# ESSAY REVIEW

Vic Baker, Book Review Editor

**THE MAP THAT CHANGED THE WORLD.** *Simon Winchester, 2003. Harper Collins Publishers, New York, 329p. Hardcover, $26.00. Softcover, $13.95.*

By now, most of the readers of this journal who would be inclined to read Simon Winchester's recent book on William Smith, *The Map That Changed the World,* will already have done so and will have formed their own opinions as to its merits. It may still be appropriate, however, to raise the broader question of the value of such books and their influence on the public perception of geology. Winchester's dramatic account of Smith and his work has reached a wide audience, and as geologists we would normally welcome any effort of this kind. However, in order to achieve his end, Winchester has resorted to such hyperbole and distortion that the picture he presents of Smith and the period in which he was working is nothing short of grotesque.

The preposterous title in itself is a good reflection of the nature of his story. At the outset, we are told (p. xvi – xviii) that Smith's map was vital to the "future of mankind." It "heralded the beginning of a whole new science." It laid the foundation of a field of study that culminated in the work of Charles Darwin. It enabled mankind to free itself from religious dogma. It made it possible to exploit the earth's mineral wealth. It was an achievement on the level of harnessing atomic energy, and on and on.

We all learned early in our geological education that William Smith was the first to use regional stratigraphic relations to produce a geological map of a large part of Britain. There is no question that this was a remarkable achievement, particularly when one considers that he did it almost single-handedly and with little or no outside support. Winchester traces Smith's rise from a modest working-class background to the status of a pre-eminent geologist who would come to be referred to in Britain as the "Father of Modern Geology." A house where Smith stayed while working as a surveyor at a coal mine in Somerset is called the "Birthplace of Geology" (p. 61–62) and is said to be as important to geology as the Galapagos Islands were to Darwin's concepts of evolution.

One can laugh off harmless exaggerations of this kind, but significant errors are another matter. Consider the following examples:

• Winchester tells us (p. 126) that Smith's map of Bath is the oldest "true geological map" and that his 1815 map of part of Britain was the first extensive geological map of any place on Earth (p. xvi). The map of Bath was a single hand-drawn copy and was never published. A perusal of almost any book on the history of geology will show that there were numerous earlier geological maps going back a century or more before Smith. Earlier, in 1780 (35 years before Smith), the French government published a map of all of France by Lavoisier, Guettard, and Monnet (Rappaport, 1969). True, these earlier maps did not designate biostratigraphic units; they lumped together units with similar lithologies without distinguishing their ages, so stratigraphers may argue that they were not "true geological maps," but they showed the distribution of major rock types, and, in the broad sense of the word, they were no less "geological."

• Winchester says (p. 14) that Smith provided a better view of the long history of the earth and made it possible for Darwin to win acceptance of his theories. The fact is that Smith made no note of organic evolution. He was what we would today call a creationist and ascribed the deposition of fossils to the biblical flood (p. 160). In this respect, he was in tune with the majority of English geologists who were still opposed to the ideas of Lamark and Geoffroy Saint-Hilaire.

• Winchester (p. 118–120) credits Smith with being the first to say that the distribution of sedimentary beds and fossils is not random but has a regular order over wide regions. In 1778, John Whitehurst published a stratigraphic scheme about which he said (pp. i and 143): "It may appear wonderful that amidst all the confusion of the strata, there is nevertheless one constant invariable order in the arrangement of them, and their various productions of animal, vegetable and mineral substances, or rather the figures or impressions of the two former. By knowing the arrangement and affinities of the *strata,* we are enabled to investigate, with much certainty, whether coal or limestone are contained in the lower regions of the earth." It is hard to see how Winchester could have overlooked this statement, because Geikie (1905) refers to it in his book *The Founders of Geology* in the same chapter in which he discusses Smith (p. 380). It is also mentioned by Challinor (1954) and Thompson (1988).

• Winchester states (p. 124–125) that Smith's map was a remarkable innovation because he utilized colors to distinguish the units. David Oldroyd (1996) lists at least four earlier geological maps that made use of color. In 1759, Johann Gottlob Lehmann drew a cross section similar to the tiny one on Smith's map that is said to have been another great innovation.

• Winchester refers (p. 270) to Adam Sedgwick as the "godfather of the Ordovician." As most students of geology know, Sedgwick established the Cambrian system, and it was Lapworth who defined the Ordovician in 1879.

