



HPS&ST NEWSLETTER

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The HPS&ST NEWSLETTER is emailed monthly to about 8,500 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 25+ years.

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 to the NEWSLETTER (publications, conferences, opinion pieces, &c.) are welcome and

should be sent direct to the editor: Michael R. Matthews, UNSW (m.matthews@unsw.edu.au).

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

HPS&ST NEWSLETTER STAFF

Editor	Michael Matthews
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Assistant Editor (Opinion Page & Formatting)	Nathan Oseroff-Spicer
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Assistant Editor (Publications & Website)	Paulo Maurício
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CONTENTS

The 16th Biennial International History and Philosophy of Science and Science Teaching Group Conference	3	<i>Science & Education</i> Thematic Issue: Epistemology & STEM Education . .	9
Teaching the Nature of Science (NOS) Book	4	Opinion Page: Pessimistic Humanism and Existential Threats, <i>Robert Nola</i>	9
Learning from Nineteenth-Century Epidemics, <i>Manuel Barcia</i>	5	Recent HPS&ST Research Articles . .	16
COVID-19 teaching materials	7	Recent HPS&ST Related Books . . .	18
University of Cincinnati Center for Public Engagement with Science . .	7	Coming HPS&ST Related Conferences	28
IUHPST Essay Prize in History and Philosophy of Science	8	HPS&ST Related Organisations and Websites	29

The 16th Biennial International History and Philosophy of Science and Science Teaching Group Conference

Conference Theme: “Energising Education with the History, Philosophy, and Sociology of Science”



The province of Alberta is the oil-sands energy centre of Canada. It has been the locale for debate about fossil fuel usage, environmental impacts, renewal energy production, First Nations relations and much else.

The concept of Energy has a long history in philosophy and science. It is a foundational understanding in all disciplines of science and technology. The conference is an occasion to develop the variety of historical, philosophical, and sociological dimensions of energy that can be brought to bear on its better and richer teaching.

Plenary Speakers

Carol Cleland is Professor of Philosophy at the University of Colorado Boulder

Cleland specialises in Philosophy of Science and

Logic. Her research focuses on issues about scientific methodology (historical science vs. experimental science, the role of anomalies in scientific discovery), biology (microbiology, origins of life, the nature of life, and astrobiology), and the theory of computation.

She has published articles in leading philosophy and science journals. She is the inventor of the term ‘shadow biosphere,’ a subject on which she has written and lectured extensively. Cleland is the author of *The Quest for a Universal Theory of Life: Searching for life as we don’t know it* (Cambridge University Press, 2019)



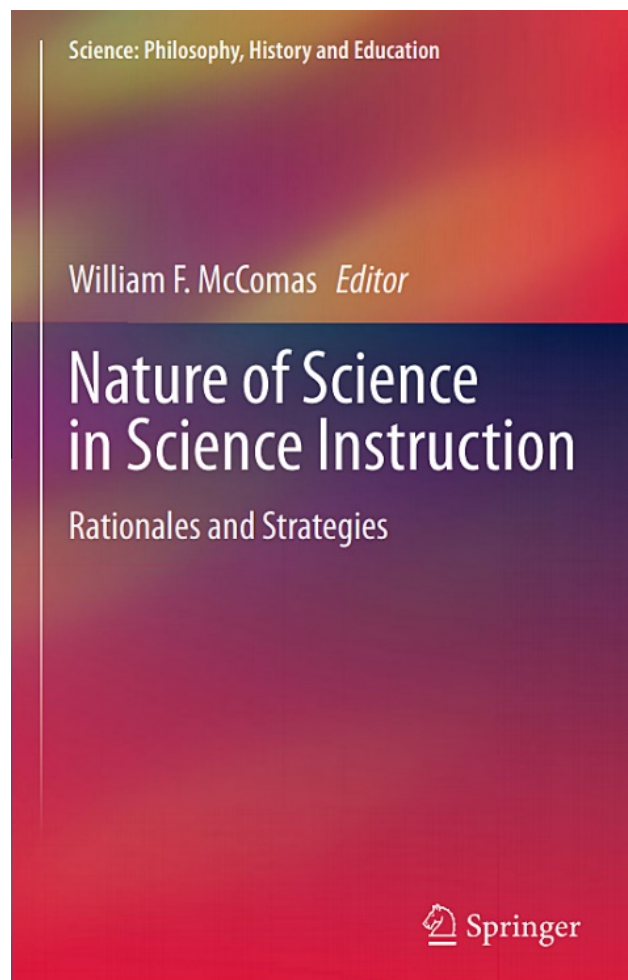
Alison Wylie is professor of philosophy at the University of British Columbia. She holds a Canada Research Chair in Philosophy of the Social and Historical Sciences.

She is currently President of the Philosophy of Science Association, and Past-President of the American Philosophical Association, Pacific Division. Dr. Wylie works on philosophical issues raised by archaeological practice, and by feminist research in the social sciences.

Among many of her publications is *Thinking From Things: Essays in the Philosophy of Archaeology*, University of California Press, (2002)



tributors from 12 countries (USA, Lebanon, Netherlands, Greece, Sweden, Canada, Israel, Germany, Taiwan, Chile, Turkey, Australia, UK).



In addition to traditional presentations of HPS&ST research there will be many other opportunities for participant engagement.

More information is available [here](#).

Teaching the Nature of Science (NOS) Book

William F. McComas (ed.) *Nature of Science in Science Instruction Rationales and Strategies*, Springer, 2020.

The book has 39 chapters, 735 pages, and 65 con-

The book reflects the most recent thinking in nature of science and features the work of both well-established scholars and those new to the field.

The primary aim of the book is to provide curriculum examples that will move the conversation about nature of science (NOS) instruction from a focus on why we should teach this content and what elements we should include in the science curriculum to the more pressing question of how to teach this interesting but complex topic.

The book provides a complete introduction to the history and purpose of NOS and offers tested strategies for teaching its elements in a variety of

instructional settings.

The first section is designed for those new to the topic and examines the why and what of nature of science. The second section focuses on extending that knowledge to include questions of scientific method, theory-laden observation, the role of experiments and observations and distinctions between science, engineering, and technology. The remainder of the book focuses on teaching aspects of NOS in a wide variety of instructional environments.

Full details available [here](#).

Learning from Nineteenth-Century Epidemics, *Manuel Barcia*

Manuel Barcia is chair of global history at the University of Leeds.

He is the author of four books and numerous articles on the history of Atlantic slavery and the slave trade. His most recent book, *The Yellow Demon of Fever: Fighting Disease in the Nineteenth-Century Transatlantic Slave Trade*, was published earlier this year by Yale University Press.

In 1830, as a deadly yellow fever epidemic spread throughout the Atlantic world, British medical doctor Robert McKinnal, surgeon on the *Sybilie*, one of the ships most affected by the epidemic, gathered his shipmates around him and proceeded to drink a whole pint of the vomit from one of his recently-deceased patients. Shocking as this stunt may have seemed to his fellow sailors, and even to the press of the time, to some extent McKinnal knew pretty well that he was doing something that would not kill him. Years before, American doctor Stubbins Firth had done something similar in

order to demonstrate that yellow fever was not a contagious disease, and he had survived.



The 19th-century debates around contagiousness that surrounded diseases such as yellow fever and the bubonic plague were central to the advancement of medical knowledge at a time when blood-letting and the use of purgatives and mercurial drugs were rampant. In more than one way, these lively debates were hindered precisely by the limited knowledge about the nature of the baffling and lethal diseases they were engaging with that spawned anxieties, and fears.

Just as today, questions of how epidemics suddenly came out of nowhere, how they passed from one person to another, and more importantly, how to treat and cure them, were at the centre of these discussions. Thanks to the work of medical practitioners who often put their lives on the line in search of remedial breakthroughs, the following decades brought the necessary knowledge to comprehend and treat most of them. With the advent of Germ Theory in the second half of the 19th

century, new prophylactic measures and therapies were formulated to avoid and contain them.

By the end of the century, physicians from places as far apart as India and Cuba, together with Italy, Britain and the United States, had established that two of the biggest killers at the time, yellow fever and malaria, were transmitted by mosquitoes, opening an entirely new field of epidemiological studies. The vector carriers for other epidemic diseases like the bubonic plague and typhus, both transmitted by fleas, were also identified, and with the arrival of the 20th century, antibiotics and new vaccines boosted the fight against many of these diseases, completely eliminating one of the deadliest – smallpox – by the 1970s.

