

Philosophy 167: Science Before Newton's PRINCIPIA

Assignment for September 30

Other Developments in Astronomy from 1609 to 1642

Reading:

Galileo, "The Starry Messenger," in Discoveries and Opinions of Galileo, Tr. Stillman Drake, pp. 21-58.

Galileo, Dialogue Concerning the Two Chief World Systems, Tr. Stillman Drake, pp. 5-7, 31-36, 70-78, 112-116, 132-148, 157-161, 311-319, 371-401, 439-464, 483-509, 519-539. (most especially, pp. 371-381, 536-537)

Wilson, "From Kepler's Laws, So-Called, to Universal Gravitation: Empirical Factors," pp. 89-103.

Questions to Focus On:

1. How do the telescopic observations reported in "The Starry Messenger" affect the issue between the Ptolemaic, the Copernican, and the Tychonic systems?
2. How do the further telescopic observations reported in the Dialogue (especially pp. 371-381) affect the issue between the Ptolemaic, the Copernican, and the Tychonic systems?
3. Why did Galileo ignore the various epicycles and other complications that Copernicus introduced so that his system could achieve a level of predictive accuracy comparable to that of Ptolemy's?
4. Why did Galileo ignore Kepler's revised, epicycle-free version of the Copernican system -- a version that achieves an enormous increase in predictive accuracy over Ptolemy's, Copernicus's, and Tycho's systems?
5. What advantages did Galileo's explanation of the tides offer, and what were his reasons for rejecting out of hand -- indeed, ridiculing -- Kepler's suggestion that the Moon causes the tides?
6. Where did the discipline of planetary astronomy stand as of 1642, the year in which Galileo died and Newton was born -- i.e. what was established with relatively high confidence, what merely probable, and what clearly uncertain?