

CORRESPONDENCE

On Hutton's authorship of an 'Abstract of a Dissertation... concerning the System of the Earth, its Duration and Stability'

SIR – The authorship of an abstract, hereafter termed *Abstract* (Hutton, 1785), 'concerning the System of the Earth, its Duration and Stability' was apparently settled by Eyles (1948, 1955). However, Bailey (1967) has raised an authoritative, if solitary, voice in opposition with his clear statement that 'Eyles has argued, according to evidence that at first sight seems conclusive, that Hutton himself prepared it. He undoubtedly agreed to its distribution, but in my opinion he could not and would not have written it. The geology is the geology of Hutton, but the voice is the voice of Playfair.' If this were true it would put the first of Playfair's geological writings some seventeen years earlier than previously thought.

My intention here is to show that almost certainly Bailey is mistaken and that there are strong grounds for thinking that Hutton really did pen the *Abstract*. Bailey's argument, which develops gradually during his chapter four, rests primarily on the analysis of Hutton's text, and particularly on the assertion that the role of 'design', always an important theme in Hutton's writings, is significantly downplayed in the *Abstract*. As Bailey puts it, Hutton 'both in his 1788 paper and in his 1795 book, continually pushes the design hypothesis to the foreground' (Hutton, 1788, 1795) while Playfair (1802) discusses the issue only when he is making it quite clear that he is quoting Hutton (Playfair, 1802, p. 199, p. 127 *et seq.*). In contrast 'Hutton's reiterated appeal to design in nature is reduced to three short well-balanced paragraphs, placed at the end of the article' (Bailey, 1967, p. 28). (Bailey means *Abstract* by article in this sentence.) The implication is therefore that Playfair actually wrote the *Abstract*.

Unfortunately this assertion cannot be sustained by a thematic analysis of the *Abstract*.

1. Thematic analysis of the text of the *Abstract*

For the purposes of reference I will consider each paragraph in the *Abstract* as numbered; there are thirty-two such paragraphs, and these can be identified unambiguously either in the original, reproduced in facsimile in Albritton (1975), or in the transcription given in Eyles (1948).

I have identified references to the theme of design in seven paragraphs (1, 7, 17, 19, 23, 24, 28) additional to those mentioned by Bailey (30, 31, 32); see Table 1. Briefly, the design theme is the idea that there is a wisdom in nature which ensures that the operation of the world works to provide a habitable surface for living. In Hutton's undoubted words, that there is 'the presence and efficacy of design and intelligence in the power that conducts the machine' (Hutton, 1795, vol. 1, p. 5).

The very first paragraph introduces the superfluous phrase 'as a world maintaining plants and animals', and Table 1 lists the seven additional references in their immediate context. The strength of the design implication varies but they are all entirely consistent with Hutton's use of the theme in his 1788 paper and his 1795 book. Paragraphs 17 and 24 are particularly strong, the former in asserting that things had to be this way in order to create a habitable world, and both in contradicting Bailey's claim that the design theme is confined to a balanced statement at the end. Paragraphs 1, 7 and 28 imply that certain actions are required for a habitable world to exist. The remaining paragraphs, 19 and 23, are merely passing phrases alluding to properties which are useful to mankind. They are, however, typical of Hutton's locutions in his undoubted works (Hutton, 1788, 1795), while such incidental references are absent from Playfair's *Illustrations* (Playfair, 1802). From these considerations I conclude that Bailey is mistaken and that the *Abstract* is, in fact, permeated by the design theme, as are the rest of Hutton's writings. The theme is suppressed in contexts where it would be difficult to introduce it: discussions of chemical changes, consolidation by heat and pressure and how to measure the elapsed time of the globe (although see paragraph 28, Table 1). It most often appears in general discussions of the overall cycle where it justifies the system as a whole or where some otherwise difficult step needs bolstering (e.g. why loose sediments must become consolidated; answer; so that erosion will proceed slowly and provide a 'habitable globe') or perhaps even unconsciously as an auxiliary reason for the very slowness of surface decay and transport.

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Table 1. Addition references to the design theme in the *Abstract*

Paragraph	Context, design theme italicized
1	...estimate with regard to the time the globe of this earth has existed, <i>as a world maintaining plants and animals</i> ; to reason with regard to the changes which the earth has undergone...
7	...in order to make this land a permanent body, resisting the operations of the waters, <i>two things had been required</i> ; 1st the consolidation of masses... 2dly, the elevation of those consolidated masses...
17	...we are led to conclude, that our land had been raised above the surface of the sea, <i>in order to become a habitable world</i> ; as well as that it had been consolidated by means of the same power of subterranean heat, <i>in order to remain above the level of the sea, and to resist the violent efforts of the ocean</i> .
19	...volcanoes are thus considered as the proper discharges of a superfluous or redundant power; not as things accidental in the course of nature, <i>but as useful to the safety of mankind</i> ,...
23	...A theory is thus formed, with regard to a mineral system. In this system, hard and solid bodies are to be formed from soft bodies, from loose or incoherent materials collected together at the bottom of the sea; and the bottom of the ocean is to be made to change its place with relation to the centre of the earth, to be formed into land above the level of the sea, <i>and to become a country fertile and inhabited</i> .
24	...As it is only by employing science in this manner, that philosophy enlightens man <i>with the knowledge of that wisdom or design which is to be found in nature</i> ,...
28	...an earth which had supported plants and animals and had supplied the ocean with those materials <i>which the construction of the present earth required</i> ,...

