

Science and belief from the Copernicans to the Creationists and the way ahead

Course Number: HIST/INDS 550

Institution: Regent College

Instructors: Dr. David Livingstone and Dr. Mark Noll

Course Description

This course examines critical historical episodes in the interaction between Christianity and science from the sixteenth century to the present. A major goal is to show how deeply embedded in specific cultural situations are all “encounters” between Christianity and science. A second goal is to subvert the notion that talking about “creation” and “evolution” was or ever can be a simple matter. A third goal is to suggest Christian strategies for a more fruitful interchange between science and faith. From this course, students should take away both enriched historical understanding and better theological balance for approaching critical questions relating science and Christianity.

Class Outline

Mon, July 17: I. Introduction

II. Telling the Story of Science and Christianity

Tues, July 18: III. The Copernican "Revolution"

IV. The Reformation and Science

Wed, July 19: V. The Puritans and Science

VI. Newton and the Mechanistic World Picture

Thurs, July 20: VII. Enlightenment and the Human Sciences

VIII. Enlightenment, Science, and Christianity in North America

Fri, July 21: IX. Pre-Darwinian, Early-Victorian Science

X. The 1830s as a crucial decade for science, theology, and society

Mon, July 24: XI. Darwin the man

XII. Evolutionary Theories in the Late 19th Century

Tues, July 25: XIII. Christian Scientists Encounter Evolution

XIV. Theological Evaluations of Darwin and Darwinism

Wed, July 26: XV. Creationism in the Context of American Religious History

XVI. Interpreting the New Creationism

Thurs, July 27: XVII. A Christology for Science

XVIII. Genesis 1:3--A Case Study

Fri, July 28: XIX. Models, Metaphors, Paradigms
XX. Wrap-up

Academic Requirements & Time Investment

	2 cr hrs	3 cr hrs
Class lectures (10 x 2 hrs)	20 hrs	20 hrs
Assigned text	20 hrs (400 pp)	20 hrs (400 pp)
Additional daily readings	10 hrs (200 pp)	10 hrs (200 pp)
Four written reaction reports	08 hrs (4 @ 1p ea)	08 hrs (4 @ 1 p ea)
Essay Reviews		
Reading	10 hrs (200 pp)	20 hrs (400 pp)
Report	06 hrs (1 @ 3 pp ea.)	12 hrs (2 @ 3 pp ea)
Reflection paper on course themes	16 hrs (8 pp)	
Discretionary Reading/Research for Paper		21 hrs (420 pp)
Research Paper		24 hrs (12 pp)
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	90 hrs	135 hrs

Course Text

John Hedley Brooke, *Science and Religion: Some Historical Perspectives* (Cambridge University Press, 1991)

Assignment Description

Additional Daily Readings/Reaction Reports

For each of the class days, an article or part of a book will be assigned as a way of preparing for the next day's lectures and discussion. For four of these readings (two each week), students will be asked to prepare 1-page reaction papers to aid in discussion.

These assignments are as follows [they will be available on Library Reserve]:

Tues, July 18: Gary Deason, "Reformation Theology and the Mechanistic Conception of Nature," in Lindberg & Numbers, 167-191.

Wed, July 19: Steven Shapin, *The Scientific Revolution* (Chicago, 1966), pp. 1-14, 155-65.

Thurs, July 20: Robert Wokler, "Anthropology and Conjectural History in the Enlightenment," in Christopher Fox, Roy Porter, and Robert Wokler, eds., *Inventing Human Science: 18th-Century Domains* (California, 1995), chapter 2.

Fri, July 21: Adrian Desmond, "Lamarckism and Democracy: Corporations, corruption and comparative anatomy in the 1830s," in *History, Humanity and Evolution*, ed. James R. Moore (CUP, 1989).

Mon, July 24: Livingstone's review of Moore and Desmond's *Darwin, Perspectives* 46 (June 1994): 123-27; Noll's review of same, *Intellectual History Newsletter* 15 (1993): 48-56; Moore's review of Noll and Livingstone on Desmond and Moore, *Perspectives* 46 (Sept. 1994): 169-72.

Tues, July 25: *From Charles Hodge, What is Darwinism? and Other Writings of Science and Religion*, pp. 50-56, 89-93, 138-39, 149-57.

Wed, July 26: Ronald L. Numbers, "Creationism in 20th-Century America," *Science* 218 (5 Nov. 1982): 538-44; and James R. Moore, "Interpreting the New Creationism," *Michigan Quarterly Review* 22 (1983): 321-34.

Thurs, July 27: Derek Kidner, *Genesis: An Introduction and Commentary* (IVP, 1967), 13-14, 26-31, 54-58, 82-83, 93-100.

Fri, July 28: Nicholas Wolterstorff, "Does Truth Still Matter? Reflections on the Crisis of the Postmodern University," *Crux* 31 (Sept. 1995): 17-28.

Essay Reviews

These reports on books that the students select themselves are meant as encouragement to pursue individual interests in this vast subject. They will be divided into approximately 300-400 words describing the book's main contributions and 1200-1600 words of interaction and interpretation. The instructors will make available a list of possible books for this assignment, though student choices will not be confined to that list (but please secure permission for the volumes you read, if not on that list). Papers should be typed double-spaced according to a standard style guide (e.g., Chicago/Turabian, MLA, Canadian Style/Dundurn).

Reflection Paper

Students who take the course for 2 hours credit will prepare a reflection paper, which may focus on any aspect of the course (including "the way ahead"); they should be essays (with a thesis and logical development of an argument), but may touch on historical, theological, practical, ecclesiastical, cultural, etc. questions. Papers should be typed double-spaced according to a standard style guide (e.g., Chicago/Turabian, MLA, Canadian Style/Dundurn).

