

A Brief Introduction to Natural Selection, Creationism and Intelligent Design

Supplementary Material for CFB3333/PHY3333
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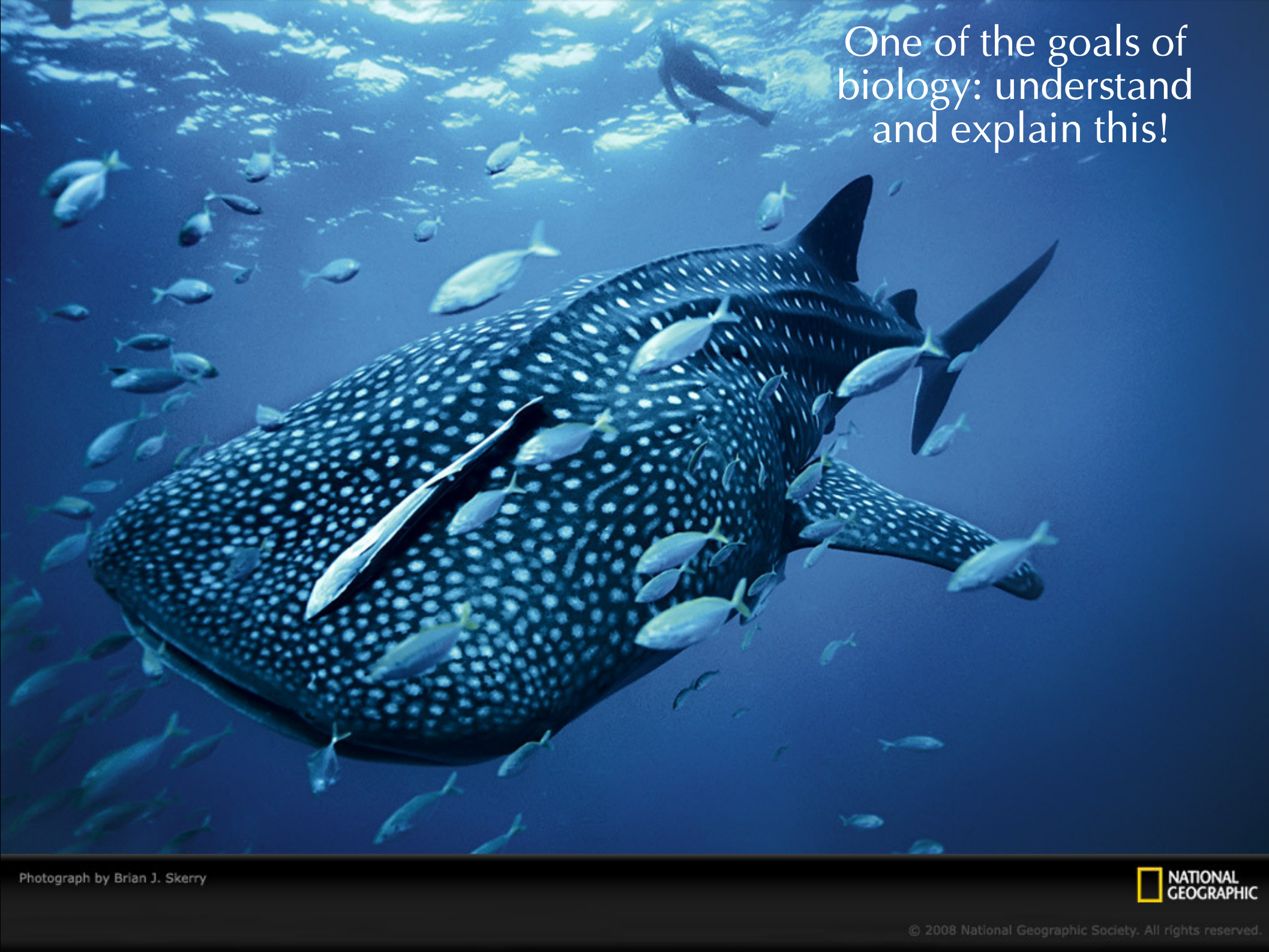
Preparation

- This lecture is a brief, brief, brief preparation for:
 - “Intelligent Design is not Science”, a guest lecture by Professor John Wise of the SMU Department of Biology
 - A discussion of these lectures in an additional class period.

