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Essay review

Show and tell: the dramatic story of nineteenth-century geological science

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The earth on show. Fossils and the poetics of popular science, 1802–1856
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The restorations of giant saurian monsters at the Crystal Palace Gardens at Sydenham in 1854, monsters resilient enough to survive the 1936 fire which burned the Palace to the ground, are of course well known. But what came before the Crystal Palace monsters? How did the Victorians and their immediate predecessors get to imaginative grips with a newly revealed prehistoric past, for which new and startling evidences were constantly being unearthed? Until now, the answer to this question has been sought mainly in nineteenth-century visual culture: in the diagrams, illustrations, maps, paintings, models and exhibitions which made visible a past which had never been witnessed by man.[1] But these visual traditions, familiar to us through dinosaur movies and popular museums, were only part of the story, as *The earth on show*—sumptuously illustrated and elegantly written—deftly explores. Illustrations and diagrams, paintings and panoramas were made comprehensible to their audiences through text: the guidebooks, descriptions, fictional excerpts, and poetic quotations which were a ubiquitous component of geological visual display. Such textual forms were not only inseparable from the images and models they accompanied, contributing to their contemporary meaning and reception, but also played demonstrable roles in creating the authority a new science needed to articulate its ideas to an initially sceptical public.

What role might fiction or poetry play in the construction of scientific knowledge? As O'Connor points out, asking such a question is unusual within the context of much recent work in the history of science, which has tended to move away from the traditional emphasis on textual scholarship.[2] Renewed attention to the importance of the institutional, social and cultural spaces in which science not only takes place, but which it is also constituted by, has emphasised the role of laboratories, museums, private collections and learned societies in determining the production and meaning of scientific knowledge.[3] A similar move has taken place even within literary studies itself: though there is a current trend back towards the study of literary form, the last thirty years have seen literary criticism focus on the social, political and historical *content* of a work, the meanings its form serves to hide as much to express. In addition, current explorations of material culture and materiality have focused critical energy more on the exploration of the role and representation of 'things' in literary texts than on the formal properties of the fiction itself.[4]

The question of the role of literary culture in the constitution of science is obviously problematic terrain, and not only because it risks moving into territory fraught with the antagonisms inherent in the old 'two cultures' debates.[5] Redundant though those debates may now seem, and as sceptically as historians might treat claims that 'reality' is a linguistic or fictional construct, nonetheless this is water which must be charted carefully. In the case of nineteenth-century geology, this problem has a very particular dimension. Historians of geology concur that the practice of nineteenth-century geology, particularly as it took place in the field and museum, cast narrative in a peripheral role, as a method liable to produce mere fictions.[6] The foundation of the Geological Society in 1807 was expressly designed as a corrective to Enlightenment cosmologies which had previously claimed to account for the history of the earth. The argument was both scientific and cultural: extending the observations gleaned from temporally and locally specific phenomena into all-encompassing historical narratives accounting for *all* phenomena, such cosmologies had been scientifically discredited by the turn of the nineteenth century. They had also become associated with the atheistic radicalism of revolutionary France. So,

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[1] Rudwick (1992).

[2] In the study of geology these studies include: Rudwick (1992); Knell (2000); Alberti (2002, 2005), focusing on visual culture, fossil collectors, and natural history societies and museums, respectively.

[3] For two relatively recent examples, see Livingstone (2003) and Morus (2006).

[4] See Brown (2003) and Freedgood (2006).

[5] Sokal & Bricmont (1998).

[6] See Secord (1986), Rudwick (1985) and Oldroyd (1990).

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repeatedly disparaging the narrative reconstruction of the past as an activity tending to produce speculative, effeminate, and dangerous fictions, founder members of the Geological Society of London eschewed theoretical conjecture in favour of a rigorously empirical study of geological 'facts'. This methodological premise yielded startling results, and consequently it long outlasted fears of revolution, becoming integral to the practice of the new science itself: by the 1830s geologists were far more concerned with determining the order and structure of the strata, and with producing geological maps, than they were with telling the story of earth history.