• Winchester mentions (p. 64) the ages of some of the fossils in Smith's collection, but as Gould (2001) pointed out, at least two of these are incorrect. Contrary to what Winchester says, stromatolites are not extinct, and trilobites did not die out before the Carboniferous but at the end of the Permian. Similarly (p. 109), the pterodactyl was a reptile, not a progenitor of birds.

• Winchester extols (p. 74–78) Smith for using fossils to make regional correlations of lithologic units in his 1815 map. When George Cuvier and Alexander Brongniart (1808) presented their map of the sedimentary rocks of the Paris Basin they emphasized that these units were characterized by distinctive assemblages of fossils. More important, they recognized the orderly temporal changes of the individual species.

• Winchester tells us (p. xvi) that Smith's map was revolutionary because it provided a practical guide to the location of economic resources. In 1774, Friedrich Gottlob Gläser published a map of a region in Saxony showing the relationship of ore deposits to the principal rock types, granite, sandstone, and limestone – all of them shown in color (Oldroyd, 1996, p108). The map by Guettard, Lavoisier, and Monnet was intended mainly to show the locations of mineral resources with respect to the distribution of various types of rocks. And, as mentioned above, there were also Whitehurst's observations to this effect in 1778.

• Winchester says (p. 38) that Steno was "compelled by the dogmatic authority of the Copenhagen bishops to accept Ussher's notion that the world was 5772 years old." As Gould (2001) pointed out, nothing of the kind happened. There is no evidence that Steno doubted this age.

• Winchester tells us (p. 235–250) that when Smith was forced to peddle his collection of fossils to the British Museum, it was "The Sale of the Century." The sale of the Louisiana territory to the United States must pale in comparison. Smith received £700 for his collection, and about this same time, Gideon Mantell sold his collection of fossils to the British Museum for £4,087 (Cadbury, p. 220–222).

These are just some of the most obvious inaccuracies that occurred to me on a hasty reading of the book. Simon Knell (2002), who knows far more about the story than I do, listed at least a dozen more.

Other reviewers (e.g. Gould, 2001, and Palmer, 2001) have already expressed regret that the book gives such an inadequate portrayal of Williams Smith as a man. Winchester does not even provide a portrait that would let us see what Smith looked like! One senses that we are missing a great deal in Winchester's depiction of Smith's character. On one page we are told how much Smith was admired, and on the next we learn that when he was in serious financial trouble, he could not rally enough support to stay out of debtor's prison (p. 251–261). Despite his supposedly indispensable role in the construction of canals, he was dismissed from his position with a canal company when irregularities were found in his handling of land purchases (p. 137). He is said to have had unique skills, but when important jobs came up, it seems that people preferred to hire others in his stead (p. 199). Clearly, there was more to be said about this man than we learn from Winchester's story. And yet the publisher's advertising called this "a well-researched narrative."

Most of these errors could have been avoided by referring to any of a number of books on the history of geology, but when one is turning out books at the rate of about one a year, there is little time for such details. Instead, it seems that Winchester obtained much of his information from Hugh Torrens, who put many years into his study of Smith (Oldroyd, 2001; Brice, 2002; Joyce, 2002; H. Torrens, pers. comm., 2004). He sat in on Torrens' lecture on Smith at the Geological Society of London and, under false pretenses, milked Torrens for information which he then dressed up for popular appeal. Torrens has passed on to me a copy of Winchester's letter requesting information. It reads in part:

> I am now planning to write a short and somewhat similarly structured book about early British geologists – my basic plan being to look at the way their personal lives relate to their professional achievements, though falling short of writing a full-scale biography of any one of them. . . . [M]y interest in Smith is far less comprehensive than I understand yours to be, and . . . anything I might write would have a minimal impact on whatever you are planning to do.

Winchester expressed profuse gratitude for the information he received from Torrens but cited only one of Torrens' many publications on Smith and failed to indicate what parts of his text came from this source. The errors in Winchester's book are his own and cannot be attributed to anything he learned from Torrens.

Another of Winchester's books, *Krakatoa,* followed a similar pattern of sacrificing accuracy for the sake of a good story. (He couldn't even get the name of the volcano right!) As Simkin and Fiske (2003) showed in their scathing review in *Science,* the book is marred by hyperbole and factual errors that could easily have been avoided if Winchester had just taken the trouble to look into standard references.

