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BOOK REVIEW - FEMMES, VULGARISATION ET PRATIQUE DES SCIENCES AU SIÈCLE DES LUMIÈRES: LES DIALOGUES SUR L'ASTRONOMIE ET LA LETTRE SUR LA FIGURE DE LA TERRE DE CÉSAR-FRANÇOIS CASSINI DE THURY

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Writing scientific text in "popular" language goes back at least to Galileo and his Dialogo. A French work, however, was a milestone in this field as it was translated into several languages and widely distributed: Entretiens sur la pluralité des mondes by Fontenelle, the first edition of which appeared in 1686. One of the main characters in this work is a woman, a marquise, to whom an astronomer explains the organization and particularities of the "worlds" of the solar system. This successful book inaugurated a specific genre, with many offspring. The manuscript examined here, les Dialogues sur l'astronomie, is a particular example of this genre of "astronomy for the ladies."

The Dialogues were in fact never printed and only existed up to now as a manuscript of César-François Cassini de Thury (also known as Cassini III, as he was the third of the famous Italian-French astronomical dynasty). This text, of which a few leaves are missing today, was composed around 1740–1742. The date can be fixed thanks to the description of the instruments of the observatory and the texts used in it. Following the Dialogues, a letter by the same author on the shape of the Earth, dated 1742, is reproduced.

Before the two texts, a long and interesting introduction by David Aubin recalls the multiple facets of the epoch. First of all, there is the scientific context of the lively debates in France regarding the exact shape of the Earth. Carried by Cassini II, the measurement of the French meridian, to the north and then to the south of Paris, indicated a length for the meridian degree which decreased towards the high latitudes. Consequently, the Earth should have been shaped like a rugby ball, that is, elongated towards the poles. However, Newtonian theories predicted a flattened planet at the poles. The quarrel between the Cartesians, led by Cassini II, and the Newtonians, led by Maupertuis, led to several expeditions. The most famous ones were those sent to Lapland and Peru: since they were testing extreme latitudes (close to the Arctic circle or the equator), these expeditions had the ability to measure large (therefore indisputable) differences in the roundness of the Earth. Their results confirmed the English theories. At the same time, however, local measurements had to be performed in France to check the French meridian. Cassini III thus re-did the observations in that country. In 1740, the outcome of this long project confirmed the results of the distant expeditions: the Earth was indeed

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flattened at the poles. One can easily imagine the delicate situation of Cassini III, who had to correct his father's work and validate a theory his father abhorred. Of course, he had to take extreme care in his work, to make it indisputable, hence the importance he attached to measurement errors and the precision of observations.

Another important facet concerns the women. From the 17th century, but especially in the 18th century, the literate public became more and more feminine. This was a market waiting to be tapped, as Fontenelle and his followers understood very well. In addition, using a woman character made it possible to justify a light or even playful tone, rendering the science easily accessible to a non-scientific public. The difficult aspects of the subject, especially mathematical calculations, were of course left aside in this type of approach. However, several concrete cases showed that women were not just beautiful, barely rational idiots—it is enough to quote here the famous Mme du Châtelet. Contrary to other authors of his time, Cassini III took a different stance that assumed female intelligence. First of all, it is a woman who is supposed to have written the text we are reading. Then, through the device of a love affair with an astronomer, she actually turns out to be at the heart of the action. Far from being the passive marquise obediently listening to Fontenelle's words, this woman observes, measures, and calculates throughout the text. She does not hesitate to ask, to argue, even to question what her learned interlocutor explains to her. Moreover, it is often she who explains astronomy, with the astronomer then validating her words. It should also be noted that the subject of the Dialogues is not a theory of the world; it is about concrete things. Here, too, Cassini III differs from the usual books, which are oriented more towards cosmic philosophy.

After that introduction, the Dialogues themselves are reproduced, with abundant footnotes to detail certain concepts and calculations. Some diagrams appearing in the manuscript are provided, spelling and punctuation have been modernised, and a short text introduces some mathematical concepts necessary for a global understanding. Over the course of the pages (10 "entretiens" in all, plus five appendices), one notices that the tone gradually changes: the love story gives way to practical astronomical problems. These are not extraordinarily complex, but neither are they simple: a good knowledge of astronomy and spherical trigonometry is necessary to understand all the details. In addition, Cassini III details the limitations of the various measurements and of the corrections that need to be applied. This is a subject close to his heart but somewhat dry for the uninitiated reader, which explains why this popularising essay was never printed at the time. Note the presence of a few typos (which can be spotted by the attentive reader), which will certainly be corrected in a second edition (for example, note 26 on page 133 evoking a proportion with 360° instead of 365d).

The short letter on the shape of the Earth, which follows the Dialogues, recounts the discussions at an (imaginary?) dinner between Newton's supporters and an author defending the honour of the Cartesian Cassini. The themes evoked in the Dialogues, in particular the question of the precision of measurements, are included.

The book closes with an epilogue discussing the aftermath of these initial efforts. Cassini III would in fact come back to popularisation during the 1770s. Always focused on observation, he hoped its popularisation would help to train enlightened amateurs, whose precise data could support the work of professional astronomers. Here again, he did not fail to target women; and once again, his efforts there were not really successful.

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This book therefore sheds an interesting light not only on the famous debate regarding the planet's shape, but above all on another way of popularising science—one centred on observation and its requirements, not just on the presentation of general ideas (which remains a habit even today), and involving women who are active, not passively listening to an astronomer, however exciting that may be. As David Aubin points out, there is a certain modernity in these texts, which therefore deserve to be rediscovered.