Critical Questions to Keep in Mind

- What is the hypothesis? Is it testable?
- What predictions are made by the hypothesis?
- What tests are proposed to assess the prediction?
Can the hypothesis be falsified?

One of the goals of
biology: understand
and explain this!



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Natural Selection: A Scientific Theory to Explain Evolution

- That species change over time was not new information – but what was the mechanism by which this occurred?
- The Theory of Natural Selection: first codified by Charles Darwin, geologist and biologist, in 1858 in his publication “On the Origin of Species”
 - The diversity of life is not an accident
 - It’s due to pressure from the environment on a population of organisms – the organisms can either adapt or go extinct
 - Adaptation might be conferred by a pre-existing ability, or arise due to mutation in the organism that confers an advantage over its peers. This is speciation. This principle is called “Descent with Modification.”
 - Mutation is the only random part of Natural Selection – the actual selection is intentional (e.g. due to predator activity, or changes in climate)



Is Natural Selection Falsifiable?

- You bet!
 - the Earth might be too young for Natural Selection to work
 - if we find a fish fossil in a geological layer that dates back to a time before fish appeared, Natural Selection is wrong.
 - a new species might spontaneously appear with no relationship to any other species (like a Sterrance!). If that happened, Natural Selection is wrong.



“If your theory’s right, all these species would get together and form a new species, then where is the cat-dog or the rat-cat, whatever it be. They don’t come together. Cats go with cats, and dogs go with dogs.”

– Ken Mercer, R-San Antonio, on the “Boiling Point” radio show

<http://tfninsider.org/2011/10/28/mercero-still-attacking-science-and-teachers/>

[Speaker’s Note: Ironically, a “rat-cat” or a “cat-dog,” if it existed in nature, would actually be evidence *against* evolution since they have incompatible reproductive systems. So this points to a true and fundamental misunderstanding of the world.]

Does Natural Selection make Testable Predictions?

- You bet! Here are some old ones:
 - The Earth must be quite old, or species would not have had time to develop
 - given the diversity of life on Earth and the time needed to exert evolutionary pressure on a species, the age was estimated at millions of years or older.
 - **CONFIRMED:** radiological dating of rocks on Earth and the moon place the age of the Earth at (4.54 +/- 0.05) billion years.

Does Natural Selection make Testable Predictions?

- You bet! Here are some old ones:
 - There must be a biological mechanism for passing along traits – even dormant ones not expressed in parents or predecessors – but it was unknown at the time Darwin published
 - **CONFIRMED:** Gregor Mendel discovered the principles of heredity (mid 1800s) and thus genetics, and nearly 100 years later DNA was identified as the source of heredity

Does Natural Selection make Testable Predictions?

- You bet! Here are some old ones:
 - Mass extinctions may be possible when a species, or whole classes of species, cannot adapt or do not have time to adapt.
 - **CONFIRMED: many examples, including the dinosaurs**

Does Natural Selection make Testable Predictions?

- You bet! Here are some old ones:
 - Very different species may have simply branched long ago in the environment, but should share common inheritance information (e.g. genes)
 - **CONFIRMED:**
 - Humans and chimpanzees have 99% of their DNA in common and shared a common ancestor 5 million years ago;
 - Whales and hippopotamuses shared a common ancestor at least 50 million years ago.

“Nothing in biology makes sense except in the light of evolution [sic].”

– title of a 1973 essay by biologist and Russian Orthodox Christian Theodosius Dobzhansky

(why “sic”? I would say “Natural Selection”, not “evolution”)

CREATIONISM

First Problem:
which creation story is “correct”?

See <http://www.physics.smu.edu/devel/pseudo/Creation/>
for a HUGE list of creation stories from cultures
from across both time and the geographic world

What is meant in the U.S. by “Creationism?”

