



Rethinking History

The Journal of Theory and Practice

ISSN: (Print) (Online) Journal homepage: <https://www.tandfonline.com/loi/rrhi20>

Anthropocenic historical knowledge: promises and pitfalls

Zoltán Boldizsár Simon, Marek Tamm & Ewa Domańska

To cite this article: Zoltán Boldizsár Simon, Marek Tamm & Ewa Domańska (2021) Anthropocenic historical knowledge: promises and pitfalls, *Rethinking History*, 25:4, 406–439, DOI: [10.1080/13642529.2021.1985224](https://doi.org/10.1080/13642529.2021.1985224)

To link to this article: <https://doi.org/10.1080/13642529.2021.1985224>



© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



Published online: 19 Nov 2021.



Submit your article to this journal [↗](#)



Article views: 531






View related articles [↗](#)



View Crossmark data [↗](#)

Anthropocenic historical knowledge: promises and pitfalls

Zoltán Boldizsár Simon ^{a,b}, Marek Tamm ^c and Ewa Domańska ^d

^aFaculty of History, Philosophy and Theology, Bielefeld University, Bielefeld, Germany; ^bInstitute for History, Leiden University, Leiden, The Netherlands; ^cSchool of Humanities, Tallinn University, Tallinn, Estonia; ^dFaculty of History, Adam Mickiewicz University, Poznań, Poland

ABSTRACT

In the form of a conversational exchange of ideas, Ewa Domańska, Zoltán Boldizsár Simon and Marek Tamm reflect on the condition and role of historical knowledge in the Anthropocene. In the conversation on the potential of ‘anthropocenic historical knowledge’ – including the limitations and use of the term – each author offers and elaborates on one main theme for discussion, on which the other two co-authors reflect: Tamm begins by posing the question of the extension of ‘the territory of the historian’, Simon takes on the challenge by calling for the development of a ‘scientific literacy’, and Domańska pulls the threads together by advocating ‘anticipatory knowledge’. In the conversation, each author reflects on all three themes that they present as fundamental tenets of a renewed historical knowledge attuned to the Anthropocene predicament.

ARTICLE HISTORY Received 17 March 2021; Accepted 21 September 2021

KEYWORDS Anthropocene; historical knowledge; anticipatory knowledge; future; historicity; territory of the historian; scientific literacy

Anthropocenic historical knowledge

The new millennium is signalled by our planetary reckoning. The notion of the Anthropocene (Crutzen and Stoermer 2000; Steffen et al. 2011), coming to prominence and overwhelming presence over the last two decades following its conception in Earth System science (ESS), is probably the foremost vehicle of understanding to facilitate such a reckoning. Enhancing the character of human imprint on the planet into a concept by considering human activity as a force of nature that alters the condition of the Earth viewed as one system kicked off manifold and often contradictory responses both in wider society and in scholarly

CONTACT Zoltán Boldizsár Simon  zoltan.simon@uni-bielefeld.de  Faculty of History, Philosophy and Theology, Bielefeld University, Bielefeld, Germany

© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group. This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

communities. Although the particular issue of anthropogenic climate change receives most of the attention, the overall notion of the Anthropocene increasingly features today on the pages of newspapers and magazines, too. More profoundly, the Anthropocene recalibrates the agendas and fundamental concerns not only of the natural and life sciences but also the human and social sciences (for instance, Davis and Todd 2017; Mitman, Armiero, and Emmett 2018; Clark and Szerszynski 2020; Horn and Bergthaller 2020; Thomas, Williams, and Zalasiewicz 2020; Magny 2021).

The collision of human/social and natural/physical systems in the Anthropocene – and, generally speaking, the Anthropocene predicament (Thomas 2019) – is typically regarded as the greatest challenge to our established modes of knowledge production, marking the collapse of the categories of understanding through which we customarily make sense of ourselves and the world. With respect to history, the theoretical challenges posed by the Anthropocene to historical thinking on a larger scale are also spelled out with increasing frequency (Robin 2013; Domańska 2014a; Quenet 2017; Chakrabarty 2018; Hartog 2020, 321–335; Tamm and Simon 2020a, 2020b; Simon 2020; Westermann and Höhler 2020; Leskanich 2021). A matching reflection on the actual reconfiguration of historical knowledge is, however, comparatively missing.

We hope to remedy the situation by initiating an exchange on the facets of what may be called ‘anthropocenic historical knowledge’, that is, historical knowledge under the Anthropocene condition. In the course of the conversation, we also hope to consider both the usefulness and the limitations of the very term ‘anthropocenic historical knowledge’. Instead of conducting a foundational theoretical enterprise that settles the question what the ‘nature’ of such historical knowledge would be prior to its many possible manifestations, we wish to discuss three tenets that we think are inevitable when considering anthropocenic historical knowledge to be a possibility in the first place. The three tenets are: (1) the extension of the territory of the historian; (2) the resulting demand to develop a scientific literacy; and (3) the necessity of endowing anthropocenic historical knowledge with an anticipatory character. In what follows, we will discuss these three in a conversational manner. Each constituent of anthropocenic historical knowledge will be introduced and analyzed by one of us, respectively, followed by brief reflections of the other two co-authors. In the end, we will offer a brief concluding section to summarize the key points of the exchange.

The territory of the historian

Marek Tamm

In 1973, when Emmanuel Le Roy Ladurie coined the concept of ‘the territory of the historian’ (and when, coincidentally, I was born), the expansion of historical knowledge was considered to be in full swing (Le Roy Ladurie 1973). Almost on a monthly basis new lands of history were discovered or conquered, and proudly reported: history from below, women’s history, *histoire des marginaux*, history of death, family history, history of animals, *et j’en passe*. A year later, in 1974, Jacques Le Goff and Pierre Nora published a three-volume collective anthology, *Faire de l’histoire*, euphorically mapping the recent progress of historical research in terms of ‘new problems’, ‘new approaches’ and ‘new objects’ (Le Goff and Nora 1974). It seemed that the advancement of historical knowledge was never-ending: there was always a new corner to be conquered, a new subject or object in need of historicization. Historical research represented a tremendous anthropological machine of making things historical. Trüper (2019, 26) has pointedly captured this attitude: ‘historical writing tends to attach a prize to historicization and resembles a practice of annexationist inclusion on a mobile frontier’. Chakrabarty (2000, 112) has explained this annexationist enthusiasm of the historians as an ‘imperious instinct of the discipline’, based on ‘the idea that *everything* can be historicized or that one should *always* historicize’. Shryock and Smail (2011, 10) reduce this instinct to Hegelian teleology, which compels historians ‘to create new subjects by incorporating ever more voices’.

Today, almost fifty years later and in the context of the Anthropocene predicament, the important question is, what are the rules of including and excluding things past from the historical? What are the limits of historicity? The territory of the historian has been defined in the last two centuries by the Hegelian principle that ‘nature has no history’ (Kolb 2008), or in the Collingwoodian dictum, ‘there is and can be no history of nature, whether as perceived or as thought by the scientist’ (Collingwood 1994, 302). Put differently, historicity belongs to the realm of humans. The expansion of the territory of the historian has been stunning over the last decades, but only within well-defined limits, i.e. that of humanity. Most historians have implicitly agreed that ‘humans had a history that was in proportion to the extent to which they were unnatural and cultural’ (LeCain 2016, 15).

The Anthropocene challenges this conception of historicity, undermining the distinction of human and natural history, of world and Earth history. At the time of the Anthropocene, historicity is no longer

specifically human, or in Mendieta's (2020, 135) recent verdict, 'We no longer can separate the history of the planet – whether it be climate history, geological history, or the history of life in general – from the history of humanity'. This means that instead of *le territoire de l'historien* we should speak about *la Terre de l'historien*; in the time of the Anthropocene, we have all become historians of the Earth, or planetary historians.

But how can *le territoire* and *la Terre* be made to converge? A contemporary of Collingwood, Theodor Adorno, indicated a useful way to 'dialectically overcome the usual antithesis of nature and history' (Adorno 2006, 252). In 1932, Adorno delivered his *Kantgesellschaft* lecture 'On the Idea of Natural History', in which he argues that we have to see nature in its historically dynamic, radical contingency. It is necessary, he claims, to grasp history itself as nature and nature itself as history. Adorno's anti-Hegelian aim is to demonstrate 'that the concepts of "nature" and "history" cannot be regarded as ontological essences without idealising them and rendering them into mythical self-parodies' (Pensky 2004, 230). I believe that Adorno's approach is today more relevant than ever. It points toward a new understanding of the historical past, to follow a recent proposal, as 'dynamically co-constituted by multiple organisms, including plants, animals, and fungi, as well as by elements and forces, from water to minerals' (O'Gorman and Gaynor 2020, 717). The notion of historicity we need at the time of the Anthropocene is *a more-than-human historicity*, a notion that extends historical agency to *all* past actors, human and nonhuman, organic and nonorganic. This approach calls for an integrated history of humans on Earth, a project launched in the early 2000s by a group of archaeologists, ecologists and historians (see Costanza, Graumlich, and Steffen 2007; <https://ihopenet.org>). In planetary historical perspective, the protagonists of history are not necessarily humans, for virtually all of its history Earth has evolved without humans. Chakrabarty (2018, 25) has in this context reiterated the old slogan of Marxist philosopher Louis Althusser about 'history as a process without a subject'. However, considering that current Earth System changes are strongly associated with changes in the coupled human–environment system, the integration of human history with Earth System history is in my understanding one of the main challenges of contemporary historical knowledge. This could mean, as Bruno Latour (2015) has suggested, that we have to redefine the very concept of history and switch to 'geostory' (*géohistoire*) – a new way to make sense of the history of the Earth.

