Then and now: Hutton’s unconformity in Jedburgh, Scotland: John Clerk of Eldin’s famous drawing from Hutton’s 1795 “Theory of the Earth.” The people and animals are not so much for scale as to contrast the present with the “former worlds” represented in the rock beneath.

The Man Who Found Time: James Hutton and the Discovery of the Earth’s Antiquity

Written by Jack Repcheck.

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The success of Dava Sobel’s Longitude in 1995 (now available in DVD!) seems to have established a model for popular scientific biographies in the geosciences. The formula involves finding an individual who had to overcome adversity and whose singular achievement is unappreciated today; then, tell a good story and keep it short. Simon Winchester followed the blueprint well with The Map That Changed the World, a biography of William (Strata) Smith. David Hamblyn did likewise with his biography of the early-Nineteenth Century English Quaker naturalist, Luke Howard, who established a classification of cloud types still in use today (The Invention of Clouds). And there have been others.

Depending on the subject, contributions to the genre run several risks: over-reach (too little material to fully sustain the narrative, which is then padded with imaginary conversations or chapters on other subjects); over-statement (inflation of the significance of the achievement); over-dramatization (foreboding, exaggeration of the supposed crises and conflicts); and, finally, over-simplification (minimizing other contributions to the solution of the problem).

Winchester’s book, for example, suffers from the fact that little was originally recorded of Smith’s life, and there is a distinct feeling of over-reach and over-dramatization upon reading it. Hamblyn’s book has more chapters on other subjects than it has on the subject of the book!

Jack Repcheck’s biography of the late-Seventeenth Century Scottish philosopher-geologist James Hutton claims ultimately to be about “the power of books to shape the history of ideas.” In Hutton’s case, the story goes, he wrote his one great book so poorly that he is little known as the
founder of modern geology (in the English-speaking world at least). After all, in physics we have Newton's *Principia*, in economics there is Smith's *Wealth of Nations*, and in biology we have Darwin's *Origin of Species*; yet few today could name Hutton's great work and its central achievements.

Hutton's full *Theory of the Earth* (1795) is a one thousand-page, two-volume set (the third was not published until recently). Much of Hutton's discussion is over now long-dead issues such as Neptunism vs. Plutonism and Primary vs. Secondary rocks. Hutton advanced the case for igneous action (Plutonic, at least) and for the existence of secondary, or derivative, rocks. Along the way, there is a good deal of geomorphology presented, including the case for fluvial action in the landscape that was to become famous as "Playfair's Law" (Playfair 1802, p.102). Hutton's approach to the study of rock strata established the modern methodological basis for proceeding with geological questions (uniformitarianism or, in shorthand, "the present is the key to the past"). But his most significant contribution (the concept that tied it all together) was his argument for a geologically dynamic Earth or a rock cycle. This cycle had an indefinite term: "no vestige of a beginning and no prospect of an end" (Hutton 1788, p.304). In making this argument, Hutton boldly ignored what Lyell (1830, p.30) termed "popular [religious] prejudices" concerning the age of the Earth and its evolution.

Yet, here is a paradox: Repcheck (and Lyell for that matter) sets up Hutton's discovery as a triumph of science over religious ideology, but Hutton in fact set his rock cycle in a religious context that modern science finds unnecessary, if not embarrassing. Hutton begins his work with a religious conclusion: "When we trace the parts of which this terrestrial system is composed . . . we perceive a fabric, erected in wisdom, to obtain a purpose worthy of the power that is apparent in the production of it" (Hutton 1788, p.209). To be fair, Repcheck does discuss Hutton's Deism, but he does not bring it to bear upon Hutton's science: in setting up his story, he prefers black versus white.

The alleged difficulty of comprehending *The Theory*, in either the 1788 or 1795 presentation, which Playfair first alluded to in 1802 (p.iii) and which Repcheck repeats, cannot be the reason for any neglect of Hutton (I say alleged, because all three volumes actually make fascinating reading). After all, few people today have read any of the other seminal works Repcheck lists, and yet the names are familiar enough. In the professional world, it is probably true that more biologists have read *The Origin of Species* and more physicists have read *The Principia* than earth scientists have read Hutton—but not by a wide margin today, I'm sure!

More importantly, Hutton's ideas certainly were influential: Charles Lyell came to know them through a companion of Hutton's, the mathematician John Playfair, and Lyell subtitled his 1830 classic *Principles of Geology* with a clear reference to Hutton's uniformitarian method: "An attempt to explain the former changes of the Earth's surface by reference to causes now in operation." Lyell certainly gave Hutton his due in an extensive review of the history of ideas in geology, stating that "Hutton labored to give fixed principles to geology, as Newton had succeeded in doing to astronomy" (1830, p.61).

Lyell's "Principles" influenced a generation of geologists and naturalists, including Charles Darwin, who contributed significantly to geology before writing on evolution. The expanse of time Darwin could allow for evolution, although unknown in actual years, seemed arguably long enough, thanks to Hutton's work.

