

Dava Sobel and the Popularisation of the History of Science

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From the itinerant lecturers of the 18th century to popularizing physics in the 21st century –
exploring the relationship between learning and entertainment

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Abstract: In 1995 Dava Sobel shot to international recognition with the publication of *Longitude*, her study of John Harrison, a narrow-minded, obsessed 18th Century watchmaker who solved the long-standing problem of longitude. The best-seller book had its origins in a completely neglected academic conference of 1993. A few years later she published *Galileo's Daughter* (1999) which also enjoyed great popular success. This paper will outline something of this Sobel Phenomenon and draw some lessons for the popularization of science.

Introduction

In November 1995 I was flying from Los Angeles to Albuquerque and read a review in *Newsweek* magazine of a book titled *Longitude*. My attention was immediately grabbed because I had been working on a book on the history and utilization of pendulum motion studies for some number of years, and the *Longitude* book was centered on one of the episodes in my own book: Timekeeping and Solving the Longitude Problem – Chapter 7, Part 8 to be precise. Needless to say my own book, on which I had been working for about five years, was not yet complete – there were still footnotes that I was chasing down. When I arrived at Albuquerque I went to the local bookstore to order Sobel's book, and to my astonishment they already had scores of them on the shelf! Subsequently the book was in every airport book kiosk that I browsed in, and was on the *New York Times* Bestseller List for some years. A large-format, glossy coffee-table version was published (1998). In 2000 a tele-movie, based on the book and starring Jeremy Irons, was screened to widespread acclaim. In 2001 Sobel received the National Science Foundation (USA) Public Service Award, with its chairperson saying 'Her vivid and engaging writing about discovery and discoverers has brought major events in the history of science to life for a wider audience. Her work enhances the public's understanding of the transforming role of science in our lives'.

Five years later my own book – *Time for Science Education: How the History and Philosophy of Pendulum Motion can Contribute to Science Literacy* – was published. It enjoyed about one-thousandth of the sales of *Longitude*, never getting within sight of a Best-Seller List. Dickens wrote a Tale of Two Cities, this talk is in part a Tale of Two Books: why one was so successful and widely admired, and why the other barely moved after publication. The Tale of Two Books hopefully tells us something about how to popularize science. My own book has 13 chapters, 440 pages, 160,000 words, 1200 references and 320 footnotes; and I humbly think provided a much richer and far more scholarly account of the intellectual and social landscape of the longitude problem than Sobel's book. Harrison was dealt with in one part of one chapter. I was largely dependent upon earlier studies of him – Gould (1923), Quill (1935) and May (1976) – none of which made it to any best seller list. Sobel did make the best seller list, and stayed there. I spent almost a decade on my own book – certainly with teaching, editing and other publications also accounting for my time, Sobel spent just under one year full time on hers.

But it is certainly not just myself who has been kicking themselves at the realization that perhaps hundreds of thousands of \$\$\$\$ had just passed them by. Sobel's book had its origins in a small meeting of historians of science, horologists and cartographers at Harvard University in November 1993 (Andrewes 1998). The twenty-odd contributors to the conference were all experts in the area of Sobel's book, they had

laboured for years on their research, had published numerous articles in scholarly journals and had made no impact in the public domain. Sobel was asked by the editor of the Harvard student paper to go to the conference and write a news story. This appeared in April 1994. It was read by an editor of Walker Publishing Company and the rest, as they say, is history. Again this invites the question of why none of the conference presenters could or would turn their hand to doing what Sobel did so remarkably in a matter of months.

An Unlikely Hero

The hero of Sobel's book is John Harrison, the 'Lonely Genius' as he is described in the subtitle. On the face of it, his character personality and engagements do not seem to be the kind of material of which best sellers are made. He was born in 1693 in Yorkshire, he had no formal education, his mother was named Elizabeth, his sister was Elizabeth, his first wife was Elizabeth, his second wife was Elizabeth and his only daughter was named Elizabeth. He lived most of his life in a small town where he was born, he read almost no books beyond Newton's *Principia* and Saunderson's *Natural Philosophy*, he did not allow copies of Shakespeare into his house, he devoted all of his life to clockmaking, including 20 years in the making of just one clock (H3, as it was to be called), died in 1776 at 83 years of age. A pity Harrison did not allow Shakespeare into his house as he might have picked up some hints about good writing: The first sentence of his booklet detailing his troubles with the government's Longitude Board goes on for 25 pages! Even in an Age that had not heard of tabloid writing, a 25 page sentence was still over the top.