- Mostly derived from the Abrahamic religions (Christianity, Islam, Judaism)
- There are different kinds: see the next page...
- Some basic tenets:
 - all species were created all at once by God; their diversity was the choice of God.
 - the Earth is only about 6000 years old, as determined by James Ussher (1654), the Bishop of Armagh, who added up the ages of people relative to dates in the Old Testament and New Testament (this is a special branch of creationism called “Young Earth Creationism”). Ussher declared that the Earth was created by God on Sunday, October 23, 4004 BC.
 - humans were “specially created” by God and are not related to other species; or, they may be related to other species but are unique in that they have a “soul” and are created in the image of God.

Old Earth Creationism	Geology	Biology
Theistic Evolution: Evolution by natural processes is the tool God used	YES	YES
Evolutionary Creationism: Adam and Eve were the first spiritually aware humans	YES	YES
Progressive Creationism: Humans were a special creation event	YES	YES
Day-Age Creationism: Six days of creation were six geological epochs	YES	SOME
Gap Creationism: 4.5 billion year gap between Genesis 1:1 and 1:2	YES	SOME
Young Earth Creationism	Geology	Biology
Omphalism: Earth was created with the appearance of age and of evolution	YES	YES
Young Earth Fundamentalism: Invented versions of all natural sciences to explain Earth's age as 6,000 years	NO	NO

The (Abridged) U.S. Legal History of Creationism in Schools

- 1925: The State of Tennessee v. John Thomas Scopes
 - first legal test of teaching evolution in U.S. public schools
 - Scopes found guilty of violating The Butler Act of Tennessee, which made the teaching of Evolution illegal in state-funded schools.
- 1968: Epperson v. Arkansas
 - U.S. Supreme Court decision overturns Arkansas law that prohibited the teaching of Evolution in state-funded schools
 - court rules that the First Amendment of the U.S. Constitution prohibits a state from tailoring education to suit the desires of a specific religious sect or dogma
- 1987: Edwards v. Aguillard
 - U.S. Supreme Court finds that a Louisiana law requiring that “creation science” be taught alongside Evolution violates the separation clause of the First Amendment of the U.S. Constitution, since the LA law advances a specific religious viewpoint.

Intelligent Design Creationism

- Tries to hide the word “God”
- Some basic tenets:
 - some or all species were “designed” by an intelligent designer
 - evidence of this design is detectable by the principle of “irreducible complexity” - a biological structure so complex that it could not have happened by selection pressure on a biological organism (popular examples: the eye, the bacterium flagellum, the immune system, . . .). This complexity allegedly can be mathematically defined and experimentally measured.
 - principle originally expressed by William Paley, a philosopher (late 1700s), in the form of “the watchmaker” argument
 - recently renamed by Michael Behe (Professor of Biochemistry at Lehigh University and Fellow at the Discovery Institute)

The Origins of Intelligent Design Creationism

- The movement has as its foundations a paper known as “The Wedge Document,” which originated from The Discovery Institute (a Seattle-based think tank), aka “The Center for the Renewal of Science and Culture,” and states:

“The proposition that human beings are created in the image of God is one of the bedrock principles on which Western civilization was built . . . The cultural consequences of the rise of [the] triumph of materialism were devastating. Materialists denied the existence of objective moral standards . . . The Discovery Institute's Center for the Renewal of Science and Culture seeks nothing less than the overthrow of materialism and its cultural legacies.” – “The Wedge,” The Discovery Institute, 1999

How Will They Achieve This?

- By driving a wedge between science and society
 - Phase 1: conduct efforts at scientific discourse and publication to get their ideas into the science literature
 - this has largely failed, and you'll see why in John Wise's lecture on Friday
 - Phase 2: Publicity and Opinion-making
 - ongoing phase. Get laws changed in your favor, sway public opinion against science, etc.
 - Phase 3: Cultural Renewal and Confrontation
 - completely change the culture through their efforts
 - change science, change teaching, and then go after the social sciences and humanities

How has “Phase 1” gone?

I searched on smu.edu/cul using “intelligent design” as a search term (with quotes), limiting to scholarly publications in journals, excluding newspaper articles and theses.

I restricted the topics to “biology”, “science”, and “intelligent design”. I got 11 results.