Whatever the reason for Hutton's lack of name-recognition with today's public, Repcheck sets out to rectify the situation. However, as with the pedestrian, equivocal title of Repcheck's book (*The Man Who Found Time*), the idea that books shape the history of ideas can be taken in different ways. Indeed, one could argue that Hutton lost his chance at instant recognition by writing the book in the difficult manner that he did. On the other hand, if Repcheck's book proves as popular as Dava Sobel's *Longitude*, it could shape popular ideas on the history of science in less fortunate ways.

Repcheck paints an excellent portrait of the intellectual and social life of Edinburgh during the Scottish Renaissance of the late-Eighteenth Century: Joseph Black (the chemist) David Hume, and Adam Smith were Hutton's contemporaries. However, despite Playfair's short biography, there are really few details available from Hutton's life (no personal papers or correspondence, for example). At times, then, Repcheck works perhaps a little too hard to create a good story. Hutton did indeed labor hard, as Lyell put it, to gather evidence in support of his ideas, but Repcheck reduces this in the end to simple "Eureka" moments.

One such alleged moment was the discovery of the world-famous Siccar Point unconformity in South East Scotland, where the rock beds from an earlier cycle in Earth's history stand vertically underneath the still-horizontal beds from a later cycle: there can be no greater disjuncture. So famous is this site that a rubber cast of this geological phenomenon is to be found in The Gottesman Hall of Planet Earth at the American Museum of Natural History in New York (AMHN). Educational material on the AMHN web site claims that "It was here in 1788 that James Hutton realized many geological truths that remain valid today . . . This discovery overturned previous beliefs that the Earth was only 4,000 years old, and spawned the field of modern geoscience" (AMHN, 2003). Similarly, Repcheck tells us that "Hutton needed to find an exposure of rocks that somehow demonstrated his theorized cycle . . . That was what the breathtaking discovery at Siccar Point in 1788 provided" (p.158).

However, neither of these presentations is correct, and both reduce the history of science to a cartoon.

Hutton's Deistic religious views predisposed him towards thinking that Earth's continued habitability depended upon a rock cycle that renewed its soil, and that Earth had been so designed. He tested his idea of a rock cycle against extensive field observations he made throughout Britain and he knew from reading many
geological reports written in French by continental geologists that unconformities existed, although he disagreed with how they were interpreted (one of the things that really does contribute to the difficulty of reading the Theory of the Earth of 1795 are the dozens of pages of untranslated quotes in French — but buried in them are clear accounts of unconformities that Hutton intended his readers to have, and which he believed established a more global case for his argument). As Repcheck notes, Hutton did indeed seek to find an example to examine for himself, but the first he came across was on the Island of Arran in 1787; its limited exposure was deemed unsatisfactory by Hutton (1795, v.1, p.430). Then, later in 1787, he found an example at Jedburgh that so perfectly verified his ideas that he wrote: “[I] rejoiced at my good fortune in stumbling upon an object so interesting in the natural history of the earth, and which I had been long looking for in vain” (Hutton 1795, v.1, p.432). One of his companions at this time was the artist and naval tactician John Clerk of Eldin, who produced a famous sketch of the site and one that Hutton used to illustrate his Theory. Unaccountably, especially given the fame of Clerk's early trip to Siccar Point, Repcheck omits this occurrence from his history (although he does discuss the earlier trip Hutton made to Arran, but in connection with some work on the origin of granite).

The true story of Siccar Point is even better than the cartoon. Hutton did not come upon Siccar Point by accident. He deduced that there had to be an exposure of the upper and lower rock strata along the coast, and he set to find it with his companions, who that day included John Playfair, but not John Clerk. It was a fabulous example of scientific prediction and Hutton was pleased to present his interpretation of it to his friends sitting on the rocks that day.

So why is Siccar Point, discovered a year later, so famous that it shades all of Hutton's careful work in almost all accounts of his life? First, the Siccar Point site itself, located on the southeast coast, is far easier to get to than Jedburgh (which, incidentally, is a gem of a town located deep inside Scotland's Border Country and dominated by the ruins of a Twelfth Century abbey). Second, the exposure of the Siccar Point rocks is much more extensive and is located on a public site.

But the real reason for Siccar Point's fame lies again in the power of books to shape our ideas of history: in particular, the biography of Hutton that John Playfair published in 1805. Repcheck, along with others before him, seems to rely on Playfair's biography for his history, rather than reading Hutton's formidable Theory of 1795. The Theory, written roughly chronologically, contains the autobiographical details that Repcheck is missing.

In his biography, Playfair included an account of the Siccar Point expedition that has proved so highly evocative (apparently more so than Clerk's drawing of the Jedburgh unconformity) that it has dominated almost all accounts of Hutton's careful work. It was in this account that Playfair wrote upon hearing Hutton's perspective on the rock strata: “The mind seemed to grow giddy by looking so far into the abyss of time” (1805, p.73).

Hence, this locale has come to symbolize Hutton's Theory and the birth of modern geology in the English-speaking world. It made good reading then, and apparently The Man Who Found Time thinks it still does. But readers are not well served by an account that does not challenge this simplification of history.

Literature Cited


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