This proposal to extend historicity to all actors on Earth, to move from history to geostory, to integrate the past of the Earth System and the history of human presence, in brief, to promote a planetary regime of historicity (Chakrabarty 2019, 2021) also has important drawback. Although in many ways opposed to nineteenth-century historicism, this way of thinking – historicizing the Earth, as it were – paradoxically marks a triumph for historicism. Sloterdijk (2018, 4) has noted ingeniously that ‘with the concept of the “Anthropocene”, contemporary geology once again adopts the nineteenth-century epistemological habit of historicizing anything and everything’. In a way, the idea of planetary history brings us back ‘to a Buffonian view in which human history and Earth history are commensurable and deeply interconnected’ (Hamilton, Bonneuil, and Gemenne 2015, 6). Therefore, it is justified to ask whether historicizing is the right answer to the Anthropocene predicament. In the context of animal history, Ewa has argued that ‘perhaps animals should not (always) be historicized. Perhaps their ahistoricity helps to reduce certain ways of absolutizing the past powered by history and opens an alternative to history with a different (nonhuman) perception of changes, reasoning, and sensing’ (Domańska 2017, 278). And Zoltán has made a similar point from a different perspective, claiming that historicist thinking is unsuitable for making sense of the Anthropocene because of the poor fit between ‘unprecedented change’ as entailed by the Anthropocene and the deep continuity of a processual historical change (Simon 2017). These interrogations point toward a fundamental question about the role of historical knowledge in the emerging new economy of human knowledge at the time of the Anthropocene, recently advocated by Jürgen Renn (2020). Put differently, the question is whether we are currently witnessing a massive extension of the territory of the historian or rather its extinction and merging into a new constellation of knowledge during an unprecedented tectonic shift.

Ewa Domańska

Marek indicated how history is expanding by generating new subfields, perspectives and approaches. Since the early nineties I have continually conducted research on new tendencies and emerging fields in the humanities and social sciences. My findings have shown that it takes approximately twenty years to turn a ‘heretical’ avant-garde tendency into a domesticated field of conventional historical studies (gender history, oral history and postcolonial history are good examples of this). Since the

discussion of the Anthropocene has been ongoing for some twenty years already, we might expect this very fruitful debate that has inspired our thinking about history and infused new energy into our field to extinguish soon.

I am enthusiastic about historians' contribution to building a holistic, inclusive, and integrative type of knowledge that the current debates about the anthropogenic changes are stimulating (cf. Simon 2019a; Chakrabarty 2021). Indeed, this is something I am engaged in myself. However, I would rather avoid the term anthropocenic (historical knowledge) as it marks a temporary fascination with the Anthropocene as an umbrella term to deal with the big picture questions. Soon anthropocenic could become a term that is as 'outdated' (meaning predictable in its thematic and approaches, and indicative of a critically toothless trend) as postmodernist is now. To be sure, I am not happy at all with this assumption. I had only just digested postmodernism before quickly moving on to posthumanism and then anthropocenism – but how exactly did I help to prevent the world from collapsing?

Anthropocenic knowledge is itself also a product of the 'academic factory' and its neo-liberal ideology (Lorenz 2012). The process of (historical) knowledge production about climate change, the loss of biodiversity and species extinction might be seen as a part of what Boltanski and Esquerre (2016) call the 'enrichment economy'. In this context, history is an object of knowledge production that might be enhanced and transformed into an 'enriched object'. Therefore, 'producing' anthropocenic historical knowledge manifests a process of enrichment of history and becomes an academic enrichment-based activity *per se*. It is activated, for example, by adding adverbs and prefixes such as anthropocenic, planetary, non- or post-anthropocentric, more-than-human, as well as bio-, eco-, geo-, neuro-, etc. In doing so, we create an 'enriched history' that demonstrates its capacity as an important partner in the discussion about the Anthropocene. The question is whether and if so, how this enrichment might change the discipline of history itself? What 'ingredients' (beyond linguistic additions that make terms more attractive) might change *le territoire* into *la Terre de l'historien* (as Marek aptly phrased it). Marek has also mentioned how this discussion challenged historians' ideas about the limits of historicity, historical time and space, relations between nature and culture, as well as human and natural history. I am interested in how such changes might contribute to raising ecological consciousness.

While I am becoming more and more sceptical about the ‘labels’ in theoretical debates, in reality there is certainly a lot to gain or lose when criticizing the foundations of history (anthropocentrism, eurocentrism, teleological thinking, linear time and historicity of beings) understood as a specific mode of knowledge of the past developed in the Greco–Roman and Judeo–Christian tradition. I am certainly very much aware of the necessity to change human behaviour in respect of its instrumental, exploitative attitude toward the Earth and non-human forms of life and beings. This is why in my field of dead body studies, I practice *Bildung* and creative pedagogy in teaching the critical history of the corpse. I am also a member of a committee that is preparing legislation that will replace the outdated Polish Cemeteries and Burials Act. The new legal regulations should allow green (or eco-)burials. When thinking about historical knowledge in the Anthropocene, I advocate action research, which means research guided by critical reflection and design thinking that leads to social action and creative use of knowledge of the past.

I do agree that in order to establish effective practices and policies of ecosystem conservation and restoration the past and past data must be *mobilized* and cross-disciplinary collaboration promoted, as Nicole Boivin and Alison Crowther from the Max Planck Institute for the Science of Human History in Jena (note the institute’s name) recently argued. History is necessary to create a sustainable future, as the above-mentioned archaeological scientists claim in their article with the telling title: ‘Mobilizing the Past to Shape a Better Anthropocene’ (Boivin and Crowther 2021). Historians are very familiar with the idea of pragmatic history, which treats history as a kind of practical activity (and practical knowledge) that is supposed to deal with problems. But perhaps scientists are too optimistic about employing knowledge of the past in a preventative function. Perhaps, I should mention here Hegel’s dictum: ‘what experience and history teach is this – that nations and governments have never learned anything from history’. However, military metaphors such as ‘mobilization’ are important as they draw attention to important factors and recalibrate the goals of creating historical knowledge. In addition to the quest for truth and the quest for justice, the quest for adaptation and resilience (‘the capacity of a system to absorb disturbance and re-organize while undergoing change, enabling retention of function, structure, identity and feedbacks’, Boivin and Crowther 2021, 273) is becoming crucial during this era of anthropogenic disasters. In order to create such practical knowledge, historians should become more cross-disciplinary, get involved in activities beyond academia, apply long-term

perspectives, become familiar with methods employed in the natural sciences and advanced technology, practice field research, and engage with Indigenous and local communities that value traditional ecological knowledge and with local community practices that are important for profiling conservation strategies, while also placing greater trust in creativity and the imagination as important factors in knowledge building.

Zoltán Boldizsár Simon

Marek and Ewa raise awareness of the limits of historicization and of disciplinary knowledge. I hope to steer the conversation further, giving a more concrete edge to these questions by calling for the development of a ‘scientific literacy’ in historical studies that leads through an engagement with Marek’s concerns about the limits of historicity and Ewa’s concerns about the ‘anthropocenic’.

To start with, I would like to bring an oft-overlooked aspect into the picture, namely, that there already is more than one dominant way of historicizing the world. Although the modern obsession with historicizing literally everything attracted serious criticism – old (Nietzsche 1980) and new (Davies 2006; Leskanich 2020) – and even calls to embrace ahistoricity as an alternative (Nandy 1995), it is seldom pointed out that historicization, in the last fifty years or so, has no longer had one shared operation across disciplines as it had in the nineteenth century. As I discussed elsewhere, there are rival modes of historicising the world (Simon 2019b).

The defining feature of the modern Western idea of history and professionalized historiography is arguably the act of seeing individual occurrences in larger developmental processes, as Hannah Arendt (1961) argues. Disciplinary history, even today, remains largely committed to historicizing everything on this premise. Associated typically with ‘historicism’, it claims that ‘the essence, identity or nature of everything in the human world is made by history, so that it is entirely the product of the particular historical processes that brought it into being’ (Beiser 2011, 2). At the same time, however, largely outside the narrow confines of disciplinary history (with a few exceptions such as Scott 2007), the emergence of social constructionist approaches all over the human and social sciences brought about a different way of historicization that remained largely unnoticed. I mean not constructionism of course, but the fact that it gave way to a new mode of historicization. Instead of showing how the nature of things is brought about by historical

processes, constructionism dismissed the whole idea that there is anything like the 'essence' or 'nature' of anything (Hacking 1999). What it challenged thereby was nothing other than the modern idea of history that sees everything – the true 'nature' of everything – as products of unfolding continuous processes. What constructionism saw instead were products of human creative powers, emerging through sudden non-continuous change and vanishing in the same way.

As Marek said, historicization can, in principle, swallow everything up. This applies to all modes, I would add. Both historicist and constructionist modes of historicization claim to subsume the entirety of human experience under their scope: Felski (2015, 77) perceptively notes that 'the set of socially constructed phenomena becomes an ever-expanding field that subsumes every conceivable object and practice'. Constructionism, however, once a fashionable idea, is not the most appealing today. It has a diverse group of adversaries (Gumbrecht 2006; Cole and Frost 2010), and its limitations have become increasingly visible over time. In light of the recent anti-anthropocentric current to which Ewa tried to align historical studies a decade ago (Domańska 2010), it may even look overly anthropocentric. The reason I mention constructionism is nevertheless not to make the case for it. Nor do I want to make the case for anti-anthropocentrism, which, despite its undeniable appeal, has its own blind spots, too. The message I hope to convey is merely that historicizing experienced novelty can take many shapes, even shapes other than the constructionist one, and perhaps neither the typical commitment of disciplinary history to historicist modes of historicization nor standard constructionist modes suit the Anthropocene predicament very well.

What kind of historical knowledge would be then more adequate in the Anthropocene? To bring this question back to Marek's concerns, it is no secret that I view a potential renewal of historical knowledge as linked with the inevitability of venturing into a new knowledge regime in the long run. Such a new knowledge regime, I think (Simon 2020), is already emerging out of the recognition that the human and the natural worlds are entangled through advanced technologies. If the entanglement of worlds represents a previously unconceivable object of knowledge that none of the specialized disciplinary knowledge formations of the modern knowledge regime are designed to study, then what we need is a knowledge regime that reconfigures the relationship between what we have known previously as the respective concerns of the natural and life sciences and the human and social sciences.

Such a knowledge regime, in my view, can reasonably be called ‘anthropocenic knowledge regime’, and the kind of historical knowledge within it – if a truly new knowledge regime would still entail anything like a ‘historical’ approach – can reasonably be called ‘anthropocenic historical knowledge’. That said, we probably all share Ewa’s suspicion about labelling. We all see how the logic of the ‘academic factory’ that Ewa aligns with ‘neo-liberal ideology’ (note the ‘neo-liberal’ label, and, by the way, nothing is more neo-liberal than academic production on the ‘neo-liberal’) may easily exhaust the ‘anthropocenic’. But would not the same be true of practically any other conceptual-linguistic alternative? Based on our experiences of the human and social sciences quickly depleting their own creations, it probably would.

