



faith in science, faith in God

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contents

- basic concepts of evolution
- comparative genomics
- faith in science, faith in God
- degrees of faith
- is harmony possible between Christianity and evolution?

definitions & theories

- **Darwin's theory of evolution**: descent from a common ancestor with natural selection operating on randomly occurring variations
- **natural selection**: populations of organisms retain variations that confer an advantage to survive in response to selective pressures in their environment. Commonly referred to as 'Survival of the fittest'
- **micro-evolution**: natural selection within species. Different characteristics emerge in organisms of the same kind as the result of adaptation to their particular environment
- **macro-evolution**: natural selection beyond species. New species evolve over many years without limitation and all species (including man) can be traced back to a single common ancestor

molecular genetics revealed the distinction between micro- and macro-evolution to be rather arbitrary

Collins' evolution in 1 day

4.5 billion years of earth's existence in 1 day

- 12.01 am earth formed
- 3.30 am life appears
- 9.00 pm Cambrian explosion
- Late evening dinosaurs roam the earth
- 11.40 pm dinosaur extinction, mammals begin to expand
- 1 min 3 sec before midnight chimp human divergence
- 3 sec before midnight modern human



Francis Collins

Head of the Human
Genome Project

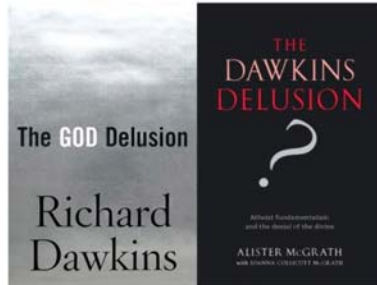
“A major part of the problem in accepting the theory of evolution is that it requires one to grasp the significance of extremely long periods of time involved in the process” – Francis Collins made the eons of history more comprehensible by compressing it into the 24 h of a day.

Cambrian explosion: the appearance of a great number of diverse invertebrates in the fossil record 550 million years ago

a war of 2 worldviews: secular vs. spiritual

Richard Dawkins

Charles Simonyi Prof for the Public
Understanding of Science
Fellow of New College
University of Oxford



Alister McGrath

Prof of historical theology
Senior Research Fellow
Harris Manchester College
University of Oxford



- “a belief in evolution demands atheism” – Dawkins
- “Dawkins is simply in denial about the darker side of atheism,…” - McGrath

Intellectuals with extreme opposing views. At the centre of the argument is Darwin's theory of evolution.

McGrath also holds a PhD in molecular biophysics. Dr John Lennox, a mathematician from Green College, University of Oxford is another fierce debater for a spiritual world view (see reference list for his book).

Is harmony/agreement possible between these opposing world views? Brilliant arguments from both sides but also weaknesses. Both are without power to proof or disproof the existence of God.

evolution to atheism

■ 2 assertions

- ☐ evolution displaces God
- ☐ evolution accounts for all of life's complexities

Dawkins' argument from evolution to atheism depends on the simultaneous validity of these two assertions.

As a scientist and Christian I deny the 1st and partially accept the 2nd – I believe in God and that evolution may account for some of life's complexities.

Evolution is a mechanism; God is a personal Agent who among other things design and create mechanisms.

Understanding the mechanism by which a Ford car works is in itself an insufficient argument to regard Mr Ford as non-existent - Lennox

scientific method

- unexplained phenomena
- hypothesis
- experiments
- accept/reject
- theory

“A theory that you can’t explain to a bartender is probably no damn good.” – physicist, Ernest Rutherford.

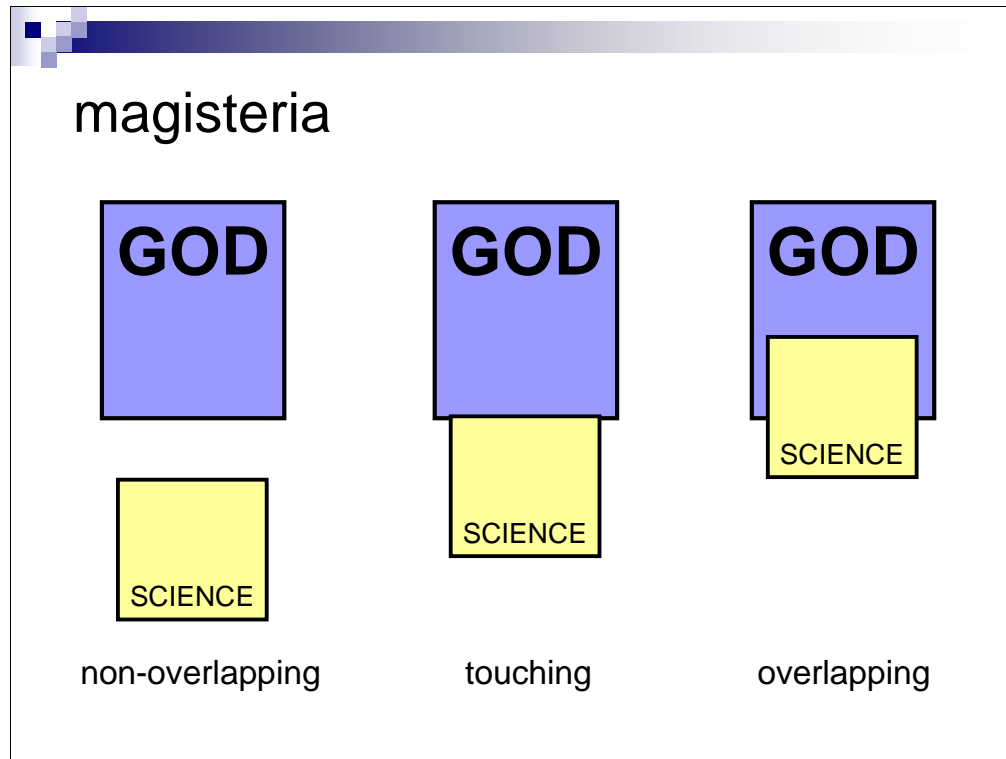
Science is not static.