Research Paper

Students who take the course for 3 hours credit will prepare a short research paper on an important theme, person, or problem in science and religion from the early modern period. Papers should be typed according to a standard style guide (e.g., Chicago/Turabian, MLA, Canadian Style/Dundurn).

Essay reviews, reflection papers, and research papers should be mailed to the College for grading and ought to be postmarked no later than August 28, 2000. Late papers will be penalized.

Evaluation	2 hours credit	3 hours credit
reaction reports + participation	10%	10%
Essay review(s)	30%	40%
Reflection paper	60%	
Research paper		50%

Bibliography / Reading for Orientation (including work by the instructors):

Barbour, Ian. *Religion and Science: Historical and Contemporary Issues*, 2nd ed. SCM Press, 1998.

Brooke, John Hedley. *Science and Religion: Some Historical Perspectives*. CUP, 1991. [course text].

Brooke, John Hedley, and Jeffrey Cantor. *Reconstructing Nature: The Engagement of Science and Religion*. T&T Clark, 1998.

Ferngren, Gary B., Edward J. Larson, and Darrel W. Amundsen, eds. *The History of Science and Religion in the Western Tradition: An Encyclopedia*. Garland Publishing, 2000.

Greene, John C. *Science, Ideology, and World View: Essays in the History of Evolutionary Ideas*. California, 1981.

Lindberg, David C., and Ronald L. Numbers, eds. *God and Nature: Historical Essays on the Encounter Between Christianity and Science*. California, 1986.

Lindberg, David C., and Robert S. Westman, eds. *Reappraisals of the Scientific Revolution*. Cambridge, 1990.

Livingstone, David N. *Darwin's Forgotten Defenders: The Encounter Between Theology and Evolutionary Thought*. Eerdmans/Scottish Academic Press, 1987.

Livingstone, David, D. G. Hart, and Mark Noll, eds., *Evangelicals and Science in Historical Perspective*. OUP, 1999.

Livingstone, David, and Mark Noll, eds., *Charles Hodge's What Is Darwinism and Other Writings on Science and Scripture*. Baker, 1994.

_____, eds. *B. B. Warfield on Scripture, Science, and Evolution*. Baker, 2000.

McGrath, Alister. *The Foundations of Dialogue in Science and Religion*. Blackwell, 1998.

_____. *Science and Religion: An Introduction*. Blackwell, 1999.

Moore, James R. *The Post-Darwinian Controversies: A Study of the Protestant Struggle to Come to Terms with Darwin in Great Britain and America, 1870-1900*. Cambridge, 1979.

Noll, Mark A. *The Scandal of the Evangelical Mind*. Eerdmans, 1994.

O'Connor, Daniel, and Francis Oakley, eds. *Creation: The Impact of an Idea*. Scribners, 1969.

Russell, Colin. *Cross-currents: Interaction Between Science and Faith*. Eerdmans, 1985.

Shapin, Steven. *The Scientific Revolution*. Chicago, 1996.

Student Responsibilities

Attend class and ask questions when you hear something you don't understand; make comments if you understand something better than what you heard.

Do the assigned reading. The reading in Brooke, *Science and Religion: Some Historical Perspectives* is foundational, and it would be ideal if you could finish Brooke during the first week of our course. But it is a substantial book, and it may be too much to cover during the two-weeks of class. No problem. Simply finish this reading before doing the final writing for the course that is due August 28, 2000.

For time-sensitive reasons, it is more important that you read the nine shorter daily reading assignments when they are scheduled. These are useful background for the lectures and discussions on the days for which they are assigned. They will also be the basis for the four one-page "reaction reports" that you hand in during the course.

Prepare four one-page "reaction reports." These written assignments are meant to supplement lectures and class discussion. They are to be handed in on the days for which the readings are assigned (see attached page for a sample). You choose the four days for which you will prepare a reaction report (be sure to do the reading the other days). Try to do two of these reports each week.

Essay-Reviews

Two-hours credit: prepare one essay-review.

Three-hours credit: prepare two essay-reviews.

These essay-reviews should be relatively substantial essay-reviews (approx. 1500-200 words). Apportion about 1/4 to 1/3 of the space to summarizing the content of the book, the rest providing your own historical, theological, personal, or scientific commentary. If you are doing a research paper (for 3 hrs. course credit), feel free to pick books that relate to your research. A model for these reports might be the shorter essays that appear in *Books & Culture: A Christian Review on scientific topics* (see attached samples).

Research Papers (for three hours credit)

These papers will usually involve critical interaction with an important primary source document (or documents), and also enough interaction with important secondary sources to set your own interpretation of the primary sources in proper context.

A good research paper will feature the following:

It will have an interesting, significant thesis. That is, the paper will make some kind of case, argument, defense, or proposition. The thesis statement should do more than say that the paper will “trace,” “look at,” “examine,” “develop,” “touch upon,” or the like. These words set up a subject field; rarely do they state a thesis.

It will have ample transitions and summary statements linking the various parts of the argument. That is, when you are finished with the exposition of a point, theme, or event, stop to say what it means. Then as you proceed to the next point, theme, or event, introduce that next step in the paper with some reference back to what has gone before. A research paper should not be a series of disconnected discussions, but a unified whole. It will have a carefully considered conclusion. After all your hard work of research and writing, take some time to reflect on the significance of what you have studied.

It will use quotations selectively. Avoid stringing long, blocked quotations together. For the most part, when you quote, quote primary sources instead of secondary sources. It will have clear writing. Short sentences are almost always better than long sentences. Be brutal with yourself in re-writing until every sentence and every paragraph is crystal clear.

It will have a regular, consistent form for the notes (either footnotes or endnotes are acceptable). Follow a consistent format, like those provided by Turabian or the Chicago Manual of Style.

It will be proofread carefully. Spell-checkers and grammar-checkers are useful, but they do not catch all typing and printing mistakes. Even in the age of the computer, it is still important to proofread.