As Gould (2001) pointed out, the publisher must share some of the responsibility for such sloppy work. The editor did not have to be a geologist to realize that parts of the text are not just wrong but downright silly. To cite a single example typical of many, according to Winchester, the evening of 11 June 1799 was a turning point in the history of the Earth (p. 128). It was then that Smith revealed to two dinner companions that three

stratigraphic units around the town of Bath were always in the same order and always had the same assemblages of fossils. When his friends recovered from this staggering revelation, they joined with Smith to compile a chart showing the relations of the rocks and fossils. "The reverberations of that late-evening meeting can be felt distinctly down through the years. Each time a new oilfield is opened, or new gold is added to a reserve, or when more platinum or cerium or iron or manganese is won from the earth's crust, it is perhaps appropriate to remember these three men." I am not making this up–this is a direct quote (p. 134–135).

Not only do such passages discredit the book and its author; they also have the effect of obscuring Smith's genuine contributions. Unless Hugh Torrens follows through with a proper biography, Winchester's best-seller is going to be a standard reference, and we are stuck with it. There is, of course, a place for popular books on geology and geologists. They help increase the public's awareness of science and, if well done, convey a better understanding of the Earth and how we study it. And to that end, a bit of dramatizing may be an acceptable way of getting the story across. But how much misinformation and hyperbole should we tolerate? In my view, Winchester's book exceeds that limit of by a wide margin.

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# BOOK REVIEWS

Vic Baker, Book Review Editor

## THE GREAT DINOSAUR CONTROVERSY: A GUIDE TO THE DEBATES.

*Keith M. Parsons, 2004. ABC-CLIO, Santa Barbara, California, 294 p. Hardcover, $85.00.*

It is comforting to think that science is a purely rational practice governed by a strict, almost mechanical methodology that aims to approach the "truth." In reality, we know that this not always to be the case. Social issues, personal opinions, and argumentative techniques sometimes seem as important as cold, hard facts, and often scientific arguments morph into fierce and bitter "controversies" that take years to resolve. Dinosaur paleontology is no exception to this model. In recent years alone, debates have raged over dinosaur extinction, endothermy, and avian origins. While each of these debates has quieted down somewhat, papers and books discussing these concepts still saturate the literature and draw substantial coverage from the popular press. In a new book, University of Houston philosopher and former Carnegie Museum of Natural History research associate Keith Parsons examines seven of the most explosive and important "controversies" in the history of dinosaur science.

Parsons' book, the latest in a series that chronicles some of the fiercest debates in the history of science, is neither a comprehensive history of vertebrate paleontology nor a technical discussion of the history of science. Instead, *The Great Dinosaur Controversy*, as spelled out in the preface, is aimed at undergraduate students and the general public. Parsons has labored to make his book accessible to college freshmen and sophomores, who have little knowledge of dinosaur paleontology, and in that he has succeeded. However, it is obvious that Parsons is driven by a goal of strict impartiality, and in some cases this leads him to give credence to poorly supported hypotheses. While a discussion of some of these hypotheses is necessary for a full and balanced summary of each controversy, this impartiality often inhibits Parsons from strongly stating that a certain hypothesis is most consistent with the known data. Despite this caveat, Parsons has done a laudable job in succinctly summarizing some of the most important moments in dinosaur paleontology.

Parsons organizes his book into eight chapters, beginning with a general introductory chapter that spells out the main goal of his book: to understand the origins and importance of scientific controversies. In this chapter Parsons comes to the conclusion that scientific controversies are unavoidable due to the vagaries of the scientific method and the fact that a theory cannot be proven absolutely. At the same time, however, he warns that the social constructivist view that no theory is better than another is incorrect, because in the end all good theories must meet certain standards of accuracy based on a rational interpretation of data. In the following chapters Parsons uses a selection of important moments in dinosaur science to support his main conclusion: that during times of controversy personal opinion and argumentative techniques can enter the picture, but when the dust settles it is rational evidence and rational evidence only that is debated.

The remaining chapters each examine a specific controversy more closely. These include detailed discussions of the first dinosaur discoveries in Victorian England, the relationship between dinosaurs and early evolutionary theory, the development of vertebrate paleontology in North America (including the Cope-Marsh "Bone Wars"), and the "crawling *Diplodocus*" controversy that pitted German and American scientists on opposite sides of what became a nationalistic debate. The final three chapters focus on more contemporary issues, including the questions of dinosaur endothermy, avian evolution, and the K-T extinction. Of these, perhaps the most pertinent chapter in the book relates to the controversies over avian origins. Unfortunately, it is here where Parsons is at his weakest, largely due to his goal of remaining impartial. This leads him to give too much weight to weaker alternatives to the hypothesis of dinosaur-bird evolution, which is robustly supported by nearly 150 years of research, hundreds of shared anatomical characteristics, and every cladistic analysis every published. While it should not be expected of Parsons to carefully critique all aspects of each hypothesis, as his book is only a general discussion of the history of science, it would have been beneficial for him to more strongly discuss the overwhelming weight of evidence supporting the dinosaur hypothesis. However, Parsons' tendency to cling to impartiality at all costs also has its positive side. Refreshingly, he refuses to characterize scientists as "good guys" or "bad guys" based on modern interpretations of the hypotheses they expounded. This is especially true in the case of Richard Owen, who has received a bad rap from many modern historians of science.