Yet, epidemics never really went away, and more to the point, new bewildering diseases have continued to emerge almost every decade since. While old foes like measles, dengue fever, Japanese encephalitis and cholera have materialised time and again, other new, often lethal diseases have also caused havoc. Since the turn of the millennium SARS, MERS, H1N1 and Ebola viruses have terrified the entire world, threatening to spread beyond the places where they originated. Today, Covid-19 has gone from being a threat to becoming an actual pandemic of the kind the world had not seen since the influenza outbreaks of 1918 and 1957.

As a result, we've resorted to the type of language that was all too common in the 19th century, with President Trump even calling COVID-19, "the invisible enemy," much as yellow fever, dysentery, and smallpox were often described as demons back then. I read about time and again. COVID-19 is, of course, a new disease, naturally surrounded by a shroud of mystery. Newspapers, online news sites, and TV channels bring us daily news of possibly game-changing new treatments

that bring hope to frightened and locked-down humans across the globe. Yet, these treatments need to go through a process of trial and error that, again, much resembles what our ancestors had to do, with less resources and hope, in the early and mid-nineteenth century.

Governments around the world have taken different approaches to how to deal with Covid-19, basing their policies on incomplete medical advice regarding how contagious or not the new disease may be; nevertheless quarantines, lockdowns and other isolationist measures are nothing new. And while they may be effective – and there is enough evidence by now to show that against Covid-19 they are – quarantines and lockdowns are also social engineering tools that also serve political agendas, just as not implementing them do. Over the recent past there have been plainly eugenicist approaches to the epidemic by those who see the weak, the ageing and the less wealthy as acceptable casualties in their rushed attempts to reopen national and world economies. On the other side, we have witnessed unambiguous power grabs, like the extraordinary powers granted to Viktor Orbán by the Hungarian parliament.

The ways in which have reacted individually and collectively against Covid-19 reflect a wide spectrum of mindsets, that go from irrational and superstitious beliefs and conspiracy theories, to the more scientific, evidence-based approach followed by what one would hope is the majority of people. Additionally, racist and xenophobic discourses have also permeated the fight against Covid-19, just as they did in the nineteenth century Atlantic.

More concerning, however, are the ways in which governments around the world have reacted, both

domestically and internationally. From carefree approaches to stringent ones, Covid-19 has created frictions within nations, blame-games among world leaders and even imprudent and rash approaches as those taken by the leaders of countries as different as Mexico, Brazil, Sweden, the UK, and particularly the United States. At a time when the sharing and dissemination of medical knowledge, and the need for working together are paramount, President Donald Trump, for example, has decided to halt the US funding for the World Health Organisation, blaming them for being an instrument of the Chinese government, among other things.

And it is here where the most glaring difference between approaches then and now is apparent. Unlike today, when it came to fighting epidemic diseases, enslaved Africans, merciless slave traders and even those engaged in suppressing this inhuman traffic in the Atlantic, were able to surmount their differences and come together to share the fragmentary knowledge they possessed and that could save their lives and the lives of others. In this final aspect, our leaders and all of us have indeed a thing or two to learn from our nineteenth-century ancestors.

COVID-19 teaching materials

COVID-19 education materials have been developed, with National Science Foundation (NSF) funding, for use in post-secondary science courses and are freely available at:

<https://storybehindthescience.org/covid19.html>

The materials include:

- [SARS-CoV-2 and COVID-19 background in-](#)

[formation](#)

- [COVID-19 Pandemic and Science-Based Decision-Making](#)
- [COVID-19 Pandemic and Pseudoscience Impact on Decision-Making](#)
- [COVID-19 Case Study: To Mask or Not to Mask](#)

Citizens are largely being asked to judge information about COVID-19 and make crucial decisions regarding how to respond. However, pervasive misinformation and pseudoscience exists regarding COVID-19 that both reflects and promotes public distrust in science and exacerbates the personal and societal decision-making that places all of society at greater risk.

The project research and data driven educative materials will promote both content understanding and foster trust in STEM professionals and the knowledge they produce to improve personal and public decision-making regarding the COVID-19 pandemic and future pandemics.

Contact the project PI, Dr. Benjamin Herman (bcherman@tamu.edu) for further information regarding the materials and if you are interested in participating in the project research.

University of Cincinnati Center for Public Engagement with Science

Scientists cannot simply communicate more scientific facts to the public to improve public understanding of scientific issues. New approaches to public engagement are needed – approaches that take seriously complex issues like trust in science,

political polarisation, the identities and world-views of scientists, and understanding scientific methods and social structure.



The Center for Public Engagement with Science is directed by Angela Potochnik. It expands and enriches the interface between science and the public to benefit all stakeholders.

- Increasing engagement with science by connecting the university to community partners and the public
- Improving quality of science engagement by promoting dialogue among and benefit for all stakeholders
- Innovating forms of science engagement by drawing on philosophy and other humanities, natural and social sciences, and science education

Center projects include both (1) organising campus and community events about science and (2) conducting research on the nature of public engagement with science. The Center also aims to facilitate collaborative work on and off campus, to develop interdisciplinary foundations for research and outreach, and to provide support for projects furthering this vision.

vision page: <https://ucengagingscience.org/>

main projects: <https://ucengagingscience.org/projects/>
announcements/news items: <https://ucengagingscience.org/news/>

Angela Potochnik
Professor, Department of Philosophy
Director, Center for Public Engagement with Science
University of Cincinnati
<https://angelapotochnik.com>

IUHPST Essay Prize in History and Philosophy of Science

The International Union of History and Philosophy of Science and Technology (IUHPST) invites submissions for the 2021 IUHPST Essay Prize in History and Philosophy of Science. This biennial prize competition seeks to encourage fresh methodological thinking on the history and philosophy of science and related areas.

Entries in the form of an essay of 5,000–10,000 words in English are invited, addressing this year's prize question:

What can history and philosophy of science, technology and medicine contribute to our current global challenges?

What constitutes a current global challenge is left to the judgment of the authors, but examples include the coronavirus pandemic, climate change, socioeconomic inequality, racism, the refugee crisis, and science denialism.

All entries should consist of original work that has not previously been published. Entries writ-

ten originally in another language should be submitted in English translation, along with the name and contact details of the translator. Entries will be judged on the following criteria, in addition to general academic quality: direct engagement with the prize question, effective integration of historical and philosophical perspectives, and potential to provide methodological guidance for other researchers in the field.

The author of the winning entry will be invited to present the work at the 26th International Congress of History of Science and Technology (ICHST) to be held in Prague, Czechia, 25–31 July 2021. Presenting at the Congress will be a condition of the award.

The award will carry a cash prize of \$1,000 and a waiver of the Congress registration fee.

Other strong entries will also be considered for presentation at the Congress. In order to ensure this consideration, entrants should submit the entry also as a standalone paper abstract for the Congress by the deadline for that, following the standard instructions indicated on the Congress website [here](#).

Entries are invited from anyone, without restriction of age, nationality or academic status. Co-authored work will be considered; if the winning entry is a co-authored work the cash prize will be shared out among the authors.

This prize is administered by the Joint Commission of the IUHPST, whose remit is to make links between the work of the two Divisions of the IUHPST: the DHST (Division of History of Science and Technology) and the DLMPST (Division of Logic, Methodology and Philosophy of Science and Technology). For further information about IUHPST, see: <http://iuhps.net>

Entries for the prize competition should be submitted in pdf format by e-mail to the Chair of the Joint Commission, Prof. Hasok Chang, Department of History and Philosophy of Science, University of Cambridge (hc372@cam.ac.uk). Any queries should also be directed to him.

The deadline for submission is **15 January 2021**.

Science & Education Thematic Issue: Epistemology & STEM Education

A special issue of the journal *Science & Education* with the title “Epistemic Underpinnings of Integrated Science, Technology, Engineering, and Mathematics in Education” has been published and is available at the following link:

<https://link.springer.com/journal/11191/29/4>

Opinion Page: Pessimistic Humanism and Existential Threats, *Robert Nola*

Robert Nola, Philosophy Department, University of Auckland

In this article I wish to explore some connections between a humanism which is pessimistic and claims that we humans are facing impending disasters of our own making (like aspects of the current pandemic or nuclear war).

Recently I was pleasantly surprised to find an account of *pessimistic humanism* by my PhD supervisor, John Passmore, written in *Free Inquiry* 1997

(seven years before his death in 2004). He had been invited to comment briefly on 'Why I am a Secular Humanist' in the illustrious company of other commentators such as Herman Bondi, Richard Dawkins, E. O. Wilson, Yelana Bonner, Arthur C. Clarke. But instead he gives reasons for being a pessimistic humanist. I wish to comment on these points.



