

Time's Arrow, Time's Cycle: Myth and Metaphor in the Discovery of Geological Time

by Stephen Jay Gould

Introductory Essay by Robert S. White

The discovery and understanding of "Deep Time" – the fact that the Earth is enormously older than humanity – is one of the most profound insights that geology has produced. It is hard to grasp the enormity of the age of the Earth. A commonly-used analogy is to represent the Earth's age as a calendar year. In that perspective, modern *homo sapiens* have lived on Earth for less than 20 minutes of the last day of the year.

Intellectual acceptance of deep time occurred over a period between the mid-seventeenth and the mid-nineteenth centuries. Stephen Gould documents the way in which now commonly-accepted notions of geology and of deep time were developed by those early thinkers. The conventional wisdom is that the blind biblical literalism of people like Thomas Burnet, who wrote his *Sacred Theory of the Earth* in the 1680s, was replaced by sober rational inferences based on observation of the Earth as it exists. The heroes in this account were, first, James Hutton, who published his original *Theory of the Earth* in the 1780s, which ended with the ringing sentiment that 'we find no vestige of a beginning, – no prospect of an end' in Earth's history. Fifty years later Charles Lyell wrote his *Principles of Geology*. Lyell was a much better writer and populariser than was James Hutton, and he is really the person who kick-started Geology as an independent and respectable subject.

Yet, as Stephen Gould shows so well in this book, all the protagonists in the debate about the nature of geological time were deeply influenced by the preconceptions of the culture in which they lived. Not least, all were subject to strong religious ideologies. Hutton and Lyell were much less driven by indisputable and undeniable evidence from observations of rocks than the modern mind assumes. Gould's thesis is that the main intellectual debate was whether time was represented better by cycles or by directional arrows. He concludes that Hutton's and Lyell's preference for deep time arose not from superior knowledge of the rocks found by geology, but from a metaphysical commitment to time's endless cycle.

A curious consequence of this is that, though we now take it as a basic tenet of geology that time progresses directionally and that the earth is enormously ancient, this position is actually closer to Burnet's position than to Hutton's or Lyell's (the supposed heroes of geological history). Furthermore, it is also clear that the great majority of the rocks that are now preserved in the geological record are the consequence of short-lived, catastrophic events like floods, landslides and volcanic eruptions, again closer to the conclusions of Burnet than of Hutton and Lyell.

Gould has done us a great service in showing that we often read back into history what we want to see, rather than what actually happened. It is much more fruitful and interesting to try to understand why and how our predecessors reached the views they did. That way we might, just possibly, avoid making some of the same mistakes they did by examining the metaphysical preconceptions we carry as baggage into all our thinking, even on what we think of as rational, evidence-based scientific issues.

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