Sample one-page “reaction report”

(The following is an abridgment, modification, etc. of V. Paul Marston’s review of Davis Young’s *The Biblical Flood: A Case Study of the Church’s Response to Extrabiblical Evidence* [Eerdmans, 1995], from *Isis* 87:1 [1996]: 146-47.)

Davis Young writes not as a “professional” historian of science but as a Christian geologist who often faces questions from fellow believers. The book’s ultimate aim is pastoral: to encourage Christians today to come fully to terms with the overwhelming evidence that the earth is very ancient and with the lack of obvious signs of a recent universal flood. Young hopes, however that his book will also interest historians of science, and his hopes should be fulfilled. Young traces the long, often complex way in

which believers in Scripture have tried to use scientific data to reinforce, alter, support, reconfigure, or otherwise relate to what they read in the Bible.

Young's book raises an interesting comparison between the situation today and a century ago. In the 1890s some of the renowned figures in geological science (e.g., Dana, Winchell, Dawson, Wright, Prestwich) were Christians, and "the Flood" was a geological issue (though most Christian academics believed it to be a local event). The contrast is sharp with today. Especially noteworthy is the fact that a century ago conservative biblical commentators were usually comparatively well informed on what geological data existed and sought harmony with mainstream geology. Many recent commentators (especially, it seems, in America) are ignorant (even willfully so) of scientific data available by the 1890s, let alone today. To many of us in the church this may be a cause for sadness and concern. But for historical purposes, it also raises a huge question. What is the historical sequence of events--socially, politically, culturally, theologically--that accounts for the major changes that have taken place in the relation between geological science and scriptural interpretation over the last century?

Daily Lecture and Reading Schedule

Monday 17 July

I. Introduction:

Biblical (Ps. 19; Exodus 31; I John 1, also John 20:31 and I Tim 3:16) and Practical

1. Psalm 19 and the meaning of "The heavens declare the glory of God...Day after day they pour forth speech."

2. Goals for the Course

(a) Historical—to show that all encounters between "science" and "religion" are embedded in specific historical situations

(b) Providence—to subvert the notion of simple models for religion and science

(c) The whole Bible—to suggest broad historical resources for thinking about science, instead of proof-texts

Discussion: how do previous experiences, books read, theologies embraced, and other personal factors dispose us to consider large questions about religious-scientific relations?

Monday 17 July

II. Telling the Story of Science and Christianity

1. Conflict

(a) Advocates: Draper, White, Simpson

(b) Social Origins of the Conflict Thesis

2. Co-operation

(a) Historical Cases:

Scientific Revolution (Merton, Hooykaas, Dillenberger, Klaaren, Jaki)

Darwinian Revolution (Moore)

(b) Harmonising Schemes

3. Competition

The arguments of Frank Miller Turner. Key concepts:

(a) Professional Struggle

(b) Cultural Authority / supremacy

(c) Intellectual Elites

(d) "Rainfall, Plagues, and the Prince of Wales"

Discussion: What is the impact upon scientific-religious dialogue if one or the other of these approaches is dominant? Is it possible to attempt multiple approaches to understanding religious-scientific interrelations?

Additional reading:

Brooke, pp. 1-51.

Lindberg and Numbers, *God and Nature*, pp. 1-18.

David N. Livingstone, *Darwin's Forgotten Defenders: The Encounter Between Evangelical Theology and Evolutionary Thought* (Eerdmans and Scottish Academic Press, 1987), chapter 1.

John Brooke and Geoffrey Cantor, *Reconstructing nature: the engagement of science and religion* (T & T Clark, 1998), chapter 1.

Colin A. Russell, "The Conflict Metaphor and Its Social Origins," *Science and Christian Belief* 1 (1989): 3-26.

Frank M. Turner, "The Victorian Conflict between Science and Religion: A Professional Dimension," *Isis* 69 (1978): 356-76.

Robert M. Young, "The Historiographic and Ideological Contexts of the Nineteenth Century Debate on Man's Place in Nature," in M. Teich and R. M. Young, eds., *Changing Perspectives in the History of Science* (Heinemann, 1973).

Moore, James R. *The Post-Darwinian Controversies: A Study of the Protestant Struggle to Come to Terms with Darwin in Great Britain and America, 1870-1900* (CUP, 1979), pp. 19-122.

Tuesday 18 July

(Reading: Gary Deason, "Reformation Theology and the Mechanistic Conception of Nature," in Lindberg & Numbers, 167-191.)

III. The Copernican "Revolution"

1. Medieval Background

- (a) Physics
- (b) Astronomy

2. The Copernican System

- (a) The System
- (b) Its Problems

3. Copernicanism and the Churches

- (a) Opposition Anticipated
- (b) Protestant Responses
- (c) Catholic Reactions
- (d) Hermeneutical Issues
- (e) Theologizing Copernicanism

4. The Galileo Affair

Discussion: How is the situation in which Copernicus prepared his theories, and in which they were publicized, like and unlike our current situation? Compare also the social prestige of "science" (and also what "science" meant) in the age of Copernicus and in our own age.

Additional Reading:

Brooke, chapter 2.

Steven Shapin, *The Scientific Revolution* (Chicago, 1996).

_____. *A Social History of Truth: Civility and Science in Seventeenth-Century England*. (Chicago, 1994).

Robert S. Westman, "The Copernicans and the Churches," chpt. 3 in Lindberg and Numbers.

William R. Shea, "Galileo and the Church," chpt. 4 in Lindberg and Numbers.

Herbert Butterfield, *The Origins of Modern Science, 1300-1800* (rev., Free Press, 1957).

A. Rupert Hall, *The Revolution in Science, 1500-1750* (3rd ed., Longmans, 1983).

Ernan McMullin, "Galileo on Science and Scripture," in Peter Machamer (ed.), *The Cambridge Companion to Galileo* (Cambridge University Press, 1998), pp. 271-347.