Yet, the Anthropocene and the ‘anthropocenic’ as its derivative entail a crucial difference to business as usual in humanities conceptual work. Here, we have a concept conceived in ESS – a new knowledge formation (Steffen et al. 2020) – about which the human and social sciences have been suspicious since the first encounter. The typical humanities relationship with the Anthropocene is rather ambivalent: a mixture of forceful conceptual criticisms, pragmatic considerations, and, indeed, kinds of ‘academic factory’ relations ranging from parallel discussions of conceptual alternatives to discussions of subject X in the Anthropocene (as is the case with this special issue and our conversation). Still, as notions emerging in ESS, the Anthropocene and its derivatives may have conceptual careers other than those we are familiar with in the humanities. If we are venturing into a new knowledge regime, we may also expect rather unexpected careers of concepts and categories. Not to mention that if we expect that this knowledge regime entails a reconfiguration of the relationship with the sciences – especially with ESS and geology (Waters et al. 2014; Steffen et al. 2016) – we need to concede that shared terms may have shared dynamics too. We need what I call ‘connective concepts’ (Simon 2020, v–ix) that build bridges to the sciences, which leads directly to the question I hope to put to the table.

Scientific literacy

ZBS

The tenet that I would like to emphasize in the renewal of historical knowledge is the necessity to develop a ‘scientific literacy’. To be clear, by this I do not mean turning history into science, a question

frequently posed in the largely tiring modern debates on whether history is science or art, with the latest rounds of polemics having been conducted on the occasion of debating the work of Hayden White (2000). What I mean by ‘scientific literacy’ is rather linked to the conditions of possibility of a mutual knowledge transfer in attempting to understand the Anthropocene as our shared predicament. Although this also entails the reverse movement of potential scientific attention paid to a ‘humanities literacy’, let me focus here less on whether the sciences are opening up to humanities concerns and more on the issue at hand, that is, on the question of why historical approaches should acquire a certain degree of ‘scientific literacy’. This is not simply an epistemological and theoretical issue, but also one that has its utmost practical dimensions for the production of knowledge.

To begin with, we witness with increasing frequency calls in disciplinary history about the necessity to move toward incorporating the work of the sciences into historical research in one way or another. McNeill (2016, 19–20) even talks about a ‘natural science turn’ and argues for a ‘methodological revolution’ that he thinks is necessary for improving the ‘ability to address puzzles from the past’. Such ‘methodological revolution by which textual evidence jostles together with that of ice cores, marine sediments, peat bogs, stable isotopic ratios, and the human genome’ leads historians to a ‘new terrain, to geo-archives and bio-archives’. Going one step further, one may also consider the vast DNA archive that, according to de Groot (*forthcoming*), ‘seems to offer a new way of interrogating historiographic assumptions as well opening up new modes for investigation and templates for understanding’, while, at the same time, ‘demands the development of methodological tools, currently lacking’. The point here, again, is not to turn history into a science, let alone reinforce existing tendencies of scientific reductionism. LeCain (2017, 15) probably captures best the stakes when making clear that his reason for advocating a neo-materialist approach that relies on scientific work ‘is not because I think critical humanist questions can now be answered by science but because I suspect they cannot be answered effectively so long as we hold to an anthropocentric idea of the human as unique and distinct from the material world’.

All this is, of course, easier said than done. Scientific literacy as a basic constituent of anthropocenic historical knowledge may not be very easy to acquire on the practical level. *Disciplinary history, by and large, lacks*

patterns of established expertise, methods, and institutional training aimed at developing skills to comprehend scientific work and handle scientific data in historical interpretations.

To see the difficulties, consider Chakrabarty's early efforts to respond to the Anthropocene challenge. On the one hand, Chakrabarty (2009, 215) claims that 'the crisis of climate change calls on academics to rise above their disciplinary prejudices, for it is a crisis of many dimension', entailing even the need to situate human/social and natural/life scientific knowledge. On the other hand, (while having a degree in physics) he must concede that overcoming disciplinary prejudices is one thing and having the skills, the training and the expertise is another: 'I am a practicing historian with a strong interest in the nature of history as a form of knowledge, and my relationship to the science of global warming is derived, at some remove, from what scientists and other informed writers have written for the education of the general public' (Chakrabarty 2009, 198).

Does this mean that we need to uncritically rely on knowledge formations other than our narrower expertise? Not really. Assuming 'the science to be right in its broad outlines' (Chakrabarty 2009, 200) does not imply any sort of uncritical attitude. It is clear that natural and life scientific views and results are just as much debated as human and social scientific interpretations, both externally and internally. Yet, it remains true that a meaningful engagement with knowledge formations across the divisions between human/social and natural/life sciences likely requires a far higher degree of trust in the work of others than is usual in the humanities contestation of interpretations and the strong advocacy of interpretative positions against practically all other competing interpretations. Even though, again, a critical attitude remains required, *anthropocenic historical knowledge may be defined less by carving out an 'original' interpretive view as relative to other interpretive positions and more by the ability to integrate or situate such interpretive views.*

Delving into scientific literature – be it popular science writing or specialist ESS literature – is nevertheless only one possible way of developing scientific literacy in the production of anthropogenic historical knowledge. Another would be to team up with scientists for collective work, such as historian Julia Adeney Thomas working together recently with paleobiologists Mark Williams and Jan Zalasiewicz on a joint book *The Anthropocene: A Multidisciplinary Approach* (2020). Yet another way leads through the participation in available forms of scientific training. In this regard, equally highlighting the benefits and pitfalls, let me quote

political scientist Samantha Frost (2016) on her preparations for a work that required engagement with the life sciences and resulted in a new theory of humans as ‘biocultural creatures’:

[. . .] I took various life science courses full-time for eighteen months. I worked through organic chemistry, molecular genetics, and the biology of perception, through biochemistry, cell signaling, endocrinology, and the metabolism of brain function, and to courses on primatology and environmental toxicology. I sat through some fascinating lectures, read lots and lots of textbooks, talked with my professors, and engaged in longer conversations with some of those same professors as my colleagues. [. . .] I would like to be able to say that I was a gracious and composed student. But I wasn't. As a professional academic and a parent coordinating childcare and the general continuance of daily life, I didn't have enough time to study in the way I remembered being able to study, which was frustrating for the nerd in me. The language and concepts initially were so alien that the readings took me forever. Without a background or commonsense understanding of what was at issue, I did not know at first how to select, distinguish between, or remember the relevant or important pieces of information. [. . .] I was humbled, humiliated, shocked, and wonderstruck. Eventually, I became more conversant in the concepts, more familiar with the abbreviations and acronyms. In the middle of the training the world picture started to congeal, and I was able to perceive, play with, and anticipate patterns in the material I encountered. And this led to a different kind of difficulty — which was how to relate my new-found knowledge to political and cultural theory. At times, new information or insights from the scientific studies would throw me back on my habits of thinking, my theoretical training, my critical proclivities, and leave me bewildered about what I know. (Frost 2016, 22–23)

Even if Frost's work lies outside a narrowly construed Anthropocene research, it responds to the very same larger predicament: the collision of the human and the natural worlds that demands the collision of our previously separated knowledges as part of the formation of a new knowledge regime explicitly attuned to the study of a world of naturalcultural entanglements (Barad 2007). In the broadest understanding of the Anthropocene predicament, all pioneer work on the boundaries of the human/social and natural/life sciences belong here, from the early work of Katherine Hayles (1999) on the posthuman and cybernetics to the more recent emergence of sociogenomics (Bliss 2018).

If historical approaches do not want to miss out the transition to anthropocenic knowledge formations, they cannot spare developing scientific literacy in one way or another. At times when the sciences already dominate the scholarly landscape and the public imagination, when funding schemes and scholarly metric systems are tailored to

scientific work with requirements blindly projected over the humanities and the social sciences, when the humanities and the social sciences are underfunded and sometimes even threatened in their existence, opening to the sciences may be a bitter pill to swallow. Yet it seems to be a necessary one, ideally implying the reverse opening on behalf of the sciences. The question, I think, is less whether we should go to this direction. First, it is already happening, and second, it is for the better if the concerns associated with the human and social sciences are brought to the developing DNA, geo- and bio-archives. The question is more that of *how* exactly we should go about it. And this is the politics of knowledge aspect that, I think, we have every reason to be concerned about.

MT

I can only agree that historians have to develop their scientific literacy in order to be able to produce historical knowledge that is relevant in the Anthropocene predicament. However, we should emphasize once more that opening history to science does not mean cherishing an old fantasy of a historical science nor subordinating history to the methods of natural sciences. Ethan Kleinberg has rightly warned historians about naturalizing a certain scientific paradigm, so that this 'become[s] the basis of explanation rather than a possible hypothetical template' (Kleinberg 2016, 97). 'The power of history and the humanities', Kleinberg argues, 'lies in our ability to provide a critical intervention and, specifically, to determine the ways that seemingly universal methodologies are actually historically determined' (Kleinberg 2016, 101). So, it might not be sufficient to simply team up with scientists for collective work or to immerse oneself in scientific literacy (like Samantha Frost), even if these are important steps. What we need, is, first, a better understanding of the epistemology of sciences and, secondly, a new economy of human knowledge. Let me address very briefly these two issues.

Philosopher of science Rein Vihalemm (2007) has proposed a useful distinction between two main types of science, Φ -sciences and non- Φ -sciences, the latter called also Σ -sciences (Kull 2009). Φ -sciences (or physical sciences) deal with knowledge as knowledge about things and the Σ -sciences (or semiotic sciences) as knowledge about knowledge. Φ -sciences do not require historical explanation, they model the world using universal laws relying on quantitative methods. In contrast, Σ -sciences are dependent on historical explanations; they model the world on a qualitative basis and use primarily qualitative and interpretative

methods. It is not possible to transcend this fundamental (but also complementary) epistemic difference simply by initiating a new partnership. Put differently, we have to overcome not only disciplinary boundaries (be it in terms on inter-, multi- or transdisciplinarity) as well as traditional forms of epistemic division, scientific organization and knowledge production. We need a new economy of knowledge (or perhaps the more adequate term would be *ecology of knowledge*) that can bring together heterogenous forms and practices of knowledge beyond the current academic constellation, keeping in mind also Karen Barad's important remark that 'making knowledge is not simply about making facts but about making worlds' (Barad 2007, 91). Different knowledge-making practices enact multiple ontological realities, (re)configure the world as we know it.

