

Johannes Kepler, Tycho Brahe and the murder behind one of history's greatest scientific discoveries

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The intense rivalry between the 16th century Danish astronomer Tycho Brahe and the German mathematician Johannes Kepler, has been extensively chronicled by historians of science. With the precise measurements of the orbit of Mars taken by Brahe, and with the reconstruction of the orbit of Mars by Kepler, modern astronomy would be born. From Brahe's precise observations, Kepler would extract his Three Laws of Planetary Motion.

When we think of martyrs of scientific martyrs we think of Galileo Galilei, a friend of the Jesuits, and his run in with the Dominican Inquisitors. Sir David Brewster in his landmark 1848 book *Martyrs of Science* characterized Kepler's achievement thus:

"When Kepler directed his mind to the discovery of a general principle, he ... never lost sight of the explicit object of his search. His imagination, now unreigned, indulged itself in his creation and invention of various hypotheses. The most plausible, or, perhaps, the most fascinating of these, was then submitted to a rigorous scrutiny; and the moment it was found to be incompatible with the results of observation and experiment, it was willingly abandoned, and another hypothesis submitted to the same severe ordeal ... By pursuing this method he succeeded in his most difficult researches, and discovered those beautiful and profound laws, which had been the admiration of succeeding ages."

The rivalry between Brahe and Kepler was inevitable. It was Brahe who invited Kepler to join him at his observatory in Graz. Brahe did not want to openly share his celestial measurements and his life's work with Kepler, and Kepler could not create a new astronomy, his *Harmony of the Spheres*, without Brahe's precise observations. Brahe planned to write a book about his own work and needed Kepler, Europe's most accomplished mathematical astronomer, to reconstruct the orbit of the planets. Kepler, in turn, wanted the data for himself so that he could write his own book and Brahe's stood in his way.

In their brief time together there was great friction between the intellectual Titans. Carl Sagan in his book and television series *Cosmos* gives a fine accounting of the tension between the two astronomers. He also touches on Kepler's Protestant education and the consequence of the Thirty

Years war on Kepler's life, family and work.

What has intrigued historians was the sudden and unexpected way in which Brahe met his death. Up until his illness, he was a vibrant and energetic man in his fifties. It is widely accepted that Brahe suffered a bout of uremia and a ruptured bladder as a result of excessive revelry and drinking. As outlined in their book *Heavenly Intrigue*, the authors argue that modern forensic science points to evidence that Brahe may have been murdered! Using proton induced X-ray emission (PIXE), samples of Brahe's hair and mustache, retrieved from his burial crypt in 1996, show that a massive dose of mercury had been ingested by Brahe just before he took ill, and that a second dose was administered to him just hours before he died.

As explained in the book, the first dose of mercury caused kidney and renal failure, and the severe inflammation of the gastrointestinal tract, which Brahe experienced for the week leading up to his death. When it looked like Brahe may recover, a second more lethal dose was administered to him, most likely from within his own household, pointing to someone in his midst as being a murderer. After Brahe's funeral, and after Kepler made off with Brahe's observations, it was hinted that his death was "unnatural" and unexpected.

Heavenly Intrigue is an excellent book, rich in historical fact and interesting scientific detail. It touches on the most recent discoveries surrounding the mystery behind Brahe's sudden demise and lays to rest any doubt as to what caused his death. Left to the question of motive and means ... I invite you to read the book and draw your own conclusions.

The thesis that Brahe was murdered is by far not a new one. However the forensic evidence that modern nuclear physics brings to the mystery is conclusive. Who actually poisoned Brahe is left to conjecture, however like a good mystery, one has only to look at the motives of the suspects. Johannes Kepler sits prominently as a prime suspect. At Brahe's funeral the family openly pointed to Kepler as a suspect after he stole away with Brahe's data and life long work. On the other hand Kepler may have just been an opportunist and took the fast way out of town, manuscripts and all.

After the passage of over four centuries we may never know the actual course of events leading to Brahe's death. There is, of course, room for

doubt. After all, Brahe was an alchemist along with being an astronomer and it is possible the poisoning was self administered. Elixirs containing heavy metals were at the time used to treat some socially embarrassing transmittable diseases and Brahe was, how shall we say, a "bon vivant."

The mercury also may have been a result of some diabolical experiment gone amok that Brahe was undertaking in his home laboratory. Mad hatter's disease was quite common amongst alchemists and were not always fatal. It is found even today. The strange madness of Newton, which was self induced and which struck the great English scientist twice in his life, were the results of his own diabolical experiments in his lab at Cambridge. Dr. H.L. Klawans, MD, gives a good accounting of the cause and consequence of Isaac Newton's condition in his book *Newton's Madness* (Harper & Row, New York, 1990).

For those who are interested in 17th century history it is fair to say that if Kepler did murder Brahe, the underpinnings to the crime, of one Protestant murdering another is more disturbing than what can be found in the 16th century censorship of Galileo. For if the Dominicans are to be accused of the misdemeanor of censorship in the matter of Galileo, than in the view of the authors of this book Johannes Kepler, a Protestant, stands accused of a capital crime.

If he is indeed guilty, is there a statute of limitation for such an act and can the Brahe family seek recompense? After all, it could have turned out that Brahe would have discovered one or more of the three laws we now attribute to Kepler and as a result we may today be reading more about Brahe and less about Kepler if things had turned out any differently.

Whatever may be the definitive story, it is time to rewrite the history of science and recognize a new Martyr of Science ... Tycho Brahe! While we have come to admire Bertolt Brecht's "The Life of Galileo", maybe it is time for someone to play the Pixe and write "The Death of Brahe".

Heavenly Intrigue

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