



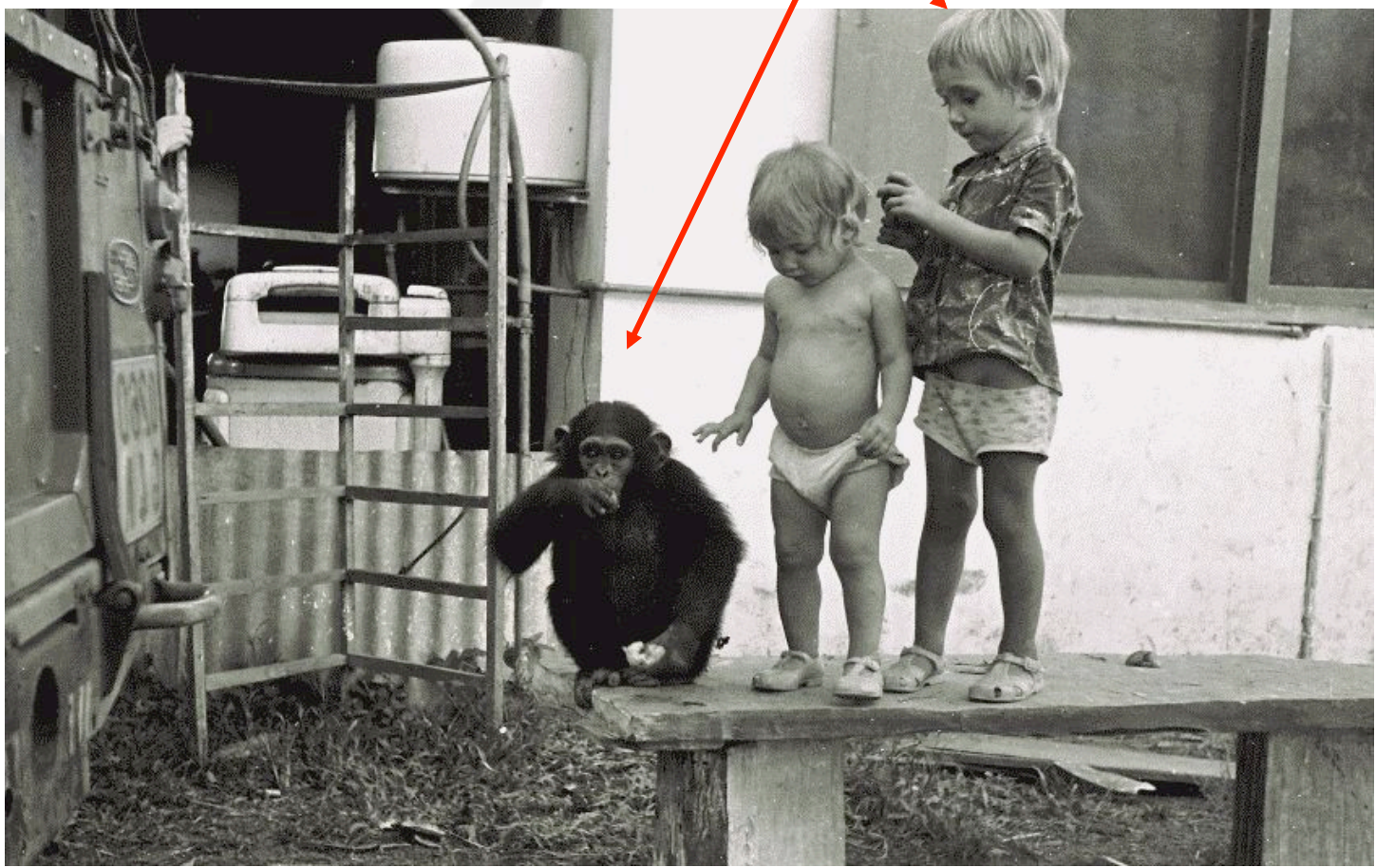
Science or Religion: Do we have to choose?