Perhaps, the first step toward a new ecology of knowledge is to adopt the principle of *scientific pluralism*. Considering the complexity of the world the most reasonable position is to support the epistemic acceptability of the existence of several incompatible accounts of a given phenomenon (see Longino 2002, 2013; Ruphy 2016). 'It appears that some parts of the world (or situations in the world) are such that a plurality of accounts or approaches will be necessary for answering all the questions we have about those parts or situations' (Kellert, Longino, and Waters 2006, xxii). In terms of scientific pluralism, we should not aim at an integration of sciences (which would mean a return to scientific monism), but rather a new constellation or assemblage of existing knowledge-making practices, creating new, unexpected forms of scientific organization. Or, as Thomas (2020, 65) recently put it: 'The Anthropocene tells us that we have a single Earth System, but we still need many voices and many disciplinary tools to tackle it'.

In addition to adopting scientific pluralism, we should also strive toward a broader concept of knowledge than that which is usually employed in academic discourse. Next to scientific literacy, we need also *artistic literacy*. Nelson Goodman argued convincingly in 1970s that the arts and the sciences are not very different. Both are cognitively valuable 'symbol-minded' activities, trying to construct appropriate or true renderings of the world. In *Ways of Worldmaking* Goodman claimed memorably that 'the arts must be taken no less seriously than the sciences as modes of discovery, creation, and enlargement of knowledge in the broad sense of advancement of the understanding' (Goodman 1978, 102). Ewa has argued in the same spirit that contemporary art can be highly relevant in renewing historical thinking: 'Art today can offer the historian

not only theoretical inspiration, but also an epistemological paradigm and a research programme for knowledge building. Innovative cognitive models, analytical categories, and representations of the past can be derived from the analysis of works of art' (Domańska 2020, 317; see also Domańska 2007, 438).

I also believe that contemporary art is a great ally in making sense of our current Anthropocene predicament and developing new epistemologies for historical thinking (cf. Ballard 2021). Libby Robin has shown how museums and galleries have become vibrant platforms for new artistic ways of knowing the world: 'Museums are a tool which, if used well, can blend the philosophies of the humanities with the Big Science that is changing the ways we think about the planet, and the nature of society itself (Robin 2020, 381). Probably the best example of combining artistic and scientific literacies in rethinking our new human condition is the series of four major exhibitions that Bruno Latour has co-curated over the last twenty years at the Zentrum für Kunst und Medien (ZKM) in Karlsruhe, Germany. 'Each time, we tried to solve through shows conceived as scale models a key existential question that could not be solved in any other way', Latour writes together with his co-curator Peter Weibel in the catalogue of the latest exhibition, *Critical Zones: The Science of Landing on Earth*, open at ZKM from May 2020 until August 2021 (Latour and Weibel 2020, 8). Together with Weibel he has coined the concept of 'thought exhibition' or *Gedankenaustellung*, following the example of 'thought experiment', used widely by scientists and philosophers. A "thought exhibition" is a way to anticipate a situation of which there is as yet no real instance', and Latour continues: 'Yes, exactly a fiction, a myth, a fable, a setup, in order to think more freely, to be given space and time to reset our compass' (Latour 2016, 22). In this statement, we can see how scientific and mythic thinking, in combination with creative thinking, can open up new spaces for knowledge production, or new 'problem spaces', to use the recent useful concept by Celia Lury (2020).

ED

I fully support Zoltán's idea of the need to develop 'scientific literacy'. For historians representing such subfields as animal history, biohistory, environmental history, neurohistory, or who work on projects that call for transdisciplinary knowledge in order to offer more holistic interpretations, journals such as *Nature*, *Proceedings of the National Academy of Sciences of the United States of America* (PNAS) or *Science* are already

fixtures on reading lists. But – as Zoltán rightly remarked, such extended literacy also has to do with training. There are already education programmes that allow students to transcend disciplinary boundaries, such as, for example, the ‘Nature – Culture’ PhD programme at the Faculty of ‘Artes Liberales’ at the University of Warsaw.

As I have argued elsewhere, there can be no contemporary *avant-garde* humanities, by which I mean here anthropocenic humanities (marked by non- or post-anthropocentric and non- or post-European approaches) without science (Domańska 2012, 168–169). None of today’s most pressing issues in the humanities can be addressed without reference to (neo) evolutionary theory, biology, genetics and brain sciences, or the life and Earth sciences. However, as Marek and Zoltán highlighted, we should not confuse the current commingling of the humanities and sciences with past attempts to make the humanities scientific. In the case of history, this shift does not mark a return to history as a science that employs the standards of objectivity and rationality defined by physics, the discipline on which the concept of science is based. Rather, what is happening is that the current debates about anthropogenic changes, the boundaries of species identity, the relation between the human and the nonhuman, effective conservation of the environment, etc., radically reformulate the questions ‘what does it mean to be human?’, ‘what is life?’, since the humanities increasingly consider these questions from the perspective of the sciences and, vice versa, the sciences from the perspective of the humanities.

After years of advocating inter- or transdisciplinary approaches, I am now emphasizing complementary approaches, drawing on Niels Bohr’s concept of ‘complementarity’ (Pattee 1978, 191). I mean that humanities research and research in the sciences should ‘complement and supplement’ each other, to borrow a phrase from LaCapra (2004, 503). Research problems or themes can be described as complementary when their investigation by humanities disciplines creates the need for their investigation by science disciplines as well, or vice versa. Research problems or themes can be described as complementary when it becomes evident that investigating them solely through the perspective of the humanities, or solely through the perspective of the natural sciences, is insufficient and that it is necessary to draw on knowledge from the other field. If we agree that it is problems rather than methodologies that connect disciplines today, we begin to see the relations between the humanities and the sciences in a different light. The concepts of complementarity (of the humanities and the sciences) and incommensurability (of theory and

practice – lack of adequate research apparatus, approaches, and theories that would provide satisfactory description and interpretation of the changes in the contemporary world) are key concepts for describing the condition of the contemporary humanities. We can say that the greater the degree of complementarity, the smaller the degree of incommensurability, and therefore incommensurability results from the lack of complementarity of a given research problem. In knowledge of the past, complementarity should work as an epistemological principle that transcends dichotomies both between the sciences and humanities, as well as between Western and Indigenous knowledge(s). It might prepare the ground for the emergence of a *different type* of knowledge of the past that includes various forms of knowledge known to us today (science is only one of them). I would say that the current integration of human/social and natural sciences (in some fields of research) is a symptom of an ongoing process of the emergence of such knowledge.

In the case of knowledge building in this critical Anthropocene era, post-disciplinarity as an approach to scholarship is becoming popular. As indicated by Neimanis, Åsberg, and Hedrén (2015, 88), this does not only mean ‘movement across scholarly disciplines, but also movement across and between academia and other spheres of public engagement’. It also includes increasing collaboration with artists – as Marek noted. Going beyond scholarly institutions, as I suggested was necessary above, is what scholars call ‘citizen humanities’. This type of practice would not only enable citizens to participate in knowledge building but also to experiment with sociocultural imaginaries that are explored in everyday alternative practices of non-Western (and non-capitalist) contexts. So we are back to action research.

I was recently reading a special PNAS feature on Insect Decline in the Anthropocene, a study that calls for an action research approach. There is increasing evidence of the decline of terrestrial insects and the growing possibility of ecosystem collapse. Some scholars even claim that we are witnessing ‘the insect apocalypse’ (Wagner et al. 2021). What we need, as the entomologists claim, is knowledge that would change ‘public attitudes toward insects and motivate efforts to protect them’ (Wagner et al. 2021, 6) and be able to mitigate or reverse the decline:

Shared goals should be to change societal attitudes about insects, dispel misconceptions, and convey to others that insects are crucial components of functioning ecosystems that also provide a diversity of cultural services, including aesthetic, recreational, and health benefits. Scientists must educate

a wider population about the ecological, economic, and scientific value of arthropods and find ways to integrate insects and other arthropods into the fabric of daily human life. (Wagner et al. 2021, 9)

Other scholars stress that ‘good science’ (together with improved land use policies, monitoring and evaluation) is ‘essential if we are to successfully conserve insects in the future and avoid the risk of ecosystem collapse’ (Warren et al. 2021, 8). I ask myself, how history might be part of such ‘good science’ and how it could contribute to changing public attitudes toward insects. Surely it can! Historians are good at shaping public opinion and in consciousness raising. They are familiar with relevant methods and have the means (education, media, popularization of knowledge, etc.) to achieve this. It is not difficult to convince certain historians to work and teach on insects, as there is already a body of existing literature on human–insect relations, especially within environmental history, medical history, military history, genocide history, colonial history, etc. (Clark 2009; Lockwood 2009; Melillo 2020). Some scholars seem to have ‘mobilized’ already and advocate ‘insect humanities’, others a ‘philosophy of insects’ (Burton-Rose 2020; Drouin 2019; Raffles 2010). However, the question arises: what kind of (historical?) knowledge that deals with insect decline in the Anthropocene do we need in order for it to be more effective in shaping social awareness and imagination and to be preventive?

Anticipatory knowledge

ED

I propose approaching ‘anthropocenic historical knowledge’ as a type of anticipatory knowledge. In order to open a distant future for historical reflection, I also propose exercising what might be called the ‘depresentification of historical knowledge’. Verónica Tozzi (2012, 2018) rightly advocates a pragmatist approach to the philosophy of history that locates action and practicality, which are very much needed today, at the very heart of its reflections. Niklas (2016, 2, 21) claims that ‘a pragmatist theory of knowledge [...] can actually elucidate a basic epistemological feature of historical inquiry: knowledge of the past can *only* be gained by means of anticipation. [...] From a pragmatist point of view, to know the past is to anticipate it. Accordingly, historical inquiry is directed towards the future of the past as known’. Thus, the pragmatist theory of knowledge, which considers knowledge as essentially anticipatory, could help

us to conceptualize anticipatory historical knowledge. Historical evidence (or ‘marks of pastness’ as C. I. Lewis called them) allows historians to make well-grounded assumptions about the past, although this ‘process of hypothesizing’, as we very well know, is always open to corrections and revisions. Thus, the past is as inaccessible as the future (there is a difference of degree of inaccessibility); predictions and retrodictions are similar types of statement. What is also highlighted by pragmatists, and is common knowledge among historians, is that in order to become historical evidence, a certain ‘object’ (a source of information) has to be recognized as such (Niklas 2016, 11–14).

