canyon, Monument to Catastrophe, and many creationist compilations). So the appearance of anomaly has been created by suppression of actual scientific content. Unfortunately, there are many examples of this kind of thing in the creationist literature; for a particularly egregious case, see the *Genesis Flood* discussion of the Lewis Overthrust fault.[10] However, I consider that they can be used as learning opportunities; see here.

Afterword: The nature of science

When I set out to write this essay, I was firmly of the opinion that there is no intrinsic difference between scientific knowledge, and the other knowledge that we have about the world. Now I am not so sure, and there are two reasons for this.

One reason is that in each of the examples I have given here an anomaly was resolved within the context of a prolonged, often multi-generational, research programme. Such evidence-guided persistence is rare outside science.

A second reason is the degree of interconnectedness between topics. The reinvestigation of Prout's conjecture led directly to the discovery of argon. But where did all that argon come from? From radioactive decay of potassium, and subsequent escape from the rocks, the kind of escape that gave rise to the apparent dating anomalies in the Grand Canyon. We can use radiometric dating to quantify the geological column, but the results can only be reconciled with the general order derived from superposition, if we recognise that under certain special circumstances this order will be disrupted by overthrusts.

Or, to take two further examples, our understanding of evolution is linked to our knowledge of the geological column, and our concerns about global warming arose directly from the analysis of Ice Age climate feedbacks.

Everything connects.

1] M.J. Behe, *Darwin's Black Box* : "The argument from imperfection overlooks the possibility that the designer might have multiple motives, with engineering excellence oftentimes relegated to a secondary role … [T]he reasons that the designer award old not do anything are virtually impossible to know unless the designer tells you specifically what those reasons are."
2] See https://plato.stanford.edu/entries/scientific-underdetermination/, Sec. 2.1.
3] Available at http://www.csun.edu/~vcsoc00i/classes/s497f09/s690s08/Lakatos.pdf ; see also the Stanford Encyclopaedia of Philosophy articles on Lakatos https://plato.stanford.edu/entries/lakatos/ and Popper https://plato.stanford.edu/entries/popper/.
4] Invoking the ideas of Dalton and Avogadro.
5] These are some of the elements that occur entirely, or almost entirely, as a single isotope.

6] Nitrogen and oxygen, when heated or sparked together, give nitric oxide, NO, which reacts further with oxygen and water to give, eventually, nitric acid.
7] This was accomplished initially by reaction with magnesium, and subsequently by fractional distillation.
8] ^{39}K, the major isotope, is struck by a neutron and ejects a proton, giving ^{39}Ar. A co-irradiated sample of known age is used as calibrant.
9] This depends on the ratio of ^{206}Pb (from the decay of ^{238}U) to ^{207}Pb (from ^{235}U), with ^{204}Pb as non-radiogenic referent.
10] http://www.talkorigins.org/indexcc/CD/CD102_1.html: Whitcomb and Morris, 1961 [*The Genesis Flood*, a foundational document for 20th-century Young Earth creationism], 187) quoted a description of the Lewis Overthrust in out of context to give the impression that rocks along the fault are undisturbed. They quoted Ross and Rezak (1959),

Most visitors, especially those who stay on the roads, get the impression that the Belt strata are undisturbed and lie almost as flat today as they did when deposited in the sea which vanished so many [million] years ago.

Whitcomb and Morris silently omit the word "million," and the original paper (Ross and Rezak 1959, 420) continues:

Actually, they are folded, and in certain zones they are intensely so. From points on and near the trails in the park it is possible to observe places where the beds of the Belt series, as revealed in outcrops on ridges, cliffs, and canyon walls, are folded and crumpled almost as intricately as the soft younger strata in the mountains south of the park and in the Great Plains adjoining the park to the east.

Illustrations

Mercury precession image from Georgia State University site. Chlorine isotopes from Chemguide. Ramsay image Vanity Fair *via Wikipedia. Geological column cartoon retrieved via* The Oldspeak Journal*; would happily acknowledge original provenance. Overthrust diagram, Myrna Martin in Kids Fun Science. Aird da Loch image, Andrew (ARG_Flickr on Flickr) via Wikipedia. Chief Mountan, public domain (US National Parks Service), via Wikipedia. Grand Canyon stratigraphy, US National Parks Service, public domain, via Wikipedia.*
I thank Ken Wolgemuth, Massimo Pigliucci, Michael Roberts, Martin Rudwick, and Mike Timmons for helpful correspondence. The responsibility, however, for the errors that I have no doubt committed in this piece is entirely my own.

* This essay originally appeared in *Three Quarks Daily*, February 19, 2018. **HERE**