2. Failure to mention granite in the *Abstract*

Bailey mentions one other matter that he believes reveals clearly the 'hand of Playfair': the fact that 'there is no mention of Hutton's proposition that granite consolidated from a molten condition – presumably because someone advised against introducing so controversial an idea in regard to a matter upon which more evidence might be expected in the near future' (Bailey, 1967, p. 28). This can be answered in several ways. In the first place the 1788 paper, undoubtedly by Hutton, and presumably the paper that was read in 1785, notes that 'the nature of granite is too intricate a subject to be here considered, where we only seek to prove the fusion of a substance from the evident marks which are to be observed in a body'. For whatever reason, therefore, granite was not treated deeply; it occupies only five pages of the two hundred which the 1788 essay occupies in its guise as the first chapter of the 1795 book, and so it is not surprising that it is omitted, in name, from the *Abstract*.

However, paragraph 7 makes the reservation 'Hence we are led to conclude, that the greater part of our land, if not the whole, had been produced by operations natural to the globe.' Hutton's reasoning was, as Playfair remarked, often 'embarrassed by the care taken to render it strictly logical' and I conclude that his reservation here is quite intentional and refers to granite. The corresponding passage in the 1788 paper, quoted here from the 1795 book (Chapter 1, p. 27 *et seq.*), echoes a similar reservation: 'The general amount of our reasoning is this, that nine-tenths, perhaps, or ninety-nine hundredths of this earth, so far as we see, have been formed by the natural operations of the globe, in collecting loose materials and depositing them at the bottom of the sea;... There is a part of the solid earth which we may at present neglect... This excluded part consists of certain mountains and masses of granite.' A very similar passage can be found on page 103 *et seq.* After the latter passage, the production of granite by fusion is considered separately.

Another point stems from the timing of the papers. It is generally accepted (Davies, 1969) that the 1788 paper was probably completed by 1780, at latest, and that at this time Hutton had only seen one granite *in situ*, and none of its contacts with the country rock. This is quite consistent with its minor part in the 1788 paper, as published, and the 1785 *Abstract*, in both of which the emphasis is upon basalt, an issue of known concern on the Continent.

It is also hard to see why the suggestion that granite was of igneous origin should be any more controversial than the same suggestion about basalt. The lack of emphasis on granite merely reflects the lack of field evidence at the time of writing and, for the 1788 paper, a failure to rewrite to include the explorations made by Hutton and various friends between 1785 and 1788. Hutton neither courted nor shunned controversy; the paper itself was quite sufficiently incendiary *in toto* for the igneous origin of granite to be just another pebble on Newton's beach, with the ocean of truth still unrevealed. In addition, it is not clear why suppressing the fact in the *Abstract* would be of any particular help since it would certainly appear in the full paper, and Hutton had no way of knowing that this would be delayed three years in publication.

3. Orthographical evidence in the *Abstract*

The *Abstract* is too short for a useful structural analysis to be made comparing it with undoubted works by Hutton and Playfair. However, there is one point that can be made. In the *Abstract* the alternative and, by the late eighteenth century, obsolescent spelling 'oeconomy' is used for 'economy' the one time it occurs. In the 1795 book both spellings are used, apparently indiscriminately, but the older version appears several times, in both volumes (Hutton, 1795, I-11, II-182 (in a chapter title), II-184, II-562). Playfair, the younger by twenty-two years, and with a mathematician's methodical manner, uses 'economy' throughout the *Illustrations* (Playfair, 1802). However, it is recognized that the choice between alternative spellings may be a compositor's preference as much as an authorial whim and, regrettably, the place and publisher of the *Abstract* is unknown (Eyles, 1955). The orthographic evidence therefore, although very slight, is not unfavourable to Hutton's authorship of the *Abstract*.

Bailey also implies textual similarity between passages in the *Abstract* and in Playfair's *Illustrations*. This, however, is a dangerous theme. Both Hutton and Playfair had access to earlier, and unpublished, manuscripts of Hutton, and Playfair in addition could peruse the published works. The likelihood that both would use similar phrases, consciously or not, is very high and does not clarify the issue under discussion or help to sway the argument either way.

4. In conclusion

The three lines of attack given above are all consistent with the view that Hutton wrote the *Abstract*, not Playfair. Any attempt to support the opposite view has to explain why Hutton should have ceded preparation of the *Abstract* to Playfair. Playfair only became acquainted with Hutton in 1781 (Playfair, 1805, p. 74, footnote) and finally moved to Edinburgh in 1782, only three years before the presentation of a theory that was already prepared. Nothing is apparently known about his initial reaction to the theory, although Hutton's close friend James Hall only came close to his views after 'three years of almost daily warfare' (Hall, 1812). Hutton wrote voluminously, and the underlying innuendo in Bailey's argument is perhaps that Hutton could never be so brief as to write the *Abstract*. Nevertheless, one might argue that a 3000-word *Abstract* for a 40000-word essay is at least twice what a modern editor might allow! I conclude that the accumulated weight of the evidence presented here suggests that both the geology and the voice of the *Abstract* belong to Hutton.

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