Thus, the ‘depresentification’ of historical knowledge – which here means the historicization of the present, distancing from it and looking at the present as if it is already past – seems to be a condition of creating anthropocenic historical knowledge as anticipatory knowledge. This approach does not go against Dipesh Chakrabarty’s scepticism (shared by Marek and Zoltán) about a ‘historicizing drive’. Rather, it reveals the limitations of the Western type of knowledge and its linear and teleological idea of time. While Tamm and Olivier (2019) are looking for multiple temporalities and different approaches to time within the Western tradition, I am inclined to consider non-Western approaches to time. For example, for the Indigenous Aymara people living in the Andean highlands of Bolivia, Peru and Chile, the past is in the front of the speaker while the future is behind. This has to do with considering knowing as seeing – we can see = know the past since it is in front of our eyes present in evidence (*ex-videre* – out of + to see), but not the future. Thus, a person has to turn back to ‘see’ the future, which is thus behind them (Núñez and Sweetser 2006). It seems to me that this is what anthropocenic scholars are doing, looking back over their shoulder to see the future if it is already behind us (yet unseen = unknown).

I am not interested in such alternative modes of future-oriented historical thinking in order to make predictions, but rather – following David J. Staley – to create scenarios that are related to ‘the plausibilities of what might be’ and describe ‘the context within which events may occur’ (Staley 2002, 78, 80). Historical evidence is crucial here since it is what makes future scenarios ‘futurible’, to use Bertrand de Jouvenel’s expression (Staley 2002, 86). We are currently already recognizing various ‘objects’ as potential future evidence of the current condition of the world and of humans, for example, plastiglomerates as markers of the Anthropocene (Corcoran et al. 2014). We are discussing archives of the future, such as those mentioned by Zoltán: bio-archives and geo-archives.

In the context of my research, I would say that mass graves are particular markers of recent human history. They are important ‘natural’ archives that store our genes. They preserve potential future fossils (Yusoff 2013, 782), our future ancestors. Therefore, to create anticipatory knowledge of the past it is essential to reflect on what kinds of source of information we choose now to become potential evidence in the future. We can shape the future at source, so to speak. The future will be as evidence is.

Belgian artist Maarten Vanden Eynde created an interesting project entitled the Museum of the Forgotten Past (2012). The artist exhibits objects from today and approaches them in an archaeological way, as remnants of a possible future past. Vanden Eynde also coined the term ‘genetology’ to describe the philosophical background of his artistic practice. By analogy to eschatology (the science of last things), genetology means ‘the science of first things’. It is a kind of post-apocalyptic science that enquires: ‘how will we look back at the past in the future?’¹

This was not the first time that when reading a PNAS special feature on insects, I realized that academic and public discussions about the Anthropocene put me in a condition of constant anticipation of coming catastrophes and disasters. As Currie (2007, 5–6) observes, such an ‘anticipatory mode of being’ is a characteristic feature of the current moment and marks the human condition. Thus, we live in a future anterior tense where ‘the present is experienced in [...] anticipation of the story we will tell later, envisaging the present as past’. The problem is that such an ‘anticipatory mode of being’ looks at the present as a pre-apocalyptic period that often foretells a post-human future, or a world without humans (such as in Zalasiewicz 2008 and Weisman 2007). Even if I have doubts as to whether humans are worth saving (as a scholar of ecocides and genocides, I see the Holocaust not as an aberration but as part of a pattern in history of interhuman and interspecies violence), this current preoccupation with (generally catastrophic) scenarios of the future deprives me of agency and demotivates me. The daily news might carry stories of new, apparently unexpected, unpredicted and disruptive events, but this does nothing to mobilize adaptation strategies or building individual and collective resilience. The crisis of democracy (Derrida’s *futur*) and pandemic (*à-venir*) come together as a manifestation of what the evolutionary biologist and neuroscientist Deacon (2012, 547–548) calls ‘constitutive absence’. This concept defines a critical defining attribute of functions, thoughts, adaptation experiences, and values; ‘the paradoxical intrinsic property of existing with respect to something missing, separate, and possibly non-existent’.

Historians, in contrast to natural scientists, know that – as Deacon (2012, 3) phrased it – ‘what is absent matters’ (whether this absence is located in the past or in the future).

ZBS

I see with Ewa the necessity to affirm futures that could be set against the cataclysmic prospects of our times, which, indeed, may paralyze action in certain ways. What I would like to add is what may be the other side of the same coin. Let me begin by agreeing that it is tremendously important to uphold the futures we would like to take place and to attempt to move toward such futures, all uncertainties inclusive. However, modern historical thinking, with its in-built future-orientation, was all about such movement and action. The modern developmental idea of history, to this day, is the precondition of emancipatory social action; it is the condition of possibility of gradual empowerment that is expected to pave the way to better futures. If the binding ties between emancipation and modern historical thinking are not easy to stomach, it is because decades of criticism have shown that grave injustices come as a necessary entailment of processual-developmental historical thinking (Chakrabarty 2000; Vázquez 2009; Appadurai 2012; Satia 2020).

What to do with future-orientation then? What to do with anticipating futures when the modern idea of history is no longer feasible? It seems to me that much of the human and social sciences prefer to assume that we can just select elements we like and drop the ones we do not, that we can just get rid of those of ill repute (teleology, linear time, the implication that some are leaders of developments while others lag behind, and so on) and focus on those we still hope to uphold (emancipatory thinking, social justice). I am afraid that it is not that easy. Cherry-picking elements of complex arrangements does not leave everything else – other elements and the whole web of complex interrelations – intact.

Think of, for instance, the postcapitalist future and historicity that Jérôme Baschet hopes to think and work toward, which Marek engaged with recently (Tamm 2020). On the one hand, Baschet seems committed to overcoming both modern historical thinking and more recent presentist temporal configurations (Hartog 2015; Assmann 2020) – a shared goal of a few recent efforts (Hellerma 2020) – by embracing a multiplicity of futures (cf. the multiple temporalities of Jordheim 2014) that ‘should be regarded neither as predictable nor as catastrophic, but as unforeseeable, with many paths leading to it’ (Tamm 2020, 457). This may be in

line with Ewa's suggestions. On the other hand, it seems rather dubious that such 'unforeseeable' futures are very much foreseeably postcapitalist ones. These may be futures we want to happen, but precisely by virtue of wanting it, they are anything but unforeseeable. *Our very act of desiring certain futures, be they postcapitalist or any other kind, actively works against the broader recognition of a multiplicity of futures.* And this is the point where I would like to turn the coin and show its other side, a side that may be far more important than we like to think.

That which we want to happen, the futures we hope to take place, are really only a tiny fragment of the multiple futures which take place regardless of whether we want them or not. Focusing too strongly on what we would like to see happen might easily prevent us from seeing the infinite ways the world is changing and transitioning to futures *without our explicit endorsements.*² Working towards our preferred futures makes sense only with even greater attention paid to mapping actual and potential transitions to futures as they occur in a great variety of practices. Marek and I recently teamed up with *History and Theory* to explore such modalities of 'historical futures' in a collective project (Simon and Tamm 2021). Taking these futures into account may provide us with a big-picture view of complexity greater than what we are used to: a complexity with a web of relations between futures, a complexity with potential self-contradictions and aporias, a complexity that may exceed our modes of comprehension. In the sociopolitical domain, for instance, a retained commitment to emancipatory futures tacitly acknowledges that the repudiated old idea of history still has some social value, even if it crumbles. At the same time, we cannot close an eye over lingering catastrophes: unwanted futures demand that we invent new modes of social action attuned to futures of threat and urgency. Perhaps, we should learn to live with the complexities and contradictions entailed by the coexistence of both kinds of social future, and many others.

Yet the sociopolitical domain is but one (although extremely large and diverse) set of variables in the big picture. If, in the Anthropocene, we aim to write more-than-human histories (O'Gorman and Gaynor 2020), to take seriously the temporalities of Earth System change (Steffen et al. 2004) and 'abrupt climate change' (Alley et al. 2003), to situate human-Earth temporalities (Sörlin [forthcoming](#)) and human/social and life/natural scientific knowledges (Lövbrand et al. 2015; Thomas 2020), then the question is, again, less whether 'anthropocenic historical knowledge' can be anticipatory and more *how* and *in what sense* exactly. How does the unforeseeability of social change fare with the predictive power of

equations explaining the physical world and the modes of anticipation in life scientific knowledge? Most importantly, emerging ‘anthropocenic’ knowledge formations may be different from the respective anticipatory capacities of existing knowledges, giving way to new modes of anticipation in knowledge constitution that, ironically, we can hardly predict.

MT

I recently made an attempt to think historical knowledge *from the future*, asking how to make sense of the past in a world where the future is not what it used to be (Tamm [forthcoming](#)). The starting point of such an endeavour was the recognition that if in the modern regime of historicity all futures were exclusively human futures, in our anthropocenic regime of historicity the future modalities extend beyond the human. Or, as Zoltán and I argue in our Historical Futures project, instead of conveying a sense of how past and future are connected, new futures increasingly appear to us as disconnective, that is, as no longer connected to pasts (Simon and Tamm [2021](#), 7). I also make a claim for a radical plurality of futures and insist that integrating the future perspective in our thinking will invest history with a new responsibility. Or as Zoltán has succinctly captured this idea, ‘new future means new history’ (Simon [2018](#), 199).