*The Great Dinosaur Controversy* is by no means a comprehensive history of dinosaur paleontology, but Parsons does an excellent job of summarizing some of the most crucial moments in a wide-ranging discipline. Parsons is a gifted writer, whose conceptual explanation of cladistics and other difficult topics will likely prove immensely important to the student audience he is writing for. Although not a textbook per se, Parsons' book would make an excellent companion volume for an undergraduate dinosaur class or history of science seminar. Since paleontology is a historical science, and its historical development as a discipline is pertinent to all modern practitioners, this book may also find a home in entry-level graduate classes or seminars. After all, for students interested in pursuing a career in science, understanding the role of controversy and the ascendancy of rational evidence, as opposed to personal credentials or argumentative techniques, is of the utmost importance.

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**FLOATING ISLANDS: A GLOBAL BIBLIOGRAPHY WITH AN EDITION AND TRANSLATION OF G. C. MUNZ's EXERCITO ACADEMICA DE INSULIS NATANIBUS (1711).** *Chet Van Duzer, 2004. Cantor Press, Los Altos Hills, California, 428p. Hardcover, $44.95*

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Figures 5 and 6 of this book are color photos of an island in a pond near Solhan, Turkey. The island is perhaps ten meters in long dimension and supports three trees, each about six meters in height. In Figure 5, the island nearly touches the shore of the pond,

and two men, standing on the shore, are pushing at the island with a long pole. In Figure 6, the two men are standing on the island, which is now about two meters from shore.

The author of this book, Chet Van Duzer, defines floating islands as "floating pieces of land, which commonly consist of peaty soil made buoyant by gases released by the decomposition of vegetable matter, or else masses of buoyant aquatic vegetation that often, but not always, have substantial amounts of organic sediments trapped among their entwined roots." From Web sources, it appears that Van Duzer is a classicist, with an eclectic view of the world.

An inventory could classify the contents of this book in three parts, not each contiguous: (1) Georg Christoph Munz's (1711) *de insulis natanibus,* in Munz's Latin, with Van Duzer's facing-page, English-language translation. This translation leads to Notes 1 through 28, of which Note 7 leads to Appendix 2, which deals with early accounts of new volcanic islands. (2) A Global Bibliography contains just about 1700 annotated entries, fifty-three percent of which originated in a language other than English. This bibliography entails separate Thematic Indices, a Geographical Index, and Appendix 1, which is a Gazetteer of floating islands not previously described in print. (3) Twelve Plates end this book, each Plate with two photographs of floating islands, 19 of the 24 photographs in color.

The statistics on the bibliography quoted above for part (2) were obtained from three five-page samples, one sample each from the beginning, middle, and end of the Bibliography. In a composite of these three samples (89 bibliographical entries), the most common non-English languages of the sources are German and Spanish, and include Japanese, Russian, Latin, French, Swedish, Finnish, Italian, Chinese, and what appear to be Serbian and Polish. The composite sample of 89 entries includes seven with Web sites.

In total, the book has xi pages of front matter, including Contents, Introduction, and Acknowledgments; 404 pages of text, including parts (1) and (2); and the twelve unpaginated plates that are part (3). The writing is clear and the type easily readable. The book is well bound and printed on archival quality paper. The photographs are well reproduced.

For whom is this book intended? The subject is specialized, yet the book makes clear that floating islands are not at all rare or new. As presented by Van Duzer, floating islands are a geographic subject with cultural aspects and a history that goes back at least to the time of classical Rome. To answer the question, this book seems a very usefuladdition to libraries serving academic departments of geography or government agencies dealing with geographical subjects. The book should also be a useful resource to limnologists, agronomists, volcanologists, and even coal geologists.

