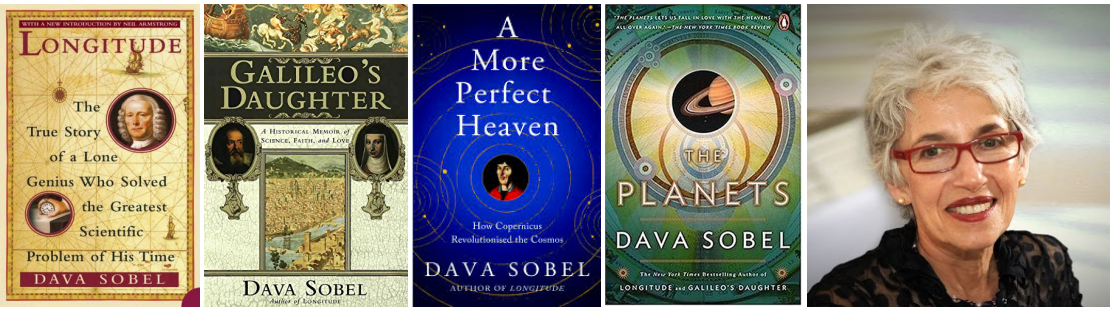
Two historical trilogies by Dava Sobel and John Banville
1. The historical trilogy by Dava Sobel



Dava Sobel is an American popular science writer. Although never officially declared a trilogy, I will briefly discuss here her biographies of John Harrison, Galileo Galilei, and Nicolaus Copernicus.

Her first book is called *Longitude* (1995) with subtitle: *The true story of a lone genius who solved the greatest scientific problem of his time*. The 'lone genius' here is John Harrison, a self-made clock maker of the 18th century. The problem of determining the longitude was important to define the position of a ship at sea. The equator is defined by the solar system, so that there is no problem to determine the latitude of the position. The longitude is defined by human agreement and there was not a cosmic way to find the longitude of the ship. After several disasters at sea with many casualties, the British government issued the *Longitude Act* in 1714 and offered a large prize for anyone who could find a method to compute the longitude up to a certain precision. Several methods were in competition. One inaccurate method was based on measuring the difference between the magnetic pole and the true pole of the earth. Another was based on the position of the moon with respect to stars, the so called *lunar distance method*. After the observation of the latter it took a skilled person to make all the long computations to find the longitude. The method was promoted by Nevil Maskelyne who became Astronomer Royal in Greenwich. Therefore, he was *ex officio* a member of the *Board of Longitude* consisting of astronomers, admirals, and mathematicians that had to judge who should be awarded the prize. A position we should nowadays recognize as a blatant conflict of interest. Maskelyne is the villain in this story. The hero(s) is(are) John Harrison (1693-1776) (and his son). Harrison's method was based on measuring the time difference between the position of the ship and some fixed meridian e.g. at Greenwich or Paris. This method was proposed by Gemma Frisius two centuries earlier but Newton and Huygens were doubtful about the possibility to construct a clock for that. Harrison constructed his first large (wooden) clock that could be taken on the ship in 1736: the Harrison-1 or H1. Two other models, the H2 and H3 were constructed before his masterpiece, the H4 sea watch, was realized in 1754. It looks like grandfather's pocket watch. This had to be tested on a long sea trip. However Maskelyne ordered to take away Harrison's clocks and notes, maltreated the instruments and stowed them away in oblivion. A replica had to be constructed to be tested and retested, Maskelyne upholding the assignment of the prize to Harrison, even though James Cook was very positive after testing the watch. When Harrison desperately complains with king George III about this injustice, he was after 40 years of struggle finally awarded his prize in 1773.


John Harrison with H1 behind him and H4 near his hand

Sobel tells the story as if it were a dramatic novel, but with a lot of precise historical information. It was used as the basis for a film and a TV series with Michael Gambon as Harrison. In the book Sobel also adds an extensive part about the further evolution of clock making after Harrison died. Pictures of the clocks and the history can be found at the website of the *Royal Museums Greenwich*. Sobel also published an illustrated version of the book including many of these pictures.