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

- 13th International Philosophy of Medicine Roundtable, **online 14-16 September**, hosted by the Department of History and Philosophy of Science, the Center for Philosophy of Science, and the Institute for Bioethics at the University of Pittsburgh.
  Details: **HERE**
- The Dunning-Kruger Effect (DKE) in politics, education and elsewhere.
  Details: **HERE**
- Max Planck and Founding of Quantum Mechanics, one in series of history of science videos
  HERE
- Eight HPS&ST books downloadable gratis
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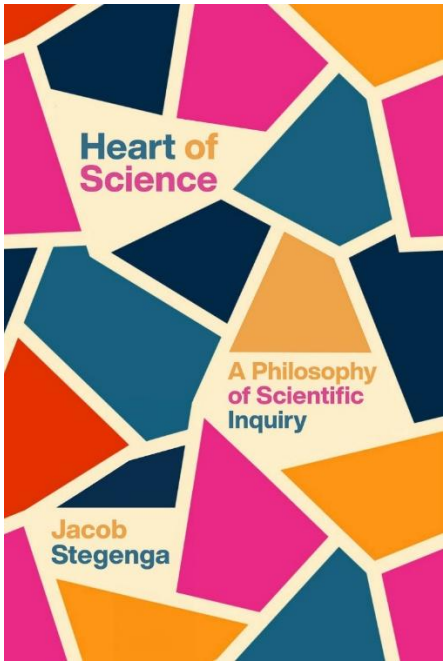
- *Science & Education* Open Access articles (226) **HERE**
- *Philosophy of Science* journal, most cited articles **HERE**

Featured Open-Access Books

(1) Jacob Stegenga, *Heart of Science: A Philosophy of Scientific Inquiry* The University of Chicago Press, 2026.

This novel epistemology of science contends that good science need not attain its aims, but it must justify its claims.



In *Heart of Science*, philosopher Jacob Stegenga breaks with the most dominant epistemologies of science to argue that in judging scientific activity, we should focus on its justification, not the achievement of truth or knowledge. Yet, Stegenga argues, the aim of science goes far beyond justification and is, instead, a special kind of truth—common knowledge, a broadly shared and mutually justified scientific finding.

Drawing on both historical examples and recent events like the COVID-19 pandemic, Stegenga outlines his approach before delving into its implications for scientific evaluation, testimony, values, progress, and credit, as well as the nature of science during times of crisis.

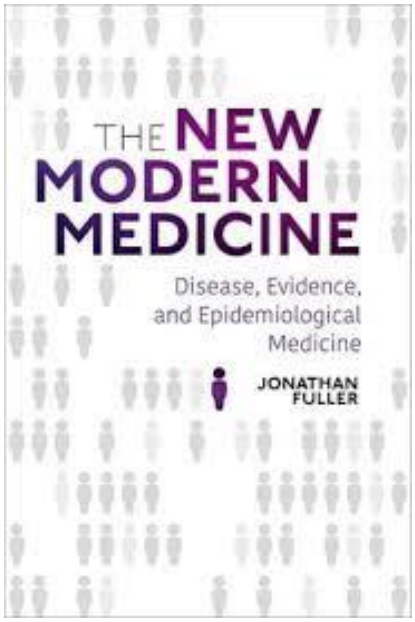
Truth, he shows, may not be easily identified in the short term. However, an evaluation of scientific justification, grounded in shared standards, *is* possible. This framework helps us appraise—and appreciate—historical theories that ultimately weren't accurate and offers fresh insights about appropriate science communication and public trust in scientific research. Justification and scientific rigor are not just means to an end, Stegenga writes, but the very heart of good science.

Jacob Stegenga is professor of philosophy in the School of Humanities at Nanyang Technological University, Singapore. He is the author of *Medical Nihilism* and *Care and Cure: An Introduction to Philosophy of Medicine*.

"Stegenga's deeply informed and wide-ranging discussions address numerous traditional issues in the philosophy of science, offering original and lucidly defended new alternatives."—Philip Kitcher, author of *The Rich and the Poor*

"In this exciting new book, Stegenga argues that the goals of science need to be radically reconceived. Illuminating arguments and counterarguments flesh out his big picture."—Elliott Sober, author of *The Philosophy of Evolutionary Theory*

(2) Jonathan Fuller, *The new modern medicine: disease, evidence, and epidemiological medicine*. New York: Oxford University Press, (2025)



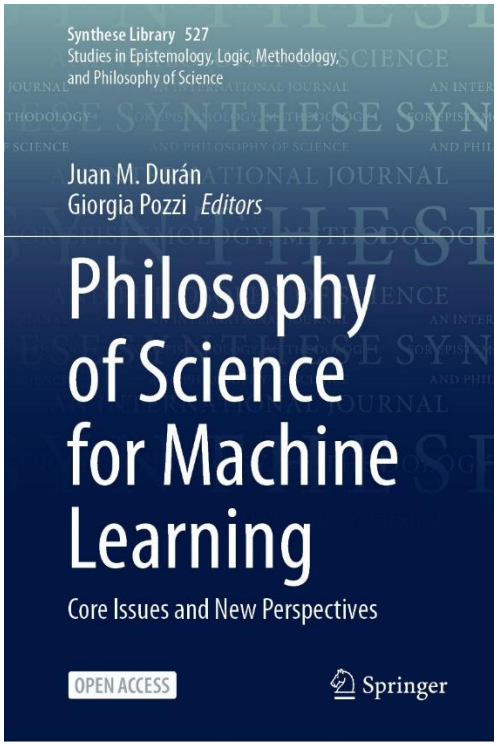
"Contemporary scientific medicine is a new modern medicine-one shaped by new disease epidemics, new norms of evidence, and the new sciences of epidemiology. Jonathan Fuller provides a philosophical treatment of this new modern medicine, an epidemiological medicine that has dominated healthcare for decades.

Epidemiological medicine is a model of medicine calibrated to the management of epidemic noncommunicable diseases such as cancers and chronic conditions, reliant on evidence from epidemiological studies such as clinical trials, and infused with epidemiological thinking. *The New Modern Medicine* utilizes resources from the philosophy of science and the philosophy of medicine to examine disease and evidence in the new modern medicine, particularly problems brought about by the twentieth century integration of medicine with epidemiology.

