

Kepler, Horrocks and the Transit of Venus in 1639

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Kepler was the first astronomer to predict a transit of Venus in his *Admonitio* from 1629. This prediction was based on his *Rudolphine Tables*, published three years before. Even though both these tables – making use of his ground-breaking new theory of the planetary motions – and the message of his *Admonitio* are a great achievement, it turned out some years later that the latter contained some views that needed to be corrected.

First of all, there was a small but – for European observers – fatal error concerning the exact time of the Venus transit of 1631, leading to its non-observation in France. Second, Kepler failed to predict the 1639 Venus transit. It was the English astronomer Horrocks who first recognized that and who did indeed observe the latter. Third, Kepler's ideas about the size of the solar system (and, hence, the apparent diameters of the planets) were substantially wrong.

In our contribution, we analyze the historical background to these errors of a genius, based on his original texts, as well as Horrocks' and Hevelius' views and discoveries on the subject. It seems that Hevelius' annotated edition of Horrocks' account *Venus in sole visa* (see Fig. 1) has scarcely been studied in the way it would deserve – which is maybe due to the fact that only a few libraries are in possession of this book.

There is little doubt that Kepler, had he lived until 1639, would have had to change his views on the proportions of our solar system dramatically. At the same time, it must be stressed that his prediction and Horrocks' observations demonstrate that knowing the *mechanism* of the planetary motions is by far more important than knowing the actual *size* of the planetary orbits and planetary bodies.

An interesting debate related to the imperfection of Kepler's *Admonitio* is whether Lansberge's ephemerides were more precise than the *Rudolphine Tables*. We will highlight Horrocks' arguments on this delicate point.

As for the sources of our study, it should be noted that Horrocks' account has been translated into English in the 19th century, while Hevelius' annotation, to the best of our knowledge, has not been translated. We will give some examples to show why it is still worth referring to the original latin text including Hevelius' comments and not only to the translation of Horrocks' observational account, even though the latter is of course very useful.

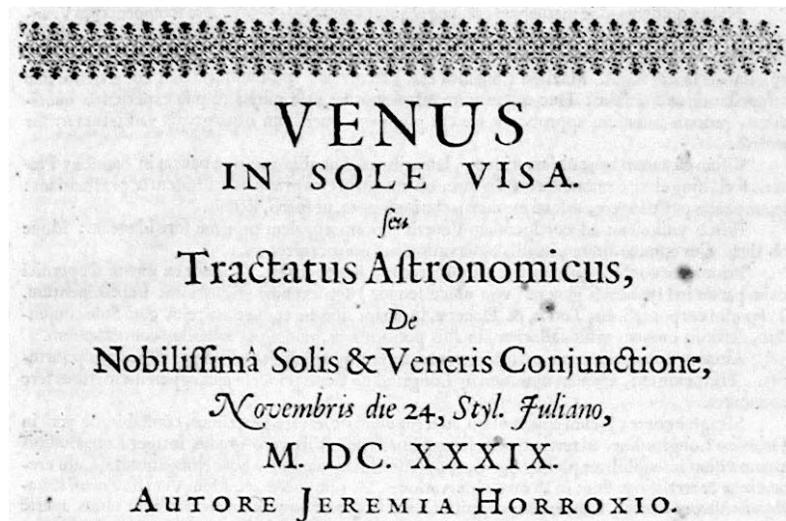


Figure 1.

Title of the Hevelius 1662 edition of
"Venus in Sole Visa" by J. Horrocks