It deals with the natural world.

It is continuously digging into unknown territories.

Science is progressive and self-correcting. Data is scrutinized by peers and experiments repeated to ensure their trustworthiness.

Theory = consistent framework of understanding emerging over a long period of time.

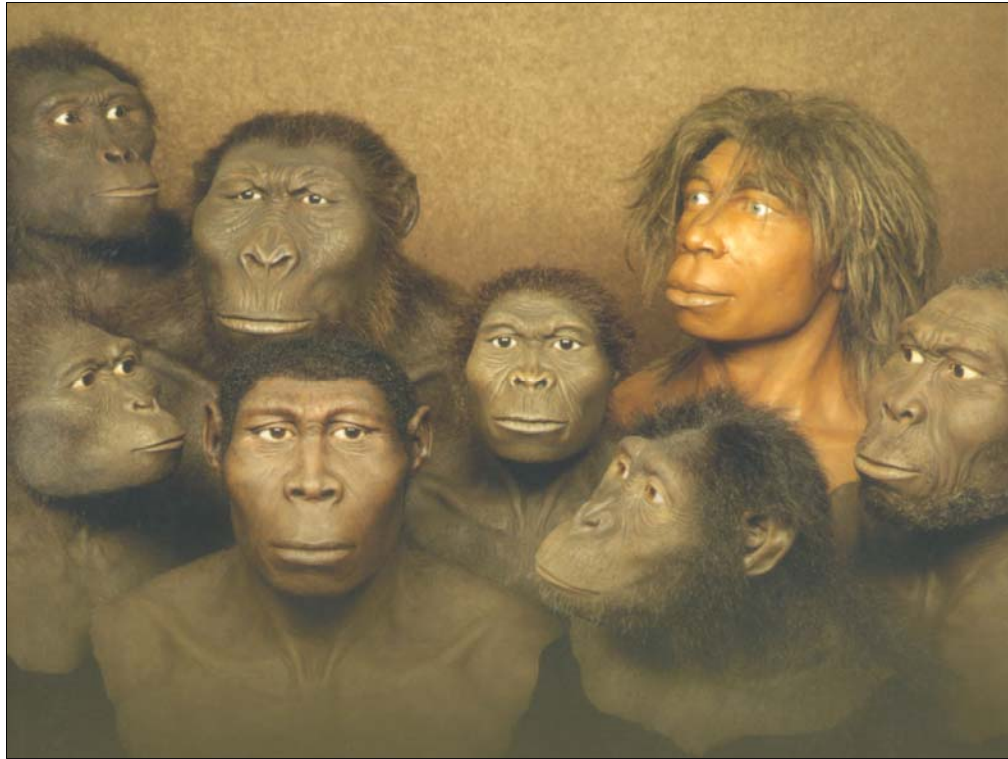



2 magisteria / spheres / realms. Are they non-overlapping, touching or overlapping?

The tools of science are incapable of answering questions about God, rather science reflects some of God's characteristics, e.g. order.

Science cannot answer if there is meaning to life? What is man? What are we here for?

The universe is like aunt Matilda's cake (metaphor used by Dr John Lennox). Scientists may be able to analyze the cake to the finest detail, but all the scientists in the world would not be able to know **why** she baked the cake. To answer this, another source of information is needed – revelation from God.