The book explores topics such as the nature and evolution of modern scientific medicine, theories of contagion and cancer, the causation and classification of disease, the nature of chronic diseases and mental disorders, evidence-based medicine and therapeutic prediction, medical interventions and concepts of risk, problems of extrapolating from clinical trials, biased evidence and therapeutic skepticism, the foundations of personalized medicine, as well as the signs and symptoms of a looming postmodern medicine."

Available online open access: **HERE**

(3) Juan M. Durán & Giorgia Pozzi (eds.) ***Philosophy of Science for Machine Learning: Core Issues and New Perspectives,*** **Springer, 2026.**



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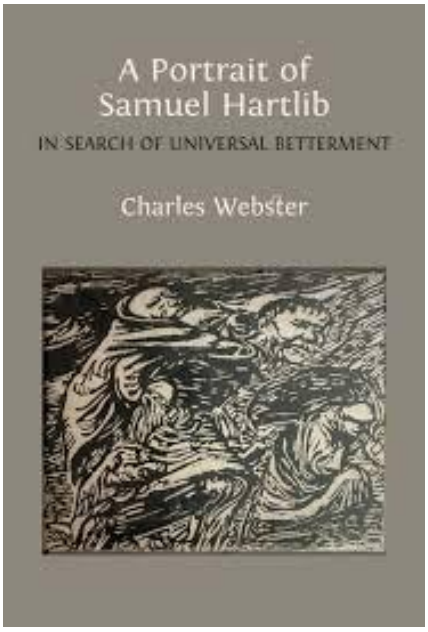
Book is available for download **HERE**:

(4) Charles Webster *Samuel Hartlib (1600-1662): In Search of Universal Betterment*, (Open Book Publishers, 2025)

Charles Webster, All Souls College, Oxford has recently published a new, open-access book. *A Portrait of Samuel Hartlib: In Search of Universal Betterment.*



The 2013 digitization of the vast Hartlib Papers archive highlighted the pressing need for a comprehensive modern study of Samuel Hartlib (1600–1662), a German-Polish-English polymath who was a central figure in seventeenth-century European intellectual life. Though educated in Eastern Europe, Hartlib spent his adult life in London, where he became a prolific correspondent and chronicler.

His Ephemerides, spanning 1634 to 1660, and his extensive correspondence with leading thinkers across Britain and Protestant Europe offer an unparalleled window into the era's religious, political, and scientific ferment. This volume goes beyond previous studies in both scope and depth, drawing extensively on archival sources and offering new interpretations of Hartlib's network and influence.

Organized chronologically, it explores the wide-ranging social, economic, and ideological pursuits of Hartlib and his collaborators—many of them renowned figures in their own right—and his close alignment with the Cromwellian cause. Providing the most complete portrait to date of the Hartlib circle's emergence and impact, this study sets a new benchmark for scholarship and invites renewed engagement with one of the early modern period's most visionary projects of knowledge, reform, and communication.

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Philosophy of Science Association (PSA)

Conference 19-22, 2026, San Diego

Submission portals for Contributed Papers and Posters remain open - paper *deadline is March 15*, 2026 and posters are due by June 1, 2026.

Hotel registration is open. The first 800 nights are offered at $215 per night, after those are booked, the price will increase to $235 per night. Additionally, there is now a sheet available on the hotel booking page to sign up for room sharing if you are interested. Just a reminder, if you are looking for a room to share or if you have a room to share, you will need to initiate contact with others on the sheet.

There is now a heading in the PhilSci Archive where conference papers can be uploaded. The link will not appear in the "Conferences and Volumes" section until the first paper is uploaded.

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https://psa26.oa-event.com/

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Sedlacek, Q.C., Friend, M., Villa, A.M. et al. (2025). STEM Disciplines are More Diverse Than Undergraduate Courses Depict. *Sci & Educ*, 1-37. https://doi.org/10.1007/s11191-025-00701-9

Recent HPS&ST Related Books

Allchin, D. (2026). *Toward a philosophy of error in science*. Oxford, UK: Oxford University Press. ISBN 9780197827673

"History is littered with scientific errors: bodily humors, atomic affinities, mislabeled planets... This contrasts sharply with the image of science as "self-correcting" and as providing a systematic method that reliably yields trustworthy knowledge. *Toward a Philosophy of Error in Science* seeks to resolve this puzzle.

"By carefully dissecting cases from history, we can catalog a vast inventory of the sources of error. The sensational claim that chronic fatigue syndrome was caused by the XMRV virus? A contaminated commercial reagent. Newton's faulty formula for the speed of sound, which even the greatest physicists could not fix for over a hundred years? Lack of collateral knowledge about adiabatic phenomena. How did Boyle's law become a universal "law," if it has so many exceptions and conditions? Overgeneralization.

"History also allows us to document how each error was corrected. How did the OPERA team track down the loose cable that led to international news headlines about a faster-than-light neutrino? How did the Mesmer Commission debunk animal magnetism? How did happenstance help unravel the entrenched view that stress and diet caused ulcers? How did the craniological practice of measuring intelligence, sustained for decades by racist and sexist ideology, eventually unravel in just a few years?