Then I wish to develop the pessimistic side of his position by drawing upon Martin Rees' book *Our Final Century: Will Civilization Survive the Twenty-First Century?* (2004). Lord Rees, who works at Cambridge University, was at one time the Astronomer Royal, President of the Royal Society and Master of Trinity College. He is a distinguished scientist who has thought deeply about what future humanity might have in the technological world it has created - if it has a future at all! "I think the odds are no better than fifty-fifty that our present civilisation on Earth will survive to the end of the present century without a serious setback." Also: "...misdirected technology could jeopardise life's potential, foreclosing its human and posthuman future" (p8).

Rees does not say how he calculates the fifty-fifty

odds. But he clearly endorses the view that the technology we have created can well lead us to disaster. He tells us writing in his 2004 book: 'I staked one thousand dollars on a bet: "That by the year 2020 an instance of bio-error or bioterror will have killed a million people"' (p74). If COVID-19 is originally a bio-error made by the Chinese, then he is well on the way to winning his bet. For Rees, humankind has a doubtful future! But how doubtful remains unclear without further evidence.

Passmore on Pessimistic Humanism

Like many humanists Passmore is an atheist. But the aspect of religion he chooses to reject is its morality rather than its theism: 'I rebelled as a young boy against the view that the whole of humanity suffers because a single person was disobedient. This I saw as tyranny of the first order'. This is a good point. If one person allegedly performs a morally culpable act, it does not follow that others who did not perform that act are also culpable and deserve to be punished. It is a central Christian doctrine concerning Eve's alleged disobedience in the (alleged) Garden of Eden that all other members of humanity are made to suffer for her act (this is part of the doctrine of original sin). For the young Passmore, and for me, the alleged culpability of the rest of humanity is morally unacceptable and repugnant. And this holds even if one thinks that this story is a fable (Catholics often treat it non-literally). What is mistaken is the fable's moral presuppositions.

The second point Passmore makes has two aspects, the first moral and the second epistemic: "I am willing to admit that there is no deed so dreadful that we can safely say 'no human being could do that' and no belief so absurd that we can safely say 'no human being could believe that.'" This

is the pessimistic side of his humanism. We are invited to face the disturbing facts that some of us humans can be grossly immoral and evil, and some of us can be so stupid as to believe any rubbish. Passmore insists that there is nothing about us humans which would rule out these two possibilities; to suppose that we could rule them out would require a quite misleading account of the nature of humans. Rather as the philosopher Kant claimed pessimistically: “Out of the crooked timber of humanity nothing straight can be made”. To establish this position, Passmore wrote a book entitled *The Perfectibility of Man* (1970) in which his account belied the title. We are not perfectible, hence his pessimism.

His third point strikes an optimistic note: “But on the other side I point to the marvellous achievements of human beings in science and art and acts of courage, love, and self-sacrifice.” As a matter of fact, some of us humans are wretchedly evil; but also as a matter of fact some humans can, in some respects, be admirable. Since we humans are a mixed bag, it would be wrong not to recognise those aspects of ourselves which make us irredeemably bad or those which make us worthy. Importantly we need to recognise that for the pessimistic humanist there is no rosy picture to be painted of us humans and our natures; to do so would be to ignore some of our worst traits, many of which have been exhibited in our recent history.

In an earlier article ‘Atheism Without Humanism’ (*The Open Society*, March 2019) I described how many versions of humanism can be set out in the style of a manifesto involving a number of principles. We can readily approve of most of these principles. However often an attempt is made to found the features of our morality upon the natures we humans possess. But there is much unclarity and some confusion about how this found-

ational link is to be made (the case for this will not be pursued again here). But if Passmore and Kant, amongst others, are right, then for the pessimistic humanist, whatever account we might give of morality, it cannot be founded on our flawed human natures or characteristics. The degree to which humans can be perverse undermines the optimism which many humanists suppose; so, another approach to morality must be found.

Rees on our Existential Risks

Like other humanists, Martin Rees is an atheist; but he is more sympathetic to religion than most and wishes to find an accommodation with it. His humanism can also be described as “pessimistic”. His book *Our Final Century* makes a disturbing case for this. But his position is not entirely pessimistic since he is also a co-founder of the Centre for the Study of Existential Risk (CSER) at the University of Cambridge. This is a research group devoted to the study of extinction-level threats posed by our technology (see <http://cser.org/>). Here Rees investigates ways in which we can fend off the worst of the possible existential threats he envisages.

Though Rees does not make the point, it is important to distinguish the many non-fatal threats which confront us from those threats which are existential, i.e., threaten our very existence (however this might be further defined). Though there is some similarity to the pessimism of Passmore, Rees explores different kinds of threats, both existential and non-existential, which have faced humanity due to the technology humans have created. Passmore focuses on our flawed morality and belief systems which need not necessarily be fatal to us humans.

Rees [tells us](#): “I’m a technological optimist in that I do believe that technology will provide solutions that will allow the world in 2050 to support 9 billion people at an acceptable standard of living. But I’m a political pessimist in that I am concerned about whether the science will be appropriately applied.” Note that his technological optimism extends only to technology’s ability to provide for a large population. It remains part of his view that technologies, even though some of them have marvellously enhanced our human existence, also contain aspects which can lead us to be pessimistic about our future. And this is separate from his political pessimism about the application of science.

The following is a quick survey of the global catastrophes that Rees claims have a fair chance of undermining our existence. Most are connected in some way to us humans and our evolving technologies. Let us set aside some of the catastrophes we face which are naturally occurring. For example, we have good evidence to think that the dinosaurs died out because of a devastating meteor impact with the Earth. There is no reason why some future meteor impact could not do the same to us humans. In fact given the frequency of close encounters with outer-space objects this is not a wholly unlikely occurrence. Instead let us focus on the catastrophes which may be due to humans and their activities. Individuals can perform only quite limited devastation with just their bare hands; but they can perform acts of mega-terror with their hands when assisted by some technologies.

1. *Nuclear Energy*. Nuclear warfare is something the horrors of which we have been familiar with since the end of world War II. Such wars may be deliberately caused or accidental; and they are taken to include the effects of any “nuclear winter”

which might follow. Despite what has been said about the balance between hostile parties achieved through nuclear deterrence, many of us remain unconvinced by the deterrence doctrine and the threat of nuclear disaster still looms large. Here people have in mind the fact that nuclear war can be accidentally started. Luckily there are those such as the Soviet Colonel Stanislav Petrov who, on 26 September, 1983, noted that his early warning system indicated that 5 USA missiles were about to attack the Soviet Union; but instead he realised that the warning was a false one and he did not order a retaliatory strike. And he was right; what the system detected was a rare alignment of the sun’s reflection off clouds and orbiting satellites. Events such as these do not fill people with any confidence about warning systems and suggest that we have merely been lucky in avoiding nuclear war. Our deterrence systems must always be correct about whether one is under attack or not; one needs to be wrong only once to unleash a nuclear disaster.

Nuclear energy can lead to other catastrophes. Domestic nuclear reactors have malfunctioned producing much devastation. For example, the consequences of the Chernobyl and Fukushima nuclear disasters are still with us. Finally, there is the possibility of “dirty bombs” being unleashed by terrorists, or nuclear power plants being attacked by terrorists. Rees discusses these possibilities in a section called ‘Nuclear Mega-terror’ (pp 43-7). There is already enough fiction (books, films, TV programmes) depicting these grim, but local, catastrophes. Though some of our nuclear technology has been beneficial, other aspects of it can be a threat to us humans, and clearly an existential threat. An extreme threat would be the total extinction of mankind. Slightly less extreme would be the survival of humans in a collapsed civilisation (perhaps akin to a pre-agricultural hu-

man existence). It is important to recognise the different kinds of threat and different kinds of subsequent collapse which envisaged.

2. *Biological Risks* (Rees, pp. 47-60). We are acquainted with naturally occurring pandemics throughout human history and in recent times pandemics of smallpox, polio, measles, SARS, and these days COVID-19. Even when naturally occurring, our technology has helped these pandemics thrive. It is no accident that with the pandemic of COVID-19 the world's airline industry has collapsed; it was one of the main ways in which the infection was spread around the world. In a different vein is biodiversity loss with the growth in the number of humans and human technology. In an alarming fashion it has recently been claimed that the world's insect population is in decline – surely a by-product of human agricultural activity. And it is often pointed out that owing to human activity we are currently in the middle of the 6th mass extinction of life on this Earth – the Anthropocene extinction.

Finally, there is biological terrorism. Rees claims that it is only a short time before terrorists turn from the gun to biological weapons which they can make after a little study of the necessary biology (perhaps undergraduate university level). We have already seen attacks involving the nerve gas sarin, and various attempts to spread anthrax. There is no reason why some “loner” cannot develop such agents in their own laboratory and then find some effective way to spread them.