Why was Sobel Successful?

So how does one make a best-seller, a coffee-table book and a movie out of such a character? What is there about Sobel's effort that historians might emulate? The following are some considerations.

(i) *Style*. Sobel's book has 38,000 words, 30 references, no footnotes, and a very generous layout of just 270 words per page. Certainly condensation, focus and presentation are part of her popular success. So too is good writing. It was not her first book, she had previously written children's books and some other about-the-house books.

(ii) *Marketing*. Interestingly *Longitude* was reviewed in *Newsweek*, *Nature*, *Science* and other popular magazines long before it was reviewed in professional history of science journals, indeed it never was reviewed in a number of the major journals of the discipline. The Sobel Phenomenon occurred outside of the discipline.

(iii) *Important Issue*. Although the public at large take for granted the accurate determination of longitude, something even more ubiquitous now that GPS devices can at the press of a button tell us the precise longitude of wherever it is that we might be standing, this was not always so. Solving the longitude problem was a momentous problem from at least the fifteenth century when Europeans began to sail out into the Atlantic ocean on missions of conquest and commerce. The problem of knowing just where at sea you were, and thus how far from landform and supplies, or how far from

dangerous reefs, was not solved until Harrison, Sobel's lone genius, provided the answer in the late eighteenth century. Sobel very effectively conveys the importance of the problem. The book's plot is not trivial; this helps with sales.

(iv) *Good Story*. Not only is the book's subject matter important, but the story is engaging and well told. There is no certainty about what makes a good story, but *Longitude* is about the triumph of the underdog, or the little man. Ever since David slew Goliath this motif has been a winner with readers: witness the success enjoyed by Robin Hood, William Tell and Zorro stories. Harrison is the uneducated, unread country-bumpkin, but by dint of incredible perseverance and exacting attention to detail, succeeds in making the long sought-after reliable and accurate marine chronometer thus enabling longitude to be determined. As Sobel herself says: 'A story that hails a hero must also hiss at a villain – in this case the Reverend Nevil Maskelyne' (Sobel 1994, p.111). Maskelyne is an educated member of the English elite, the Astronomer Royal, and he was joined by others of the dominant elite. The case for astronomical methods of determining longitude seems so much stronger than Harrison's chronological method, yet the latter succeeded where the former failed. As Sobel remarks: 'Harrison stood alone against the vested navigational interests of the scientific establishment', therein lies a good story.

Academic Response to Longitude

The book tells a great story, but how do historians judge the book? This is a difficult question to answer as the history of science community appears to have made no, or at best very little, response to the book. But if we start at the beginning, there are scholarly quibbles.

To begin with, the subtitle is wrong! It reads: 'The True Story of a Lone Genius Who Solved the Greatest Scientific Problem of His Time'. But first, it was not at all a scientific problem that Harrison solved; it was a technological problem. The scientific problem has been solved in 1530 by Gemma Frisius the Flemish astronomer and teacher of Mercator the map-maker. He stated clearly that an accurate and reliable timekeeper would allow the longitude problem to be solved by comparing local time (ascertained by sun readings, or shadow measurement) with time at the port of departure (as signified by an accurate clock set going on departure). Frisius realized that given that the earth rotates 360° in 24 hours, each hour of difference between local noon and place-of-departure noon represents a 15° difference in longitude. Harrison understood the logic and physics of this, as did most everyone else, but only Harrison was able to perfect the appropriate clock – the marine chronometer. It is important that distinctions be made between technology and science, and Sobel is guilty of muddying the waters on this matter.

Second, to call Harrison a 'lone' genius is to overlook the extent that his work depended on that of Huygens and of Newton. Huygens had painstakingly corrected Galileo's theory of the isochronic *circular* motion of a pendulum and replaced it with the correct *cycloidal* theory of isochronic motion. It was only by constructing pendulum clocks whose bob moved in a cycloidal path that an accurate timekeeper was possible. Harrison railed against the educational establishment, but the heart of his clockwork depended upon the theoretical achievements of Huygens, and the testing of them depended upon Newton's establishment of the 'clockwork' nature of planetary motion.