Dr. Ard Louis
Department of Physics
University of Oxford

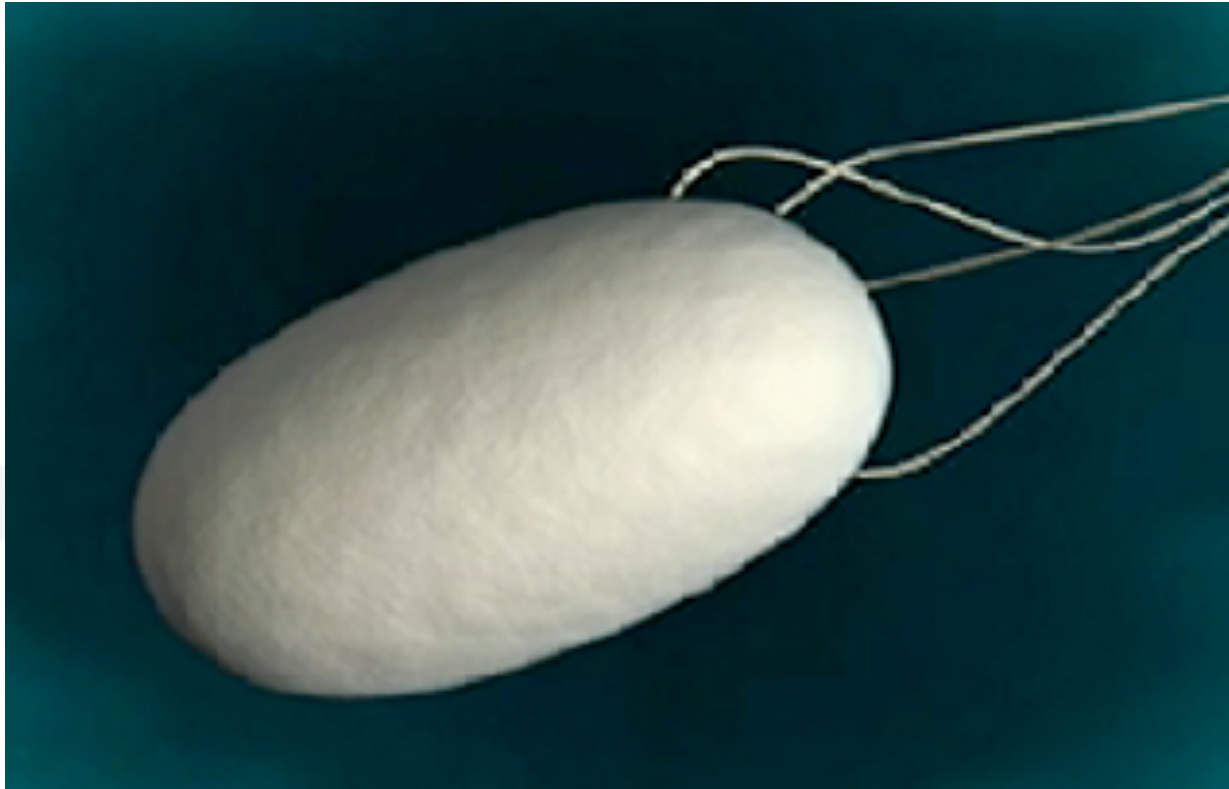


We share 15% of our genes with E. coli
" " 25% " " " yeast
" " 50% " " " flies
" " 70% " " " frogs
" " 98% " " " chimps

what makes us different?



