

Review Article

Modernity through the Eyes of a Palaeontologist

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The Earth After Us: What Legacy Will Humans Leave in the Rocks? By Jan ZALASIEWICZ. New York: Oxford University Press, 2008, 251 pp. ISBN: 978-0-19-921497-6 (Hardback). ISBN: 978-0-19-921498-3 (Paperback).

The word, 'modernity' and the adjective, 'modern,' have been put to so many contradictory uses in recent decades (what is 'post-modern' to some is merely 'modern' to others) that they have been leached of any conceptual energy they may once have possessed. This poses a problem for world historians who would like to argue that historical changes in the last two hundred years or so have been significant on very large scales.

Recently, another historical discipline, geology, has thrown up an alternative conceptual scheme that could re-invigorate his-

torical discussion about what it is that makes the history of recent centuries so different. That conceptual scheme is built around the idea that in the last two centuries we have entered a new geological epoch, the “Anthropocene.” This is the epoch in which, for better or worse, our species began to transform the entire biosphere. The idea was first proposed by the climate scientist, Paul Crutzen, in 2002.¹ It has been taken up by a number of geologists, including Jan Zalasiewicz, the author of the book reviewed in this article.² And the idea is gaining momentum. In December 2008 the American Geophysical Union conference included as many as 9 panels on the idea of the Anthropocene. In 2009, the Subcommittee on Quaternary Stratigraphy of the International Commission on Stratigraphy, the body that formalizes decisions on geological chronology, created a formal working group to consider the idea; that group is convened by Zalasiewicz.³ In February 2011, the Royal Society in London published a Theme issue on the subject with Zalasiewicz as one of the authors.⁴

I mention all this because the book under review can be thought of as an introduction to the idea of the Anthropocene for non-geologists. Zalasiewicz is a palaeontologist, and his book is a wonderful brief introduction to the methods and perspectives of palaeontologists. How do you date major changes in the history of life on earth; how do you identify causes if the events you are studying happened 100 million years ago? Zalasiewicz writes about

¹ Paul J. Crutzen, “Geology of Mankind: The Anthropocene,” *Nature* 415 (2002), 23. Retrieved April 25, 2012, from <http://www.nature.com/nature/journal/v415/n6867/full/415023a.html>; see also Will Steffen, Paul J. Crutzen, & John R. McNeill, (2007), “The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?” *AMBIO* 36, no. 8 (2007): 614–21, retrieved April 25, 2012, from http://allenpress.com/pdf/ambi-36-08-06_614..621.pdf; Will Steffen, Jacques Grinevald, Paul Crutzen, and John McNeill, John, (2011), “The Anthropocene: Conceptual and Historical Perspectives,” *Philosophical Transactions of the Royal Society A*, 369 (1938), 842–67.

² Jan Zalasiewicz, et al., “Are We Now Living in the Anthropocene?” *Geological Society of America* 18, no. 2 (February 2009): 4–8.

³ <http://www.quaternary.stratigraphy.org.uk/workinggroups/anthropocene/> retrieved Nov. 19, 2012.

⁴ “The Anthropocene: A New Epoch of Geological Time?” (1 February 2011). Theme Issue compiled and edited by Mark Williams, Jan Zalasiewicz, Alan Haywood and Mike Ellis, *Philosophical Transactions of the Royal Society A*, 369, 835-1112.

paleontology with passion and enthusiasm. And he writes elegantly and engagingly about the complex and sophisticated methods now available to study the remote past.

But his book also links paleontology and human history more explicitly, for its goal is to use the insights of paleontology to try to measure the impact of human history on the biosphere. And that is the key to the idea of the Anthropocene: are the activities of human beings in recent centuries significant on geological time scales? As a palaeontologist, Zalasiewicz raises the question by asking what traces we will leave behind to future alien palaeontologists who may visit our earth in 100 million years. (To put that period in perspective, it is 1/45 of the age of the earth, and the dinosaurs were wiped out 67 million years ago after the landing of a huge asteroid.)

Zalasiewicz is clearly pessimistic about our chances of taming the colossal power we now possess as a species. “It is unlikely,” he suggests, “that the world’s countries will agree among themselves to stem [the use of fossil fuels], arguing that to do so would trash their economies ...” (p. 148). So he imagines a thought experiment in which human civilizations vanish within a few centuries of the present day. If, 100 million years after that happens, aliens land on our earth and study our planet using methods and tools at least as sophisticated as those of a present-day palaeontologist, will they find traces of our existence? What impression will we have left behind?