Third, to call Harrison a genius is to devalue the currency. He was persistent, creative and dogged, but it is arguable if this adds up to being a genius. There is a cost to be paid for being relaxed or generous in our usage of the term. Galileo, Newton, Huygens, Leibniz, Mozart, Beethoven and Einstein are assuredly geniuses, and clearly deserve the accolade. To elevate Harrison to their company assists in selling books, but it can only be to devalue the coinage.

After Sobel's subtitle there are other problems, but not major ones. The book is well researched, and Sobel has turned up, with the acknowledged guidance of many of the original Harvard conference participants, a host of material from American and European libraries and horology collections. Academics would have appreciated footnotes and better indication of what sources were used to support the different parts of the story, but combining scholarly apparatus and best-selling appeal is perhaps an unworkable expectation.

A Second Success: Galileo's Daughter

Just five years after the runaway success of *Longitude* Sobel struck a second chord with the reading public, she published what is basically another life and times of Galileo under the title of *Galileo's Daughter* (Sobel 1999). The title was brilliant and the use of the letters of Galileo's favourite daughter, Virginia or Sister Maria Celeste as she becomes, to her father as a skeleton on which to hang the story of his life, times and tribulations, was clearly inspired. Hundreds and hundreds of books have been published on Galileo: none have gotten within sight of the sales of Sobel's book, none have made it onto the shelves of airport and railway bookstores.

Sobel says of Virginia that 'She alone of Galileo's three children mirrored his brilliance, industry and sensibility' (Sobel 1999, p.4). Again this has to be an outbreak of completely unwarranted hyperbole. Virginia entered an enclosed convent at the age of 14 years. The convent was bereft of books, culture, decent food, indeed pretty much everything except prayers and mean-minded sisters. She had little communication with the outside world except for gardeners and suppliers of very basic foodstuffs. The letters are nice and reveal an interior life that has adjusted remarkably to her situation, but to claim that Virginia was brilliant, let alone that her brilliance 'mirrored' that of her father, is to be completely carried away with one's subject. Ditto for her industry. Sobel's claims about Virginia do mirror her claims about Harrison, and both are unsupported by the evidence.

Nevertheless, the book is a terrific read, and is most considered. It manages to convey the life, times and tribulations of Galileo in a completely engaging manner. There are nearly 200 primary and secondary sources consulted, and notes are provided. Sobel translated scores of letters from Virginia (unfortunately Galileo's letters were destroyed by the convent at some time after his condemnation). In the Acknowledgements, Sobel does say that 'Stillman Drake merits particular mention and gratitude for having translated every one of Galileo's major works into English'. This is a reasonable acknowledgement, but it also might warn more critical readers that Sobel is very dependent on Drake, and consequently on Drake's often criticized empiricist and anti-philosophical reading of Galileo.

Academic and Popular History of Science

What can be learnt from these successes of Sobel? One thing to be learnt is that we need to recognize two different genres of work: Academic and Popular history.

Academic history should not be judged by popular history criteria – ‘Oh, what a boring story’ might reasonably be said against a popular history book, but not against an academic history. Nor should popular history be judged by criteria for academic history – ‘Oh, what an incomplete story’ might reasonably be said against an academic history book, but not against a popular history.

Academic History should meet at least the following criteria:

- 1 Knowledge and mastery of primary sources.
- 2 Knowledge and critical appraisal of secondary sources and the scholarly tradition of work in the field.
- 3 Use of scholarly apparatus such as footnotes, bibliographies etc.
- 4 Cogent argument and avoidance of unsupported inferences.
- 5 Use of proper hermeneutical and interpretative principles, including not letting philosophical or ideological or political positions distort facts or force interpretations.
- 6 Be clearly written.

Popular History might be thought of as sharing the above, except for (3) but not being held to the same standards for each: knowledge of primary sources, but not as much; knowledge of secondary material, but not as much; cogent argument, but not every ‘t’ need be crossed nor every ‘i’ dotted. Popular history should come up to the same standard as academic history with respect to criteria (5) and (6): just because something is for popular consumption does not mean that it can be an ideological distortion of history, or that it can be needlessly opaque. But additionally for popular history there are further criteria:

- 7 Be well written, engaging, and display some style.
- 8 Be intelligible to an ‘educated’ reader.

It would be nice if academic history was forced to meet these last two criteria, but they are clearly above and beyond the call of academic history; nice if they are met, but not a requirement of the genre.

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