Focusing quite radically, then, on the geological story of earth history as it was constructed between 1802 and 1856 O'Connor argues that, if the gentlemen of the Geological Society did not write narratives of earth history, this was largely determined by their necessarily cautious approach to the public mood. As the century wore on, however, narrative histories of the earth's past grew in confidence, stature, and public appeal. They moved out of the private arenas of the dinner club or the university lecture and into the public domain of exhibitions and geological works intended for the general reader. Shifting the sources of historical inquiry from geological practice onto geological texts, O'Connor considerably reworks received literature on this subject, telling the tale of a growing range of outlets for a storytelling geological imagination. By the 1840s and 1850s competing versions of earth history positively battled it out in the literary marketplace, fighting to tell the most consummate story and to best capture their readers' imaginations.

O'Connor's textual approach to the study of earth history far transcends conventional historical methods. For one thing, he does not abandon attention to the institutional and cultural spaces in which scientific knowledge was produced in the nineteenth century: museums, exhibitions, paintings and panoramas figure prominently in his discussion. More importantly, he lingers long and fruitfully on unconventional and ephemeral texts and textual moments: on the beginnings and endings of chapters in geological textbooks, on guidebooks, on poetic quotations as they were situated alongside visual displays, on unpublished geological verses, on annotations and broadsheets. The story of earth history tentatively took hold in the relatively ephemeral textual spaces of the frontispiece, or the thumbnail sketch of the antediluvian past. Such sketches often took the form of brief snapshots in much larger works, offering an only temporary imaginative respite from painstaking description and analysis. In Buckland's *Geology and mineralogy* verbal restorations of earth history are largely pictorial, for example, their overarching narratives left implicit, to be inferred by readers rather than revealed to them. Similarly, writers often exhibited self-consciousness about the movement from technical exposition to the restoration of scenes from deep time, demarcating the transition through typography or abrupt shifts in prose style. The ephemerality of such writings contributes to the exciting texture of O'Connor's historical reconstruction of the shaping up of the story of earth history in this period, and it bears an elegant resemblance to the nature of nineteenth-century geological research, reassembling creatures and worlds from tiny fragments. Poking into the recesses of the written geological imagination, in the textual interstices between visual and material representations of earth history, this book breaks into new territory as a methodology through which to think about the histories of science and of literary culture. Indeed, as O'Connor argues throughout, the appellation 'science and literature' fails in its ostensible aim to disrupt the disciplinary separation of knowledge or of modes of knowing. The approach here is to see geological writing as an intrinsic part of literary culture. Less science *and* literature, for O'Connor science *is* literature.

It is possible to put forward a range of counter-arguments and caveats which are worthy of consideration on this subject. Are all scientific modes of writing equally contributory to the literary culture of any given period? Is nineteenth-century geology, racked with epistemological problems about the role of narrative in reconstructing the past, and seeking to imaginatively reconstruct landscapes and creatures for whom much of the available evidence had been lost, simply a special case? Or, is there a distinction to be made between modes of writing which share genres, or which share content, and those which can be considered to be of the same *disciplinary* formation? But to suggest that the problem requires careful thought is not to detract from the power this approach has for O'Connor's work. The literary nature of Victorian geological science, particularly in its interpenetration with the visual and material cultures of display and reconstruction, is nowhere clearer than in his opening discussion of the mammoth reconstructions at Pall Mall and the Egyptian Temple in the earliest years of the century, for example. The rhetoric of the spectacular in the guidebooks to these exhibits directly influenced William Buckland's verbal restorations of earth history in his Oxford University lectures of the 1820s and 1830s. In turn, the geological verses penned by the students and dons who attended Buckland's lectures, circulated in manuscript or in privately printed broadsheets, represent the first, still-tentative efforts to tell the *story* of earth history. Rarely straying outside the milieu of the genteel these verses functioned as a comic vein through which daring scenarios could be tested without the need for public commitment. And, though they were circulated within and produced by a relatively small group of readers, Buckland's important position within the university as a bastion of Anglican learning meant that his dramatic restorations of former worlds, and his images of geologist as necromancer, time-travelling guide, and visionary dreamer became central to geology's more public articulation in the 1830s and beyond.