support for Darwin's theory of evolution descent from a common ancestor

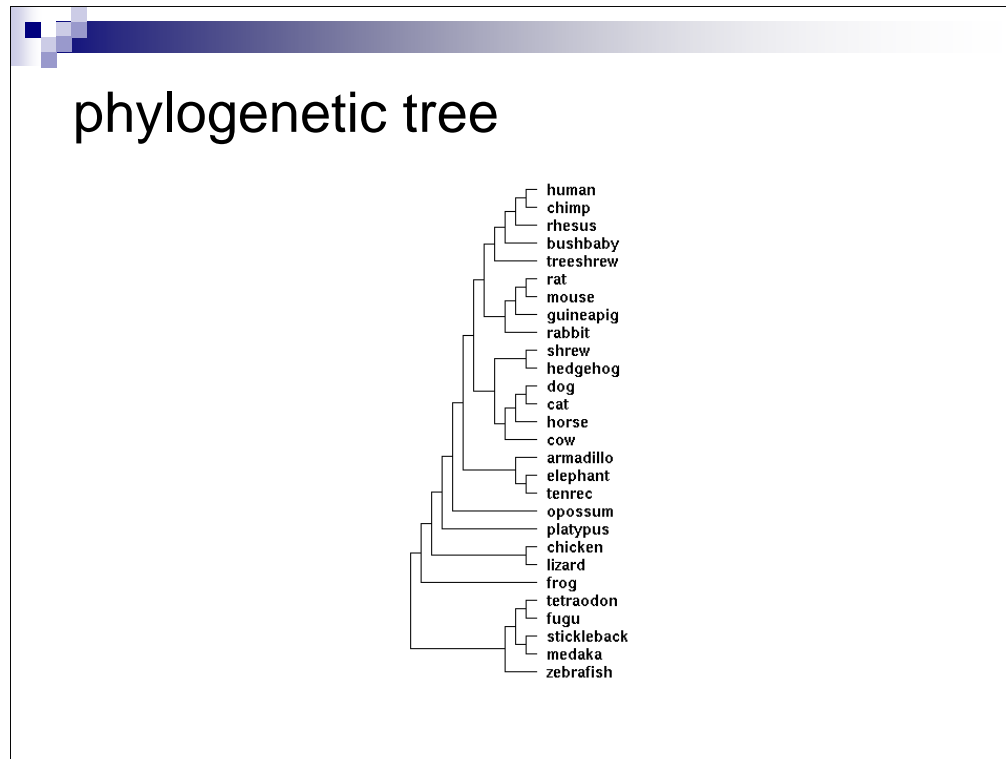
- molecular human genetics

- comparative genomics

- Similarity in sequence between species
 - Order of genes along chromosomes
 - positions and truncation of jumping genes (ancient repetitive elements [ARE])

- protein biochemistry

- Are certain complexes irreducible complex?



A tree of life where relationships between different species are inferred solely by a comparison of their DNA sequences (comparative genomics). According to this phylogenetic tree, human is most closely related to chimp and least so to the zebrafish.

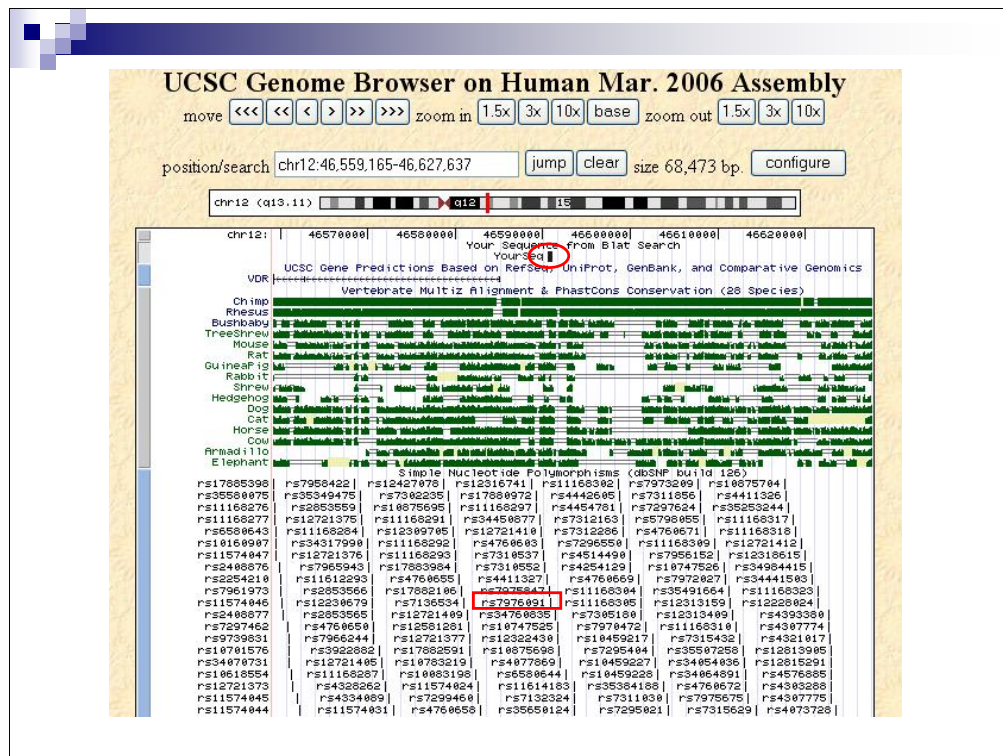
The similarity of this tree of life to conclusions drawn from comparative anatomy from both existent organisms and fossil remains is striking.

human genome

- 3.1 billion base pairs (letters) across 24 chromosomes
- Only 1.5% used to code for proteins
- Only about 20 000 – 25 000 protein-coding genes
- Humans are 99.9% equal in code; least variable species
- Comparative genomics; human vs. chimp (100% gene sequence identity, 98% inbetween gene sequence identity).

