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ROUNDTABLE

Should the Lithosphere Tell Our Stories?

Jeremy Schneider[1] and Siyakha Mguni[2]

[1]Department of History, Cornell University, USA and [2]Michaelis School of Fine Art, University of Cape Town, South Africa

Corresponding author: Jeremy Schneider; Email: js3933@cornell.edu

This discussion pursues potential areas of epistemic productivity at the convergence of Western scientific frameworks and Indigenous knowledge systems to understand the ontological unity of natural systems, interpreting the lithosphere not merely as a physical substrate, but as a deep archive of human histories, cultural practices, and cosmologies in all the world's regions. By de-fossilizing knowledge – a useful analytical concept that allows the discovery of potential conjunction of scientific thought and robust forms of knowing from ancient cultures – we foreground relational epistemes and explorative narrative possibilities inherent in ancient human landscapes. The selected cases, though brief and not exhaustive, support our view that there are strong resonances between Western science and ancient knowledge forms seen among Indigenous cultures in the world.

Jeremy Schneider

Let me begin with a thought experiment. Ancient Greek and Roman mythology imagined a world not unlike our own: a cosmos created from nothing; a long line of descent down to humanity; a series of catastrophes that destroyed the Earth's former inhabitants. What is more, the ancients started looking for evidence in the earth. They dug up fossilized bones, which they interpreted as the remains of creatures. They inspected rocks, from which they inferred past changes to the Earth's surface. Historians, I think, tend to forget that the ancients practised their own form of 'geology'. My point is not that ancient mythology is modern science; rather, that modern science may well be our mythology.[1]

In my remarks, I want to ponder to what degree one might recast histories of geology as histories of myth. As Siyakha Mguni and I met to prepare this conversation, we thought that the concept of 'cross-contextualization' would be a fruitful way to engage with one another's work. On the face of it, the worlds that we study seem oceans apart. I am a specialist in the European history of science, examining how figures between the sixteenth and eighteenth centuries used fossils to think about

[1]See Adrienne Mayor, *The first fossil hunters: dinosaurs, mammoths, and myth in Greek and Roman times* (Princeton, NJ, 2000).

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the Earth's history. Yet Siyakha's work reconstructs the cosmologies and 'creation myths' of the San people of southern Africa, who lived almost 10,000 years prior. Given this temporal chasm, there was this interesting question for us: how do we begin to bring our disparate endeavours into conversation?

Conversation was the key. Once we began talking, we found that there were many shared themes and motifs running through our sources. A motif that we converged on was the idea that the Earth is, and has always been, imbued with stories. Rocks and fossils, caves and mountains are not just objects or spaces; they are mirrors, projecting back the dreams and beliefs of the past. In the hands of the historian, a single rock can become a mouthpiece voicing past beliefs – scientific and mythological – about what forces governed the universe and where everything originated from.

So how were we to approach this more broadly? Over the last two decades, a new literature has emerged in the global history of science that has tried to reconnect the archives of European geological science with archives of Indigenous earth-knowledge. My impression is that this scholarship has moved on from seeing Indigenous actors simply as 'informants' for a European project and instead aims to show how Indigenous landscapes and cosmologies themselves shaped Western science.[2] Yet as scholars move towards more connected histories, I think it is important to reflect on which archives become connected – and why. Global historians often use the concept of 'global circulation'. Yet built into this idea is an emphasis, indeed a privileging of causal interaction. The assumption is that when one person or object encounters another, that is when two archives 'meet'. But that puts Siyakha and myself in an uncomfortable spot, because none of the actors that we study had this kind of encounter. The cosmologies of African hunter-gatherers and those of early modern Europeans are historically as far apart as can be. So how do Siyakha and I make our archives speak to each other? How do *we* perform the work of cross-contextualization?

I revisited Sujit Sivasundaram's classic paper and realized that it was quite critical of the emphasis on causation in global histories of science. Sivasundaram complained that global historians had artificially bifurcated archives into 'Western' and 'non-Western', because they were 'moving questions of causation to center stage'.[3] That made me think that cross-contextualization is an exercise in hermeneutics, not causation. The question is not: When did one archive causally impact another? It is rather: How can two archives illuminate or problematize each other? As Siyakha and I began to talk, we hoped to find such complementary insights between our archives, even though they were causally separated.