In her second book *Galileo's daughter* (1999), subtitle: *A drama of science, faith and love*, she writes a biography of Galileo (1564-1642). Also this book was very successful and won the Pulitzer prize in 2000. Although Galileo was not married, he had two daughters and a son. The daughters he put in the San Matteo Convent in Arcetri. The 'daughter' of the title is Virginia, the eldest of the two, who became Suor Maria

Celeste as a nun. She was the only heir of Galileo that inherited his sharpness of mind. In fact she copied and edited some of his manuscripts. The larger part of the book is based on the surviving letters she wrote to her father, whom she usually addresses as *Most illustrious and beloved lord father* and signed *S.M.C.* Of course we learn all the historical facts. Galileo who became convinced of the Copernican system, placing the sun at the center of the solar system, which was contradicting the Bible in which Joshua commanded the sun to stand still. So he wrote several books to sustain his beliefs based on sunspots and the sea tides. In his book *Dialogue concerning the two world systems* three persons are discussing the solar system. Salvatio is defending the heliocentric system and *Simplicio* defends the earth as the center of the universe. This errancy could not be accepted by the inquistion, and although Galileo defended it as just a hypothesis, he was sentenced to imprisonment which was converted to house arrest and the book was placed on the list of forbidden books, just like the book by Copernicus before. The house arrest gave him all the time to work on his last book *Discourses and mathematical demonstrations relating to two new sciences*, which was eventually published by Lodewijk Elzevir in Leiden. It has the same form as the *Dialogue* but Simplicio is made a bit less simple.


Suor Maria Celeste

Besides these scientific facts, Sobel also highlights Galileo as the one who had to sponsor his sisters, support the convent of his daughters, and take care of his son, in fact the whole family relies on him. Many (translated) letters and quotes of Maria Celeste and from other letters addressed to Galileo are included. Later Sobel published a book collecting the 120 original letters by S.M.C. with their translation. She also catches here well Galileo's dilemma, keeping scientific integrity while being a sincere catholic and we are confronted with Galileo's bad health condition suffering regularly of longer periods of illness during which he was unable to travel or work.

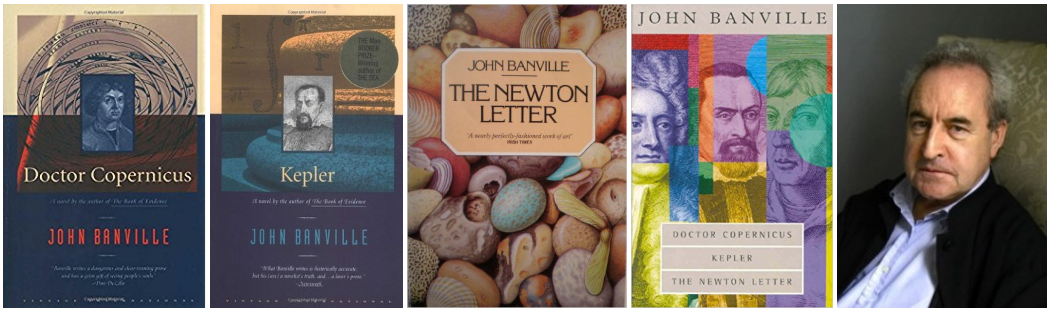
The third book *A more perfect heaven* (2011) is a biography of Mikołaj Kopernik (1463-1543) whom we know as Copernicus. Orphaned at the age of 10, he was raised under the supervision of his maternal uncle Lucas Walzenrode who became later the bishop of Varmia, and Copernicus' boss. Copernicus studied in Italy but never got his degree. He studied medicine including reading horoscopes and astrology which was part of the education. The times were turbulent with emerging Lutheranism and Teutonic Knights terrorising the Polish countryside. His uncle appointed him as his personal physician and as an administrator and as a canon of the chapter of Frombork (Frauenburg) he had to supervise the farmers who still worked in a feudal system. Mathematics and astronomy was a hobby he exercised in his free time. He wrote some notes in 1514 in which he proposed a hypothetical heliocentric solar system which he distributed among friends. He continued working on this on and off, but refrained from publishing, anxious to be ridiculed.