Examples from the vitamin D receptor (*VDR*)

- TB susceptibility, populations
- comparative genomics, species
- Single nucleotide polymorphisms (SNPs), variations



The vitamin D receptor gene (*VDR*) on Chr 12 from University of California Santa Cruz genome browser (UCSC).

Tracks in the top half show multiple pair wise alignments of the DNA sequences for the *VDR* regulatory region (68 469 bp) for primates (blue) and certain placental mammals with the human genome showing evolutionary conservation among species.

Double line: aligning species has one or more unalignable bases in the gap region. Possibly due to excessive evolutionary distance between species or independent indels in the region between the aligned blocks in both species.


Pale yellow coloring: aligning species has Ns in the gap region. Reflects uncertainty in the relationship between the DNA of both species, due to lack of sequence in relevant portions of the aligning species.

Single nucleotide polymorphisms (SNPs) present in this region of the *VDR* are indicated in the bottom half as single tick marks (can have 2, 3 or 4 alleles).

UCSC Genome Browser on Human Mar. 2006 Assembly

move <<< << < > >> >>> zoom in 1.5x 3x 10x base zoom out 1.5x 3x 10x

position/search chr12:46,590,810-46,590,827 jump clear size 18 bp. configure

chr12 (q13.11) 

chr12:	46590815 46590820 46590825																	
--->	C	T	T	T	G	C	T	T	T	C	G	G	C	C	T	C	T	G
YourSeq																		
UCSC Gene Predictions Based on RefSeq, UniProt, GenBank, and Comparative Genomics	Vertebrate Multiz Alignment & PhastCons Conservation (28 Species)																	
Gaps	C	T	T	T	G	C	T	T	T	C	G	G	C	C	T	C	T	G
Human	C	T	T	T	G	C	T	T	T	C	G	G	C	C	T	C	T	G
Chimp	C	T	T	T	G	C	T	T	T	T	G	G	C	C	T	C	T	G
Rhesus	C	T	T	T	G	C	T	T	T	T	G	G	C	C	T	C	T	G
Bushbaby	C	T	T	T	G	C	T	T	T	T	G	G	C	C	T	C	T	G
TreeShrew	C	T	T	T	G	C	T	T	T	T	G	G	C	C	T	C	T	G
Mouse	T	T	T	T	G	C	T	T	T	T	G	G	C	C	T	C	T	G
Rat	T	T	T	T	G	C	T	T	T	T	G	G	C	C	T	C	T	G
GuineaPig	C	T	T	T	G	C	T	T	T	T	G	G	C	C	T	C	T	G
Rabbit	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Shrew	C	T	T	T	G	C	T	T	T	T	G	G	C	C	T	C	T	G
Hedgehog	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Dog	C	T	T	T	G	C	T	T	T	T	G	G	C	C	T	C	T	G
Cat	C	T	T	T	G	C	T	T	T	T	G	G	C	C	T	C	T	G
Horse	C	T	T	T	G	C	T	T	T	T	G	G	C	C	T	C	T	G
Cow	C	T	T	T	G	C	T	T	T	T	G	G	C	C	T	C	T	G
Armadillo	C	T	T	T	G	C	T	T	T	T	G	G	C	C	T	C	T	G
Elephant	G	T	T	T	G	C	T	T	T	T	G	G	C	C	T	C	T	G

Simple Nucleotide Polymorphisms (dbSNP build 126)

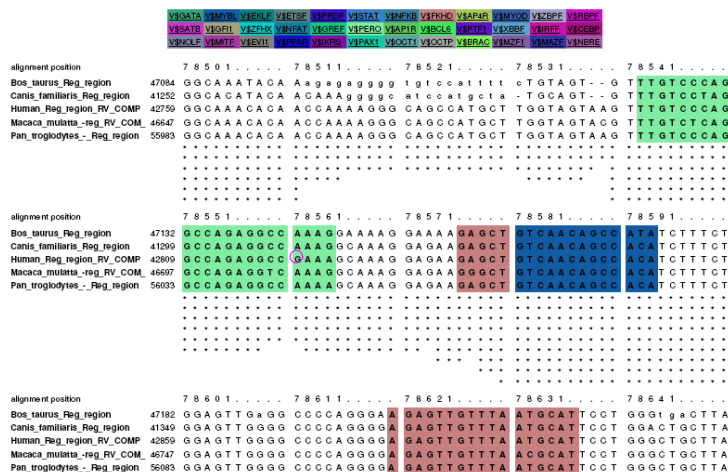
rs7976091

Human alleles: C/T; Ancestral allele: T (Chimp and Rhesus)

Zoomed in to the region indicated in the red oval of the previous slide. Note the similarity in letter code sequence for this region of the VDR gene between different species. rs7976091 is a SNP / variation in humans at the indicated position (red), occurring as one of two alleles (C/T). This variation occurred after divergence of human from non-human primates since all other species contain only the 'T' allele. A single variations like this may contribute to disease susceptibility or resistance.