Zalasiewicz’ own work looks back about 100 million years, to a period when our earth was much warmer than today. So he has a good idea of how objects and species fare at such time scales.

Will we show up? The early chapters of Zalasiewicz’ book suggest some of the techniques our alien palaeontologists may use to figure out something about our earth’s history. For historians, this is a wonderful short introduction to the methods used by palaeontologists to document the past. The final chapters, beginning with Chapter 7, ask more specifically if the visitors will notice us. And Zalasiewicz’ answer is that they surely will.

First, they will notice a massive extinction event, similar in scale to the major extinction events already documented by human palaeontologists. But they will note a distinctive aspect of this extinction event. The study of fossilized pollen will show that, though the earth's surface was divided into several separate continents, many of its species could be found everywhere. A very thin geological layer will show a sudden 'Macdonaldization' of the world, with similar plants and animals showing up almost everywhere.

Second, our alien palaeontologists will find evidence that the oceans warmed up and sea levels rose. And it will not be hard for them to establish that both phenomena were due to rising levels of atmospheric CO₂. For one thing, they will notice a missing layer of limestone, a sure sign that increased CO₂ levels were making the world's oceans more acidic and making it more and more difficult for organisms that build skeletons to do so. Calcium carbonate will simply be dissolved away as it was during a warm period well studied by human palaeontologists, about 55 million years ago during the Eocene epoch. They will also notice the vanishing of coral reefs, which are major builders of limestone.

Third, if they persist, they will find direct evidence of human activities. They will find what Zalasiewicz calls the 'urban stratum', a stratum that will surface periodically and is made up of the debris of human urban civilizations. It will be formed only from cities that are sinking into the mud today (they include New Orleans, London and Amsterdam) because cities such as San Francisco that are being lifted up will be eroded away and will leave no traces behind. "Occasionally, petrified cities will be exhumed back to the surface. Here, there will be metres-thick layers of rubble, of compressed outlines of concrete buildings, some still cemented hard, some now decalcified and crumbly; of softened brick structures; of irregular patches of iron oxides and sulphides representing former iron artefacts, from automobiles to AK-47s; of darkened and opaque remnants of plastics; of white, devitrified fragments of glass jars and bottles; of carbonized structures of shaped wood; of outlines of tunnels and pipes and road foundations; of giant middens of rubble and waste" (p. 189).

It is possible that our alien paleontologists will also find the remains of human beings, most probably laid out in orderly grids outside the cities, in what today we call 'graveyards'. With the cold objectivity of someone used to studying fossils, he asks: will victims of the Mafia be among them? "... the fabled practice among the gentlemen of the New York Mafia of permanently terminating the ambitions of business competitors and then dropping their mortal remains into Hudson Bay in concrete overcoats. This practice creates moulds of the body outline (with mantling trench coat, fedora hat, and spats, perhaps) in a geologically hardwearing material, while placing the remains directly into an environment where scavenging is limited (the weight of the concrete should sink the cadavers some distance into the mud) and where pyritization and phosphatization of soft tissues can instantly begin" (p. 212).

Finally, Zalasiewicz asks if our alien visitors will be able to figure out what went wrong. They will be puzzled by a species that seemed to combine "high intelligence with breathtaking stupidity in equal measure" (p. 217). They will find plenty of evidence of great technological sophistication; indeed they will find the clearest evidence on the moon. On the Sea of Tranquillity they will find seismographs, a reflector, a golf ball, a US flag and other objects that will hardly have changed at all in 100 million years.

But they will also guess at some extremely self-destructive behaviours. Evidence from the urban stratum will show that our species must have needed huge amounts of energy, and it will not be hard to figure out (partly from the huge underground excavations left behind by the extraction of coal, oil and gas) that humans used fossil fuels. From that it will be no great leap to figuring out that we may have unwittingly caused catastrophic climatic changes.

Historians have a lot to learn from other scholars who study the past, including palaeontologists, and I strongly recommend Zalasiewicz' book both as an introduction to the past-recovery methods of palaeontologists and as a powerful introduction to the idea of the Anthropocene.