I believe indeed, like Robin and Steffen ([2007](#), 1699), that ‘the Anthropocene is not just a new way to look at the past; it strongly affects the future’. However, the contrary is also true: in many respects our apprehension of the past derives from our anticipation of the future, because without a concept of futurity the past ceases to exist as such. Hayden White stated half a century ago that ‘in choosing our past, we choose a present; and vice versa’ (White [2010](#), 135). The same principle applies to the future: in choosing our future, we choose a past, and vice versa. The future in this sense is not only about imagination and expectation, but is instead present within the present. ‘It inhabits the relations that establish the interdependence of things, and which contain the potential for producing unintended and unforeseen consequences’ (Adam and Groves [2007](#), 122). In recent years, some heritage scholars have demonstrated convincingly how different forms of heritage practices generate specific kinds of future. From this perspective, it is ‘possible to think of heritage as a series of activities that are intimately concerned with assembling, building and designing future worlds’ (Harrison et al. [2020](#), 4). The future-orientedness of heritage is particularly telling in the context of digital culture. ‘It is not just the past, therefore, that must be

managed carefully, as argued for other types of heritage, but with digital data the future too must be fortified through preservation efforts', Cameron (2021, 75) has recently pointed out. In addition, in contemporary archaeology we can notice attempts to consider 'archaeology as a practice of the future', as 'a form of futurology, in that it imagines a future in which this past has significance' (Graves-Brown, Harrison, and Piccini 2013, 11), but also, at the same time, 'a past in which the future has significance' (Reilly 2019, 2).

I find useful in this context the distinction that Baschet (2018, 92) makes between two types of future: the 'prognosticable future' (*le futur prévisionnel*) and the 'expected future' (*le futur expectatif*). The first type entails various scientific future scenarios about the welfare of our planet and the sustainability of human life, whereas the second denotes the multiple imaginaries of the future of humanity and the end of the world produced by the contemporary movie industry, fiction, and, increasingly, science. In the context of anticipatory historical knowledge, both types of future are relevant, although the first, prognosticable, future is probably becoming more and more important in the production of historical knowledge. But I do agree with Ewa that it would be highly rewarding to pay attention to non-Western future imaginaries. Reflecting on White's argument about choosing our past, Ewa asks very intriguingly: 'What could happen if some groups chose animal (or other non-human entities such as plants or things) ancestors rather than human ones? What would be the radical or liberatory potential of such a choice and what kind of future could follow it?' (Domańska 2014b, 64). And I believe like Ewa that this choice of non-human ancestry would help to recast historical knowledge so as to take into account the more-than-human modalities of the future.

Conclusion

In the form of a conversational exchange of ideas, we have discussed the condition and the role of historical knowledge in the Anthropocene. In reflecting on the potential of 'anthropocenic historical knowledge' to address the challenges of our times, we have touched upon a variety of themes, such as extending the territory of the historian, the limits of historicity, the changing relations between history and natural/Earth/life sciences, the comprehension of scientific data and interpretations in historical studies, the role of the future, and historical knowledge as anticipatory knowledge. Domańska was sceptical about the adjective

‘anthropocenic’ as a symptom of temporary fascination with the Anthropocene but still considered it a fruitful intellectual platform that enriches historical reflection, especially by contributing to the integration of knowledge, focusing on adaptation and resilience as goals of historical knowledge building and engaging history in action research. While reflecting on the current ‘anticipatory human condition’, she advocated the ‘depresentification of historical knowledge’ and proposed that we consider (anthropocenic) historical knowledge as an anticipatory knowledge. Tamm laid the groundwork for conversing about such themes by asking how discussions about the Anthropocene are extending the territory of the historian (and thereby also historical knowledge), entangling human and natural history, and problematizing conventional modes of historicization by a more-than-human historicity. He also called for a better understanding of the epistemology of sciences and for a new ecology of human knowledge with the principle of scientific pluralism as its base and including also artistic forms of knowledge production. Simon explicitly embraced on the necessity of an ‘anthropocenic knowledge regime’ and advocated the idea of a ‘scientific literacy’ as a central constituent of a renewed historical knowledge in the Anthropocene. He argued that the emergence of ‘anthropocenic’ knowledge formations that are neither like scientific knowledge formations as we know them nor humanities knowledge formations as we know them will give way to new modes of historicization just as well as new modes of anticipation, neither of which we can predict.

The issues discussed do not of course exhaust the renewal of historical knowledge in the Anthropocene. Nor do the views of the authors represent a definite way to go about it. As the conversational form hopes to convey, this article intends to facilitate a broader discussion that we all think should take place – sooner rather than later.

Notes

1. Maarten Vanden Eynde’s website: <https://www.maartenvandeneinde.com/> (accessed: 26 February 2021). Cf. Gregos (2021) and Beckenstein (2020). There are many contemporary artists who ‘excavate the future’, create historical evidence for the purpose of future historical research, and speculate about heritage that might be relevant for the future, such as Ai Wei Wei (*Han Dynasty Urn with Coca-Cola Logo*, 1994), Roy Arden (*Versace*, 2006), Paul McCarthy (*Burial*, 2006), as well as Mark Dion, Damien Hirst, Cornelia Parker, Simon Starling, to mention only a few.

2. This applies to unwanted futures too that we actively put to criticism. The futures we explicitly want to take place or avoid are infinitesimal as compared to the futures that take place without us paying attention.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes on contributors

Zoltán Boldizsár Simon is a research fellow at Bielefeld University. He has been Assistant Professor at Leiden University and Visiting Fellow at the Max Planck Institute for the History of Science. He has written extensively on the theory of history, historical time, questions of temporality, and the challenges posed by technology and the Anthropocene to the human condition and to modern historical thinking. His articles can be read in journals ranging from *History and Theory* to *The Anthropocene Review*. He is the author of *History in Times of Unprecedented Change: A Theory for the 21st Century* (Bloomsbury, 2019) and *The Epochal Event: Transformations in the Entangled Human, Technological, and Natural Worlds* (Palgrave, 2020).

Marek Tamm is Professor of Cultural History at the School of Humanities in Tallinn University. His primary research fields are cultural history of medieval Europe, theory and history of historiography, and cultural memory studies. He has recently published *A Cultural History of Memory in the Early Modern Age* (ed. with A. Arcangeli; Bloomsbury, 2020); *Rethinking Historical Time: New Approaches to Presentism* (ed. with L. Olivier; Bloomsbury, 2019), *Juri Lotman – Culture, Memory and History: Essays in Cultural Semiotics* (ed., Palgrave Macmillan, 2019), and *Debating New Approaches to History* (ed. with P. Burke; Bloomsbury, 2018).

Ewa Domańska is Professor of Human Sciences and holds her permanent position at the Faculty of History, Adam Mickiewicz University, Poznań, Poland. She is a corresponding member of the Polish Academy of Sciences. Her teaching and research interests include history and the theory of historiography, comparative theory of the humanities and social sciences as well as the environmental humanities, ecocide and genocide studies. She recently published 'The Environmental History of Mass Graves', *Journal of Genocide Research*, vol. 22, no. 2, 2020: 241-255 and 'Prefigurative Humanities', *History and Theory*, vol. 60, no. 4, December 2021: 141-158.

ORCID

Zoltán Boldizsár Simon  <http://orcid.org/0000-0001-8763-7415>

Marek Tamm  <http://orcid.org/0000-0002-0347-504X>

Ewa Domańska  <http://orcid.org/0000-0003-0875-976X>

References

- Adam, B., and C. Groves. 2007. *Future Matters: Action, Knowledge, Ethics*. Leiden and Boston: Brill.
- Adorno, T. 2006. "The Idea of Natural-History." In *Things beyond Resemblance: Collected Essays on Theodor W. Adorno*, edited by R. Hullot-Kentor, 1–23. New York: Columbia University Press.
- Alley, R. B., J. Marotzke, W. D. Nordhaus, J. T. Overpeck, D. M. Peteet, R. A. Pielke, R. T. Pierrehumbert, et al. 2003. "Abrupt Climate Change." *Science* 299 (5615): 2005–2010. doi:10.1126/science.1081056.
- Appadurai, A. 2012. "Thinking beyond Trajectorism." In *Futures of Modernity: Challenges for Cosmopolitical Thought and Practice*, edited by M. Heinlein, C. Kropp, J. Neumer, A. Pofel and R. Römhild, 25–31. Bielefeld: Transcript.
- Arendt, H. 1961. *Between Past and Future: Six Exercises in Political Thought*. New York: Viking Press.
- Assmann, A. 2020. *Is Time Out of Joint? On the Rise and Fall of the Modern Time Regime*. Trans. Sarah Cliff. Ithaca: Cornell University Press and Cornell University Library.
- Ballard, S. 2021. *Art and Nature in the Anthropocene: Planetary Aesthetics*. New York and London: Routledge.
- Barad, K. 2007. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham: Duke University Press.
- Baschet, J. 2018. *Défaire la tyrannie du présent. Temporalités émergentes et futurs inédits*. Paris: La Découverte.
- Beckenstein, J. 2020. "Maarten Vanden Eynde: Digging into the Future." *Sculpture*, January 28. Accessed 26 February 2021. <https://sculpturemagazine.art/maarten-vanden-eynde-digging-into-the-future/>
- Beiser, F. C. 2011. *The German Historicist Tradition*. Oxford: Oxford University Press.
- Bliss, C. 2018. *Social by Nature: The Promise and Peril of Sociogenomics*. Stanford: Stanford University Press.
- Boivin, N., and A. Crowther. 2021. "Mobilizing the past to Shape a Better Anthropocene." *Nature Ecology & Evolution* 5 (3): 273–284. doi:10.1038/s41559-020-01361-4.
- Boltanski, L., and A. Esquerre. 2016. "The Economic Life of Things. Commodities, Collectibles, Assets, Trans. Matthew Cunningham." *New Left Review* 98: 31–54.
- Burton-Rose, D. 2020. "Towards A Sinophone Insect Humanities: A Review Essay." *Journal of the History of Biology* 53 (4): 667–678. doi:10.1007/s10739-020-09624-3.
- Cameron, F. R. 2021. *The Future of Digital Data: Heritage and Curation in a More-than-Human World*. Abington and New York: Routledge.
- Chakrabarty, D. 2000. *Provincializing Europe: Postcolonial Thought and Historical Difference*. Princeton and Oxford: Princeton University Press.
- Chakrabarty, D. 2009. "The Climate of History: Four Theses." *Critical Inquiry* 35 (2): 197–222. doi:10.1086/596640.