Region surrounding **rs7976091**, as aligned between diurnal animals. rs7976091 is indicated with a pink circle, and falls in the V\$PERO binding site. The colours used for each TFBS are shown at the top of the figure.

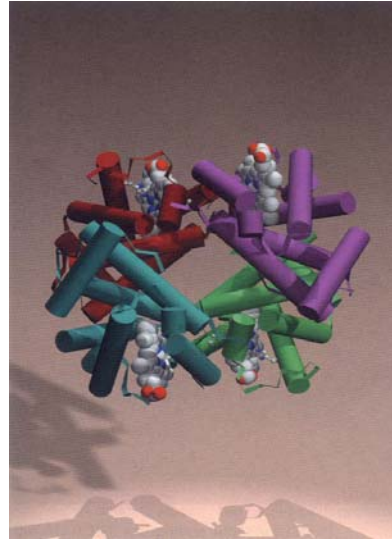
Note: Only letters in upper case are considered to be aligned.



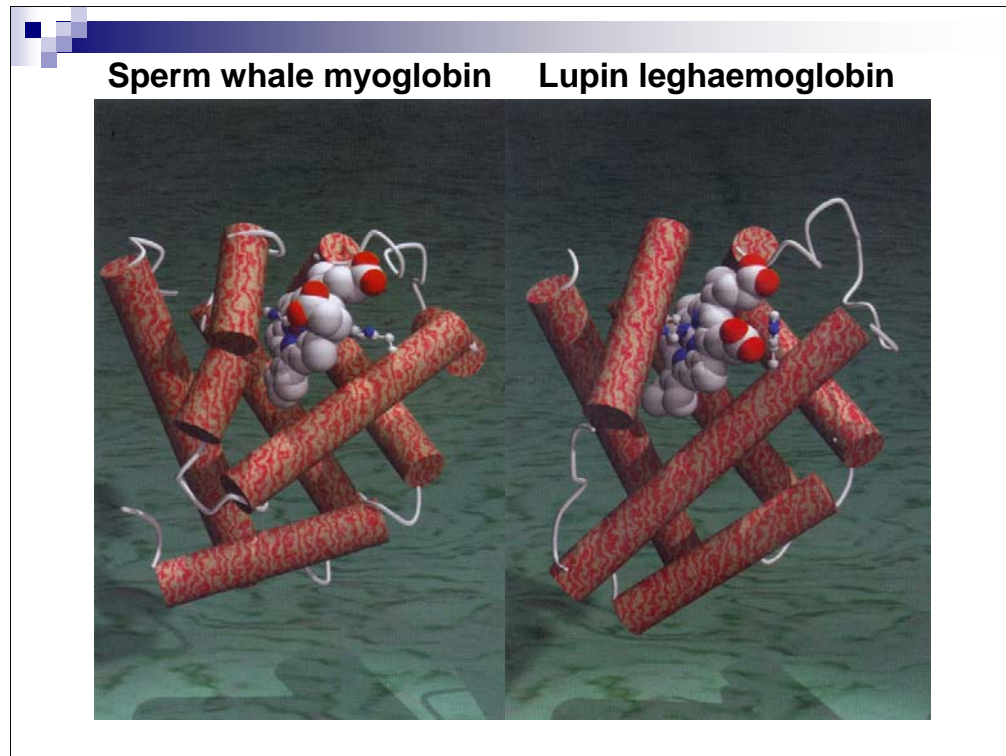
Comparative genomics also facilitates the detection of regions, conserved among diverse species that most likely fulfill an essential function, e.g. binding proteins that regulate the expression of a certain gene.

Human haemoglobin

Tetramer globin structure: $\alpha_2\beta_2$

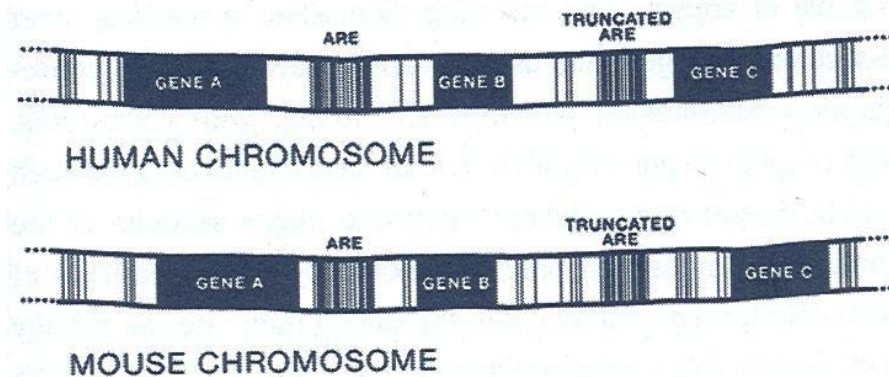


Similarities in DNA sequence is reflected in similarities of protein structure.