Joachim Rheticus was a mathematician from Wittenberg who visited Copernicus in 1539 and became his pupil for 2 years. He did everything to convince Copernicus to polish his notes and publish them as a book. Eventually Copernicus succumbed and gave the manuscript of *De revolutionibus orbium coelestium* to his friend Tiedemann Giese the bishop of Kulm who delivered it to Rheticus who had already published his own accound (*Narratio prima*) and now had to supervise the printing process in Nuremberg, Germany. However Reticus accepted a job promotion in Leipzig and passed the supervision to Andreas Osiander, a Lutherian theologian who added his own preface defending the 'new system'. Legend goes that Copernicus died the day that the first copy of his book was delivered.

Sobel tells this story in a particular way. In a first part, it starts like a classical biography but the story of his mathematical and astronomical research is interrupted by quotes from his diary that he kept as the administrator of the rural community, thus simulating that he did his mathematics in between his major task. In a second part, she writes a script for a stage play where Rheticus arrives at the residence of Copernicus with his hard set intention to convince Copernicus to publish his work with in the background the bishops of Kulm (Giesen) and of Varmia (who claims to be poisoned by protestants), and Anna, the live-in housekeeper who has a relation with Copernicus. The third part goes on with the printing process and how the work was received afterwards by other scientists like for example Galilei and Kepler.

Sobel wrote two other popular historical books: *The planets* (2005) about the solar system and her last book *The Glass Universe* (2016) about the women who worked at the Harvard Observatory somewhat paralleling several similar books of 2016 (see for example *Hidden figures* and *Rise of the rocket girls*).

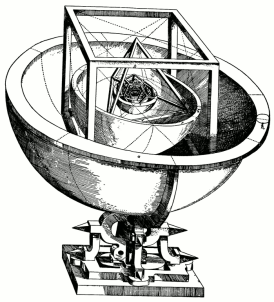
2. The historical trilogy by John Banville



John Banville is an Irish novelist who also wrote two novels based on historical facts that discuss the lives of Copernicus and Kepler and a novella *Newton's Letter*, which were bundled in the *Revolutions* trilogy.

The first one is entitled *Doctor Copernicus* (1976). Banville sketches a dark repulsive historical period with harlotry, stench, prostitution, bigotry, and political scheming. Copernicus is presented as a taciturn, sequestered loner, presumably unable to feel empathy, living in an abstract world of his own, shying away from the hostile outside world. An important role is played by Andreas, Copernicus' brother who is his extravert opposite, not good at anything and who is almost an impersonation of the devil himself. He catches a terrible disease that turns him into a disfigured atrocity. The first part is describing the youth of Copernicus told from his viewpoint. The second describes the young Copernicus who has released his first notes about his heliocentric vision in between his other duties and gains some reputation in Europe. In the third part we meet Rheticus, a self-centred cynic who as an older man tells his story how he convinced Copernicus to publish his work, but feels betrayed by Copernicus and his entourage as well as during the printing process. He feels that he had just been used to smuggle the manuscript to the Lutheran Germany. In the final part, the first copy of the book is brought to the dying Copernicus who is raving, forbidding the publication of his book, but finally meets his previously diseased brother Andreas in the afterlife.

The second book from (1981) is called *Kepler* (1571-1630). It is of course a romanticised biography of Kepler. It is not told in chronological order though. It might be helpful to read a short summary of his life and work to follow the historical events and to distinguish the fantasy of Banvill from what has happened in reality. Because, just as was the case with Copernicus, also here there is a clear difference with a proper biography. People have moods and feelings, and they have unspoken opinions. There are dialogues, spoken with a certain intonation, there are weather conditions, illness, doubts, etc. The facts are woven in between. Something about his childhood is only told in flashbacks. In his first book *Mysterium Cosmographicum* Kepler defends the Copernican system by a model of nested Platonic solids. It made Kepler's reputation and introduced him to possible sponsors. This is where the novel starts: Kepler meets Tucho Brahe for the first time and somewhat later in 1597 he marries Barbara Müller who was 23 and widowed twice already but, most importantly, she was rich by inheritance. Also her parents were rich while Kepler was poor so that there was some reluctance from their side.