Here is one insight from our discussion. I was fascinated to learn that ancient San cosmologies spoke about the Earth's crust as its 'skin'. In the Western tradition, the earliest documentation of *strata* – the Earth's layers – also draws on the analogy of skin. As Ivano Dal Prete has recently demonstrated, artists and earthworkers in Renaissance Italy referred to the Earth's layers as 'skins', also likening

[2]See Pratik Chakrabarti, *Inscriptions of nature: geology and the naturalization of antiquity* (Baltimore, MD, 2020); and Alison Bashford, Emily M. Kern, and Adam Bobbette, eds., *New Earth histories: geo-cosmologies and the making of the modern world* (Chicago, IL, 2023).

[3]Sujit Sivasundaram, 'Sciences and the global: on methods, questions, and theory', *Isis*, 101 (2010), pp. 146–58, at p. 147.

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Figure 1. The 'skins' of the Earth as depicted in Andrea Mantegna's *Agony in the garden*, c. 1460 (Permission: The National Gallery, London).

them to 'pages' and 'leaves'.[4] It was refreshing to learn that such analogies were grounded in a long history of observation, implying that strata were not solely a discovery by Enlightenment geologists, but have been conceptualized in belief systems from African hunter-gatherers to Renaissance artists. And it makes sense: the Earth's layers *are* like skins, which wrinkle and scar with age (Figure 1).

This raises questions about where modern scientific concepts originate from and how they have been recast over time. I find it interesting that the idea of *strata* conjures up associations like 'science' and 'geology', whereas the analogous language of *skins* is associated with categories like 'cosmology' and 'knowledge', 'folklore' and 'myth'. Why is that? The idea that the Earth's history can be read off its layers is as central to pre-modern beliefs as it is to modern geology.

A point I wish to make is that cross-contextualization of this kind is not only a modern analytical tool, but also an actor's category. If you lived in sixteenth-century Europe, for example, and wanted an account of the Earth's origins, you would probably turn to the text of the Old Testament. But the account in Genesis does not say much about the history of the Earth. It details how the Earth was created in six days. And then? Silence. The only natural event that is subsequently recorded is the catastrophe of Noah's Flood that devastated the Earth's surface. But *besides* the Flood,

[4]Ivano Dal Prete, *On the edge of eternity: the antiquity of the Earth in medieval and early modern Europe* (Oxford, 2022), pp. 76–80.

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what else might have happened? Europeans did not know. And it was here that they turned to other cultures' archives.

As colonial empires expanded, Europeans turned to non-Western cosmologies for clues these might contain about the deep history of the Earth. Missionaries and scholars examined Egyptian, Chinese, and American 'creation myths'. They cross-contextualized, if you will, their biblical account of Earth-history with those from other cultures.[5] They also looked at ancient mythology, because it seemed to describe geological events wholly absent from the Bible. In ancient poems and dialogues, they read about the ancient pagan belief that great conflagrations had rained down from the sky and earthquakes had sunk landmasses beneath the ocean.[6] In early modern Europe, people turned to 'non-scientific' archives – from the myths of ancient pagans to the myths of Indigenous peoples – to highlight omissions in 'scientific' accounts. That is a fact worth lingering on. The act of cross-contextualizing disparate archives is something that humans have long been doing.

Siyakha Mguni

I draw from southern African Indigenous voices in the Bleek and Lloyd Archive – a collection of San linguistic and cultural resources compiled by the mid-nineteenth-century ethnographers, Wilhelm Bleek and Lucy Lloyd.[7] Much of this material concerns the |xam and !kun of South Africa's Northern Cape and Namibia, respectively, and smaller assemblages from Khoekhoen groups such as Nama and Kora. Several of these languages, including |xam and N|uu, have disappeared. The |xam worldview shares affinities with present-day Ju|'hoan communities of Botswana and Namibia, widely studied by anthropologists since the 1950s. What is most fascinating here is how accumulated Indigenous knowledge enters dialogue with traditions once thought incompatible.

In southern Africa, the phrase Indigenous knowledge systems has become clichéd, but what it means retains much substance. In its purview, cross-contextualization can offer the possibility of coupling certain forms of scientific claims and Indigenous knowledge. It is at the periphery of interdisciplinary connections, at the frontiers of these knowledge domains, where the real magic happens. In rock art studies – an area that relies on San ethnographic archives – these connections are realized, but in slightly different ways to how cross-contextualization conceives of them. Thus, Sivasundaram's critique applies there as well, where San

[5]See, inter alia, most recently, Mackenzie Cooley, 'The giant remains: Mesoamerican medicine, extinction, and cycles of empire', *Isis*, 112 (2021), pp. 45–67; Lydia Barnett, 'Giant bones and the Taunton stone: American antiquities, world history, and the Protestant International', in Paula Findlen, ed., *Empires of knowledge: scientific networks in the early modern world* (London, 2019), pp. 225–45; Gianamar Giovannetti-Singh, 'Astronomical chronology, the Jesuit China mission, and Enlightenment history', *Journal of the History of Ideas*, 84 (2023), pp. 487–510; Daniel Stolzenberg, *Egyptian Oedipus: Athanasius Kircher and the secrets of antiquity* (Chicago, IL, 2013), pp. 151–79.

