



Miranda

Revue pluridisciplinaire du monde anglophone /
Multidisciplinary peer-reviewed journal on the English-
speaking world

2 | 2010

Voicing Conflict : Women and 20th Century Warfare

Martin J.S. Rudwick, *Worlds Before Adam: The Reconstruction of Geohistory in the Age of Reform*

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Electronic version

URL: <http://journals.openedition.org/miranda/1393>

DOI: 10.4000/miranda.1393

ISSN: 2108-6559

Publisher

Université Toulouse - Jean Jaurès

Electronic reference

Laurence Talairach-Vielmas, "Martin J.S. Rudwick, *Worlds Before Adam: The Reconstruction of Geohistory in the Age of Reform*", *Miranda* [Online], 2 | 2010, Online since 03 July 2010, connection on 16 February 2021. URL: <http://journals.openedition.org/miranda/1393> ; DOI: <https://doi.org/10.4000/miranda.1393>

This text was automatically generated on 16 February 2021.



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Martin J.S. Rudwick, *Worlds Before Adam: The Reconstruction of Geohistory in the Age of Reform* (Chicago and London: The University of Chicago Press, 2008), 614 p, ISBN 978-0-226-73128-5

- 1 It is a daunting task to review one of Martin Rudwick's books. A former palaeontologist, Martin Rudwick is the author of many books, among which *The Meaning of Fossils: Episodes in the History of Palaeontology* (1972), *The Great Devonian Controversy: The Shaping of Scientific Knowledge among Gentlemanly Specialists* (1985), *Scenes from Deep Time: Early Pictorial Representations of the Prehistoric World* (1992), *Georges Cuvier, Fossil Bones, and Geological Catastrophes* (1997), *The New Science of Geology: Studies in the Earth Sciences in the Age of Revolution* (2004), *Lyell and Darwin, Geologists: Studies in the Earth Sciences in the Age of Reform* (2005) or *Bursting the Limits of Time: The Reconstruction of Geohistory in the Age of Revolution* (2005). *Worlds Before Adam: The Reconstruction of Geohistory in the Age of Reform* is the sequel to *Bursting the Limits of Time*, and a new dense and rich study highlighting that geohistory was firmly established well before the middle of the 19th century. Indeed, the book traces the development of the practice of geohistory within the sciences of the earth from the 1820s to the early 1840s. The period is significant as it corresponds to the July Revolution in France as well as the Great Reform Bill in Britain. Rudwick's study aims to present the first stages of modern geology, revealing how geologists attempted to reconstruct the earth's history (geohistory) by examining and reconstructing antediluvial worlds peopled with extinct creatures. Rudwick not only deals with the history of geology in Britain but intends as well to "correct an overwhelmingly anglocentric and anglophone bias in much of the historiography of

geology” (4) by looking at the research in the sciences of the earth done in the main European nations, most especially in France—French being at the time the preeminent scientific language worldwide and Paris being the heart where the emerging science of geology developed, most especially with Georges Cuvier at the Muséum d’Histoire Naturelle.

- 2 Rudwick’s study is divided into four parts and thirty-six chapters. The first part deals with the early 1820s and focuses on Georges Cuvier. Rudwick explains how Cuvier’s pioneering work in stratigraphy and his creation of geological maps were used to build geohistorical inferences. He recalls the origins of the term “paleontology”, coined by the Frenchman Henri Marie Ducrotay de Blainville (1772–1850), who first proposed the term “paléosomiologie” and replaced it by “paléontologie” in 1822. The new term typified the growing interest in fossils. Rudwick then highlights how scientists used the present to decipher the past, analysing William Buckland’s exploration of Kirkdale Cave and his interpretations of the “deluge” equated with the Biblical Flood.
- 3 The second part of the book looks at the later 1820s and early 1830s. It develops further the growing impact of studies of the fossil record, relating the history of the reconstruction of the geohistory of the Paris Basin (notably Louis-Constant Prevost’s work and his criticism of Alexandre Brongniard and Georges Cuvier). Examination of the fossil record suggested that organisms had evolved and become more complex through the ages. Thus, as Rudwick makes explicit, the observation of fossils, just like the observation of rocks, formed a part of the development of geohistory. These first reconstructions of life habits of ancient creatures (especially with the discovery of coprolites, or fossilized feces), underlining food chains and predatory (even cannibalistic) relationships, were followed by attempts at placing man among these extinct “antediluvian” creatures. In other words, the development of the sciences of geology and paleontology went hand in hand with the issue of the origin and place of the human species itself and man’s potential contemporaneity with other species. Though Cuvier, followed by Buckland and many others, drew a sharp division between human history and the reconstructed worlds of extinct mammalian megafauna, still, it was more and more obvious that species had died out in piecemeal fashion and not as the result of one main catastrophe. Moreover, if finds pointed to the contemporaneity of man and extinct mammals, the continuous presence of man while part of the fauna was becoming extinct became a source of concern to scientists, some of whom, like Buckland, clung to the diluvial theory. Yet, the idea of transmutation, which was starting to emerge as well, could perhaps be applied to the human species, as Charles Lyell’s work surmised. Etienne Geoffroy St Hilaire’s application of Jean-Baptiste Lamarck’s transformist theory to the fossil record actually followed the actualist method developed by Lyell. Of course, his theory, which foregrounded the role of chance and accident, was viewed suspiciously by the advocates of divine design. However, it paved the way for the quest for the origins of life. As a matter of fact, if scientists started imagining scenarios explaining extinction, they had no idea regarding the origins of life.
- 4 Charles Lyell is at the heart of the third and fourth parts of Rudwick’s study. The third part focuses on Charles Lyell’s approach to geology and his own perspective on geohistory as developed in the three volumes of his *Principles of Geology*, whose publication spread over four years (1830–33). Lyell’s views on the evolution of the earth were quite distinct from those of his contemporaries, and his geothory, inspired by