Tuesday 18 July

IV. The Reformation and Science

1. Variations of the Cooperation Thesis

- (a) Michael Foster, Stanley Jaki
- (b) R. Hooykaas, E. Klaaren, J. Dillenberger
- (c) G. Deason
- (d) Max Weber
- (e) Problems with the thesis

2. How the principles of the Reformation may have affected early modern science

- (a) Justification by faith alone
- (b) The priesthood of all believers
- (c) The authority of Scripture
 - i) as a principle of authority opposed to the authority of Aristotle
 - ii) but now a new situation for questions of interpretation
 - iii) Calvin's notion of "accommodation" as especially crucial

3. What does it matter?

- (a) Science, Natural Theology, and a divided Europe
- (b) A new utility for "science" (or "applied science")

Discussion: How have recent historians treated the role of the Reformation's Big Religious Questions for the doing of science? What do you make of Calvin and Luther's rejection of Aristotle and the return by their students to the use of Aristotle (for scientific and other intellectual purposes)?

Additional reading:

Gary B. Deason, "The Protestant Reformation and the Rise of Modern Science," *Scottish Journal of Theology* 38 (1985).

B. A. Gerrish, "The Reformation and the Rise of Modern Science," *The Impact of the Church Upon Its Culture*, ed. Jerald C. Brauer (Chicago, 1968), 231-75.

Hooykaas, Reijer. *Religion and the Rise of Modern Science* (Eerdmans, 1972).

Stanley L. Jaki, *The Road of Science and the Ways to God* (Chicago, 1978).

Eugene M. Klaaren, *Religious Origins of Modern Science* (Eerdmans, 1977).

Cameron Wybrow, ed., *Creation, Nature, and Political Order in the Philosophy of*

Michael Foster (1903-1959): The Classic Mind Articles and Others, With Modern Critical Essays (Edwin Mellen, 1992).

Wednesday 19 July

(Reading: Steven Shapin, *The Scientific Revolution* (Chicago, 1966), pp. 1-14, 155-65.

V. The Puritans and Science

1. Who were the Puritans?

2. Puritanism and Science

(a) Reijer Hooykaas

(b) Merton

(c) Christopher Hill

3. Discussion/Criticism

(a) The Imprecision of "Puritanism"

(b) The Ambiguities of the Puritan emphasis upon experience

Discussion: John Morgan characterizes Puritanism as a "fragile coalition" that balanced "irrational faith" (i.e., belief in the Holy Spirit, etc.) and "determined learning." Compare that Puritan balancing act with balancing acts in the religious movements or groups that you know best.

Additional reading:

John Morgan, "Puritanism and Science: A Reinterpretation," *The Historical Journal* 22 (1979): 535-60.

_____, *Godly Learning: Puritan Attitudes towards Reason, Learning, and Education, 1560-1640* (CUP, 1986).

_____, "The Puritan Thesis Revisited," in David N. Livingstone, D.G. Hart, and Mark A. Noll (eds), *Evangelicals and Science in Historical Perspective* (Oxford University Press, 1999), pp. 43-74.

Edward B. Davis, "Christianity and Early Modern Science," in David N. Livingstone, D.G. Hart, and Mark A. Noll (eds), *Evangelicals and Science in Historical Perspective* (Oxford University Press, 1999), pp. 75-95.

Robert K. Merton, "Puritanism, Pietism and Science," *Sociological Review* (1936), reprinted in *Social Theory and Social Structure* (Free Press, 1957), 574-606.

Charles Webster, "Puritanism, Separatism, and Science," chapter 7 in Lindberg & Numbers.

Peter Harrison, *The Bible, Protestantism and the Rise of Natural Science* (Cambridge University Press, 1998).

Wednesday 19 July

VI. Newton and the Mechanistic World Picture

1. The Mechanical Philosophy

- (a) Its Characteristics
- (b) Descartes (1596-1650)
- (c) Newton (1642-1727)
 - i. The Man
 - ii. The Laws
 - iii. Their Significance

2. Newton: The Last of the Magicians

- (a) Theories of Matter
- (b) Aristotelianism and Occult Qualities
- (c) Rejecting Occult Qualities
- (d) Newton's Critique
- (e) The Natural Magic Tradition
- (f) Newton the Magician

3. The Social-Political Significance of Newton

- (a) The long European crisis over authority (1517-1859)
- (b) "Political Newtonianism" (Margaret Jacob)
- (c) Natural Theology and science in a divided Europe

Discussion: True or False? "Nature and Nature's Laws lay hid in night; God said, 'Let Newton Be,' and all was light."

Additional reading:

Brooke, chapter 4.

Richard S. Westfall, *Never at Rest: A Biography of Isaac Newton* (CUP, 1980).

Jacob, Margaret. *The Cultural Meaning of the Scientific Revolution* (Temple, 1988).

Alexandre Koyré, "The Significance of the Newtonian Synthesis," chpt 1 of *Newtonian Studies* (Chicago, 1965).

Steven Shapin, "Of Gods and Kings: Natural Philosophy and Politics in the Leibniz-Clark Disputes," *Isis* 72 (1981): 187-215.

John Henry, "Newton, Matter and Magic," in J. Fauvel, R. Flood, M. Shortland, and R. Wilson, eds., *Let Newton Be! A New Perspective on His Life and Works* (OUP, 1988), 126-45.

Simon Schaffer, "Newtonianism," in R.C. Colby et al (eds) *Companion to the History of Modern Science* (Routledge, 1990), pp. 610-626.

Thursday 20 July

(Reading: Robert Wokler, "Anthropology and Conjectural History in the Enlightenment," in Christopher Fox, Roy Porter, and Robert Wokler, eds., *Inventing Human Science: Eighteenth-Century Domains* (California, 1995), chapter 2.)