[6]Yushi Ito, 'Hooke's cyclic theory of the Earth in the context of seventeenth century England', *British Journal for the History of Science*, 21 (1988), pp. 295–314. For the use of ancient myths in natural history, see Dániel Margócsy, 'A natural history of the satyr: a dialectical history of myth and scientific observation since 1550', *Annals of Science*, 82 (2025), pp. 407–35.

[7]See the new online |xam collections: https://digitalbleeklloyd.uct.ac.za/index.html.

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archives appear to serve primarily as illustrative material for science-derived frameworks to explain the same people's material culture. Researchers are authoritative superordinate actors, deciding what are valid questions or areas of inquiry and approaches, while Indigenous actors in the archives or extant populations are subordinated as informants – now called 'teachers' or 'co-creators'. Indigenous perspectives are valuable solely to the extent that they substantiate a particular line of argument or theoretical formulation. We can, instead, relearn from accepting people's viewpoints as local conceptualizations of phenomena, about which they tell stories anchored on the lithosphere. Much of what is essential for integrating Indigenous and Western knowledge systems can be discovered at interdisciplinary intersections. Here, Jeremy and I seek to cast light on the bridging of Western geological thought with Indigenous San cosmology preserved in old and new ethnographic archives.

Reflecting on the San archives, the lithosphere emerges as an important aspect of understanding hunter-gatherer thought about their place in the world. It is not hard to imagine why that is the case; everything and the everyday are grounded on the lithosphere as the canvas, where life worlds are painted or performed. And, of course, in rock art studies, we also look at the *material* itself. The paintings and engravings were made on rocks as meaningful surfaces. Practically, rocks may be a more natural surface to place the art, but artists could have used other materials. Rocks were therefore thought to be 'alive', perhaps as active *materiality* with its own agency. As succinctly put elsewhere, 'To consider the materiality of stone…is to consider its social significance, the stone as meaningful, as implicated in social acts and events and the stories of people's lives, in both the past and the present.'[8]

We gain such insights from examining, for example, the |xam and !kun stories in the archive. We find hints from mythology, legends, and life histories that indicate that rocks, caves, and other geological features meant much more than their physicality in the landscape: they also stood for other ways of understanding the intangible aspects of the environment. Thus, unique natural formations like the Tsodilo Hills and Matsieng in Botswana became central to ancestor traditions and creation myths, where local origins theories and cosmology are inscribed onto geology.[9]

San stories are anchored on the lithosphere. Take the |xam story of a young woman whose mother cursed her for refusing to fetch her water, preferring instead to gather lizards from rock clefts. While extracting lizards from cracks, her mother's curse took effect causing her breast to be encrusted into the rock cleft – but the rock is revealed to be an agentic entity to be coerced or tricked into releasing her. A plethora of San myths and stories involve a portmanteau category of personages during the primeval period called the 'First Bushmen', or 'Early Race', when the cosmos was established and before separating in the present world order. Not only did humanity and animals share powers of speech and behaviours, but other inanimate

[8]Christopher Tilley, 'Materiality in materials', *Archaeological Dialogues*, 14 (2007), pp. 16–20.

[9]A. C. Campbell, L. H. Robbins, and M. L. Murphy, 'Oral traditions and archaeology of the Tsodilo Hills Male Hill Cave', *Botswana Notes and Records*, 26 (1994), pp. 37–54; Nick Walker, 'In the footsteps of the ancestors: the Matsieng creation site in Botswana', *South African Archaeological Bulletin*, 51 (1997), pp. 95–104.

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forms did so too.[10] In another |xam myth, an Early Race man vanished in a flat rock while on the run, after absconding his marital home. Other examples can be added to the litany of such relational stories that connect humans, social contexts, and the materiality of the lithosphere. Though the lithosphere is composed of rocks, these stories remind us of the superfluity of the quality of inanimateness: despite its empirically outward solid state, the earth is in fact alive with agentic stones. The San consider caves and holes in the ground as places of transformation, much like the incubation of life forms inside an egg or womb; with the Earth itself often described in anthropomorphic terms. Humans can be embedded into the rocks of the Earth, entering its belly, where transformation occurs, or they fall into deep wells, as referenced in Ju|' hoan narratives.[11]

In hunter-gatherer thought, the lithosphere is sometimes conflated with water. This link is explainable from a geological, or hydrological, perspective, as these two natural substances always co-occur. Yet much more concerns their *materiality* than their physical solid and fluid states. In San archives, people report dreams, for example, of falling into deep wells only to later emerge transformed. These conceptual transformations are sometimes related to religious practices such as trances and visions. Healers' journey into the spirit realm are often through slipping into openings on the Earth's surface, and along underground rivers until they emerge elsewhere transformed in the realms of spirits and gods. There, as they say, one must present in a different form – often an animal that is their source of supernatural power – to stay alive.

