

- a. (Palmieri a former Ferrari engineer specializing on sloshing fuel in tanks of race cars)
- b. Actual tides, ignoring meteorological effects, result from a combination of (1) gravity toward the moon and sun, (2) rotation of the earth, and (3) depths and widths of channels
- c. Palmieri (see Appendix) argues that Galileo recognized the last of these, and to some extent the second, so that his mistake concerns only the driving source of the tides

#### H. Galileo's Trial and Recantation (1633)

1. In spite of the numerous Imprimatur's, the *Dialogue* was condemned within 6 months of its publication, and Galileo was ordered to stand trial for “vehement suspicion of heresy” before the Inquisition, where he was treated with due leniency
  - a. Though shown the instruments of torture, was never tortured (nor really imprisoned while awaiting trial)
  - b. Result (see Appendix): convicted of vehement suspicion of heresy (Copernicanism and freedom to hold opinions after declared contrary to Scriptures), which would be absolved provided he abjured; never convicted of heresy
  - c. Sentenced to (palatial) house "arrest" for remainder of his life, and promises no subsequent publications (violated)
    - (1) Initially with Cardinal of Siena, then at Arcetri, finally in Florence itself
    - (2) Care from daughter Virginia, especially after going blind (see Sobel's book)
2. An immediate *cause celebre* throughout the educated world: the world's foremost scientist being made to abjure views for which he had marshalled strong empirical evidence
  - a. An important element in anti-Catholicism, reinforced by fact that the *Dialogue* and other Copernican works were not removed from the Index until 1822 (with revised Index in 1835)
  - b. A subsequent decline in science and mathematics in parts of Italy, with distinct shift toward England, Holland, and France
  - c. In 1897 Leo XIII announced a view of relation between science and Scriptures akin to Galileo's (1616 letter to duchess); in 1979 John-Paul II acknowledged that Galileo suffered unjustly, and in 1992 Church acknowledged he was innocent of wrongdoing
  - d. (See Finocchiaro's *Retrying Galileo* for the history of reconsideration of Galileo's trial)
3. One long investigated and much disputed question: why did the Church choose to try Galileo and risk the very response that it received -- e.g. de Santillana's *The Crime of Galileo* and Redondi's *Galileo Heretic* , and (best) Fantoli's *Galileo for Copernicanism and for the Church*
  - a. Galileo's Jesuit enemies within the Vatican, including Father Grassi; on this view Copernicanism a lesser consideration; Urban VIII himself and his sense of a violation of trust and friendship the key to the 1633 outcome
  - b. A question of authority -- intellectual and otherwise -- aggravated by Bruno's conviction, Campanella's defense, and Urban VIII's difficult political position at the time owing to pressure on him to commit Vatican resources to the Thirty Years War
  - c. Urban VIII continued his animus against former friend, even denying a request for a

monument on his grave after he died in 1642

4. Another long investigated and somewhat disputed question: why did Galileo, a devout Catholic, go ahead with the *Dialogue* when he could see the very distinct possibility of what ultimately happened (see Fantoli)
  - a. Wanted to free "science" -- a word he championed -- from the narrow-minded dogmatism that surrounded it in universities and that he had spent much of his lifetime fighting
  - b. Wanted to save the Church from the mistake of interposing itself against the new science, in the process undercutting its intellectual respectability
5. Galileo succeeded on the first score, probably beyond his wildest imagination, in no small part thanks to the Church
  - a. Wonder if he might have toned the book down if he had realized that it was going to have the impact on Catholicism that it did
  - b. Equally, if he had realized that it was going to be the primary source for the educated public's conception of the birth of science
    - (1) He was too good a scientist not to be uncomfortable with the picture of science he conveyed
    - (2) But then too he was too much of a polemicist not to receive some pleasure from the fact that his greatest polemic could even distort the whole world's picture of history
6. A final question: was Galileo sincere in recanting
  - a. Most outspokenly think not, for they cannot see how Galileo could have brought himself to reject the truth of Copernicanism
  - b. But don't forget that perjury in such circumstances was a mortal sin, condemning one to eternity in Hell, and Galileo was a devout Catholic

### III. Assimilation of the Two Revolutions in Astronomy from 1630 to 1642

#### A. The State of "Predictive Astronomy" in 1630

1. As remarked earlier, in retrospect we can see that Kepler was years ahead of everyone else in mathematical astronomy when he died
  - a. Not just in substance, having identified Keplerian motion, determined methods of calculating such motion, and defined elements for all of the orbits from Tycho's data supplemented with some of his own
  - b. But also in his understanding of where his astronomical efforts stood -- i.e. what was comparatively well established, what was more shaky, what was largely conjectural, etc.
2. Other sets of tables had been devised during the 1620's, besides Kepler's, and not surprisingly their authors made claims for them akin to Kepler's claims, giving the community a problem
  - a. Longomontanus (1622), the other assistant to Tycho in 1600, in the manner of Tycho
  - b. And van Lansberge (1630), predicated on the Copernican system and its uniform circular motion, and presupposing the integrity of ancient observational reports (in direct opposition to Kepler and Longomontanus) claiming a more secure long-term foundation