- Chakrabarty, D. 2018. "Anthropocene Time." *History and Theory* 57 (1): 5–32. doi:10.1111/hith.12044.
- Chakrabarty, D. 2019. "The Planet: An Emergent Humanist Category." *Critical Inquiry* 46 (1): 1–31. doi:10.1086/705298.
- Chakrabarty, D. 2021. *The Climate of History in a Planetary Age*. Chicago: University of Chicago Press.
- Clark, J. F. M. 2009. *Bugs and the Victorians*. New Haven: Yale University Press.
- Clark, N., and B. Szerszynski. 2020. *Planetary Social Thought: The Anthropocene Challenge to the Social Sciences*. Cambridge: Polity.
- Cole, D., and S. Frost. eds. 2010. *New Materialisms: Ontology, Agency, and Politics*. Durham: Duke University Press.
- Collingwood, R. G. 1994. *The Idea of History*. Rev ed. Oxford: Oxford University Press.
- Corcoran, P. L., Ch. J. Moore, and K. Jazvac. 2014. "An Anthropogenic Marker Horizon in the Future Rock Record." *GSA Today* 24 (6): 4–8. doi:10.1130/GSAT-G198A.1.
- Costanza, R., L. J. Graumlich, and W. Steffen, eds. 2007. *Sustainability or Collapse? An Integrated History and Future of People on Earth*. Cambridge, MA: and London: The MIT Press.
- Crutzen, P. J., and E. F. Stoermer. 2000. "The 'Anthropocene.'" *Global Change Newsletter* 41: 17–18.
- Currie, M. 2007. *About Time: Narrative, Fiction and the Philosophy of Time*. Edinburgh: Edinburgh University Press.
- Davies, M. L. 2006. *Historics: Why History Dominates Contemporary Society*. London and New York: Routledge.
- Davis, H., and Z. Todd. 2017. "On the Importance of a Date, or Decolonizing the Anthropocene." *ACME: An International Journal for Critical Geographies* 16 (4): 761–780.
- de Groot, J. forthcoming. "The DNA Archive". In *Historical Understanding: Past, Present, and Future*, edited by Z. B. Simon and L. Deile. London: Bloomsbury Academic. 2022.
- Deacon, T. W. 2012. *Incomplete Nature: How Mind Emerged from Matter*. New York: Norton.
- Domańska, E. 2007. "'Let the Dead Bury the Living.' Daniel Libeskind's Monumental Counter-History." In *The Many Faces of Clio: Cross-Cultural Approaches to Historiography*, edited by E. Wang and F. L. Fillafer, 437–454. New York: Berghahn Books.
- Domańska, E. 2010. "Beyond Anthropocentrism in Historical Studies." *Historein* 10: 118–130. doi:10.12681/historein.11.
- Domańska, E. 2012. "Biohistory and the Contemporary Human and Social Sciences." In *Historia y globalización*, edited by F. J. Caspistegui, 167–180. Pamplona: Eunsa.
- Domańska, E. 2014a. "The New Age of the Anthropocene." *Journal of Contemporary Archaeology* 1 (1): 98–103. doi:10.1558/jca.v1i1.96.
- Domańska, E. 2014b. "Retroactive Ancestral Constitution, New Animism and Alter-Native Modernities." *Storia della Storiografia* 65 (1): 61–75.

- Domańska, E. 2017. "Animal History." *History and Theory* 56 (2): 267–287. doi:10.1111/hith.12018.
- Domańska, E. 2020. "Unbinding from Humanity: Nandipha Mntambo's Europa and the Limits of History and Identity." *Journal of the Philosophy of History* 14 (3): 310–336. doi:10.1163/18722636-12341452.
- Drouin, J-M. 2019. *A Philosophy of the Insect*. New York: Columbia University Press.
- Felski, R. 2015. *The Limits of Critique*. Chicago: University of Chicago Press.
- Frost, S. 2016. *Biocultural Creatures: Toward a New Theory of the Human*. Durham and London: Duke University Press.
- Goodman, N. 1978. *Ways of Worldmaking*. Indianapolis: Hackett Publishing.
- Graves-Brown, P., R. Harrison, and A. Piccini. 2013. "Introduction." In *The Oxford Handbook of the Archaeology of the Contemporary World*, edited by P. Graves-Brown, R. Harrison, and A. Piccin, 1–23. Oxford: Oxford University Press.
- Gregos, K., ed. 2021. *Maarten Vanden Eynde: Digging up the Future*. Brussel: Mercatorfonds.
- Gumbrecht, H. U. 2006. *Production of Presence: What Meaning Cannot Convey*. Stanford: Stanford University Press.
- Hacking, I. 1999. *The Social Construction of What?* Cambridge, MA: Harvard University Press.
- Hamilton, C., C. Bonneuil, and F. Gemenne. 2015. "Thinking the Anthropocene." In *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch*, edited by C. Hamilton, C. Bonneuil, and F. Gemenne, 1–13. New York and London: Routledge.
- Harrison, R., C. DeSilvey, C. Holtorf, and S. Macdonald. 2020. "For Ever, For Everyone . . ." In *Heritage Futures: Comparative Approaches to Natural and Cultural Heritage Practices*, edited by R. Harrison, C. DeSilvey, and C. Holtorf, 3–19. London: UCL Press.
- Hartog, F. 2015. *Regimes of Historicity: Presentism and Experiences of Time*. Trans. Saskia Brown. New York: Columbia University Press.
- Hartog, F. 2020. *Chronos. L'Occident aux prises avec le Temps*. Paris: Gallimard.
- Hayles, N. K. 1999. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. Chicago: University of Chicago Press.
- Hellerma, J. 2020. "Negotiating Presentism: Toward a Renewed Understanding of Historical Change." *Rethinking History* 24 (3–4): 442–464. doi:10.1080/13642529.2020.1848132.
- Horn, E., and H. Bergthaller. 2020. *The Anthropocene*. London and New York: Routledge.
- Jordheim, H. 2014. "Introduction: Multiple Times and the Work of Synchronization." *History and Theory* 53 (4): 498–518. doi:10.1111/hith.10728.
- Kellert, S. H., H. Longino, and C. K. Waters, eds. 2006. *Scientific Pluralism*. Minneapolis: University of Minnesota Press.
- Kleinberg, E. 2016. "Just the Facts: The Fantasy of a Historical Science." *History of the Present* 6 (1): 87–103. doi:10.5406/historypresent.6.1.0087.
- Kolb, D. 2008. "Darwin Rocks Hegel: Does Nature Have a History?" *Bulletin of the Hegel Society of Great Britain* 57 (1–2): 97–117. doi:10.1017/S0263523200000793.

- Kull, K. 2009. "Biosemiotics: To Know, What Life Knows." *Cybernetics and Human Knowing* 6 (3/4): 81–88.
- LaCapra, D. 2004. "Tropisms of Intellectual History." *Rethinking History* 8 (4): 499–529. doi:10.1080/13642520412331312070.
- Latour, B. 2015. *Face à Gaïa: Huit conférences sur le nouveau régime climatique*. Paris: La Découverte.
- Latour, B. 2016. "Introduction: Let's Touch Base!" In *Reset Modernity!*, edited by B. Latour and C. Leclercq, 11–23. Karlsruhe: ZKM – Center for Art and Media. Cambridge, MA, and London: The MIT Press.
- Latour, B., and P. Weibel, eds. 2020. *Critical Zones: The Science of Landing on Earth*. Karlsruhe: ZKM – Center for Art and Media. Cambridge, MA, and London: The MIT Press.
- Le Goff, J., and P. Nora, eds. 1974. *Faire de l'histoire*. 3 vols. Paris: Gallimard.
- Le Roy Ladurie, E. 1973. *Le territoire de l'historien*. Paris: Gallimard.
- LeCain, T. 2016. "Heralding a New Humanism: The Radical Implications of Chakrabarty's 'Four Theses'." *RCC Perspectives: Transformations in Environment and Society* 2: 15–20. In "Whose Anthropocene? Revisiting Dipesh Chakrabarty's 'Four Theses'", ed. by Robert Emmett and Thomas Lekan.
- LeCain, T. J. 2017. *The Matter of History: How Things Create the Past*. Cambridge: Cambridge University Press.
- Leskanich, A. 2020. "The Poverty of Historical Precedent." *The Philosopher* 108 (4): 82–91.
- Leskanich, A. 2021. "Retrospective Redundancy: The Anthropocene and the Crisis of Historical Comprehension." *New Global Studies* 15 (2–3): 181–192. doi:10.1515/ngs-2021-0016.
- Lockwood, J. A. 2009. *Six-Legged Soldiers: Using Insects as Weapons of War*. Oxford: Oxford University Press.
- Longino, H. 2002. *The Fate of Knowledge*. Princeton, NJ: Princeton University Press.
- Longino, H. 2013. *Studying Human Behavior*. Chicago: University of Chicago Press.
- Lorenz, C. 2012. "If You're so Smart, Why are You under Surveillance? Universities, Neoliberalism, and New Public Management." *Critical Inquiry* 38 (3): 599–629. doi:10.1086/664553.
- Lövbrand, E., S. Beck, J. Chilvers, T. Forsyth, J. Hedrén, M. Hulme, R. Lidskog, et al. 2015. "Who Speaks for the Future of Earth? How Critical Social Science Can Extend the Conversation on the Anthropocene." *Global Environmental Change* 32: 211–218. doi:10.1016/j.gloenvcha.2015.03.012.
- Lury, C. 2020. *Problem Spaces: How and Why Methodology Matters*. Cambridge: Polity.
- Magny, M. 2021. *L'Anthropocène*. Paris: Presses Universitaires de France.
- McNeill, J. 2016. "Historians, Superhistory, and Climate Change." In *Methods in World History: A Critical Approach*, edited by A. Jarrick, J. Myrdal, and M. W. Bondesson, 19–43. Lund: Nordic Academic Press.
- Melillo, E. D. 2020. *The Butterfly Effect: Insects and the Making of the Modern World*. New York: Alfred A. Knopf.
- Mendieta, E. 2020. "Anthropocenic Temporalities: The Time of the End and the End of Time." *Environmental Philosophy* 17 (1): 125–141. doi:10.5840/envirophil20201888.