the Huttonian conception of the earth, was quite influential. Rudwick relates Lyell's tour of France and Italy (from Auvergne and the Mediterranean Coast to the volcanoes of southern Italy and Sicily and northern Italy), gradually making up an ambitious inventory of actual causes to fashion his theory, as recorded in the *Principles*. Rudwick then turns to the reception of Lyell's work in scientific circles in Britain (notably by Henry de la Beche, William Conybeare, William Whewell and Adam Sedgwick, who both praised and criticized his work) as well as on the Continent. As Rudwick explains, drawing on Huttonian geohistory, Lyell's theory gradually became known, though he had to modify it to fit in with "uniformitarian" and "catastrophist" approaches. The evolution of the earth, as posited by the Scottish geologist James Hutton's perception of geological processes at the end of the 18th century, and expounded in *Theory of the Earth; or an Investigation of the Laws Observable in the Composition, Dissolution, and Restoration of Land upon the Globe* (1788), counteracted literalist readings of the Bible. Hutton suggested, rather, that geological processes could transform continents with time, causes being always identical. This view of the evolution of the Earth as a slow and continuous process was furthered by Lyell who believed that geography changed through the elevation of some parts of the earth's crust and the depression of others. However, some traces of past geohistory pointed to geological catastrophes for which Lyell was trying to find explanations.

- 5 This is examined further in part 4, which deals with the development of geohistorical themes through the 1830s and into the early 1840s partly in response to Lyell's work. In part 4, Rudwick takes further the reception of Lyell's *Principles*, now fully published, which provoked arguments among geologists. Though not revolutionary, Lyell's theory on geohistory, as well as his argument about human antiquity, typifies the increasingly "progressive" character of the history of life. In the 1830s, more and more geologists, following in the footsteps of William Conybeare (whose cartoon of Buckland crawling into the antediluvian hyena den had pioneered a kind of geohistorical reconstruction) and Henry de la Beche (in his "Duria Antiquior"), attempted to reconstruct geohistory by focusing on the Jurassic reptiles. This genre of reconstructed scenes from deep time, in Rudwick's terminology, took part in the expansion of geohistory, even if the popular and highly sensationalized reconstructions were often to the detriment of scientific accuracy. Rudwick does not fail to mention the work of Charles Darwin, a convinced Lyellian, who became a member of the Geological Society on his return from his voyage on the *Beagle*. Firmly believing in actual causes, Darwin's geothory testified to the idea that actual causes could explain "all the traces of past geohistory" (483). Still, while Lyell's work was becoming more and more accepted and acclaimed in scientific circles, William Buckland's early "diluvianism" (the evolution of the earth through inundations, as shown in his *Reliquiæ Diluvianæ, or, Observations on the Organic Remains attesting the Action of a Universal Deluge* [1823]) still haunted geological debates. True, the biblical Flood was no longer plausible; but the theory of a geological "deluge" remained strong in the 1830s. This is why Rudwick looks at the ways in which Lyell attempted to develop his geohistory without resorting to such catastrophic events. To do so, he developed earlier ideas related to drifting ice floes and icebergs as examples of actual causes backing up uniformity. The idea of a glaciation on the global scale (snowball earth), particularly developed by Louis Agassiz, furnished Lyell with evidence of climactic crisis in the history of life which did not therefore jeopardize uniformitarianism. So, Rudwick ends his 600-page study (with over 150 illustrations) in

the mid-1840s on the putative Ice Age—a theory that would continue to tease scientists in the following decades.

- 6 Rudwick's study is simply fascinating: closely and accurately, Rudwick looks at the history of science of the period beyond polarities, offering us insights into scientists' fieldwork and work in progress. Because uniformitarianism or catastrophist theories reflected a multitude of visions of the era's emerging geohistory, Rudwick proposes, instead of a study of the debates between science and religion, a journey into the work of scientists and their reception, as their theories were frequently simultaneously acclaimed and criticized. In addition, the book is both addressed to historians of science (most particularly the sciences of the earth) and to readers who want to learn about the beginning of geology and the shaping of knowledge in the early 19th century. Rudwick's book not only includes a summary at the end of each chapter, but the text is also enhanced by illustrations, providing visual aids to the readers. In short, we can only praise Rudwick's magisterial and erudite work.
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Keywords: extinction, fossils, geology, paleontology, Uniformitarianism

Mots-clés: extinction, fossiles, géologie, paléontologie

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