The 3-D structures of two globin proteins from 'evolutionary' very different species (whale and bean) which is nonetheless extremely similar. Is it conservation of a life-supporting molecule during evolution or are the two molecules created separately (successful design principle used over and over)? What are the evidences for macro-evolution?

- a. gene order on hromosomes
- b. jumping genes (ARE) position & truncation



Taken from: Collins FS, *The language of God*, p. 135

This diagram from *The Language of God*, Collins FS, illustrates two concepts in molecular genetics that supports macro-evolution

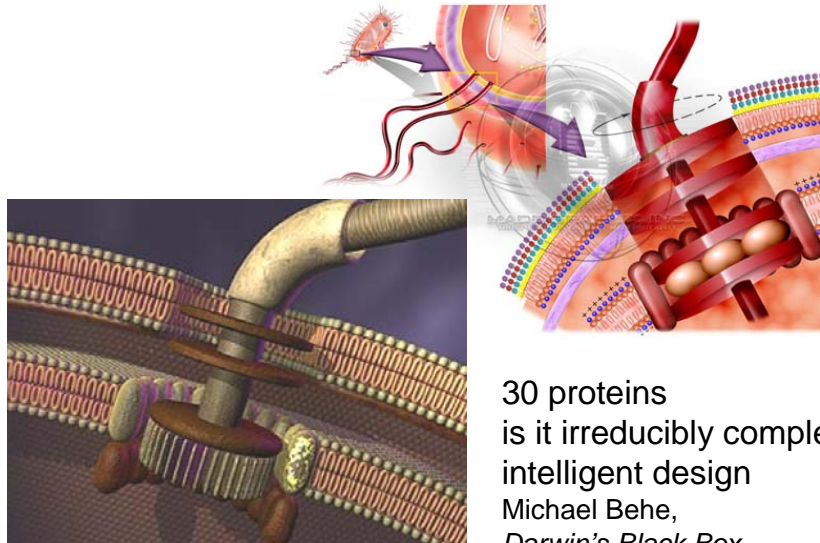
a. Order of genes along chromosomes (A – B – C)

The order of genes along chromosomes from different species are often the same as illustrated for human and mouse genes A, B and C

b. Positions and truncation of jumping genes (ancient repetitive elements [ARE])

The presence of precisely truncated jumping genes (AREs) between genes in exactly the same position for human and mouse genomes is strong evidence that this insertion event must have occurred in an ancestor common to both species (macro-evolution).

the bacterial flagellum



30 proteins
is it irreducibly complex?
intelligent design
Michael Behe,
Darwin's Black Box

Intelligent design, used this protein complex to motivate irreducible complexity. Recent advances revealed that the Type III secretory apparatus – injecting toxins in other bacteria – consists of only some of the proteins of the flagellum complex. An observation that support the possible evolvement of the flagellum from an less complex ancestor.

possible support from science to believe in God

- origin of life / self-replicating system
- a fine-tuned universe: 9 physical constants
- mathematical principles
- order of creation

caution: 'God of the gaps' – do not insert divine action where scientific understanding is currently lacking.

Mechanisms, like evolution, can be designed even if they involve an element of randomness in their operation. Self-winding watch – random arm movements.

However, a self-replicating system / genetic material is necessary for evolution to start

Arguments from chemistry, physics and cosmology (9 constants)

Energy levels of C atom

Rate universe expands

Nuclear ground state energy / resonance

Nuclear strong force

Distance earth to sun

Surface gravity and temp.

Rotational speed of the planet

Relative sizes of moon and sun and distances to earth

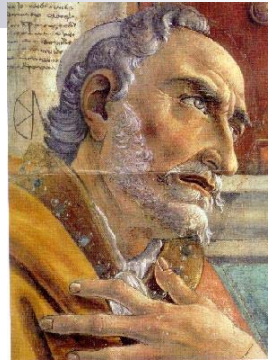
faith in science	faith in God
<ul style="list-style-type: none">■ evidence-based■ natural■ how?■ for all■ now	<ul style="list-style-type: none">■ assured hope■ supernatural■ why?■ elect■ eternal

Science has a “Show me the data” attitude.

Science can not answer whether God exist or not - Stephen Jay Gold

Aunt Matilda's cake – Lennox.

Saint Augustine 400 AD



“In matters that are so obscure and far beyond our vision, we find in holy scripture passages which can be interpreted in very different ways without prejudice to the faith we have received. In such cases, we should not rush in headlong and so firmly take our stand on one side that, if further progress in the search for truth justly undermines this position, we too fall with it.”