Kepler's model in the *Mysterium*

Tycho Brahe was a Danish astronomer who had the most accurate astronomical observations of his time, but he did not want to share them with anyone. Although he was opposed to the results of Kepler, they came to an agreement and Kepler started working for him. Kepler brought his family to the new observatory near Prague, but they were not well received and he was ordered to do boring observations of Mars. Brahe was working on astronomical tables ordered by the emperor Rudolf II. When Brahe died unexpectedly, Kepler became in 1601 as his successor, the imperial mathematician. His observations of Mars became the incentive for his laws of motion of the planets. They were eventually published in his *Astronomia nova*. It forced him to leave the idea of perfect circular trajectories. After trying oval and egg-shaped versions it led him to to the elliptic version. Publishing a book was in those days not simple. One had to find sponsors and the printing itself was a laborious and time consuming process that required close supervision.

A third part of the novel is called *Diptrice* which refers to his book about optics after he learned about

Galileo's telescope. Kepler and Galileo never collaborated though. The fourth part is called *Harmonice Mundi*, a book in which Kepler iterates on the regular polytopes of the *Mysterium* and describes the so-called Kepler solids. This part of the novel consists completely of fictitious letters that Kepler addresses to diverse people. The fifth part is entitled *Somnium* (the dream). Because of changes in the political situation and an increasing pressure from Calvinist side, Kepler is moving to Linz, where he continued working on the *Rudolfian tables*. Because his wife Barbara died, he remarried in 1613 with Susanna Reuttinger. There was more dying of some of his children, his mother was brought on trial accused of whitchcraft, and Kepler, who had bad sight for most of his life was loosing his sight almost completely. All tragic events, but rather common in those days.

One might now expect in a trilogy that a third book called *Newton's Letter* (1982) is in the line of the two previous ones, a romanticized biography of Newton trying to understand the psychology of the man. However it turns out to be a novella about an historian who is unable to finish a book about Newton. He rents a cottage in the countryside hoping to finish his book in the quietness of isolation. However he gets involved with the Lawless family hiring the cottage. There is Charlotte and her husband Edward who has a drinking problem, their adopted child Michael, and Charlotte's younger niece Ottilie who is Michael's true mother. He starts a passionate relation with Ottilie, while imagining he is in love with Charlotte. He is unable to properly analyse the psychological chemistry of his own feelings and what exactly happens in the Lawless family. This interferes with his struggle trying to interpret a letter that Newton wrote to Locke. The novella is a long letter he writes to his friend in which he tries to explain why he is unable to finish the book on Newton.

Sir

Being of opinion that you endeavoured to embroil me with woemen & by other means I was so much affected with it as that when one told me you were sickly & would not live I answered twere better if you were dead. I desire you to forgive me this uncharitableness. For I am now satisfied that what you have done is just & I beg your pardon for my having hard thoughts of you for it & for representing that you struck at the root of morality in a principle you laid down in your book of Ideas & designed to pursue in another book & that I took you for a Hobbist. I beg your pardon bo for saying or thinking that. there was a designe to sell me an office, or to embroile me. I am

your most humble & most unfortunate Servant

Is. Newton.

This letter of Newton from September 1693 is historical, although Banville only tangentially refers to it. It starts with "Being of opinion that you endeavoured to embroil me with woemen..." and ends with "thinking that there was a designe to sell me an office, or to embroile me" and he apologizes for having been rude and angry about that. Newton obviously refused some offer by Locke upon which Locke told Newton that "he suffered from an incurable disease" and Newton answered "Drop dead". Newton explains his temporary loss of senses by writing that he "had not slept an hour a night for a fortnight together & for 5 nights together not a wink". Many biographers have speculated about what exactly had happened and why Newton had been so angry. Some have seen this rejection of women as an indication of Newton's homosexuality, but there is no evidence of that.

On the website corpusnewtonicum.wordpress.com/ we find a possible explanation under the title Why? You endeavoured to embroil me with woemen.... In 1693 Newton was 50 and had been in Cambridge for a long time. Most professors in his position would marry and look for a retirement position in London. This is probably what Locke had proposed to Newton. At that moment Newton probably just had a bad hair day and overreacted. In fact shortly after he accepted to become Warden of the Royal Mint in 1696. There was no marriage though. What Newton's relation with women was is still unresolved.

So Banville may have had problems understanding Newton's reaction and didn't know how to define Newton's feelings towards man or women, hence was unable to write his book about Newton, and ended up by writing a novella. So it can be interpreted as his explanation of why he could not finish the book on Newton that he probably wanted to write originally.

Adhemar Bultheel