- Mitman, G., M Armiero, and R. S. Emmett, eds. 2018. *Future Remains: A Cabinet of Curiosities for the Anthropocene*. Chicago: University of Chicago Press.
- Nandy, A. 1995. "History's Forgotten Doubles." *History and Theory* 34 (2): 44–66. doi:10.2307/2505434.
- Neimanis, A., C. Åsberg, and J. Hedrén. 2015. "Four Problems, Four Directions for Environmental Humanities: Toward Critical Posthumanities for the Anthropocene." *Ethics & The Environment* 20 (1): 67–97. doi:10.2979/ethicsenviro.20.1.67.
- Nietzsche, F. 1980. *On the Advantage and Disadvantage of History for Life*. Trans. Peter Preuss. Indianapolis: Hackett Publishing.
- Niklas, S. 2016. "The Anticipated past in Historical Inquiry: A. O. Lovejoy, C. I. Lewis and E. Wind on Accounting for Knowledge of the past within a Pragmatist Theory." *European Journal of Pragmatism and American Philosophy* 8 (2): 1–21.
- Núñez, R. E., and E. Sweetser. 2006. "With the Future behind Them: Convergent Evidence from Aymara Language and Gesture in the Crosslinguistic Comparison of Spatial Construals of Time." *Cognitive Science* 30 (3): 401–450. doi:10.1207/s15516709cog0000_62.
- O’Gorman, E., and A. Gaynor. 2020. "More-Than-Human Histories." *Environmental History* 25 (4): 711–735. doi:10.1093/envhis/ema027.
- Pattee, H. H. 1978. "The Complementarity Principle in Biological and Social Structures." *Journal of Social and Biological Structures* 1: 191–200. doi:10.1016/S0140-1750(78)80007-4.
- Pensky, M. 2004. "Natural History: The Life and Afterlife of a Concept in Adorno." *Critical Horizons* 5 (1): 227–258. doi:10.1163/1568516042653620.
- Quenet, G. 2017. "L’Anthropocène et le temps des historiens." *Annales. Histoire, Sciences Sociales* 72 (2): 267–299. doi:10.1017/S0395264917000543.
- Raffles, H. 2010. *Insectopedia*. New York: Pantheon Books.
- Reilly, M.C. 2019. "Futurity, Time, and Archaeology." *Journal of Contemporary Archaeology* 6 (1): 1–15. doi:10.1558/jca.36830.
- Renn, J. 2020. *The Evolution of Knowledge: Rethinking Science for the Anthropocene*. Princeton and Oxford: Princeton University Press.
- Robin, L. 2013. "Histories for Changing Times: Entering the Anthropocene?" *Australian Historical Studies* 44 (3): 329–340. doi:10.1080/1031461X.2013.817455.
- Robin, L. 2020. "Museums in the Long Now: History in the Geological Age of Humans." *Journal of the Philosophy of History* 14 (3): 359–381. doi:10.1163/18722636-12341448.
- Robin, L., and W. Steffen. 2007. "History for the Anthropocene." *History Compass* 5 (5): 1694–1719. doi:10.1111/j.1478-0542.2007.00459.x.
- Ruphy, S. 2016. *Scientific Pluralism Reconsidered: A New Approach to the (Dis)unity of Science*. Pittsburgh, PA: University of Pittsburgh Press.
- Satia, P. 2020. *Time’s Monster: How History Makes History*. Cambridge, MA: Belknap Press of Harvard University Press.
- Scott, J. W. 2007. "History-Writing as Critique." In *Manifestos for History*, edited by K. Jenkins, S. Morgan, and A. Munslow, 19–38. London and New York: Routledge.
- Shryock, A., and D. L. Smail, eds. 2011. *Deep History: The Architecture of Past and Present*. Berkeley: University of California Press.

- Simon, Z. B. 2017. "Why the Anthropocene Has No History: Facing the Unprecedented." *The Anthropocene Review* 4 (3): 239–245. doi:10.1177/2053019617742170.
- Simon, Z. B. 2018. "History Begins in the Future: On Historical Sensibility in the Age of Technology." In *The Ethos of History: Time and Responsibility*, edited by S. Helgesson and J. Svenungsson, 192–209. Oxford and New York: Berghahn.
- Simon, Z. B. 2019a. *History in Times of Unprecedented Change: A Theory for the 21st Century*. London: Bloomsbury Academic.
- Simon, Z. B. 2019b. "Historicism and Constructionism: Rival Ideas of Historical Change." *History of European Ideas* 45 (8): 1171–1190. doi:10.1080/01916599.2019.1653351.
- Simon, Z. B. 2020. *The Epochal Event: Transformations in the Entangled Human, Technological, and Natural Worlds*. Cham: Palgrave.
- Simon, Z. B., and M. Tamm. 2021. "Historical Futures." *History and Theory* 60 (1): 3–22. doi:10.1111/hith.12190.
- Sloterdijk, P. 2018. *What Happened in the Twentieth Century? Towards a Critique of Extremist Reason*. Cambridge: Polity.
- Sörlin, S. forthcoming. "Environmental Times: Synchronizing Human-Earth Temporalities from Annales to the Anthropocene, 1920s to 2020s". In *Times of History, Times of Nature: Temporalization and the Limits of Modern Knowledge*, edited by A. Ekström and S. Bergwik. New York: Berghahn. 2022.
- Staley, D. J. 2002. "A History of the Future." *History and Theory* 41 (4): 72–89.
- Steffen, W., A. Sanderson, P. D. Tyson, J. Jäger, P. A. Matson, B. Moore III, F. Oldfield, et al. 2004. *Global Change and the Earth System: A Planet under Pressure*. Berlin: Springer.
- Steffen, W., J. Grinevald, P. Crutzen, J. McNeill. 2011. "The Anthropocene: Conceptual and Historical Perspectives." *Philosophical Transactions of the Royal Society A* 369 (1938): 842–867. doi:10.1098/rsta.2010.0327.
- Steffen, W., K. Richardson, J. Rockström, H. J. Schellnhuber, O. P. Dube, S. Dutreuil, T. M. Lenton, et al. 2020. "The Emergence and Evolution of Earth System Science." *Nature Reviews Earth & Environment* 1 (1): 54–63. doi:10.1038/s43017-019-0005-6.
- Steffen, W., R. Leinfelder, J. Zalasiewicz, C. N. Waters, M. Williams, C. Summerhayes, A. D. Barnosky, et al. 2016. "Stratigraphic and Earth System Approaches to Defining the Anthropocene." *Earth's Future* 4 (8): 324–345. doi:10.1002/2016EF000379.
- Tamm, M. 2020. "How to Reinvent the Future?" *History and Theory* 59 (3): 448–458. doi:10.1111/hith.12173.
- Tamm, M. forthcoming. "Future-Oriented History". In *Historical Understanding: Past, Present, and Future*, edited by Z. B. Simon and L. Deile. London: Bloomsbury Academic. 2022.
- Tamm, M., and L. Olivier. 2019. "Introduction: Rethinking Historical Time." In *Rethinking Historical Time. New Approaches to Presentism*, edited by M. Tamm and L. Olivier, 1–20. London: Bloomsbury Academic.
- Tamm, M., and Z. B. Simon. 2020a. "More-than-Human History: Philosophy of History at the Time of the Anthropocene." In *Philosophy of History: Twenty-First-Century Perspectives*, edited by J.-M. Kuukkanen, 198–215. London: Bloomsbury Academic.

- Tamm, M., and Z. B. Simon. 2020b. "Historical Thinking and the Human: Introduction." *Journal of the Philosophy of History* 14 (3): 285–309. doi:10.1163/18722636-12341451.
- Thomas, J. A. 2019. "Why the 'Anthropocene' Is Not 'Climate Change' and Why It Matters". *Asia Global Online*, January 10. Accessed 8 March 2021. <https://www.asiaglobalonline.hku.hk/anthropocene-climate-change/>.
- Thomas, J. A. 2020. "The Anthropocene Earth System and Three Human Stories." *RCC Perspectives: Transformations in Environment and Society* 3: 41–67. J. A. Thomas and J. Zalasiewicz, *Strata and Three Stories*.
- Thomas, J. A., M. Williams, and J. Zalasiewicz. 2020. *The Anthropocene: A Multidisciplinary Approach*. Cambridge: Polity.
- Tozzi, V. 2012. "Pragmatist Contributions to a New Philosophy of History." *Pragmatism Today* 3 (1): 121–131.
- Tozzi, V. 2018. "A Pragmatist View on Two Accounts of the Nature of Our 'Connection' with the Past: Hayden White and David Carr Thirty Years Later." *Rethinking History* 22 (1): 65–85. doi:10.1080/13642529.2017.1423010.
- Trüper, H. 2019. "The Flatness of Historicity." *History and Theory* 58 (1): 23–49. doi:10.1111/hith.12098.
- Vázquez, R. 2009. "Modernity, Coloniality and Visibility: The Politics of Time." *Sociological Research Online* 14 (4): 109–115. doi:10.5153/sro.1990.
- Vihalemm, R. 2007. "Philosophy of Chemistry and the Image of Science." *Foundations of Science* 12 (3): 223–234. doi:10.1007/s10699-006-9105-0.
- Wagner, D. L., E M. Grames, M L. Forister, M R. Berenbaum, D. Stopak. 2021. "Insect Decline in the Anthropocene: Death by a Thousand Cuts." *PNAS* 118 (2): e2023989118: 1–10. doi:10.1073/pnas.2023989118.
- Warren, M. S., D. Maes, Chris A. M. van Swaay, P. Goffart, H. Van Dyck, Nigel A. D. Bourn, I. Wynhoff, et al. 2021. "The Decline of Butterflies in Europe: Problems, Significance, and Possible Solutions." *PNAS* 118 (2): e2002551117: 1–10. doi:10.1073/pnas.2002551117.
- Waters, C. N., J A. Zalasiewicz, M. Williams, M A. Ellis, A M. Snelling. 2014. "A Stratigraphical Basis for the Anthropocene?". *Geological Society, London, Special Publications* 1: 1–24. doi:10.1144/SP395.18.
- Westermann, A., and S. Höhler. 2020. "Writing History in the Anthropocene: Scaling, Accountability, and Accumulation." *Geschichte und Gesellschaft* 46 (4): 579–605. doi:10.13109/gege.2020.46.4.579.
- White, H. 2000. "An Old Question Raised Again: Is Historiography Art or Science? (Response to Iggers)." *Rethinking History* 4 (3): 391–406. doi:10.1080/136425200456958a.
- White, H. 2010. "What Is a Historical System?" In *Fiction of the Narrative: Essays on History, Literature, and Theory 1957–2007*, edited by R. Doran, 126–135. Baltimore: John Hopkins University Press.
- Yusoff, K. 2013. "Geologic Life: Prehistory, Climate, Futures in the Anthropocene." *Environment and Planning. D, Society & Space* 31 (5): 779–795. doi:10.1068/d11512.