

Philosophy 167: Science Before Newton's PRINCIPIA

Assignment for November 18

Other Developments in Astronomy from 1642 to 1684

Reading:

Wilson, "From Kepler's Laws, So-Called, to Universal Gravitation: Empirical Factors," pp. 103-136.

Van Helden, "The Micrometer from Huygens to Flamsteed" and "Cassini, Flamsteed, and the New Measure," from Measuring the Universe, pp. 118-143.

Flamsteed, excerpts from the Preface to Historia Coelestis Britannica, pp. 103-140.

"Römer and Huygens on the Speed of Light -- Two Excerpts," (handout) pp. 334-338 and 128-132.

Questions to Focus On:

1. What effect did the various unsuccessful attempts to replace Kepler's area rule during the period from 1640 to 1676 end up having on the evidence for it?
2. On the one hand, the ellipticity of the orbits was the most widely accepted of Kepler's three "laws" among astronomers in the 1642 to 1684 period. On the other hand, it is the only one of the three that Newton took still to be an open question in 1685. How, if at all, can these contrasting attitudes be reconciled?
3. Technological advances in astronomical equipment helped Huygens solve the mystery of the bulges of Saturn. What impact did advances of this sort have on any other problems outstanding in astronomy? Also, how were they incorporated into the design of Flamsteed's observatory at Greenwich.
4. The Royal Academy's expedition to Cayenne, along with the expedition to Uraniborg, can be regarded as among the first projects of "big science." To what extent did this project realize its objectives? Did it have any unforeseen payoffs?
5. In 1676 Römer managed to infer a value for the speed of light from vagaries in the eclipses of Io, the innermost of Jupiter's Galilean satellites. What previous results of 17th century science were required for his inference?