"We can develop more effective methods for regulating errors in the future. We can also rethink our views of progress in science, the role of "bias," and even our very concept of knowledge." (From the Publishers)

More information HERE

Dawes, G. W. (2026). *Is science Western? An inquiry*. Cham, Switzerland: Palgrave Macmillan. ISBN: 978-3-032-10640-7

"In many fields in the humanities, it has become common to refer to science as 'Western' science? But what could this mean? And is it true? In what sense, if any, are the sciences 'Western'? A first step towards answering these questions is to be clear about their terms. The English word 'science' has three different uses. In a first (now obsolete) sense it refers to knowledge in general; in a second sense it refers to a systematized body of knowledge (as in the Latin scientia); in a third it refers to those systematized bodies of knowledge that began to take on their present form in early modern Europe. All societies have science in the first sense; some (but not all) have science in the second. But the focus of this study is the third: modern science.

"Modern science might appear to be Western insofar as its origins lie in Western Europe. But what happened in Western Europe was not a creatio e nihilo. On the operational level of scientific practice – what scientists actually do – it was more a renaissance than a revolution. It revived practices of mathematical modeling and experimentation whose roots lay in the ancient Mediterranean world and which were transmitted in part by Muslim scholars. These are, in turn, refined versions of practices found in all societies: observation-based reasoning, measurement, and the employment of those core cognitive capabilities that all humans share. So on its operational level modern science is not solely Western.

"What about the theoretical and metatheoretical levels of modern science? Has its European history shaped the kind of theories it formulates? The answer to this question is a cautious 'yes'. There were three features of late medieval Europe that contributed to the character of modern science. The first was a legal revolution that gave rise to corporate entities. The second was a passion for quantification inspired by the growth of commerce. The third was a revival of the ancient sceptical tradition given new force by challenges to religious authority.

Among the pioneers of early modern science these factors gave rise to a preference for mechanical models, whose operations could be

described mathematically, and a spirit of organized scepticism exemplified by the Royal Society's nullius in verba (take no one's word for it). The religious controversies of the age also encouraged a separation between matters of fact and matters of value, the scope of science being restricted to the former.

"To the extent that they retain these metatheoretical assumptions the modern sciences are Western in character. But the history of modern science shows that the operational level of scientific practice takes priority over its theoretical and metatheoretical levels. Even apparently entrenched metatheoretical assumptions have been revised in the light of observation and experiment.

Since observation and experiment are refined versions of practices found everywhere, modern science is not merely Western. Its practices are sophisticated forms of shared human practices and the knowledge to which it gives rise has no cultural boundaries." (From the author)

More information HERE

Durán, J. M., & Pozzi, G. (Eds.). (2025). *Philosophy of science for machine learning: Core issues and new perspectives*. Cham, Switzerland: Springer. ISBN: 978-3-032-03083-2 [Open Access]

"This open access book offers a comprehensive and systematic debate on the key concepts and areas of application of the philosophy of science for machine learning. The current landscape of the debate about the epistemic and methodological challenges raised by machine learning in scientific fields is fragmented and lacks a common thread that helps to understand the complexity of the issue. Against this background, this book brings together expert researchers in the field, structuring the debate in ways that allow readers to navigate quickly in this evolving field of research and pave the way to new paths of philosophical and technical research. Although the book is written from the perspective of philosophy of science and epistemology, it is of interest to philosophers in a myriad of fields, such as philosophy of mind, philosophy of language, philosophy of neuroscience, and metaphysics of science, STS studies, as well as to researchers working on technical and computational issues such as explainability, trustworthiness, interpretability, transparency." (From the Publishers)

More information HERE

Ellebrecht, N., et al (Eds.). (2025). *The order of people: Contesting bio-scientific human classifications*. Bielefeld, Germany: transcript publishing. ISBN 978383767237

"Bioscientific concepts of human diversity and politics of inequality have long been intertwined in efforts to order and classify people. The contributors to this volume critically examine the particular ways in which these concepts are constituted and applied across various national contexts and within different life science disciplines, including genetics, medicine, forensics, anthropology, epidemiology, and microbiome research.

By highlighting cases outside the dominant research focus on the United States, the authors unpack the epistemological foundations, inherent ambiguities, and political dimensions underlying key classifications—such as race, ethnicity, ancestry, and migration background." (From the Publishers)

More information HERE

Erwin, D. H. (2026). *The origins of the new: Novelty and innovation in the history of life, culture, and technology*. Princeton, NJ: Princeton University Press. ISBN 9780691178943

"*The Origins of the New* presents a revolutionary approach to evolutionary success in all realms of life. In this groundbreaking book, Douglas Erwin takes readers on a dazzling excursion across science and history to explore how evolution generates new and enduring features in biology, culture, and technology.

"Erwin begins by tracing how thinkers from Darwin's time to the present day have sought to discover the driving mechanisms of evolutionary novelty. He then lays out compelling empirical evidence for separating novelty from innovation, showing how novelty involves the emergence of unique characteristics while innovation has to do with the success of those characteristics across time. Erwin develops a unifying conceptual framework for these powerful dynamics, demonstrating how they have shaped everything from the evolution of avian feathers and flight to the creation of human language and the breathtaking advances in digital computing we're witnessing today.