Not only was the literary culture of geology vital within the institutions and cultural spaces in which knowledge was produced and displayed—the lecture hall, the exhibition space, or the university. Geological guidebooks, lectures, descriptions and poems were an important and neglected stream within nineteenth-century literary culture itself. Exploring the controversy surrounding Byron's verse-drama *Cain: A mystery*, a biblical 'problem play' asking how Cain came to kill Abel, O'Connor explains that Lucifer's temptation of Cain involved the teaching of an ancient earth through a cosmic voyage into deep time, populated with extinct pre-Adamites, mammoths and leviathans. The explicitly Cuverian geology embodied in Lucifer's teaching meant that some commentators saw it as an unwelcome form of geological popularisation, and Buckland saw the text as enough of a threat to his positioning of geology within Anglican learning to write a satirical verse 'antidote' to Byron's play, *The professor's descent* (1822). Nonetheless, by 1836 Buckland's friends and colleagues George Poulett Scrope and William Broderip used *Cain* to puff his *Geology and mineralogy* (1836) in the *Quarterly Review*, casting Buckland as Lucifer in order to generate a *frisson* around the text. Later, O'Connor argues that *Cain* was in Gideon Mantell's mind as he wrote the 'retrospect' envisioning the colossal forms of a dim and distant landscape in his widely selling *The medals of creation* (1844). Biblical stories, epic poetry, and the writings of Buckland, Cain, Scrope, Broderip, Cuvier, interweave here to the point of indissolubility. Geological writings constitute a powerful imaginative strand within the nineteenth-century imagination, and fiction was a vital mode through which earth history could be given shape. The phrase 'literature *and* science' cannot apply here.

This productive collapse of disciplinary boundaries extends into the very texture of O'Connor's argument. Not only does *The earth on show* make an important contribution to the current rise in interdisciplinary or multidisciplinary studies, and to discussions of the best ways in which to write histories free from the

encumbrances of modern disciplinary formations. It is also richly attentive to the construction of disciplinary and denominational divisions within the nineteenth century itself. In part this is achieved by a focus on what O'Connor calls 'popular' science. By this he means any attempt to reach a wider public than had hitherto been usual. This definition of 'popular' science is far broader than that recently given by Bernard Lightman, who excludes instrument makers, museum curators, and showmen and women from the business of science proper, and institutes a clear dividing line between 'popularizers' and 'practitioners'. Refusing to make such distinctions, O'Connor is enabled to talk about the place of narrative in a science which defined itself in opposition to storytelling, and about the role of texts within a historiography which has hitherto focused more squarely on geological practice. But more importantly he is also enabled to do justice to the sheer multiplicity of intellectual positions occupied by writers from across a spectrum of ideological, disciplinary, and denominational positions. For instance, as more English fossil vertebrates were identified in the 1820s geological writers garnered an increasing self-confidence. Such writers included not only the 'old-earth' geologists but Biblical literalists, whose contributions to the debate are not derided here, but are explored as so imaginatively powerful that old-earth geologists, including Charles Lyell, were spurred on to step up their publicity. O'Connor demonstrates that Lyell and the literalists both drew on the same showmanlike, epic and apocalyptic rhetoric. Moreover, the literalists themselves are revealed in much of their heterogeneity: far from represented as a single group of backwards-looking, antiscientific reactionaries, as much of the literature has had them, here they are shown to make a wide range of different arguments about the meaning and status of geological science. Many 'literalists' supported the old-earth geology. In this light literalist interpretations of the Bible emerge neither as inherently oppositional, nor as merely peripheral, to the 'real' business of geological science, but as a central discourse through which it gained access to the public stage.