VII. Enlightenment and the Human Sciences

1. What was Enlightenment?
2. Enlightenment and the Science of Humankind
3. The Development of Anthropology
 - (a) Challenges to Convention
 - (b) La Peyrère and the Preadamite Heresy
 - i) Preadamitae (1655)
 - ii) The Beginnings of Biblical Criticism
 - (c) Monogenism and Polygenism
 - i) Lord Kames vs. Samuel Stanhope Smith
 - ii) American Polygenism and Racism
 - (d) Reconciling Ethnology and Theology
4. Wider Domains: Religion as a Dependent Variable
 - (a) Human Nature and Conjectural History
 - (b) Religion and Ritual

Discussion: "The Enlightenment Project" is taking a lot of heat these days. Is that criticism justified? Asked another way, is it possible to separate out genuine advances in Enlightenment procedures for verifying knowledge from Enlightenment hubris at the capacities of human beings?

Additional reading:

Brooke, chapters 5 and 6.

Dorinda Outram, *The Enlightenment* (CUP, 1995).

Roy Porter and Mikuláš Teich, eds., *The Enlightenment in National Context* (CUP, 1981).

Richard B. Sher, *Church and University in the Scottish Enlightenment: The Moderate Literati of Edinburgh* (Princeton, 1985).

David N. Livingstone, *The Preadamite Theory and the Marriage of Science and Religion* (American Philosophical Society, 1992).

John W. Yolton (ed.), *The Blackwell Companion to the Enlightenment* (Blackwell, 1995).

David N. Livingstone and Charles W.J. Withers (eds), *Geography and Enlightenment* (University of Chicago Press, 1999)

Thursday 20 July

VIII. The Enlightenment, Science, and Christianity in North America

1. The Enlightenment for America (Henry May)

- (a) Not skeptical (David Hume, Voltaire)
- (b) Not radical (Paine, Godwin)
- (c) But moderate (Newton, Locke)
- (d) And especially Scottish (Francis Hutcheson, Thomas Reid)

2. The American Problem

- (a) Establishing social order, a new nation, and Christianity
- (b) Without tradition, inherited authority, state-church

3. The Solution—Scottish Common Sense Moral Philosophy

- (a) The “science of politics” and the Constitution
- (b) “The science of morals” for social order (Stanhope Smith)
- (c) A scientific grounding for theology (John Witherspoon, A. Alexander)

4. Implications, Results

Discussion: The "American Enlightenment" illustrates nicely how important non-scientific uses of scientific material can be, especially (in this case) the edify of Natural Theology built upon scientific foundations. We are supposedly a lot less naive now than our American ancestors, but has there been any real advance in how "interested" communities enlist "the assured results of modern science" for their social and political causes?

Additional reading:

Henry May, *The Enlightenment in America* (OUP, 1976).

Mark A. Noll, *Princeton and the Republic, 1768-1822: The Search for a Christian Enlightenment in the Era of Samuel Stanhope Smith* (Princeton, 1989).

Mark A. Noll, *The Scandal of the Evangelical Mind* (Eerdmans, 1994).

Theodore Dwight Bozeman, *Protestants in an Age of Science: The Baconian Ideal and Ante-Bellum American Religious Thought* (North Carolina, 1977).

Herbert Hovenkamp, *Science and Religion in America, 1800-1860* (Pennsylvania, 1978).

D. H. Meyer, *The Instructed Conscience: The Shaping of the American National Ethic* (Pennsylvania, 1972).

Michael Gauvreau, *The Evangelical Century: College and Creed in English Canada from the Great Revival to the Great Depression* (McGill-Queen's, 1991).

Mark A. Noll, "Science, Theology, and Society: From Cotton Mather to William Jennings Bryan," in David N. Livingstone, D.G. Hart, and Mark A. Noll (eds), *Evangelicals and Science in Historical Perspective* (Oxford University Press, 1999), pp. 99-119.

Allen C. Guelzo, "'The Science of Duty': moral Philosophy and the Epistemology of Science in Nineteenth-Century America," in David N. Livingstone, D.G. Hart, and Mark A. Noll (eds), *Evangelicals and Science in Historical Perspective* (Oxford University Press, 1999), pp. 267-289.

Friday 21 July

(Reading: Adrian Desmond, "Lamarckism and Democracy: Corporations, corruption and comparative anatomy in the 1830s," in *History, Humanity and Evolution*, ed. James R. Moore (CUP, 1989).)

IX. Pre-Darwinian, Early-Victorian Science

1. The Scientists

- (a) Lamarck (1744-1829) and evolution
- (b) Cuvier (1769-1832) and the fixity of species
- (c) Lyell (1797-1875) and uniformitarianism

2. Science and Religion

- (a) William Buckland's Diluvialism
- (b) Thomas Chalmer's Gap Theory
- (c) John Fleming's Uniformitarianism
- (d) Hugh Miller's Day-Age Theory
- (e) The American Scene
 - i) Edward Hitchcock
 - ii) Benjamin Silliman

3. The Politics of Evolution

The arguments of Adrian Desmond on Anatomy, Medicine, and Radicalism

Discussion: In the early 19th century science begins to take on the complexity that has made it hard for lay people to participate fully, and yet it was also a period when bright lay thinkers were very active at the interface of religion and science. For this earlier period, can you comment on the relationship between ever more complex scientific procedures and ever more pressing demands to explain the Broader Significance of scientific learning?

Additional reading:

Brooke, chapter 7.

Martin J. S. Rudwick, "The Shape and Meaning of Earth," chpt. 12 in Lindberg & Numbers.

James R. Moore, "Geologists and Interpreters of Genesis in the Nineteenth Century," chapter 13 in Lindberg & Numbers.