"A landmark work that redefines our understanding of the changes happening all around us, *The Origins of the New* reveals how the forces of novelty and innovation are the same across nature and culture, continually producing new forms and refashioning the world as we know it." (From the Publishers)

More information HERE

Fuller, J. (2025). *The new modern medicine: Disease, evidence, and epidemiological medicine*. Oxford, UK: Oxford University Press. ISBN: 9780190066178 [Open Access]

"Contemporary scientific medicine is a new modern medicine, one shaped by new disease epidemics, new norms of evidence, and the new sciences of epidemiology. This book provides a philosophical treatment of the new modern medicine, an epidemiological medicine that has dominated healthcare for decades. Epidemiological medicine is a model of medicine calibrated to the management of epidemic noncommunicable diseases such as cancers and chronic conditions, reliant on evidence from epidemiological studies such as clinical trials, and infused with epidemiological thinking.

The book uses resources from the philosophy of science and the philosophy of medicine to examine disease and evidence in the new modern medicine, especially problems brought about by the twentieth-century integration of medicine with epidemiology. It explores topics such as the nature and evolution of modern scientific medicine, theories of contagion and cancer, the causation and classification of disease, the nature of chronic diseases and mental disorders, evidence-based medicine and therapeutic prediction, medical interventions and concepts of risk, problems of extrapolating from clinical trials, biased evidence and therapeutic skepticism, the foundations of personalized/precision medicine, and signs and symptoms of a looming postmodern medicine." (From the Publishers)

More information HERE
Book available **HERE**

Griffiths, M. (2025). *Joseph Harris: Scientist, artisan, assay master.* Cardiff, UK: University of Wales Press. ISBN 9781837723003

"While Joseph Harris may not be a household name, his contributions to science and public policy left a lasting impact on Britain and beyond. A protégé of Edmond Halley and a skilled artisan in mapmaking, Harris played a crucial role in advancing astronomy and navigation. His work influenced some of the most prominent scientists of his time, and as assay master at the Royal Mint, he helped standardize weights and measures, which shaped Britain's economic policies in ways still felt today.

"This profile restores Harris to his rightful place in history, revealing his role as both a scientist and a dedicated public servant. From recording the 1761 Transit of Venus to advising prime ministers on monetary policy, his life exemplifies the intersection of craftsmanship and governance. A tribute to one of Wales's unsung intellectuals, *Joseph Harris: Scientist, Artisan, Assay Master* redirects our focus on the individuals who quietly shaped the modern world." (From the Publishers)

More information HERE

Gronda, R., & Tuboly, A. T. (Eds.). (2026). *Ernest Nagel on science and philosophy: Volume I – Biographical materials and correspondence*

with C. G. Hempel. Cham, Switzerland: Springer. ISBN: 978-3-031-99458-6

"This book provides new perspectives on the twentieth-century history of philosophy of science through the person of Ernest Nagel. Being one of the philosophical and institutional motors of the new discipline of philosophy of science, Ernest Nagel is still much underappreciated by scholars. By including a major intellectual biography of Nagel's life and works (written by his daughter Yvonne Nagel and narrated through the personal correspondence of Ernest Nagel), this book provides a unique opportunity for researchers.

The Nagel-Hempel correspondence is published here for the very first time, enabling scholars to get a sense of how logical empiricism emigrated to the States, got acclimatized, and took over American philosophy in less than two decades." (From the Publishers)

More information HERE

Healey, R. (2026). *Pragmatism works: Essays on quantum theory, science, and metaphysics*. Oxford, UK: Oxford University Press. ISBN 9780198911555

"*Pragmatism Works* presents what became a unified pragmatist view of quantum theory, science, and metaphysics developed over the past fifteen years. The essays show what work pragmatism can do in philosophy, but also in science. Indeed, the distinction between science and philosophy is relatively recent. The word 'science' originally denoted theoretical knowledge of any kind, not just of the natural world. Only after the scientific revolution did it come to have its more specialized modern meaning. The term 'natural philosophy' referred to a branch of philosophy encompassing any systematic study of the natural world.

"While the essays are all contributions to natural philosophy, some were originally published in physics journals and others in philosophy journals. Some chapters appeared originally in edited volumes, while two appear here for the first time. Many of these essays concern the proper understanding of a particular physical theory or quantum theory. Ideas from contemporary pragmatist philosophers proved pivotal in seeking a better understanding. One hundred years after Heisenberg's seminal paper, there is still no expert consensus on how quantum theory should be understood. Later essays further develop and defend a pragmatist view of quantum theory against views of other physicists and philosophers.

"These essays draw on additional pragmatist ideas, about the nature and function of truth and about objectivity. The use of pragmatist ideas in understanding quantum theory prompts their wider application. Later essays explore consequences of pragmatism for general topics in the philosophy of science and for the relations between science and metaphysics. Two address the topic of scientific laws by taking these to have epistemic and practical functions facilitated by their role in licensing reliable inferences. Some scientific explanations fit phenomena into a causal framework designed to satisfy our practical need to control our world. Others provide the epistemic satisfaction of unifying our shared system of belief. Inquiries into the metaphysics of laws, causation, and explanation are misdirected, as are attempts to extract metaphysical conclusions from quantum probability, entanglement, and space-time emergence in quantum gravity." (From the Publishers)

More information HERE

Nassar, D. (2026). *Romantic empiricism: Nature, art, and ecology from Herder to Humboldt*. Oxford, UK: Oxford University Press. ISBN 9780197841358

"In *Romantic Empiricism*, Dalia Nassar distinguishes and explores an understudied philosophical tradition that emerged in Germany in the late eighteenth and early nineteenth centuries, traces its development, and argues for its continued significance. Moving from the late Kant's notion of reflecting judgment, to Herder's articulation of

the idea of "animal worlds," Goethe's explication of the obligations of the scientist, and Alexander von Humboldt's aesthetic science, Nassar demonstrates how these thinkers developed a sophisticated empirical approach to the natural world, which focuses on the phenomenon while also recognizing the creative role of the knowing subject and the cognitive value of art and aesthetic experience. She explores how these four thinkers worked together-sometimes as rivals, but more often than not as teachers and collaborators-and illustrates how their search for a new methodology culminated in a new, ecological understanding of the world and the human place within it.