If there is a point of difficulty in the arguments offered by *The earth on show* these are little more than an outcome of its illuminating and successful intervention in the subjects and methods of the historical study of the sciences, its fruitful destabilisation of the boundaries between modes of writing and between scientific practices. In shifting attention from the visual iconography of geology, from the projects of mapping and stratigraphy which have hitherto been seen to dominate the science, and from the powerhouse of geological thought, the Geological Society, O'Connor opens up new ways of thinking about earth science and its cultural significance. But his attention to textual fragments and to marginalised historical voices (including poets, guidebook writers and literalists) occasionally threatens imbalance. O'Connor points out that his story of augmenting nineteenth-century confidence in the geological story is reliant on relatively tiny textual reconstructions which threaten to be overwhelmed by the much greater body of technical and descriptive prose pouring out of the nineteenth-century presses. And he has a sharp sense of narrative as a *problematic* concern for would-be geological storytellers, frequently referring to the uneasiness with which narratives of earth science continued to be articulated by nineteenth-century writers even into the 1850s. But the problematic nature of stories of earth history often gets lost in the exuberance with which he treats his material. This issue is clear in his negotiation of the tensions that exist between pictorial and narrative modes of representation. On one level, poetic and visual boundaries were often collapsed in nineteenth-century theatrical presentations of other landscapes and times, as this book explores in profuse detail. But the nature of these moments of collapse, and the precise manner in which they negotiated representational difficulties, are of interest in the case of the contested narrative representation of the earth's past. O'Connor uses David Ansted's *The ancient world*, partly written to refute evolutionary romances like *Vestiges*, as an argument both for the narrative composition of even anti-evolutionary texts and for their theatricality: 'Like *Vestiges*', he writes, 'its geological narrative mainly comprises descriptions of fossil evidence rather than lively restorations, but there are enough of the latter sprinkled around to sustain the impression of "picturesque sketches". Cautious as Ansted was, theatrical analogies lurk in the background'. Theatricality does not necessarily entail narrative: indeed, such Victorian theatrical forms as melodrama often presented a series of largely discontinuous scenes only loosely connected by a narrative thread, or not connected in narrative sequences at all. Ansted's 'picturesque sketches' are equally likely to be produced by an author *wary* of making the kinds of narrative connections between scenes that were being made by the authors of transmutationist theories as they are to be considered rival narratives in their own right. Again, O'Connor strains to describe Miller's simultaneously 'theatrical' and 'storytelling' imagination but does not explore in depth the tensions between those two terms—his means of reconciling them without further comment is simply to suggest that Miller was accustomed 'to reading plays rather than watching them' (p. 398). In more general terms, the occasional slippages which exist in O'Connor's writing between theatre, spectacle and story suggest the dangers which lurk behind his methodology: though his deconstruction of the boundaries between 'literature' and 'science', or between and within different groups of geological writers, is the basis of this book's powerful contribution to nineteenth-century intellectual history, it is important to remember (as O'Connor almost always does) that sometimes the differences between genres, disciplines, and historical actors are as important as their similarities.

Nonetheless, the conjunction of the spectacular, the poetic, and the fictional here brings into sharp relief the genuine hybridity of Victorian literary culture. Within the context of the commercialisation of museums after the 1830s, the growth of the literary and philosophical societies, and the expansion of print culture, the road was paved for a geological vein of writing characterised (much like, though O'Connor does not note this, the novelistic productions of these years) by 'generic plurality' (p. 229). Travel writing, natural history compendia, antiquarian works, biblical scholarship, adventure stories, autobiographical accounts, didactic literature, the 'conversations' genre, apocalyptic spectacle, and natural theology treatises shaped the writing of this new earth history with increasing elaboration, and such writings exhibited increasing confidence to allude to Byron, Milton and Dante, and legends, romances, novels and epic poems. On occasion this hybrid geological mode even prompted original verse-creations by those seeking to verbally restore former worlds to the human imagination. In the final chapter the geologist and journalist Hugh Miller is considered as an exemplar of this hybrid geological writing, stylistically and structurally reproducing dioramic and panoramic modes of envisioning the world, complete with stage directions and imaginary voyages into the past. Rich in Miltonic undercurrents, Miller's prose is used to enrich rather than eclipse the Biblical narrative just as Milton himself had done. As such, Miller's time-travelling forays into prehistory were epics for the industrial age, and they function for O'Connor as emblematic writings in a powerful imaginative tradition which reaches from the nineteenth century to the present.