Rodney L. Stiling, "Scriptural Geology in America," in David N. Livingstone, D.G. Hart, and Mark A. Noll (eds), *Evangelicals and Science in Historical Perspective* (Oxford University Press, 1999), pp. 177-192.

Friday 21 July

IX. The 1830s as the critical decade for science, theology, and society

1. Unsettled Circumstances

- (a) A New Industrial Britain (new wealth, but also new squalor)
- (b) Political-Social Upheaval
 - (i) 1828, Catholic Emancipation
 - (ii) 1829, Repeal of Test and Corporation Act
 - (iii) 1832, Reform of Parliament
- (c) Religious Innovation, Reaction, Disarray (including)
 - (i) The Oxford Movement (high church Anglican)
 - (ii) Famous people converting to Catholicism (eg, Newman)
 - (iii) Edward Irving, charismata, the Catholic Apostolic Church
 - (iv) The Scottish Disruption (1843)
 - (v) Rise of Dissent and American-style evangelism
 - (vi) Doctrinal development, especially on Scripture (D. Bebbington)

2. Natural Theology, Theodicy

- (a) The nature of William Paley's Design
 - (i) ameliorative
 - (ii) adaptive (and visibly so)
- (b) Different functions of Design Arguments
 - (i) "To Design" (confessional--eg, Thomas Chalmers)
 - (ii) "From Design" (apologetic--eg, A. Alexander)

(c) An Age of Atonement? (Boyd Hilton)

(i) Thomas Chalmer's use of Adam Smith & Thomas Malthus

(ii) Others move away from Christianity (eg, George Eliot)

3. The 1830s and Darwin's reluctance to publish on natural selection

Discussion: The period just before *The Origin of Species* is a perfect one for trying to relate the "internal" history of science (what scientists do in their labs and how they write about it to each other) and the "external" history of science (how social conditions prepare the way for enunciating and communicating scientific conclusions). Is it possible to keep "external" and "internal" perspectives at the same time, or must one inevitably push the other aside in any analysis of science-in-society?

Additional reading:

J. H. Brooke, "The Natural Theology of the Geologists," in L. J. Jordanova and R. S. Porter, *Images of the Earth* (British Society for the History of Science, 1978), 39-64.

Boyd Hilton, *The Age of Atonement: The Influence of Evangelicalism on Social and Economic Thought, 1795-1865* (OUP, 1988).

James R. Moore, "Crisis Without Revolution: The Ideological Watershed in Victorian England," *Revue de Synthèse* 107 (Jan.-June 1986): 53-78.

R. M. Young, "Malthus and the Evolutionists: The Context of Biological and Social Theory," chpt. 2 in Young's *Darwin's Metaphor: Nature's Place in Victorian Culture* (CUP, 1985).

Michael Roberts, "Design up to Scratch? A Comparison of Design in Buckland (1832) and Behe," *Perspectives on Science and Christian Faith* 51, No. 4 (1999): 244-252.

Monday 24 July

(Readings: Livingstone's review of Moore and Desmond's *Darwin*, *Perspectives* 46 (June 1994): 123-27; Noll's review of same, *Intellectual History Newsletter* 15 (1993): 48-56; Moore's review of Noll and Livingstone on Desmond and Moore, *Perspectives* 46 (Sept. 1994): 169-72.)

XI. Darwin the Man

1. Early Days

(a) Schooling

(b) Edinburgh

(c) Cambridge

2. The Beagle Voyage

(a) Brazilian Forest

- (b) Tierra del Fuego
- (c) The Andes
- (d) Galapagos Islands

3. The Origin of Species

- (a) Opening the Notebooks
- (b) Wallace's "Bolt from the Blue"
- (c) An "Abstract"

4. Wilberforce and Huxley—myth/reality

5. The Descent of Man and Later Works

- (a) Human Origins
- (b) Expression of Emotions in Man and Animal

6. Darwin's Loss of Faith

- (a) Natural Theology
- (b) Annie's Death
- (c) Hell
- (d) The "Devil's Chaplain"

7. Westminster Abbey

Discussion: Why did many of Darwin's most serious religious readers (like Asa Gray, Charles Hodge, and B. B. Warfield) consider him to be an unusually estimable human being?

Additional Reading:

Adrian Desmond and James Moore, *Darwin: The Life of a Tormented Evolutionist* (Warner, 1991).

Peter J. Bowler, *Charles Darwin: The Man and His Influence* (Blackwell, 1990).

B. B. Warfield, "Charles Darwin's Religious Life: A Sketch in Spiritual Biography," *Presbyterian Review* 9 (Oct. 1888): 569-601.

James R. Moore, "Of Love and Death: Why Darwin 'gave up Christianity,'" in *History, Humanity and Evolution*, ed. Moore (CUP, 1989).

James R. Moore, *The Darwin Legend* (Baker, 1994).

John H. Brooke, "The Relations Between Darwin's Science and His Religion," in *Darwinism and Divinity*, ed. John Durant (Blackwell, 1985), 40-75.

Monday 24 July

XII. Evolutionary Theories in the Late 19th Century

1. The Structure of Darwin's Theory

- (a) Growing Doubts About Creationism
- (b) Natural Selection: What it was
- (c) Natural Selection: What it was not
- (d) Darwinian Metaphors
- (e) Sexual Selection, Correlative Variation, Group Selection

2. Darwinism and Society

- (a) Victorian Capitalism
- (b) Racial Evolution
- (c) Altruism in the Social Insects

3. The Lamarckian Alternative

- (a) Darwin's Critics
 - i) Gaps in the Fossil Record
 - ii) Kelvin and the Age of the Earth
 - iii) Fleeming Jenkin and Blending Inheritance
- (b) Neo-Lamarckianism
- (c) Lamarckism and Society

Discussion: Is it in principle possible to define "Darwinism"? If late-Victorian efforts to define "Darwinism" are complicated, what do you make of contemporary defenders and critics who speak succinctly of "the Neo-Darwinian synthesis" or "Darwinism" as axiomatically good or evil?