"Revisiting their thought, especially their distinctive approach to the study of nature, Nassar demonstrates, has the potential to redirect contemporary environmental debates and respond to urgent ecological questions in new and productive ways." (From the Publishers)

More information HERE

Prkachin, Y. (2026). *Wired together: The Montreal Neurological Institute and the origins of neuroscience*. Chicago, IL: University of Chicago Press. ISBN 9780226845463

"*Wired Together* explains the rise of neuroscience by tracing the history of the Montreal Neurological Institute (MNI) and the men and women who transformed it into neuroscience's most innovative and productive research site. Opened by neurosurgeon Wilder Penfield in 1934, the MNI pioneered the surgical treatment of epilepsy and transformed the operating theater into a new kind of scientific laboratory for investigating the functions of the brain. But more than that, the MNI became a crucial site for forming new interdisciplinary practices. These involved, as Yvan Prkachin puts it, wiring together new assemblies of physicians, surgeons, and scientists into a growing network that made possible the emergence of an interdisciplinary science of the brain.

"*Wired Together* also traces how the MNI and its network of scientists spread this new interdisciplinary neuroscience to the rest of the world. Prkachin uncovers the surprising history of some of the most important neuroscientific organizations, discoveries, theories, and instruments from their beginnings in Montreal through the complex international networks of the post-war sciences. In doing so, he tells the stories of the most crucial and least understood characters from early neuroscience—such as Brenda Milner, Donald Hebb, Herbert Jasper, Molly Harrower, and David Hubel—as well as the surprising origins of scientific practices and ideas like sensory deprivation, multiple forms of memory, and artificial neural networks." (From the Publisher)

More information HERE

Rees, A., Kohlt, F. E., McLeish, T., Sleigh, C., & Wilkinson, D. (2026). *Science, religion, and the human future: Conflict, collusion, and consequences*. Oxford, UK: Oxford University Press. ISBN 9780198889007

"*Science, Religion, and the Human Future: Conflict, Collusion, and Consequences* demonstrates that the myth of an inevitable conflict between science and faith is based on a misunderstanding of history, with potentially adverse consequences for human futures.

"The work focuses first upon ancient, medieval and Islamic scholars and the intimate connections they made between theology and the investigation of the natural world-and why we know so little about them. Moving into the modern era, it argues that one of the most concerning features of the science-faith relationship was their collusion in defining and validating the 'civilising mission' of Western imperialism. This collusion recontextualises the creation of the conflict thesis. Turning to the present day, the book investigates episodes of scientific controversy in which effective science communication was hindered not as a result of a clash between science and faith but because of a close and unexamined entanglement between the two.

"In cases ranging from space colonisation to AI, climate change to Covid-19, the problem is not so much science's split from faith as the unexamined and problematic theologies that remain implicit within it. Learning from these examples, the book outlines some productive and non-conflict-based frameworks for talking about science and faith in the future." (From the Publishers)

More information HERE

Simberloff, D. (2026). *Ecological explosions: The history of biological invasions and invasion science*. Chicago, IL: University of Chicago Press. ISBN 9780226842578

"From the arrival of the naval shipworm in the Black Sea in the first millennium BC to the escape of the Burmese python in Florida in 1992, humans have moved species to new locations, deliberately or inadvertently, for thousands of years. Agricultural and environmental impacts of some invasions were evident early, although whether observers recognized that the cause was an introduced species is uncertain.

The history of invasion biology truly begins in the sixteenth through eighteenth centuries, when explorers noticed European species on various distant islands and in North America. In the nineteenth century, biogeographers, studying species distributions across the globe, introduced the first native and non-native species categorizations, and prominent researchers like Charles Darwin began to describe the impacts of introduced species. In the nineteenth and twentieth centuries, as humans moved increasing numbers of species across the globe, the advent of modern ecology deepened our understanding of the scope of the problem.

"In *Ecological Explosions*, invasive species expert Daniel Simberloff provides a thorough overview of the development of invasion science, from early research—including from the perspectives of leading scientists like Aldo Leopold—to the field's future. Simberloff explores the work of pioneering ecologists like Charles Elton, antecedents of what became today's invasion biology, before discussing the field's true emergence in the 1980s, its explosive methodological and theoretical expansion, its integration with other disciplines, and its increasing visibility, not only within the biological literature but also in government policies across the world in the 1990s. Finally, he investigates current controversies, such as the debate over whether the entire science is xenophobic, and asks how ecosystems might adapt to a rapidly globalizing world and ever-increasing numbers of introduced species—including the joro spider, lionfish, spotted lanternfly, common reed, and Asian carp." (From the Publishers)

More information HERE

Thierfelder, J. (2026). *The making of scientific knowledge: Sensory and bodily practices in field biology*. Bielefeld, Germany: transcript publishing. ISBN 9783837679311