The world has a Biological Weapons Convention (BWC) which needs to be funded and upheld as well as updated and checked for compliance. However due to international political disputes the BWC has serious shortcomings which need to be addressed. (Toby Ord in his book *Precipice*

(2020) estimates that BWC's funding is smaller than the average McDonalds.) The COVID-19 pandemic reveals the very tangible risks the world faces if the BWC is not strengthened. One need only consider issues around whether Saddam Hussain of Iraq had weapons of mass destruction to show how difficult these matters can become politically. Biological terrorism can yield high levels of existential threat in which much of the human population can be wiped out.

3. *Climate change* (Rees, chapter 8). Hopefully by now arguments that climate change does not have some anthropogenic origin are receding fast and it is recognised that human activity has made a large contribution to it. Already during the current COVID-19 epidemic, even the casual observer can note that with humans under some form of “lockdown”, so they are much less active, the skies are much clearer of pollution (e.g., Beijing, Los Angeles, etc). Once we cease to be preoccupied with the current pandemic, we will have to return to the issue of climate change. The pandemic may go away but climate change will not. It remains to be seen if we could survive radical climate change but in a collapsed civilisation (i.e., something akin to humans in previous ice ages).

4. *Cyberterrorism*. We are all aware that our individual computers can be subject to various “viruses” and to cyberattack. However such attacks can be extended to systems of computers involved in critical national infrastructures such as a nation's banking systems, its government, its policing organisations, its businesses, its stock markets, its military and defence organisations and its voting systems (if they are computerized). For such reasons organisations go to great lengths to protect their computer systems from attack. They know how debilitating and destructive such attacks can be. Of equal concern is when computer

systems are secretly infiltrated for the information they store, thereby the undermining privacy of citizens.

However, one can ask if this is really an existential threat? I am old enough to have been a student when no computers existed. But now I can appreciate the way in which they have enhanced human activity. To suddenly find that computers cannot be used (due to virus infection or whatever) would be vastly inconvenient and a threat to our current style of life; but this would not be a threat to our very existence. Not all threats to some aspect of our existence (such as our use of computers) are threats to existence itself. Here we also need to distinguish not only the different kinds of threat but the level of the threat (high, middling or low) and the probability of occurrence of the threat. These are matters for further research into claims about the threat of cyberterrorism.

5. *Risks from Artificial intelligence*. (Rees, pp. 18-21) Though this is more in the realm of futurology, Rees does consider the possibility that the machines we make may one day surpass the intelligence of us humans. The point at which this occurs more ardent futurologists call the “singularity”. After the singularity, do we humans then become subordinate to machines? Or do we lose our humanity? Or do we need to expand our notion of what counts as human to include the new machines?

Whether or not there is a singularity, many researchers agree that as we progress in investigating AI, new possibilities are opened for us humans in our interaction with the non-biological intelligent machines. It has been argued that we have little idea what these future interactions will be like, and here is said to lie a serious problem for us humans due to our current ignorance. What we ought to

be doing now is developing research to ensure that future progress in AI is safe and beneficial for us. As Huw Price (a co-founder with Rees of CSER) puts the matter: “We need the best of human intelligence to make the best of artificial intelligence.”

Popular fears over these matters are widespread. Recently no less than Henry Kissinger has voiced fears concerning a burgeoning AI which we have to get under control least it overwhelms us. His 2018 article in *The Atlantic* is ominously entitled ‘[How the Enlightenment Ends](#)’! (*The Atlantic* June 2018.) A good survey of the issues here can be found in Müller, ‘Ethics of Artificial Intelligence and Robotics’, *Stanford Encyclopedia of Philosophy*.)

Again, we can ask: is this some kind of threat to our existence or some kind of non-fatal threat to some aspect of our existence? It is hard to answer this given that even those who propose its possibility are not sure how the AI-based threats might come about. Those who advocate a future singularity tend to exaggerate the threat to humans on at least one scenario in which the future machines are said to enslave us rather than be nice to us. The level of threat and its probability are unclear. However Toby Ord in his excellent book on existential threats, *Precipice* (2020), estimates that ‘humanity spends more on ice cream every year than on ensuring that the technologies we develop do not destroy us’ (Chapter 2, ‘Our Neglect of Existential Risks’). (Importantly in chapter 6 Ord gives his reasons for rating highly the risks we face due to artificial intelligence as 1 in 10 over our century! These are Ord’s judgements of degree of belief which he says have some evidential basis.)

Research on Risks

The above are some of the important technological crises Rees alleges faces humans. But we can agree that for most of us fears of such impending catastrophes need not always be rationally well justified fears. As a result, there have emerged several well-funded centres of research set up to investigate these issues. This is all to the good as the matters raised do need careful exploration before we can live happily with them. In this area quite often claims of catastrophe are made without much, or no, evidence for them. We need to know, at least for some possible outcome, the level of the threat (high, low, etc) and the probability of it. But quite often the probabilities are subjective best guesses and not, as they ought to be, probabilities based on evidence or calculation. To resolve these problems research is vital. Finally, some catastrophe may have a very small probability in occurring but would have a huge disvalue if it were to occur. Here serious problems are raised if we were to make important applications of Decision Theory to any catastrophe we might face.

One of the research centres already mentioned is the Cambridge Centre for the Study of Existential Risk (CSER) with which Rees is involved. Also important is The Oxford Martin School and its various programmes. (Similar research groups have been set up around the world at other universities including the University of Auckland). Importantly the Oxford Martin School includes the Programme on Misinformation, Science and Media. The concerns of this programme are not listed by Rees, but they ought to be. It attempts to address issues concerning the public discussion of science, countering misinformation about science, confronting non-scientific views which clash with science and decision-making involving science (usually under conditions of uncertainty).

That these issues have become pertinent is both surprising and disappointing. We will not get far in public discussion addressing Rees' concerns about technology if the underlying science is not better understood. Given elementary misunderstandings about, say, vaccination and a general dismissal of science by some politicians, we remain in a parlous position regarding an understanding of the very science which underlies the technology that Rees finds challenging. Worse than this is the low level of human understanding of probability, as much research in psychology into us as probabilistic reasoners has shown. (Note that to address some of these problems Passmore wrote a book *Science and its Critics*, 1978.)

A Note on Pessimism

The positions of Passmore and Rees have been called "pessimistic". What does this mean? Neither are philosophical pessimists, a stance in philosophy from ancient times to contemporary philosophy which need not concern us. Pessimism has also been characterised as a mental attitude, usually of the depressed; but this does not fit either Rees or Passmore. Moreover, Rees and Passmore remain activists in attempting to combat those matters of which one might be pessimistic; so their pessimism is to be contrasted with fatalism or some other non-activist stance. What their brand of pessimism invites us to do is to face up to certain very unpalatable realities which we ought to redress in some way. So, their pessimism is not global but local in that it is directed to particular aspects of the world and our existence in it. For example, Passmore directs us to our flawed morality and flawed epistemic capabilities; and Rees directs us to the risks our technology poses for the inventors of it. And each of these can have different kinds of threat to our existence or the quality

of it.

Pessimism can also be directed towards the belief in progress or the efficacy of religious faith. Passmore is strongly pessimistic about religion and rejects it while Rees is much less pessimistic about religion and attempts a reconciliation with it. More difficult to determine is whether we ought to be pessimistic about human progress. In general, both Passmore and Rees think that if we humans are capable of exercising our intellect then we can overcome some of those situations about which we are currently pessimistic. It remains to be seen if Passmore's book *The Perfectibility of Man* allows for a limited human progress. But these are issues which would take us beyond the present discussion. (To pursue them we would have to at least consider Passmore and Rees in the light of Steven Pinker's case for human progress made out in his recent book *Enlightenment Now* (2018), and in particular chapter 19, "Existential Threats" for Pinker's critique of a position like Rees's.)

Invitation to Submit Opinion Piece

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

Contributions can be sent direct to [Michael Matthews](#) or [Nathan Oseroff-Spicer](#).

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

pieces will be put on the web with a link given in the NEWSLETTER.