Additional reading:

James R. Moore, "Deconstructing Darwinism: The Politics of Evolution in the 1860s," *Journal of the History of Biology* 24 (Fall 1991): 353-408.

Peter J. Bowler, *Evolution: The History of an Idea* (California, 1989).

_____, *The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades Around 1900* (Johns Hopkins, 1983).

Tuesday 25 July

(Reading: From Charles Hodge, *What is Darwinism? and Other Writings of Science and Religion*, pp. 50-56, 89-93, 138-39, 149-57.)

XIII. Christian Scientists Encounter Evolution

1. The Agassiz-Gray Debate

2. Detractors

- (a) Arnold Guyot
- (b) John William Dawson

3. Advocates

- (a) George Frederick Wright
- (b) James Dana

4. Go-Betweens

- (a) Alexander Winchell
- (b) George Macloskie
- (c) Henry Drummond

Discussion: The Christian world of the late-19th century encompassed several views on evolution held by people who still were more-or-less in communication with each other. Compare the benefits and debits of that situation to the modern situation where Christian views on evolution tend to be segregated off from each other more completely?

Additional reading:

Brooke, chapter 8.

David N. Livingstone, *Darwin's Forgotten Defenders: The Encounter Between Evangelical Theology and Evolutionary Thought* (Eerdmans and Scottish Academic, 1987).

A. Hunter Dupree, *Asa Gray* (Harvard, 1959).

Susan Sheets-Pyenson, *John William Dawson: Faith, Hope, and Science* (McGill-Queen's, 1996).

Moore, James R. *The Post-Darwinian Controversies: A Study of the Protestant Struggle to Come to Terms with Darwin in Great Britain and America, 1870-1900* (CUP, 1979).

Frederick Gregory, "The Impact of Darwinian Evolution on Protestant Theology in the Nineteenth Century," chpt. 15 in Lindberg & Numbers.

Ronald L. Numbers and John Stenhouse (eds), *Disseminating Darwinism: The Role of place, Race, Religion and Gender* (Cambridge University Press, 1999)

Tuesday 25 July

XIV. Theological Evaluations of Darwin and Darwinism

1. Overview featuring North America (from Jon Roberts and Canadians)

- (a) Importance of historical synthesis of theology and science

- (b) 1860s: Scientists skeptical, so also almost all theologians
- (c) 1870s: Scientists mostly convert, theologians divided
- (i) Reject Darwinism completely
- (ii) Critical interaction
- (iii) Adapt Christianity to Darwinism (modernism)

2. Charles Hodge (1797-1878) as case study

- (a) The positive contribution to science to biblical interpretation
- (b) Darwinism unpacked
 - (i) Development
 - (ii) Natural selection
 - (iii) Ateleology
- (c) "Darwinism as atheism"
- (d) Asa Gray's rejoinder

3. B. B. Warfield (1851-1921) as another case study

- (a) Warfield's important for the question (biblical inerrancy + evolution)
- (b) Accepting evolution, rejecting "Darwinism"
 - (i) Cattle breeding and natural selection as "pure Darwinian"
 - (ii) From "Darwinian" to examining evolution
 - (iii) Questions: evidence, teleology
 - (iv) The authority of Calvin ("pure evolutionism")

Discussion: One of the reasons it is rewarding to study Hodge and Warfield is to discover the care with which they worked in defining concepts like "Darwinism" before they attempted their criticism. What has changed in the religious world to make that kind of careful defining apparently less important in our day than it was in theirs?

Additional reading:

Jon H. Roberts, *Darwinism and the Divine in America: Protestant Intellectuals and Organic Evolution, 1859-1900* (Wisconsin, 1988).

David N. Livingstone and Mark A. Noll, (eds), *Charles Hodge's What Is Darwinism? and Other Writings on Science & Religion* (Baker, 1994).

David N. Livingstone and Mark A. Noll, "B.B. Warfield (1851-1921): A Biblical Inerrantist as Evolutionist," *Isis*, 91 (2000).

Mark A. Noll and David N. Livingstone, (eds), *Evolution, Scripture, and Science: Selected Writings of B.B. Warfield* (Baker, 2000).

Ronald L. Numbers, *Darwinism Come to America* (Harvard University Press, 1998)

Wednesday 26 July

(Readings: Ronald L. Numbers, "Creationism in 20th-Century America," *Science* 218 (5

Nov. 1982): 538-44; and James R. Moore, "Interpreting the New Creationism," *Michigan Quarterly Review* 22 (1983): 321-34.)

XV. Creationism in the Context of American Religious History
and

XVI. Interpreting the New Creationism

1. Historical Evangelical Reliance on Science (especially in America)

- (a) 18th century: "experimental" divinity
- (b) 19th century: Baconian procedure
- (c) Science as critical for creating a Christian society (hence political)

2. Creationism as a Bible-only alternative science

- (a) Precedents
 - i) John Hutchinson's anti-Newtonian, Anglican, biblical science
 - ii) Philip Gosse's Victorian (P. Brethren) strategy of apparent age
- (b) But harmonization as the usual strategy

3. Anti-evolutionism

- (a) George McCready Price
- (b) The tangled historiography of the W. J. Bryan and the Scopes Trial
- (c) Ambrose Fleming and the Evolution Protest Movement

4. The Creationist Movement

- (a) Flood geology
- (b) Six-day creationism

5. Interpreting the New Creationism

- (a) Eschatology
- (b) An alternative science
- (c) Cultural crisis
- (d) Harmonization strategies and their wisdom

Discussion: American Protestants have been renowned (or vilified) for stressing "the Bible only" as an authority. What are gains or losses from the prosecution of that principle for scientific concerns? What are the major issues at stake politically, theologically, and academically in the modern history of creation-science?