Only one is actually a scientific paper – the rest are social studies/commentary on the issue. The scientific paper is a scientific CRITICISM of ID and shows how it can be ruled out with data:

Testing fundamental evolutionary hypotheses

Journal of theoretical biology, ISSN 0022-5193, 08/2003, Volume 223, Issue 3, pp. 377 - 385

“Consider photosynthetic enzymes from plants living in a hot, dry desert (a cactus and a desert grass) with those from a moist-temperate grass. A wise creator might design similar photosynthetic enzymes for leaves functioning under hot dry conditions (the cactus and a desert grass). This brings together enzymes from similar physical environments; under stress from high temperatures and strong water deficits. In contrast, the theory of descent predicts that the grass enzymes would be more similar. This unites sequences sharing a more recent common ancestor, irrespective of their current physical environment. In practice, common ancestry gives the correct prediction for photosynthetic enzymes . . . the theory of descent leads to testable predictions. It is possible for Intelligent Design to fudge predictions to make them identical to the theory of descent, but this is unsatisfactory. It provides no mechanism that leads to the observed data, and it leads to a creator appearing to be the ‘Great Deceiver’ who deliberately misleads rational humans.”

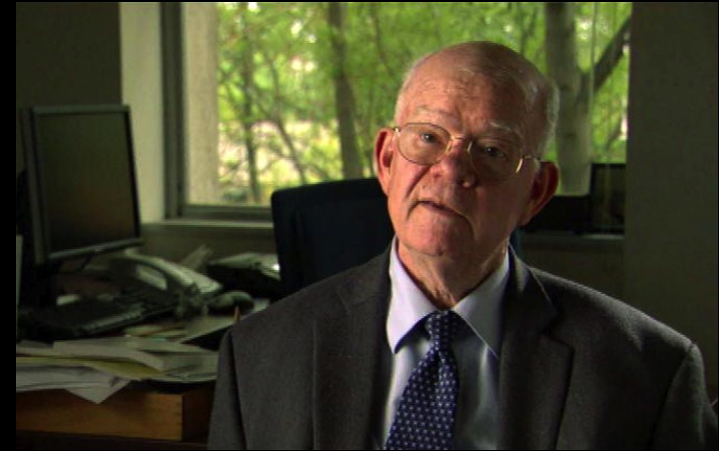
Faces of the ID/Creationism Movement



Michael Behe, Professor of Biochemistry at Lehigh University and Fellow at The Discovery Institute



Stephen C. Meyer, Ph.D. in philosophy, Director of the Discovery Institute's Center for the Renewal of Science and Culture and Senior Fellow at the Discovery Institute.



Philip Johnson, retired Berkley Law Professor, "Father of Intelligent Design Movement," co-founder of the Discovery Institute, credited as a founder of the Wedge Strategy.



William Dembski, B.A. in Psychology, M.S. in Statistics, Mathematics, and Philosophy, Ph.Ds. in Mathematics and Philosophy, and M.Div. in Theology. Senior Fellow at the Discovery Institute.

First Legal Test of ID/C

- 2005: Kitzmiller v. Dover Area School District
 - 11 parents sued the Dover, Pennsylvania school district for requiring ID/C be taught along side Evolution
 - Pennsylvania Supreme Court found that:
 - ID is a form a creationism (which is why it's labeled ID/C these days) and thus is in violation of previous U.S. Supreme Court rulings. The teaching of ID in a state-funded school is thus a violation of the First Amendment of the U.S. Constitution.
 - Note: Judge John E. Jones III, who oversaw the trial, was appointed in 2002 by President George W. Bush and was a conservative.

Current Intelligent Design Legal Efforts

- “Academic Freedom Laws” for grade schools
 - multiple states have tried to pass them (Alabama, Maryland, New Mexico, Florida, Michigan, South Carolina, Iowa, Indiana, Tennessee, New Hampshire, Oklahoma). Only Louisiana succeeded.
 - they are based on language crafted by the Discovery Institute
 - why is this a bad thing?
 - trying to solve a problem that doesn’t exist – public grade school teachers are already free to teach within the constraints on the approved curriculum
 - opens the door to teaching pseudoscience as science
 - They claim to allow teachers to introduce “alternatives” to Natural Selection. However, there are no competing scientific theories with the Theory of Natural Selection. If there were, it would be in standard biology textbooks. This is a purely disingenuous way of allowing teachers to teach their religious views in science class.
 - Indiana is the latest state whose legislature is trying to introduce such a bill. More will likely follow.