Biological self-assembly

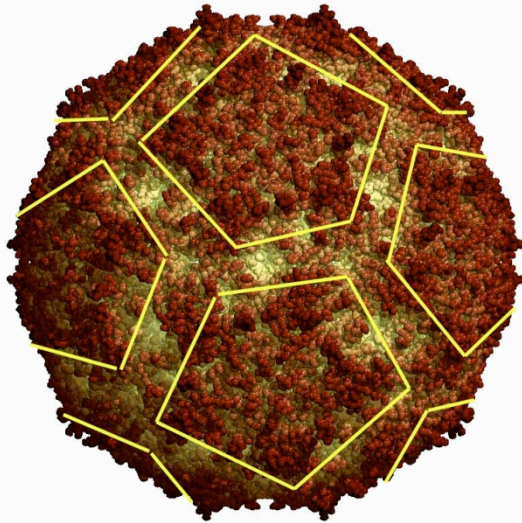


<http://www.npn.jst.go.jp/> Keiichi Namba, Osaka

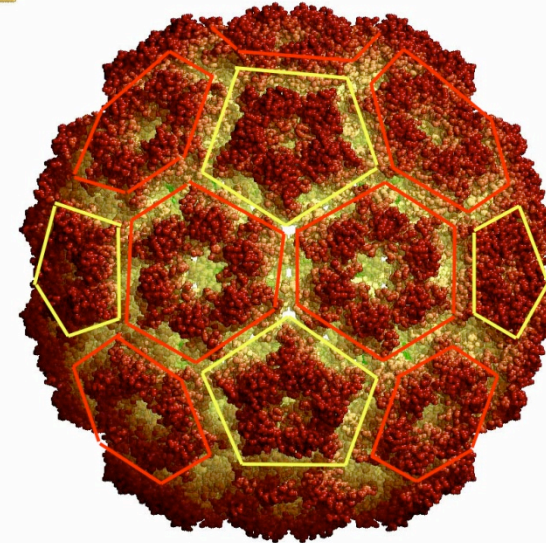
- Biological systems **self-assemble** (they make themselves)
- Can we understand?
- Can we emulate? (Nanotechnology)