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

PhD Theses in HPS&ST Domain

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

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

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

Recent HPS&ST Research Articles

ISIS (Vol 111, N. 3, 2020)

Focus: Pedagogy

Editor: Karen Rader

Berichte zur Wissenschafts-Geschichte (Volume 43, Issue 3, 2020)

Special Issue: Rethinking Performative Methods in the History of Science

Editor: Marieke M.A. Hendriksen

- Buchwald, J., Yeang, C., Stemmeroff, N. et al. (2020) What Heinrich Hertz discovered about electric waves in 1887–1888. *Arch. Hist. Exact Sci.*, 1-47.
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- DeFeo, D.J., Tran, T.C. & Gerken, S. (2020) Mediating Students' Fixation with Grades in an Inquiry-Based Undergraduate Biology Course. *Science & Education*, 1-22.
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- Greenslade Jr., T. B. (2020) Adventures with historical physics apparatus. *American Journal of Physics*, 88, 864-870. doi:[10.1119/10.0001685](https://doi.org/10.1119/10.0001685)
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doi:[10.1007/s11191-020-00159-x](https://doi.org/10.1007/s11191-020-00159-x) online first
- McCaskey, J.P. (2020) History of 'temperature': maturation of a measurement concept. *Annals of Science*. doi:[10.1080/00033790.2020.1817980](https://doi.org/10.1080/00033790.2020.1817980) online first
- Mizrahi, M. (2020) Conceptions of scientific progress in scientific practice: an empirical study. *Synthese*, 1-20.
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doi:[10.1007/s11191-020-00146-2](https://doi.org/10.1007/s11191-020-00146-2) online first
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doi:[10.1007/s11191-020-00162-2](https://doi.org/10.1007/s11191-020-00162-2) online first

Recent HPS&ST Related Books

Bognon-Küss, Cécilia & Wolfe, Charles T. (2020). *Philosophy of Biology Before Biology*. Abingdon, UK: Routledge. ISBN: 978-0-367-66162-5

“The use of the term ‘biology’ to refer to a unified science of life emerged around 1800 (most prominently by scientists such as Lamarck and Treviranus, although scholarship has indicated its usage at least 30-40 years earlier). The interplay between philosophy and natural science has also accompanied the constitution of biology as a science.

“*Philosophy of Biology Before Biology* examines biological and protobiological writings from the mid-eighteenth century to the early nineteenth century (from Buffon to Cuvier; Kant to Oken; and Kielmeyer) with two major sets of questions in mind:

“What were the distinctive conceptual features of the move toward biology as a science? “What were the relations and differences between the ‘philosophical’ focus on the nature of living entities, and the ‘scientific’ focus?

“This insightful volume produces a fresh but also systematic perspective both on the history of biology as a science and on the early versions of, in the 1960s in a post-positivist context, the philosophy of biology. It will appeal to students and researchers interested in fields such as history of science, philosophy of science and biology.” (From the Publisher)

More information available [here](#).

Chakrabarti, Pratik (2020). *Inscriptions of Nature: Geology and the Naturalization of Antiquity*. Baltimore, MD: Johns Hopkins University Press. ISBN: 978-1-421-43874-0

“In the nineteenth century, teams of men began digging the earth like never before. Sometimes this digging—often for sewage, transport, or minerals—revealed human remains. Other times, archaeological excavation of ancient cities unearthed prehistoric fossils, while excavations for irrigation canals revealed buried cities. Concurrently, geologists, ethnologists, archaeologists, and missionaries were also digging into ancient texts and genealogies and delving into the lives and bodies of indigenous populations, their myths, legends, and pasts. One pursuit was intertwined with another in this encounter with the earth and its inhabitants—past, present, and future.

“In *Inscriptions of Nature*, Pratik Chakrabarti argues that, in both the real and the metaphorical digging of the earth, the deep history of nature, landscape, and people became indelibly inscribed in the study and imagination of antiquity. The first book to situate deep history as an expression of political, economic, and cultural power, this volume shows that it is complicit in the European and colonial appropriation of global nature, commodities, temporalities, and myths. The book also provides a new interpretation of the relationship between nature and history. Arguing that the deep history of the earth became pervasive within historical imaginations of monuments, communities, and territories in the nineteenth century, Chakrabarti studies these processes in the Indian subcontinent, from the banks of the Yamuna and Ganga rivers to the Himalayas to the deep ravines and forests of central India. He also examines associated themes of Hindu antiquarianism, sacred geographies, and tribal aboriginality.

“Based on extensive archival research, the book provides insights into state formation, mining of natural resources, and the creation of national topographies. Driven by the geological imagination of India as well as its landscape, people, past, and destiny, *Inscriptions of Nature* reveals how human evolution, myths, aboriginality, and colonial state formation fundamentally defined Indian antiquity.” (From the Publisher)

More information available [here](#).

de Chadarevian, Soraya (2020). *Heredity under the Microscope: Chromosomes and The Study of The Human Genome*. Chicago, IL: The University of Chicago Press. ISBN: 978-0-226-68508-3

“By focusing on chromosomes, *Heredity under the Microscope* offers a new history of postwar human genetics. Today chromosomes are understood as macromolecular assemblies and are analyzed with a variety of molecular techniques. Yet for much of the twentieth century, researchers studied chromosomes by looking through a microscope. Unlike any other technique, chromosome analysis offered a direct glimpse of the complete human genome, opening up seemingly endless possibilities for observation and intervention. Critics, however, countered that visual evidence was not enough and pointed to the need to understand the molecular mechanisms.

“Telling this history in full for the first time, Soraya de Chadarevian argues that the often bewildering variety of observations made under the microscope were central to the study of human genetics. Making space for microscope-based practices alongside molecular approaches, de Chadarevian analyses the close connections between genetics and an array of scientific, medical, ethical, legal, and policy concerns in the atomic age. By exploring the visual evidence provided by chromosome research in the context of postwar biology and medicine, *Heredity under the Microscope* sheds new light on the cultural history of the human genome.” (From the publisher)

More information available [here](#).

de Courtenay, Nadine, Darrigol, Olivier, & Schlaudt, Oliver (Eds.) (2020). *The Reform of the International System of Units (SI): Philosophical,*

Historical and Sociological Issues. Abingdon, UK: Routledge. ISBN: 978-0-367-66260-8

“Systems of units still fail to attract the philosophical attention they deserve, but this could change with the current reform of the International System of Units (SI). Most of the SI base units will henceforth be based on certain laws of nature and a choice of fundamental constants whose values will be frozen. The theoretical, experimental and institutional work required to implement the reform highlights the entanglement of scientific, technological and social features in scientific enterprise, while it also invites a philosophical inquiry that promises to overcome the tensions that have long obstructed science studies.” (From the publisher)

More information available [here](#).

Enriquez, Juan (2020). *Right/Wrong: How Technology Transforms Our Ethics*. Cambridge, MA: The MIT Press. ISBN: 978-0-262-04442-4

“Don’t get caught on the wrong side of changing ethics and exponential technologies. Juan Enriquez potently leverages the past to predict the future or, better yet, to change it. From COVID-19 to CO₂ this book is timely, yet timeless. Could this beautiful little book depolarise our politics? Could it turn rationalisation into rational rationales? Convert static, dismissive myopia into comprehensive exohexahedralism? Let’s do more than hope so; let’s make it so.” – George Church, Professor of Genetics at Harvard Medical School; founding member of the Wyss Institute for Biologically Inspired Engineering

“Most people have a strong sense of right and wrong, and they aren’t shy about expressing their opinions. But when we take a polarising stand on something we regard as an eternal truth, we often forget that ethics evolve over time. Many shifts

in the right versus wrong pendulum are driven by advances in technology. Our great-grandparents might be shocked by in vitro fertilisation; our great-grandchildren might be shocked by the messiness of pregnancy, childbirth, and unedited genes. In *Right/Wrong*, Juan Enriquez reflects on what happens to our ethics as technology makes the once unimaginable a commonplace occurrence.

“Evolving technology changes ethics. Enriquez points out that, contrary to common wisdom, technology often enables more ethical behaviours. Technology challenges old beliefs and upends institutions that do not grow and change. With wit and compassion, Enriquez takes on a series of technology-influenced ethical dilemmas, from sexual liberation to climate change to the “immortality” of mistakes on social media. (“Facebook, Twitter, Instagram, and Google are electronic tattoos.”) He cautions us to judge those who “should have known better,” given today’s vantage point, with less fury and more compassion. We need a quality often absent in today’s charged debates: humility. Judge those in the past as we hope to be judged in the future.” (From the Publisher)

More information available [here](#).

Feké, Jacqueline (2020). *Ptolemy’s Philosophy: Mathematics as a Way of Life*. Princeton, NJ: Princeton University Press. ISBN: 978-0-691-21039-1 [Paperback] [Shortlisted for the Pickstone Prize, British Society for the History of Science]

“The Greco-Roman mathematician Claudius Ptolemy is one of the most significant figures in the history of science. He is remembered today for his astronomy, but his philosophy is almost entirely lost to history. This groundbreaking book is the first to reconstruct Ptolemy’s general philosophical system—including his metaphysics, epistemology, and ethics—and to explore its relationship to astro-

nomy, harmonics, element theory, astrology, cosmology, psychology, and theology.