Genesis 1-3, how or why?

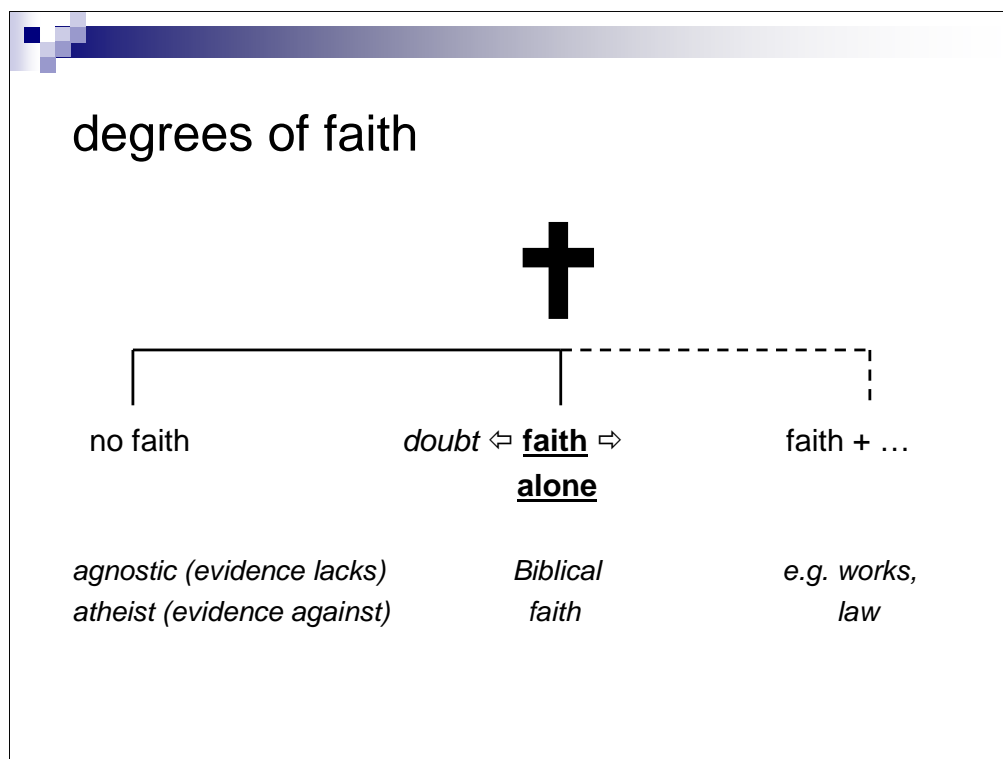
- God was before
- God made all
- Man in God's likeness
- Order and harmony
- God is in control
- Man, accountable to God and steward
- Satan - doubt
- Man turned away
- God's wrath
- Everything affected
- God's love and promise

How should we interpret Genesis? What does it tell us: how or why?

Everything was perfect, we messed it up, but God gives a promise of a 2nd chance

Not scientific; it does not give detail on the molecular mechanisms used.

Those who interpret Genesis absolutely literally conclude that the earth is only 6 000 years old and reject most of the conclusions cited.



The faith God requires from us is faith, without any strings attached.

Biblical faith is under threat; either by doubt or our tendency to add things on to it, e.g. good works, to demand adherence to tradition, rules and laws. Jewish Christians (Judaizers) in Galatia is an example of faith+, insisting on the circumcision of Gentile Christians.

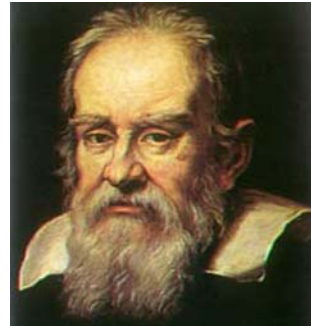
The church may attach itself to a prior view of things and incorporate it into its core belief system – e.g. the way they interpret the Bible.

Christians have reason to defend the authority and interpretation of God's word, but it may become a law in itself.

No faith: Atheists believe there is evidence that God does not exist, while agnostics argue we cannot say if God exists or not.

Agnosticism (Huxley invented the term to describe himself) is of the essence of science – to know or believe in God he needed evidence he felt was lacking.

history of science and church/religion; example of faith+



- Galileo Galilei (1564)
- heliocentricity
- 17th century Catholic Church
- Psalms 93:1 ...Yes, the world is established; it shall never be moved.
- Psalms 104:5 He set the earth on its foundations, so that it should never be moved.
- Ecclesiastes 1:5 The sun rises, and the sun goes down, and hastens to the place where it rises

Galileo was a firm believer in God and the Bible, and remained so all his life. Based on scientific evidence he postulated that the earth revolves around the sun. The 17th century Catholic Church condemned him based on their literalistic reading of parts of the Bible.