"What does really happen between the moment when a scientist is observing a bird in the wild and publishing a scientific chart? Jana Thierfelder reveals the hidden life of field science through the 30-year archive of biologist Michael Griesser's work with Siberian jays in Sweden. Blending design, anthropology, and science studies, it uncovers the sketches, notes, tools, and sensory practices behind scientific knowledge. By tracing how scientific observation becomes publication, it shows that science is not just objective output – but lived, embodied, and relational work. It is about the people, places, and processes that shape knowledge. A call for more open, transdisciplinary approaches to how we understand and share science." (From the Publishers)

More information HERE

Tooley, M. (2026). *Causation: A defense of a non-reductionist approach*. Oxford, United Kingdom: Oxford University Press. ISBN 9780197801611

"In *Causation: A Defense of a Non-Reductionist Approach*, Michael Tooley offers detailed criticism of various approaches to

understanding causation and makes an argument for the superiority of a theoretical-term, non-reductionist analysis of causation.

“He begins by offering detailed criticisms of alternative approaches, including the competing non-reductionist view that no analysis of the concept of causation is needed, since the relation of causation is directly observable, thereby entailing that the concept of the relation of causation is analytically basic. In response, Tooley argues that the relation of causation is not directly observable.

“His argument then considers reductionist approaches to causation, which can be divided into those that accept David Hume's thesis that there can never be logical connections between distinct existents, and those that reject that thesis. In the case of the former, Tooley outlines and criticizes at length accounts that attempt to analyze causation in terms of laws of nature, counterfactual approaches, a variety of probabilistic accounts, analyses in terms of agency, and conserved quantity accounts. Here Tooley offers both specific, detailed objections to each approach, and powerful general arguments that warn against any Humean-style reductionist analysis.

Finally, the book discusses non-Humean-style approaches that attempt to analyze both causation and laws of nature in terms of dispositional properties. Tooley argues that the idea of intrinsic, irreducible dispositional properties leads to a contradiction.

“Clearly outlining the faults in other approaches, the book concludes that a very simple and sound analysis of causation can be given if the relation of causation is viewed as a theoretical relation between events.” (From the Publishers)

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.

Translations of Classic Works of Science: André Koch Torres Assis

Democratizing access to scientific knowledge is the mission of UNICAMP professor André Assis. The professor at the Gleb Wataghin Institute of Physics (IFGW) is responsible for translations into Portuguese and English of classic works by authors such as the Greek Archimedes (c. 287-212 BC), the Englishman Isaac Newton (1642-1727), the Frenchmen Charles Augustin de Coulomb (1736-1806) and André-Marie Ampère (1775-1836), and the German Wilhelm Weber (1804-1891).

His most recent work is the *Weber’s Works on Electrodynamics Translated and Annotated*, published in four volumes in 2025 by the Canadian publisher Apeiron. Assis had already edited, with the help of German and American colleagues, the annotated translation from German to English. “It is the largest work I have ever translated and the one that required the most work,” he said.

The goal of this effort is to allow teachers, students, and interested individuals to learn about the original ideas of these thinkers. "These are extremely important works, but they involve a question of paradigm shifts: when there is a dominant line of thought, sometimes there is no interest in translating other lines of thought," explained Assis.

In 2022, the professor also published an annotated translation, from French to Portuguese, of Coulomb's works on torsion balances, electricity, and magnetism. He then joined forces with Louis L. Bucciarelli, a retired professor at MIT (USA), to publish, in 2023, the annotated translation of these materials in English.

Until recently, many of these works did not have versions even in English, such as Ampère's work, originally published in 1826, which has now been translated with commentary into English and

Portuguese — in a joint effort with João Paulo Chaib, a former doctoral student of Assis.

“In the case of electromagnetism, we follow the line of Field Theory of [Michael] Faraday and [James Clerk] Maxwell, two Englishmen. The French and German lines were abandoned,” the professor argued.

Assis has already received two Jabuti awards in the "Exact Sciences" category, in 1996 and 2012, for books published by Editora da Unicamp:Weber's electrodynamics"and "Ampère's electrodynamics The first is a book about Weber's theory, and the second is an annotated translation from French to Portuguese of Ampère's most important work, entitled *Theory of Electrodynamic Phenomena*.

Most of the works are available for free on a website It is maintained by the professor and is aimed at high school and undergraduate students in the fields of physics and engineering, as well as those interested in the history of science.

Most of the mentioned books are freely available not only in Portuguese, but also in English in this homepage: **HERE**

Nuncius Prize 2026

Nuncius is a peer-reviewed and international journal devoted to the history of the material and visual culture in science. Published three times a year by Brill and under the auspices of the Museo Galileo in Florence, Nuncius explores the material sources of scientific endeavor, such as scientific instruments and collections, and the specific settings of experimental practice, as well as the visual cultures of science and interactions between sciences and arts.

The 2026 Nuncius Prize, which is supported by Brill, will be awarded to the best original essay related to the material and visual history of science, technology and medicine in any period. The editors of Nuncius have established this prize with the aim of encouraging, recognizing and promoting high-quality research among graduate and early career scholars.

The winner of the 2024 Essay Prize (second edition) was:

Francesca Strobino with “Colouring and Crafting 19th-Century Science. Giorgio Roster and His Hand-Coloured Lantern Slides”

The essay been published openly in the issue 40.2 (2025) of Nuncius: https://brill.com/view/journals/nun/40/2/nun.40.issue-2.xml

The winner will receive a cash prize of €500 and the open-access publication in Nuncius.