Interestingly, geologically you talk of the lithosphere as the crust of the Earth. In the case of some San understandings, this crust is thought of as the skin of the Earth. Such analogical terms play a central role in helping us bridge these forms of knowledge. This also requires translation: understanding thought patterns within Indigenous knowledge systems often means analysing language, its lexical forms, and their original contexts. In my own research, I started by thinking about dreams using their English term, but on closer inspection of the material in the archive, and the conceptual context, I realized that it is a very limiting term. For example, the Kalahari Ju|'hoan phrase, 'a gathering up of the spirits' is one definition of the English noun 'dream'.[12] It is evident that the English word is limiting, not only conceptually but also in terms of the allied thought-patterns of dream beliefs. We must recognize that when dealing with such mismatched terminologies of classification, there tends to be difficulties in penetrating the real meaning of culture-specific subject matter and conceptual transference from one epistemic context to another. Without proper cross-contextual understanding of their histories and ontologies, we cannot successfully marry Western scientific thought and Indigenous knowledge systems.

Perhaps we should problematize what constitutes evidence in scientific research. In most Indigenous systems, it means different things in different contexts, so evidence or proof could actually be a repeatability of something that people can

[10]Wilhelm Bleek and Lucy Lloyd, *Specimens of bushman folklore* (London, 1911).

[11]Megan Biesele, *Women like meat: the folklore and foraging ideology of the Kalahari Ju/'hoan* (Johannesburg, 1993).

[12]Marjorie Shostak, *Nisa: the life and words of a !Kung woman* (Cambridge, MA, 1981).

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observe. For example, evidence can mean community-validated repeatability – as when dream revelations are confirmed over time to mark a reliable dreamer; that becomes evidence of being someone gifted in the ability of reporting predictive dreams. That may not actually apply scientifically where objective claims are reified and experimental replication is an empirical proof of validity.

Among the San, the notion of landscape is an aspect of proving one's existence in the lithosphere. Most stories are thus rooted in specific places on the Earth, complete with given names. Living knowledge becomes one of the layers that transform the lithosphere as a lived space into a cultural landscape imbued with meaning, much like 'a phenomenological perspective linked to a concept of *materiality*'.[13] Thus, the lithosphere itself is both a physical and spiritual anchorage of life, with life forms that exist above it and below it, both tangible and intangible. It becomes that meaningful liminal space that people walk on and other forms of life walk on, but below, there is something else that may not be physical, but still no less real than the physical entities above.

Conclusion: from geological curiosities to human cultural understandings

Caves and lithic materials, often viewed as geological curiosities in much of the early history of scientism, possess special resonances with human social and spiritual life, having served humanity from the earliest times of the evolution of the *Homo* lineage as sites of shelter, ceremony, and memory. Today, elevating Indigenous epistemologies, which understand rocks and caves as sentient and storied beings, encourages moving towards a rethinking of how the Earth's materiality is intertwined with identity, belonging, and responsibility.[14] Through comparative analysis, this discussion advocates for a dialogical approach that honours both Western scientific rigour of the geological disciplines and the enduring Indigenous wisdom exemplified through |xam hunter-gatherer thought and belief in southern Africa.[15] Ultimately, we ask: can and should the lithosphere itself become a storyteller, and what are the ethical implications of listening to the Earth's testimony in an era of ecological crisis?

[13] Tilley, 'Materiality in materials', p. 19.

[14] Ambelin Kwaymullina, 'Research, ethics and Indigenous peoples: an Australian Indigenous perspective on three threshold considerations for respectful engagement', *AlterNative: An International Journal of Indigenous Peoples*, 12 (2016), pp. 437–49; Shawn Wilson, *Research is ceremony: Indigenous research methods* (Halifax, NS, 2008).

[15] On the benefits and dangers of 'ontological symmetry', see Suman Seth, 'Pluriversal problems, revolutionary remedies', *Science, Technology & Society*, 28 (2023), pp. 22–9.

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