Biblical faith

1. **definition:** Heb 11:1 Now faith is the assurance of things hoped for, the conviction of things not seen. (not necessarily received in this life^a)
2. **focused on:** God^a, his promises^b (Christ^c), not man/matter/reason
3. **the key to:** the gospel of grace^a, righteousness of God^b, justified
4. **preceded by:** repentance
5. **followed by:** Holy Spirit^a, sanctification^b, obedience^c, peace, love^d, joy^e, works of faith^f, counted as righteous^g, salvation of our souls^h, eternal life
6. **opposing forces:** Satan^a, wicked and evil^b, idols, riches^c, reason, knowledge (wisdom of men^d), doubt^e, distrust^f
7. **opposites:** demanding evidence/sign^a (to see), hopelessness, works of law^b, pride^c
8. **strengthened/tested by:** difficulties
9. **for:** the elect
10. **origin:** gift from God^a, comes from hearing the word of Christ^b
11. **a weapon:** against Satan^a and the world^b
12. **a means of understanding** the creation of the universe
13. **a requirement:** to draw near to God and please Him

A summary of key aspects of Biblical faith using the English Standard version.

<http://www.crosswire.org/> was searched for verses containing "Faith" (255 hits) or "believe*" (252 hits).

1. ^aHeb 11:13, 39
2. ^aMk 11:22; ^bGal 3:8; ^cJn 6:29;
3. ^aEph 2:8-9; ^bHab 2:4; Rom 1:17
4. Mk 1:15
5. ^aGal 3:2,14; Hab 2:4; ^bActs 26:18, ^cRom 1:5; 16:26; ^dGal 5:6; ^ePhillipians 1:25; ^fJames 2:14; ^gRom 4:5; Gal 3:11; ^h1 Pet 1:9
6. ^aLk 8:12; ^b1 Tim 4:1; ^b2 Thes 3:2; ^c1 Tim 6:10; ^d1 Cor 2:5; ^eJames 1:6; Matt 14:31; ^fRom 4:20-22
7. ^a2 Cor 5:7; ^aHeb 1:11; ^aHeb 11:1; ^a1 Peter 1:8,9; ^aJn 6:30; ^aJn 20:29; ^bRom 4:13,14; 9:32; ^bGal 2:16; 3:2; Rom 3:27, 28; ^cRom 11:20; Rom 12: 3; Eph 2:8-9; Phil 3:9;
8. 1 Peter 1:6,7; James 1:2-3
9. Tit 1:1; Acts 13:48; Matthew 13:10-17
10. ^aEph 2:8-9; ^bRom 10:17
11. ^aEph 6:16, 1 Pet 5:9; 1 Jn 5:4^b
12. Heb 11:3, Rom 4:17
13. Heb 11:6



what do we make of the evidence for evolution?

“...fence sitting is an inappropriate posture
for both scientists and believers.”

Francis Collins

Head of the human genome project

Is harmony possible?

- atheism and agnosticism: science trumps faith
- creationism: faith trumps science
- intelligent design: science needs divine help
- Theistic evolution (TE): science and faith in harmony. Francis Collins, BioLogos (Bio: life, Logos: word [God])

See *The Language of God*, Collins FS, for a detailed description of these positions.



summary

- a modern understanding of science can be harmonised with a belief in God
- science should not be denied by the believer, it should be embraced
- the tools of science are powerless to answer questions about God. The ultimate decision about God's existence is based on faith not proof
- by faith we understand that the universe was created by the word of God, so that what is seen was not made out of things that are visible - Heb 11:3

recommended reading

The best I came upon:

1. Holy Bible English Standard Version (ESV) Collins, UK.
<http://www.crosswire.org/study/passagestudy.jsp?mod=ESV#cv>

To trust, understand and correctly interpret the Bible:

2. Beynon N, Sach A (2005) Dig deeper! Tools to unearth the Bible's treasure. Inter-varsity Press.
3. Orr-Ewing A (2005) Why trust the Bible? Inter-varsity Press. Leicester, England.
4. Roberts V. (2003) God's big picture. Inter-varsity Press. Leicester, England.

The Christian side of the debate:

5. Collins FS (2007) The language of God. A scientist presents evidence for believe. Simon and Schuster, Ltd. London, UK.
6. Lennox JC (2007) God's undertaker. Has science buried God? Lion Hudson, Oxford, England.
7. McGrath A, Collicutt McGrath J (2007) The Dawkins delusion. Atheist fundamentalism and the denial of the divine. Society for Promoting Christian Knowledge, London, Great Britain.
8. Robertson D (2007). The Dawkins Letters. Challenging atheist myths. Christian Focus publications, Ltd., Ross-shire, Great Britain.

The non-Christian side of the debate:

9. Dawkins R (2006) The God delusion. Bantam Press, London, UK.

considering Christianity?

- use the best source for the knowledge of God – the Bible
- start by reading one of the biographies of Jesus
 - ☐ Matthew
 - ☐ Mark
 - ☐ Luke
 - ☐ John

God's primary way to reveal himself to us is through Christ in his word, the Bible – special revelation.