In their own words

- Don't take my word for it – listen to founders and proponents of the ID movement state that what they do is not science:

"Intelligent design is just the Logos theology of John's Gospel restated in the idiom of information theory."

--William Dembski, Signs of intelligence: A primer on the discernment of intelligent design. Touchstone 12(4) (Jul/Aug 1999): 76-84.

In their own words

- Don't take my word for it – listen to founders and proponents of the ID movement state that what they do is not science:

"the conceptual soundness of a scientific theory cannot be maintained apart from Christ"

--William Dembski, Intelligent Design: The Bridge between Science and Theology, 1998, p. 209

In their own words

- Don't take my word for it – listen to founders and proponents of the ID movement state that what they do is not science:

"As a Christian man, yes, I do believe it is God as the divine power and as the intelligent designer of evolution."

--William Dembski, Darwin's Unpaid Debt, Baylor University 22 October 2008

In their own words

- Don't take my word for it – listen to founders and proponents of the ID movement state that what they do is not science:

"Our strategy has been to change the subject a bit so that we can get the issue of intelligent design, which really means the reality of God, before the academic world and into the schools."

--Phillip Johnson, American Family Radio, 10 January 2003.

In their own words

- Don't take my word for it – listen to founders and proponents of the ID movement state that what they do is not science:

"there are no peer reviewed articles by anyone advocating for intelligent design supported by pertinent experiments or calculations which provide detailed rigorous accounts of how intelligent design of any biological system occurred."

--Michael Behe, 2005

In their own words

- Don't take my word for it – listen to founders and proponents of the ID movement state that what they do is not science:

"Father's words, my studies, and my prayers convinced me that I should devote my life to destroying Darwinism, just as many of my fellow Unificationists had already devoted their lives to destroying Marxism."

--Jonathan Wells, Darwinism: Why I Went for a Second Ph.D.

(Incidentally, the person whom Wells calls "Father" is Sun Myung Moon, founder of the Unification Church which is also known as the "Moonies", and the ultraconservative Washington Times.)

In their own words

- Don't take my word for it – listen to founders and proponents of the ID movement state that what they do is not science:

"Many states have brought in Intelligent Design but they have called it science. A design needs a designer which is god. It's religion, not science."

--William Nowers, one of the founders of Creation and Evolution Studies Ministry and author of the book, Creation-Evolution and a Nation in Distress, being surprisingly honest about the goals of "intelligent design" /creationism proponents. His ministry is making an effort to put religion in science classes in Virginia.

In their own words

- Don't take my word for it – listen to founders and proponents of the ID movement state that what they do is not science:

Eric Rothschild: But you are clear, under your definition, the definition that sweeps in intelligent design, astrology is also a scientific theory, correct?

Michael Behe: Yes, that's correct.

--Kitzmiller v. Dover Area School District, Trial transcript: Day 11 (October 18, 2005), PM Session, Part 1

“Many religious groups - Christian and other - do not regard evolutionary theory as a threat. For many people of faith, science and religion go hand in hand. When scholars criticize [Intelligent Design (ID)], they are not attacking religion. They are only asking ID proponents to be transparent in their agenda, accurate about their representations of scholarship, and willing to play by the same rules of peer review and quality control that legitimate scholars and scientists around the world follow every day.”

– Prof. Mark Chancey, SMU Daily Campus, Oct. 4, 2010.
At the time, Dr. Chancey was chair of SMU’s Religious Studies department.

Notes

- Think:
 - think about the arguments of ID/Creationism as you listen to the next few lectures – why might ID/C be or not be a science? Keep the principles of the scientific method in mind:
 - a useful hypothesis explains things that an established one cannot, and makes predictions that differentiate it from the existing theory.
 - what are the predictions, and are they testable?
 - what are the tests? Are they feasible and repeatable by independent experimentalists?
 - Ask questions:
 - take advantage of the opportunity to ask questions you might have about what you have heard or what is discussed in lecture.