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# INTERESTING PUBLICATIONS

Gerald M. Friedman, CONTRIBUTING EDITOR

Since the start of this journal, Founding Editor Gerald M. Friedman has prepared this column. Contributors wishing to list recent books and papers of interest to our membership are requested to send them to Professor Gerald M. Friedman, Northeastern Science Foundation, Rensselaer Center of Applied Geology, P.O. Box 746, Troy, NY 12181-0746, U.S.A.; Fax: 518-273-3249; E-mail: gmfriedman@juno.com

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**Mark D. Pharaoh** was educated in England (B.A.(Hons) Economic History at Leeds University, M.A. Heritage Studies Nottingham Trent University), and more recently in Australia, with a diploma in Archives remotely at Edith Cowan University, I have been working with what is generally described as the personal collection of Sir Douglas Mawson, namely the Mawson Collection, since 1995, first when it was owned by the University of Adelaide, then increasingly with the South Australian Museum as they acquired ownership - part of the arrangement was that the Collection be utilised as part of a permanent million dollar Mawson Gallery, and more recently, a Mawson Centre with visual storage facilities. Here the main collection interest is Australian exploration, particularly as a polar science, which relates to Douglas Mawson, John Rymill and George Hubert Wilkins (all 'locals'), but which also extends to fellow expeditioners.

**Howard Plotkin** teaches the History of Science at the University of Western Ontario. For the past several years, his research has focused on the history of meteoritics, often in collaboration with Roy S. Clarke, Jr., the Curator Emeritus of Meteorites at the National Museum of Natural History, Smithsonian Institution, Washington, D.C. Current projects include publications on Harvey Nininger, Frederick Leonard, Stuart Perry, the development of meteoritics at the Smithsonian Institution, and the Dresden (Ontario) meteorite.

**Clive L. Wilson-Roberts.** After several years in a drafting office, Clive Wilson-Roberts entered Western Teacher's College in Adelaide, graduating with a Diploma in Art Teaching in 1970. After 23 years teaching a wide range of Art activities, he retired, becoming a volunteer with the Mawson Collection in 1997. He played a significant part in setting up the Mawson Centre at the S.A. Museum, where he is occupied with research, preparing educational material, and interpreting the Collection. Working with researchers of both images and documents has helped develop his knowledge of, and expertise of the photographic images, their processes and history. This was recently acknowledged by his being made an Honorary Consultant by The Friends of Mawson Group.

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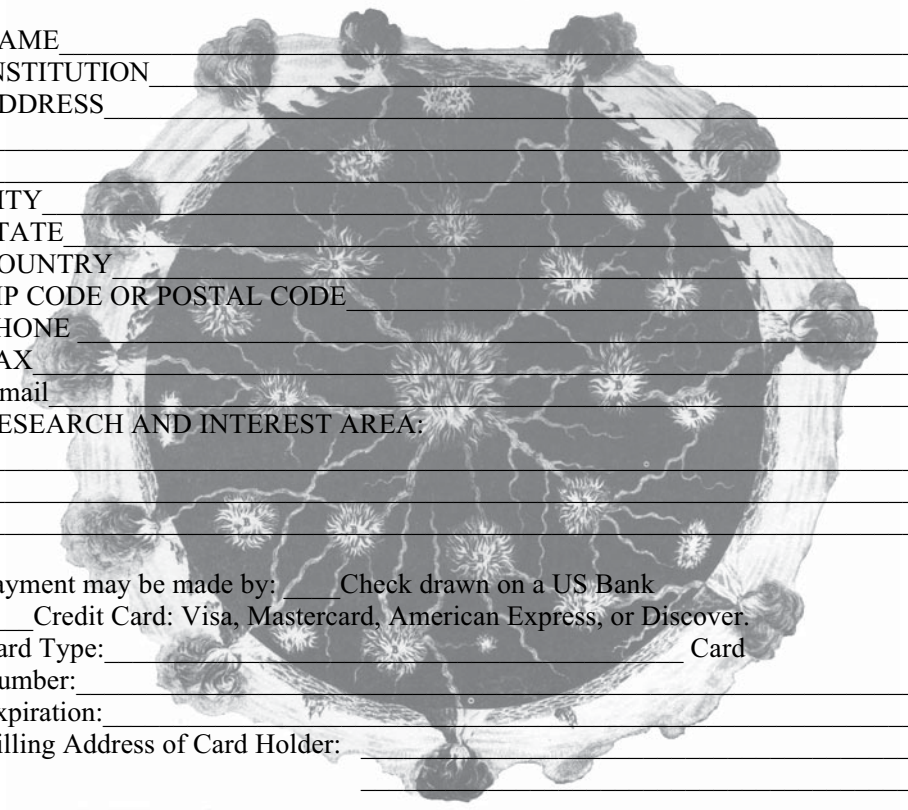

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