In this respect, as well as in its close attention to marketing and publishing strategies, to traditions of science writing, and to an unstable literary market, this book shares much with James A. Secord's *Victorian sensation* (2000). Furthermore, despite its focus on textual culture, it continues to owe a debt to Rudwick's work on geological visual culture, and particularly to the study of Victorian spectacle in Richard Altick's seminal work *The shows of*

London (1978).[7] Provocatively examining a genuinely hybrid cultural mode, the nineteenth-century geological imaginary, *The earth on show* takes an ambitious and original approach to the methodological problems facing critics and cultural historians who wish to talk about science. Its evocation of the interpenetration of visual and verbal scientific modes intelligently dispenses with much of the disciplinary and critical paraphernalia which often hampers writings on this subject. Moreover, the density of its research and the persuasiveness of its fruitful readings of a broad range of texts and spectacles mean that, like the works of Altick, Rudwick and Secord, this book is likely to form the basis of a host of further studies. As O'Connor points out, his book provides groundwork for studies of the reception of geological verse or spectacle, or of the role of other literary genres such as the novel, in the development of the modern geological imagination. That it is so richly suggestive of further avenues can only be taken as a sign of the vibrancy of its approach to the idea of fiction in the scientific imagination, and the importance of its contribution to scholarly studies in that area.

References

Alberti, S. J. M. M. (2005). Objects and the museum. *Isis, 96*, 559–571.

Alberti, S. J. M. M. (2002). Placing nature: Natural history collections and their owners in nineteenth-century provincial England. *British Journal for the History of Science, 35*, 291–311.

Altick, R. (1978). *The shows of London*. Cambridge, MA: Belknap Press.

Brown, B. (2003). *A sense of things: The object matter of American literature*. Chicago: University of Chicago Press.

Freedgood, E. (2006). *The ideas in things: Fugitive meaning in the Victorian novel*. Chicago: University of Chicago Press.

Knell, S. J. (2000). *The culture of English geology, 1815–51: A science revealed through its collecting*. Aldershot: Ashgate.

Livingstone, D. (2003). *Putting science in its place*. Chicago: University of Chicago Press.

Mantell, G. A. (1844). *The medals of creation: Or, first lessons in geology, and in the study of organic remains* (2 vols.). London: Bohn.

Morus, I. (2006). Replacing Victoria's scientific culture. *19: Interdisciplinary Studies in the Long Nineteenth Century, 2*. http://www.19.bbk.ac.uk/issue2/ReplacingVictoria.pdf.

Oldroyd, D. R. (1990). *The highlands controversy: Constructing geological knowledge through fieldwork in nineteenth-century Britain*. Chicago: University of Chicago Press.

Rudwick, M. (1992). *Scenes from deep time: Early pictorial representations of the prehistoric world*. Chicago: University of Chicago Press.

Rudwick, M. (1985). *The great Devonian controversy: The shaping of scientific knowledge among gentlemanly specialists*. Chicago: University of Chicago Press.

Secord, J. A. (1986). *Controversy in Victorian geology: The Cambrian–Silurian dispute*. Princeton: Princeton University Press.

Secord, J. A. (2000). *Victorian sensation: The extraordinary publication, reception, and secret authorship of Vestiges of the Natural History of Creation*. Chicago: University of Chicago Press.

Sokal, A. D., & Bricmont, J. (1998). *Intellectual impostures: Postmodern philosophers' abuse of science*. London: Profile.

[7] Altick (1978).