Additional reading:

Numbers, Ronald L. *The Creationists* (Knopf, 1992).

Edward J. Larson, *Trial and Error: The American Legal Controversy over Creation and Evolution* (OUP, 1985).

Edward J. Larson, *Summer for the Gods: The Scopes Trial and America's Continuing Debate over Science and Religion* (Basic Books, 1997).

Langdon Gilkey, *Creationism on Trial: Evolution and God at Little Rock* (Winston, 1985).

Laurie R. Godfrey, ed., *Scientists Confront Creationism* (New York: Norton, 1983).

Henry M. Morris, *A History of Modern Creationism* (Master's, 1984).

Young, Davis A. *The Biblical Flood: A Case Study in the Church's Response to Extrabiblical Evidence* (Eerdmans, 1995).

Eileen Barker, "In the Beginning: The Battle of Creationist Science against Evolutionism," in *On the Margins of Science: The Social Construction of Rejected Knowledge*, ed. Roy Wallis (University of Keele, 1979), 179-200.

Del Ratzsch, *The Battle of Beginnings: Why Neither Side is Winning the Creation-Evolution Debate* (IVP, 1996).

David N. Livingstone, "Evolution and eschatology," *Themelios*, 22 (1996): 26-36.

Phillip E. Johnson, Denis O. Lamoureux et al, *Darwinism Defeated? The Johnston-Lamoureux Debate on Biological Origins* (Regent College, 1999).

Thursday 27 July

(Reading: Derek Kidner, *Genesis: An Introduction and Commentary* (IVP, 1967), 13-14, 26-31, 54-58, 82-83, 93-100.)

XVII. A Christology for Science

1. Why Christology as a basis for science?
2. Christological encouragements for science
 - (a) materiality
 - (b) particularity
 - (c) beauty
 - (d) holy this-worldliness
 - (e) confessional commitment to design
3. Christological hints for science
 - (a) contingency
 - (b) duality
 - (c) particularity-universality

Discussion: Compare the value of thinking Christologically about science with more standard approaches that stress God as Creator or Designer of the physical world?

Additional reading:

Nancey Murphy, *Theology in the Age of Scientific Reasoning* (Cornell, 1990).

Wolfhart Pannenberg, *Theology and the Philosophy of Science* (Westminster, 1976).

T. F. Torrance, *Reality and Scientific Theology* (Scottish Academic Press, 1985).

J. G. Polkinghorne, *One World: The Interaction of Science and Theology* (Princeton, 1986).

Thursday 27 July

XVIII. Genesis 1-3: A Case Study

1. Biblical teaching on how to use the Bible
2. Empirical approach commended
3. What the created world says about itself
4. Genesis as science?
5. Authorial intention
6. Cultural context
7. A better way

Discussion: Derek Kidner provides about a dozen ways in which conservative Christians have approached the cosmological and human accounts in early Genesis? The easy question to ask is, which do you prefer and why? A harder question is, are you able to connect the various answers Kidner surveys to specific social, ecclesiastical, academic, institutional, or cultural contexts in which they "fit"?

Additional reading:

Howard J. Van Till, *The Fourth Day: What the Bible and the Heavens Are Telling Us about the Creation* (Eerdmans, 1986).

Henri Blocher, *In the Beginning: The Opening Chapters of Genesis* (IVP, 1984).

Francis Schaeffer, *Genesis in Space and Time* (IVP, 1972).

John H. Sailhammer, *Genesis Unbound: A Provocative New Look at the Creation Account* (Multnomah Books, 1996).

Friday 28 July

(Reading: Nicholas Wolterstorff, "Does Truth Still Matter? Reflections on the Crisis of the Postmodern University," *Crux* 31 (Sept. 1995): 17-28.)

IX. Models, Metaphors, Paradigms

1. Models and Metaphors

- (a) The nature of analogy
- (b) Models as metaphors

2. Theology and the Metaphors of Nature

- (a) The Divine Economist
- (b) Mother Nature
- (c) The Celestial Mechanic

3. Thomas Kuhn and "Paradigms"

4. Science and Postmodernity

- (a) Modernity
 - (i) Foundationalism in philosophy
 - (ii) A positive science of society
 - (iii) Architectural functionalism
- (b) Post-Modernity
 - (i) Feminist critiques (Haraway)
 - (ii) Post-colonial voices (Said)
 - (iii) Discourse and power (Foucault)

Discussion: Can you construct an explicitly Christian appreciation for at least some aspects of post-modern criticisms of modernity that does not lead to skepticism about scientific research and the applications of that research?

Additional reading:

Ian G. Barbour, *Myths, Models and Paradigms: The Nature of Scientific and Religious Language* (Harper & Row, 1976).

Janet Martin Soskice, *Metaphors and Religious Language* (OUP, 1985).

Mary B. Hesse, *Models and Analogies in Science* (Notre Dame, 1966).

Phillip E. Johnson, *Darwin on Trial* (IVP, 1991).

Del Ratzsch, *Philosophy of Science: The Natural Sciences in Christian Perspective* (IVP,

1986).

David N. Livingstone, "Evolution as Metaphor and Myth," *Christian Scholar's Review* 12 (1983): 111-25.

Edward Said, *Orientalism: Western Conceptions of the Orient* (Penguin, 1991).

Steven Weinberg, "Sokal's Hoax," *New York Review* Aug 8, 1996, pp. 11-15.

Stephen Toulmin, *Cosmopolis: The Hidden Agenda of Modernity* (University of Chicago Press, 1990).

Roger Lundin, *The Culture of Interpretation: Christian Faith and the Postmodern World* (Eerdmans, 1993).

Michel Foucault, *Power/Knowledge: Selected Interviews* (Harvester, 1980).

Bruno Latour, *We Have Never Been Modern* (Harvard University Press, 1993).