“In this stimulating intellectual history, Jacqueline Feké uncovers references to a complex and sophisticated philosophical agenda scattered among Ptolemy’s technical studies in the physical and mathematical sciences. She shows how he developed a philosophy that was radical and even subversive, appropriating ideas and turning them against the very philosophers from whom he drew influence. Feké reveals how Ptolemy’s unique system is at once a critique of prevailing philosophical trends and a conception of the world in which mathematics reigns supreme.

“A compelling work of scholarship, *Ptolemy’s Philosophy* demonstrates how Ptolemy situated mathematics at the very foundation of all philosophy—theoretical and practical—and advanced the mathematical way of life as the true path to human perfection.” (From the publisher)

More information available [here](#).

Gorman, Michael John (2020). *Idea Colliders: The Future of Science Museums*. Cambridge, MA: The MIT Press. ISBN: 978-0-262-53924-1

“Today’s science museums descend from the Kunst-und Wunderkammern of the Renaissance—collectors’ private cabinets of curiosities—through the Crystal Palace exhibition of 1851 to today’s “interactive” exhibits promising educational fun. In this book, Michael John Gorman issues a provocative call for the transformation of science museums and science centers from institutions dedicated to the transmission of cultural capital to dynamic “idea colliders” that spark creative collaborations and connections. This new kind of science museum would not stage structured tableaux of science facts but would draw scientists into conversation with artists, designers, policymakers, and the public.

Rather than insulating visitors from each other with apps and audio guides, the science museum would consider each visitor a resource, bringing questions, ideas, and experiences from a unique perspective.

“Gorman, founder of the trailblazing Science Gallery, describes three scenarios for science museums of the future—the Megamuseum Mall, “the Cirque de Soleil of the science museum world”; the Cloud Chamber, a local space for conversations and co-creation; and the invisible museum, digital device-driven informal science learning. He discusses hybrids that experiment with science and art and science galleries that engage with current research, encouraging connection, participation and surprise. Finally, he identifies ten key shifts in the evolution of science museums, including those from large to small, from interactive to participatory, from enclosed to porous, and from subject-specific to cross-disciplinary.” (From the Publisher)

More information available [here](#).

Janssen-Lauret, Frederique (Ed.) (2020). *Quine, Structure, and Ontology*. Oxford, UK: Oxford University Press. ISBN: 978-0-198-86428-8

“W.V. Quine, a champion of philosophical naturalism and pioneer of mathematical logic, was one of the most important philosophers of the 20th century. Contemporary thought in ontology, epistemology, and the philosophy of logic and language owes much to his influence, yet recent work in these areas has become increasingly dismissive of his views. This is often because of mistaken or overly simplified conceptions of his philosophy which overlook the development of his views over time, in particular the growing importance of a kind of structuralism to his system as it evolved. This volume provides a fuller, richer picture of Quine’s views and their development. With contributions from leading philosophers in a range of subfields

including philosophical logic, philosophy of language, history of philosophy, mathematics, philosophy of time, and set theory, it is the first to investigate Quine’s views on structure and how it permeates and shapes his attitude to a range of philosophical questions.” (From the Publisher)

More information available [here](#).

Klein, Ursula (2020). *Technoscience in History: Prussia, 1750–1850*. Cambridge, MA: The MIT Press. ISBN: 978-0-262-53929-6

“Do today’s technoscientific disciplines—including materials science, genetic engineering, nanotechnology, and robotics—signal a radical departure from traditional science? In *Technoscience in History*, Ursula Klein argues that these novel disciplines and projects represent not an “epochal break,” but part of a history that can be traced back to German “useful” sciences and beyond. Klein’s account traces a deeper history of technoscience, mapping the relationship between today’s cutting-edge disciplines and the development of the useful and technological sciences in Prussia from 1750 to 1850.

“Klein shows that institutions that coupled natural-scientific and technological inquiry existed well before the twentieth century. Focusing on the science of mining, technical chemistry, the science of forestry, and the science of building (later known as civil engineering), she examines the emergence of practitioners who were recognized as men of science as well as inventive technologists—key figures that she calls “scientific-technological experts.”

“Klein describes the Prussian state’s recruitment of experts for technical projects and manufacturing, including land surveys, the apothecary trade, and porcelain production; state-directed mining, mining science, and mining academies; the history and epistemology of useful science; and the founding of Prussian scientific institutions in the nineteenth century, including the University of Berlin,

the Academy of Building, the Technical Deputation, and the Industrial Institute.” (From the Publisher)

More information available [here](#).

Lennartson, Anders (2020). *Carl Wilhelm Scheele and Torbern Bergman: The Science, Lives and Friendship of Two Pioneers in Chemistry*. Dordrecht: Springer. ISBN: 978-3-030-49193-2

“This book tells the story of two of the most important figures in the history of chemistry. Carl Wilhelm Scheele (1742–1786) was the first to prepare oxygen and realise that air is a mixture of nitrogen and oxygen; he also discovered many important organic and inorganic substances. His fellow chemist and good friend, Torbern Bergman (1735–1784), was one of the pioneers in analytical and physical chemistry. In this carefully researched biography, the author, Anders Lennartson, explains the chemistry of Scheele and Bergman while putting their discoveries in the context of other 18th-century chemistry. Much of the information contained in this work is available in English for the first time.” (From the publisher)

More information available [here](#).

McGrath, Larry Sommer (2020). *Making Spirit Matter: Neurology, Psychology, and Selfhood in Modern France*. Chicago, IL: Chicago University Press. ISBN: 978-0-226-69982-0

“The connection between mind and brain has been one of the most persistent problems in modern Western thought; even recent advances in neuroscience haven’t been able to explain it satisfactorily. Historian Larry Sommer McGrath’s *Making Spirit Matter* studies how a particularly productive and influential group of nineteenth- and early twentieth-century French thinkers attempted to solve this

puzzle by showing the mutual dependence of spirit and matter. The scientific revolution taking place at this point in history across disciplines, from biology to psychology and neurology, located our mental powers in the brain and offered a radical reformulation of the meaning of society, spirit, and the self. Tracing connections among thinkers such as Henri Bergson, Alfred Fouillée, Jean-Marie Guyau, and others, McGrath plots alternative intellectual movements that revived themes of creativity, time, and experience by applying the very sciences that seemed to undermine metaphysics and religion. *Making Spirit Matter* lays out the long legacy of this moment in the history of ideas and how it might renew our understanding of the relationship between mind and brain today.” (From the Publisher)

More information available [here](#).

Metcalf, Alida C. (2020). *Mapping an Atlantic World, circa 1500*. Baltimore, MD: Johns Hopkins University Press. ISBN: 978-1-421-43852-8

“Beginning around 1500, in the decades following Columbus’s voyages, the Atlantic Ocean moved from the periphery to the centre on European world maps. This brief but highly significant moment in early modern European history marks not only a paradigm shift in how the world was mapped but also the opening of what historians call the Atlantic World. But how did sixteenth-century chartmakers and mapmakers begin to conceptualise—and present to the public—an interconnected Atlantic World that was open and navigable, in comparison to the mysterious ocean that had blocked off the Western hemisphere before Columbus’s exploration?

“In *Mapping an Atlantic World, circa 1500*, Alida C. Metcalf argues that the earliest surviving maps from this era, which depict trade, colonisation, evangelism, and the movement of peoples, reveal powerful and persuasive arguments about the possibil-

ity of an interconnected Atlantic World. Blending scholarship from two fields, historical cartography and Atlantic history, Metcalf explains why Renaissance cosmographers first incorporated sailing charts into their maps and began to reject classical models for mapping the world. Combined with the new placement of the Atlantic, the visual imagery on Atlantic maps—which featured decorative compass roses, animals, landscapes, and native peoples—communicated the accessibility of distant places with valuable commodities. Even though individual maps became outdated quickly, Metcalf reveals, new mapmakers copied their imagery, which then repeated on map after map. Individual maps might fall out of date, be lost, discarded, or forgotten, but their geographic and visual design promoted a new way of seeing the world, with an interconnected Atlantic World at its center.

“Describing the negotiation that took place between a small cadre of explorers and a wider class of cartographers, chart-makers, cosmographers, and artists, Metcalf shows how exploration informed mapmaking and vice versa. Recognising early modern cartographers as significant agents in the intellectual history of the Atlantic, *Mapping an Atlantic World, circa 1500* includes around 50 beautiful and illuminating historical maps.” (From the Publisher)

More information available [here](#).