Three honourable mentions (€100 of Brill book tokens each) will also be provided.

The prize is intended for those who are currently graduate and doctoral students, or have been awarded their PhD (or equivalent) within the last six years.

Essays must be: unpublished and not submitted to any other journal or competition at the same time; written in English; no more than 9,000 words in length (including footnotes); referenced in accordance with Nuncius guidelines **HERE**

The opening date for entries is 00.01 (CET) on 30 November 2025. The closing date of the Prize is 23.59 (CET) on 31 August 2026. Submissions received after this time will not be accepted.

Nuncius uses online submission only. Authors should submit their manuscript via the Editorial Manager (EM) online submission system (by selecting article type “Nuncius Prize”) at: **HERE**

When submitting the article, authors should indicate that they wish it to be considered for the Prize. All entries should be accompanied by a cover letter with a short biographical note that includes a statement of how the author meets the eligibility requirements for the Prize.

For further information, please contact: Elena Canadelli **HERE**

Golden Oldie: HPS&ST Research from 30+ Years Ago

Good HPS&ST research is clearly written, philosophically informed, well-argued, and has enduring value. Clarity encourages critique and evaluation so that flaws can be identified and corrected. This is a condition for the advance of knowledge.

Much education research is timely. This is useful. But an unfortunate consequence can be that what is timely today might not be timely tomorrow. Circumstances change. The research might leave no trace. Conversely, some research can leave a big trace but be philosophically flawed and so do educational and, ultimately, cultural damage.

Good HPS&ST research has a long shelf-life. In defence of this claim, the HPS&ST Newsletter will identify 30+ years-old articles that had, and still have, philosophical, historical and educational value. These Golden Oldies are available, month-by-month **HERE**

16th in the series:

Nahum Kipnis, 1996, 'The "Historical-Investigative" Approach to Teaching Science', *Science & Education* 5(3), 277-292.

ABSTRACT: The paper describes the author's experience in using the history of science in teaching physics to science teachers. It was found that history becomes more useful to teachers when explicitly combined with 'investigative' experimentation, which, in turn, can benefit from various uses of the history of science.

The article can be read and downloaded **HERE**.

Nahum Kipnis's work was elaborated in subsequent publications:

Kipnis, N.: 1998, 'A History of Science Approach to the Nature of Science: Learning Science by Rediscovering It'. In W.F. McComas (ed.) *The Nature of Science in Science Education: Rationales and Strategies*, Kluwer Academic Publishers, Dordrecht, pp. 177-196.

Kipnis, N.: 2005, 'Chance in Science: The Discovery of Electromagnetism by H.C. Oersted', *Science & Education* 14(1), 1-28.

Kipnis, N.: 2007, 'Discovery in Science and in Teaching Science', *Science & Education* **16**(9-10), 883-920.

Kipnis, N.: 2020, 'A History of Science Approach to the Nature of Science: Learning Science by Rediscovering It'. W.F. McComas (ed) *Nature of Science in Science Instruction: Rationales and Strategies*, Springer, Dordrecht, pp.177-196.

Readers are welcome to send suggestions, including appropriately-aged own-papers, with bibliographic detail plus pdf file, for the Golden Oldie Award to the Editor.

Coming HPS&ST Related Conferences

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February 23-27, 2026, 'Material Culture in the History of Physics', Deutsches Museum.
Details: **HERE**

March 5-6, 2026, US Philosophy of Education Society, annual meeting, Pittsburgh
Details: **HERE**

April 10, 2026, Remembering Bill Brock: Chemistry and Culture. Maison Française d'Oxford.
Details: Frank James (frank.james@ucl.ac.uk)

April 9-11, 2026, British Society for Literature and Science conference in Glasgow at the University of Strathclyde
Details: **HERE**

April 19 - 22, 2026, NARST Conference, Seattle
Details: **HERE**

May 29-31 2026, Karl Popper in China, Hong Kong, UST
Details: **HERE**

June 9-12, 2026, Scientae annual conference, Nantes, France
Details: **HERE**

June 11-14, 2026, Committee for Skeptical Inquiry, 50th Conference, Buffalo, NY.
Details: **HERE**

June 11-13, 2026, Francis Bacon: Four Centuries of Thought, UTN
Details: rodolfo.garau@utn.de & daniela.jalobeanu@utn.de

June 22-25, 2026, 8th ICASE World Conference on Science & Technology Education, University College, Cork, Ireland
Details: HERE
July 6-10, 2026, IHPST 18th Biennial Conference, Lisbon.
Details: **HERE**
July 13-16, 2026, joint European Society for the History of Science/History of Science Society meeting, Edinburgh.
Details: **HERE**
July 15-17, 2026, Biennial Conference, Society for Philosophy of Science in Practice (SPSP), University of Cambridge
Details: **HERE**
July 29-31, 2026, 29th Conference of the International Society for the Philosophy of Chemistry
Details: **HERE**
September 14-15, Law-based Explanations Conference, London School of Economics
Details: **HERE**
September 14-16, International Philosophy of Medicine Rountable, University of Pittsburgh (on line)
Details: **HERE**
November 19-22, PSA Annual Meeting, San Diego.
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)
SHOT - Society for the History of Technology

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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