

Lecture 5: Romantic Science

1. Background: challenge to Newtonian optics
2. Electricity and Science
 - Limited experimentation or theorizing in 1600s
 - Leyden Jar: storing electricity
 - Electrical machines: generating static electricity
 - Electricity and entertainment: shocking games
 - Benjamin Franklin and atmospheric electricity
 - Electrical therapeutics
 - Electric eels, torpedo fish, and biological electricity
3. The Galvani-Volta Debates
 - Galvani's frogs: intrinsic electricity in animals
 - Volta's batteries: unity of physical and biological electricity
 - Is there something special about life?
4. Romanticism as a Reaction against Newtonian Science
 - Aristotelian teleology
 - Newtonian mechanism: the clockwork universe
 - Enlightenment search for meaning in science
 - Romanticism: aesthetic judgment, subjectivity, teleology
5. Romantic Science
 - Blumenbach and bildungstrieb (formative pressure)
 - Hydras, embryology, preformation vs. epigenesis
 - Reil, obstetrics, and the powers of the uterus
 - Humboldt revisits Galvani and Volta
 - Mary Shelley's *Frankenstein*
6. Goethe as the Ideal Romantic
 - Theory of color: afterimages, illusions, color wheel
 - much that Newton cannot explain
 - Comparative anatomy and the vertebrate archetype
 - Evolution as progressive striving towards the archetype
7. Legacy of Romanticism
 - Erasmus Darwin: brain actively interprets the senses
 - Unity of nature, evolution from simple to complex
 - Humboldt: adaptations of minerals, plants, animals
 - Environments and assemblages
 - Both influenced Charles Darwin

Further Reading:

Robert Richards, *The Romantic Conception of Life: Science and Philosophy in the Age of Goethe*, 2002.

Alan Richardson, *British Romanticism and the Science of the Mind*, 2001.

Names and Dates:

Leyden Jar

Benjamin Franklin (1706-1790)

Luigi Galvani (1737-1798), *Commentary on the Effects of Electricity on Muscular Motion*, 1791

Alessandro Volta (1745-1827)

Voltaic pile 1800

Johann Friedrich Blumenbach (1752-1840)

Johann Christian Reil (1759-1813)

Johann Wolfgang von Goethe (1749-1832)

Metamorphosis of Plants (1790)

Theory of Colors (1810)

Erasmus Darwin (1731-1802)

Baron Alexander von Humboldt (1769-1859)

Mary Wollstonecraft Shelley (1797-1851), *Frankenstein*, 1818