Oldstone, Michael B. A. (2020). *Viruses, Plagues, and History: Past, Present, and Future* (2nd Edition). Oxford, UK: Oxford University Press. ISBN: 978-0-190-05678-0

“More people were killed by smallpox during the twentieth century—over 300 million—than by all of the wars of that period combined. In 1918 and 1919, influenza virus claimed over 50 million lives. A century later, influenza is poised to return, ongoing plagues of HIV/AIDS and hepatitis infect millions,

and Ebola, Zika, and West Nile viruses cause new concern and panic.

“The overlapping histories of humans and viruses are ancient. Earliest cities became both the cradle of civilisation and breeding grounds for the first viral epidemics. This overlap is the focus of virologist/immunologist Michael Oldstone in *Viruses, Plagues and History*. Oldstone explains principles of viruses and epidemics while recounting stories of viruses and their impact on human history. This fully updated second edition includes engrossing new chapters on hepatitis, Zika, and contemporary threats such as the possible return of a catastrophic influenza, and the impact of fear of autism on vaccination efforts. This is a fascinating panorama of humankind’s longstanding conflict with unseen viral enemies, both human successes—such as control of poliomyelitis, measles, smallpox and yellow fever, and continued dangers—such as HIV and Ebola. Impeccably researched and accessibly written, *Viruses, Plagues and History* will fascinate all with an interest in how viral illnesses alter the course of human history.” (from the publisher)

More information available [here](#).

Pearce, Trevor (2020). *Pragmatism’s Evolution: Organism and Environment in American Philosophy*. Chicago, IL: Chicago University Press. ISBN: 978-0-226-71991-7

“This book is an important contribution to the history of philosophical discussion of biology. I do not know of any other book that covers the material so thoroughly. It will be invaluable to anyone interested in the history of pragmatism and the influence of biology and evolution on pragmatic thinkers.” – Richard J. Bernstein

“Pearce’s book adds a welcome new dimension to discussion of the history of pragmatism. His treatment of the movement’s early years includes an ex-

panded range of characters, some of them fascinating but neglected, others who are recognized as leading figures but not usually linked to pragmatist philosophy. Pearce also shows the influence on pragmatism of an unruly, speculative, and rich collection of ideas about biological evolution and historical change. The book is meticulously researched, very well written, and full of surprises.” – Peter Godfrey-Smith

“In *Pragmatism’s Evolution*, Trevor Pearce demonstrates that the philosophical tradition of pragmatism owes an enormous debt to specific biological debates in the late 1800s, especially those concerning the role of the environment in development and evolution. Many are familiar with John Dewey’s 1909 assertion that evolutionary ideas overturned two thousand years of philosophy—but what exactly happened in the fifty years prior to Dewey’s claim? What form did evolutionary ideas take? When and how were they received by American philosophers?

“Although the various thinkers associated with pragmatism—from Charles Sanders Peirce to Jane Addams and beyond—were towering figures in American intellectual life, few realize the full extent of their engagement with the life sciences. In his analysis, Pearce focuses on a series of debates in biology from 1860 to 1910—from the instincts of honeybees to the inheritance of acquired characteristics—in which the pragmatists were active participants. If we want to understand the pragmatists and their influence, Pearce argues, we need to understand the relationship between pragmatism and biology.” (From the Publisher)

More information available [here](#).

Pritchard, Sara B., & Zimring, Carl A. (2020). *Technology and the Environment in History*. Baltimore, MD: Johns Hopkins University Press. ISBN: 978-1-421-43899-3

“An excellent book. Examining works at the inter-

section of environmental history and the history of technology, Pritchard and Zimring bring readers unfamiliar with the wide range of scholarly work in this area up to speed in a concise manner.” – Hugh S. Gorman, Michigan Technological University

“Global in their vision, Pritchard and Zimring abandon geographical and chronological conventions to reveal systems that reshaped environments while placing burdens on marginalized communities. This remarkable book is essential for everyone who wishes to better understand the complex, porous relationship between environment, technology, and society.” – Kathleen A. Brosnan, University of Oklahoma

“An excellent and timely addition to the growing literature on envirotech. The book’s overview of relevant scholarship at the intersection of the history of technology and environmental history will be useful to scholars and students alike, while its combination of vital and understudied topics makes for provocative reading and study. Here’s to Sara Pritchard and Carl Zimring for this fine work.” – Martin V. Melosi, Center for Public History, University of Houston

“For both students and scholars, this book is a most welcome contribution to the discussion that will dominate the coming century: the relationship between environment and technology. The authors provide a well-grounded yet fresh outlook, adopting a thematic and analytic approach that allows them to tell a story that transcends traditional divides.” – Nina Wormbs, KTH Royal Institute of Technology

More information available [here](#).

Schwartz, James S.J. (2020). *The Value of Science in Space Exploration*. Oxford, UK: Oxford University Press. ISBN: 978-0-190-06906-3

“Space exploration, especially the recent push for the commercialisation and militarisation of space,

is attracting increased attention not only from the wider public and the private sector but also from scholars in a wide range of disciplines. At this moment of uncertainty about the future direction of national spaceflight programs, *The Value of Science in Space Exploration* defends the idea, often overlooked, that the scientific understanding of the Solar System is both intrinsically and instrumentally valuable. Drawing on research from the physical sciences, social sciences, and the humanities, James S.J. Schwartz argues further that there is truly a compelling obligation to improve upon our scientific understanding-including our understanding of space environments-and that there exists a corresponding duty to engage in the scientific exploration of the Solar System.

“After outlining the underpinning epistemological debates, Schwartz tackles how this obligation affects the way we should approach some of the major questions of contemporary space science and policy: Is there a need for environmental preservation in space? Should humans try to establish settlements on the Moon, Mars, or elsewhere in the Solar System, and if so, how? In answering these questions, Schwartz parleys with recent work in science policy and social philosophy of science to characterise the instrumental value of scientific research, identifying space research as a particularly effective generator of new knowledge. Additionally, whereas planetary protection policies are currently employed to prevent biological contamination only of sites of interest in the search for extraterrestrial life, Schwartz contends that all sites of interest to space science ought to be protected. Meanwhile, both space resource exploitation, such as lunar or asteroid mining, and human space settlement would result in extensive disruption or destruction of pristine space environments. The overall ethical value of these environments in the production of new knowledge and understanding is greater than their value as commercial or real commodities, and thus confirms that the exploitation and settlement of space should be avoided until the

scientific community develops an adequate understanding of these environments. At a time when it is particularly pertinent to consider the ways in which space exploration might help solve some of the world’s ethical and resource-driven concerns, *The Value of Science in Space Exploration* is a thought-provoking and much-needed examination into the world of space.” (From the Publisher)

More information available [here](#).

Shan, Yafeng (2020). *Doing Integrated History and Philosophy of Science: A Case Study of the Origin of Genetics*. Dordrecht: Springer.

ISBN: 978-3-030-50616-2

“This book offers an integrated historical and philosophical examination of the origin of genetics. The author contends that an integrated HPS analysis helps us to have a better understanding of the history of genetics, and sheds light on some general issues in the philosophy of science. This book consists of three parts. It begins with historical problems, revisiting the significance of the work of Mendel, de Vries, and Weldon. Then it turns to integrated HPS problems, developing an exemplar-based analysis of the development and the progress in early genetics. Finally, it discusses philosophical problems: conceptual change, evidence, and theory choice. Part I lays out a new historiography, serving as a basis for the discussions in part II and part III. Part II introduces a new integrated HPS method to analyse and interpret the historiography in Part I and to re-examine the philosophical issues in Part III. Part III develops new philosophical accounts which will in turn make a better sense of the history of scientific practice more generally. This book provides a practical defence of integrated HPS: the best way to defend integrated HPS is to do it.” (From the publisher)

Mote information available [here](#).

Smith, George E., & Seth, Raghav (2020). *Brownian Motion and Molecular Reality*. Oxford, UK: Oxford University Press.

ISBN: 978-0-190-09802-5

“Between 1905 and 1913, French physicist Jean Perrin’s experiments on Brownian motion ostensibly put a definitive end to the long debate regarding the real existence of molecules, proving the atomic theory of matter. While Perrin’s results had a significant impact at the time, later examination of his experiments questioned whether he really gained experimental access to the molecular realm. The experiments were successful in determining the mean kinetic energy of the granules of Brownian motion; however, the values for molecular magnitudes Perrin inferred from them simply presupposed that the granule mean kinetic energy was the same as the mean molecular kinetic energy in the fluid in which the granules move. This stipulation became increasingly questionable in the years between 1908 and 1913, as significantly lower values for these magnitudes were obtained from other experimental results like alpha-particle emissions, ionisation, and Planck’s blackbody radiation equation.

