

## II. Descartes: The Third Post-Copernican Generation

### A. Descartes: A Biographical Sketch

1. Descartes was born near Tours in 1596; from 1628 to 1649 he lived in Holland; and he died (from pneumonia) in 1650 in Sweden, where he had moved the year before, accepting an invitation from Queen Christina
  - a. He was thus a part of the third post-Copernican generation, along with Mersenne (1588-1648), Gassendi (1592-1655), and Riccioli (1598-1671), not to mention his main rival in mathematics, Fermat (1601-1665)
  - b. Kepler and Galileo were already major figures when he was a teenager, and Ptolemaic astronomy was largely a thing of the past, at least in "scientific" circles
2. Descartes received a strict Scholastic education at the hands of the Jesuits at La Fleche (where Mersenne was also schooled a few years earlier)
  - a. Received a degree in law in 1616
  - b. While in Holland in 1618, met Beeckman, and worked with him on such things as a mathematical relation describing free fall
  - c. On November 10, 1619, in a fever-related dream while in Germany, had the vision of a complete new mathematical and scientific system: "Descartes' dream"
3. From 1622 to 1628 he worked on aspects of this system, often visiting Paris, where he became known in intellectual circles
  - a. Started *Rules for the Direction of the Mind* around 1619, picking it up again after 1625 and finally abandoning it unfinished in 1628
  - b. Whether Mersenne or others saw any of this manuscript is unclear
  - c. Descartes did engage in discussions with Mersenne and his circle while in Paris from 1625-1628
4. In his first attempt to publish a comprehensive system, Descartes wrote *Le Monde, ou Traite de la lumiere* and the *Treatise on Man* from 1629 to 1633
  - a. When he learns of the trial of Galileo, he withholds them from publication, fearing his proof of Copernicanism in *Le Monde* will lead him into similar problems
  - b. Though Mersenne knew of these works, he and his circle apparently never saw them; they were published in 1664
5. Descartes' first major publication was the *Discourse on the Method*, published (in French) in 1637, with the *Geometry*, *Meteorology*, and *Optics* accompanying
  - a. Full published title: "*Discourse on the Method of rightly conducting one's reason and seeking the truth in the sciences, and in addition the Optics, the Meteorology and the Geometry, which are essays in this method*"
  - b. Originally proposed title: "*The Plan of a universal Science which is capable of raising our nature to its highest degree of perfection. In addition, the Optics, the Meteorology and the*

*Geometry, in which the Author, in order to give proof of his universal Science, explains the most abstruse Topics he could choose, and does so in such a way that even persons who have never studied can understand them"* (Cottingham, et al)

6. Both the *Optics* and the *Geometry* made major contributions, the latter especially via van Schooten's Latin editions, with commentary (greatly expanding the text), of 1649 and 1659
  - a. *Optics* includes the law of refraction, which (like others) he appears to have discovered independently of Snel
    - (1) With this law, a theory of geometric optics covering shapes of lenses -- introducing real science into the design of telescopes
    - (2) Identifies and explains spherical aberration (mistakenly attributing chromatic aberration to the same thing) and indicates lens shapes for eliminating it
  - b. *Geometry* extends classical geometry in ways that legitimate the use of algebraic methods to solve problems
    - (1) A primary step, together with the work of Fermat, in forming what we call analytical geometry
    - (2) Though not a reduction of geometry to algebra (just the opposite) and no Cartesian coordinates in it
    - (3) Rather, it expands the notion of geometric construction beyond compass and straight edge, and then "reduces" algebra to this expanded geometry, thereby legitimating it
    - (4) Huygens studied Cartesian geometry under van Schooten in Leyden, and Newton's reading of van Schooten's second edition contributed greatly to his early advances in math, including the calculus -- arguably as much as anything else did
  - c. *Meteorology* covers phenomena like lightning, storms, and clouds, but now probably best known for Descartes' account of rainbows (Eighth Discourse)
7. The works that made Descartes most famous were published in the 1640's, appearing initially in Latin, but with authorized translations into French
  - a. *Meditations on First Philosophy, with Objections and Replies* in 1641 (2nd ed, 1642); French translation, 1647
  - b. *Principia Philosophiae* -- the *Principles of Philosophy* in 1644; French translation, 1647
  - c. *Passions of the Soul* in 1649, and working on *Description of the Human Body*, which would have complemented the *Principles*, at the time of his death

## B. Descartes' Intellectual Mission

1. While Descartes, as much as Mersenne and Gassendi, was part of an anti-Scholastic movement within Catholicism, he never rejected its goal of a unified, comprehensive philosophy
  - a. His concept of education remained that of obtaining a world view, tied to Catholicism
  - b. The fault lay not in the goal of Scholasticism, but in the Aristotelian philosophy underpinning it