“In this case study in the history and philosophy of science, George E. Smith and Raghav Seth here argue that despite doubts, Perrin’s measurements were nevertheless exemplars of theory-mediated measurement—the practice of obtaining values for an inaccessible quantity by inferring them from an accessible proxy via theoretical relationships between them. They argue that it was actually Perrin more than any of his contemporaries who championed this approach during the years in question. The practice of theory-mediated measurement in physics had a long history before 1900, but the concerted efforts of Perrin, Rutherford, Millikan, Planck, and their colleagues led to the central role this form of evidence has had in microphysical research ever since. Seth and Smith’s study thus replaces an untenable legend with an account that is not only tenable, but more instructive about what

the evidence did and did not show.” (From the publisher)

More information available [here](#).

Spence, John C. H. (2019). *Lightspeed: The Ghostly Aether and the Race to Measure the Speed of Light*. Oxford, UK: Oxford University Press.

ISBN: 978-0-198-84196-8

“This book tells the human story of one of man’s greatest intellectual adventures - how it came to be understood that light travels at a finite speed, so that when we look up at the stars, we are looking back in time. And how the search for a God-given absolute frame of reference in the universe led most improbably to Einstein’s most famous equation $E=mc^2$, which represents the energy that powers the stars and nuclear weapons. From the ancient Greeks measuring the solar system, to the theory of relativity and satellite navigation, the book takes the reader on a gripping historical journey. We learn how Galileo discovered the moons of Jupiter and used their eclipses as a global clock, allowing travellers to find their Longitude. And how Ole Rømer, noticing that the eclipses were a little late, used this to obtain the first measurement of the speed of light, which takes eight minutes to get to us from the sun. We move from the international collaborations to observe the Transits of Venus, including Cook’s voyage to Australia, to the achievements of Young and Fresnel, whose discoveries eventually taught us that light travels as a wave but arrives as a particle, and all the quantum weirdness which follows. In the nineteenth century, we find Faraday and Maxwell, struggling to understand how light can propagate through the vacuum of space unless it is filled with a ghostly vortex Aether foam. We follow the brilliantly gifted experimentalists Hertz, discoverer of radio, Michelson with his search for the Aether wind, and Foucault and Fizeau with their spinning mirrors and lightbeams across the rooftops of Paris.

Messaging faster than light using quantum entanglement, and the reality of the quantum world, conclude this saga.” (From the publisher)

More information available [here](#).

Video by the Author (How Einstein Abolished the Aether): [here](#).

Weightman, Gavin (2020). *The Great Inoculator: The Untold Story of Daniel Sutton and his Medical Revolution*. New Haven, CT: Yale University Press. ISBN: 978-0-300-24144-0

“Smallpox was the scourge of the eighteenth century: it showed no mercy, almost wiping out whole societies. Young and old, poor and royalty were equally at risk – unless they had survived a previous attack. Daniel Sutton, a young surgeon from Suffolk, used this knowledge to pioneer a simple and effective inoculation method to counter the disease. His technique paved the way for Edward Jenner’s discovery of vaccination – but, while Jenner is revered, Sutton has been vilified for not widely revealing his methods until later in life.

“Gavin Weightman reclaims Sutton’s importance, showing how the clinician’s practical and observational discoveries advanced understanding of the nature of disease. Weightman explores Sutton’s personal and professional development, and the wider world of eighteenth-century health in which he practised inoculation. Sutton’s brilliant and exacting mind had a significant impact on medicine – the effects of which can still be seen today.” (From the publisher)

More information available [here](#).

Weldon, Stephen P. (2020). *The Scientific Spirit of American Humanism*. Baltimore, MD: Johns

Hopkins University Press.

ISBN: 978-1-421-43858-0

”This is a terrific book, based on massive research, covering American humanism from the past to the present. It is a story that needed telling, and Stephen P. Weldon tells it so well. Above all, it is tremendously interesting. It is a perfect exemplar of its subject: human intelligence applied to important problems, yielding great understanding. Five-star rating!” – Michael Ruse, Florida State University

”Weldon provides a much-needed comprehensive history of American humanism that explodes the myth of a sharp dichotomy between science and religion. This admirable, deeply researched study reveals a complex social movement and a series of sometimes forgotten thinkers who creatively employed democratic ideals and moral values to address some of the most contentious issues in American life.” – Paul V. Murphy, Grand Valley State University

”The ever-growing historical literature on science and religion has tended to focus on the problems and challenges that modern science creates for Christians. In contrast, Weldon’s engaging study shows how religious liberals, from Unitarians to atheists—especially secular humanists—have enthusiastically embraced the methods and ethos of science in the twentieth century.” – Ronald L. Numbers, Professor Emeritus, University of Wisconsin–Madison

“Recent polls show that a quarter of Americans claim to have no religious affiliation, identifying instead as atheists, agnostics, or ”nothing in particular.” A century ago, a small group of American intellectuals who dubbed themselves humanists tread this same path, turning to science as a major source of spiritual sustenance. In *The Scientific Spirit of American Humanism*, Stephen P. Weldon tells the fascinating story of this group as it developed over the twentieth century, following the fortunes of a few generations of radical minis-

ters, academic philosophers, and prominent scientists who sought to replace traditional religion with a modern, liberal, scientific outlook.

“Weldon explores humanism through the networks of friendships and institutional relationships that underlay it, from philosophers preaching in synagogues and ministers editing articles of Nobel laureates to magicians invoking the scientific method. Examining the development of an increasingly antagonistic engagement between religious conservatives and the secular culture of the academy, Weldon explains how this conflict has shaped the discussion of science and religion in American culture. He also uncovers a less known—but equally influential—story about the conflict within humanism itself between two very different visions of science: an aspirational, democratic outlook held by the followers of John Dewey on the one hand, and a skeptical, combative view influenced by logical positivism on the other.

“Putting America’s distinctive science talk into historical perspective, Weldon shows how events such as the Pugwash movement for nuclear disarmament, the ongoing evolution controversies, the debunking of pseudo-science, and the selection of scientists and popularizers like Carl Sagan and Isaac Asimov as humanist figureheads all fit a distinctly American ethos. Weldon maintains that this secular ethos gained much of its influence by tapping into the idealism found in the American radical religious tradition that includes the deism of Thomas Paine, nineteenth-century rationalism and free thought, Protestant modernism, and most important, Unitarianism. Drawing on archival research, interviews, and a thorough study of the main humanist publications, *The Scientific Spirit of American Humanism* reveals a new level of detail about the personal and institutional forces that have shaped major trends in American secular culture. Significantly, the book shows why special attention to American liberal religiosity remains critical to a clear understanding of the scientific spirit in American culture.” (From the Publisher)

More information available [here](#).

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

Coming HPS&ST Related Conferences

November 19-22, 2020, Twenty-Seventh Biennial Meeting of the PSA. Baltimore, Maryland
Details available [here](#).

December 11-12, 2020, ‘History, Philosophy and Sociology of School Biology’, on-line and in-person ISHPSSB symposium, Dublin City University
Details available [here](#).

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

July 11-16, 2021, Biennial meeting of the International Society for the History, Philosophy, and Social Studies of Biology, Milwaukee, WI
Details available [here](#).

July 19-23, 2021 ‘Objects of Understanding: Historical Perspectives on Material Artefacts in Science Education’ will take place at the Europa-Universität Flensburg (Germany)
Details: Roland Wittje, roland.wittje@gmail.com and [here](#).

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

September 20-22, 2021, ‘Developing Mario Bunge’s Scientific-Philosophical Programme’, Huaguang Academy of Information Science, Wuhan, China
Details from Zongrong LI 2320129239@qq.com.

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

HPS&ST Related Organisations and Websites

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

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

DHST – Division of History, Science, and Technology

IHPST – International History, Philosophy, and Science Teaching Group

NARST – National Association for Research in Science Teaching

ESERA – European Science Education Research Association

ASERA – Australasian Science Education Research Association

ICASE – International Council of Associations for Science Education

UNESCO – Education

HSS – History of Science Society

ESHS – European Society for the History of Science

AHA – American History Association

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

BSHS – British Society for History of Science

EPSA – European Philosophy of Science Association

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

HOPOS – International Society for the History of Philosophy of Science

PSA – Philosophy of Science Association

BSPS – The British Society for the Philosophy of Science

SPSP – The Society for Philosophy of Science in Practice

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

PES – The Philosophy of Education Society (USA)

The above list is updated and kept on the HPS&ST website [HERE](#).

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

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