Virus self-assembly

20Å Galleria mellonella densovirus PDB_ID: 1DNV



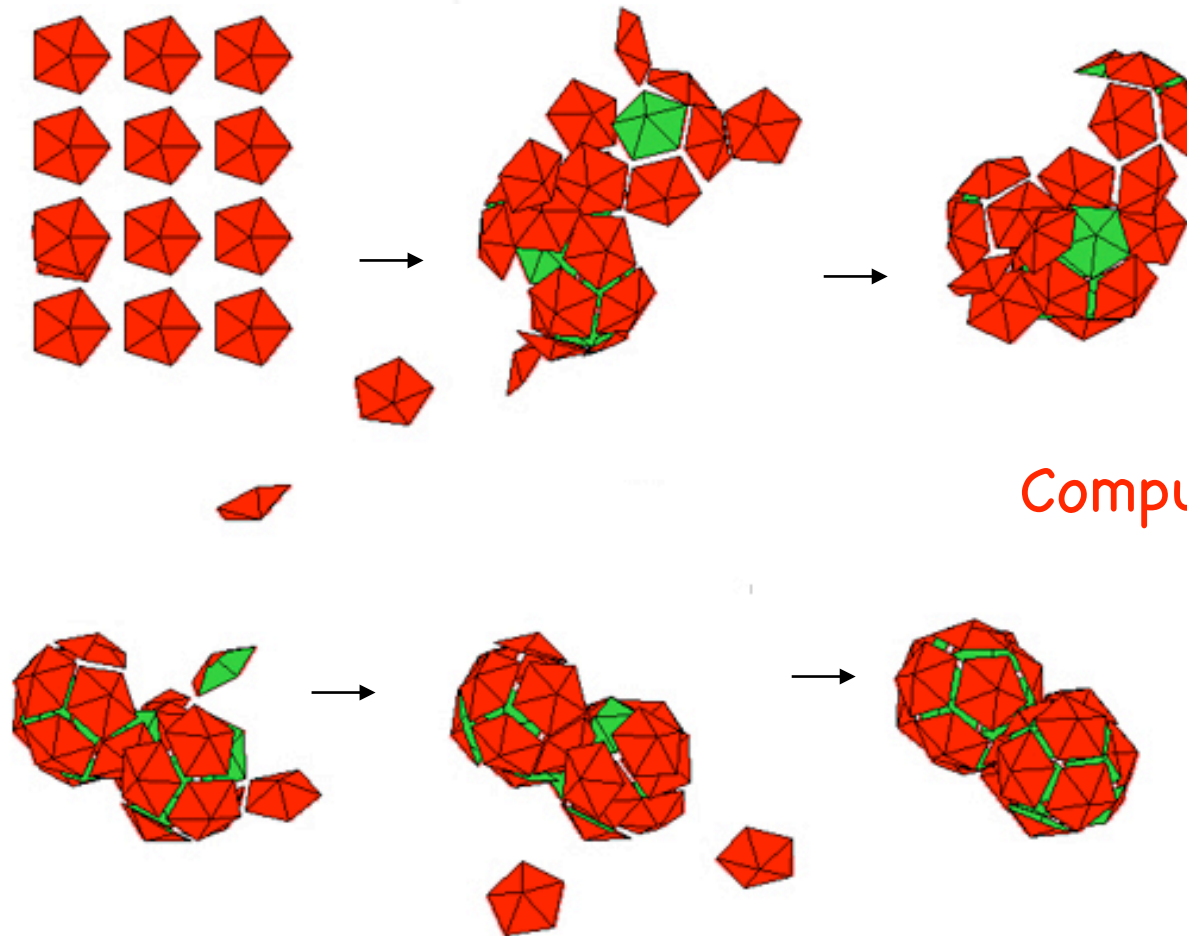
20Å Cucumber mosaic virus PDB_ID: 1F15



viruses

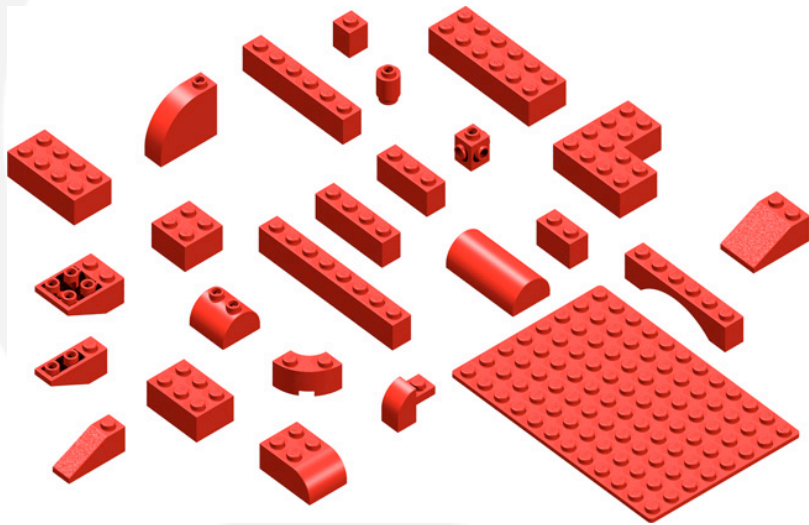
- Self-assembled from identical subunits (capsomers).

"computer virus" self-assembly

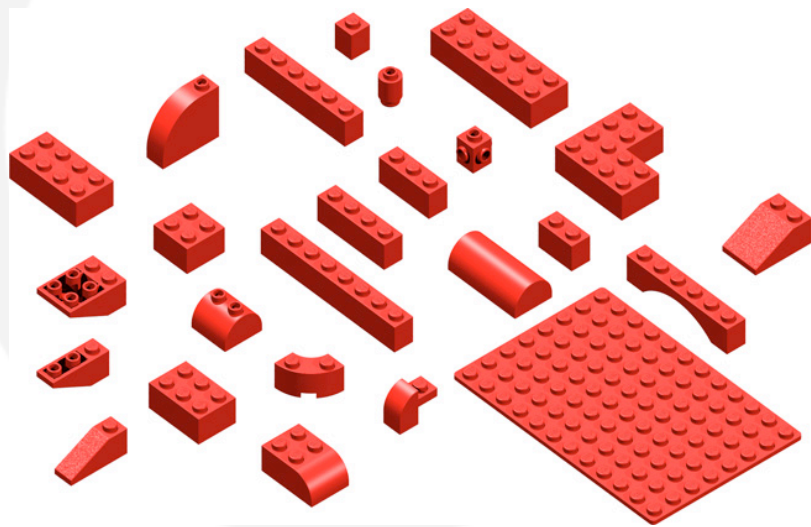


Monte-Carlo simulations: [stochastic optimisation](http://www-thphys.physics.ox.ac.uk/user/IainJohnson/)
<http://www-thphys.physics.ox.ac.uk/user/IainJohnson/>

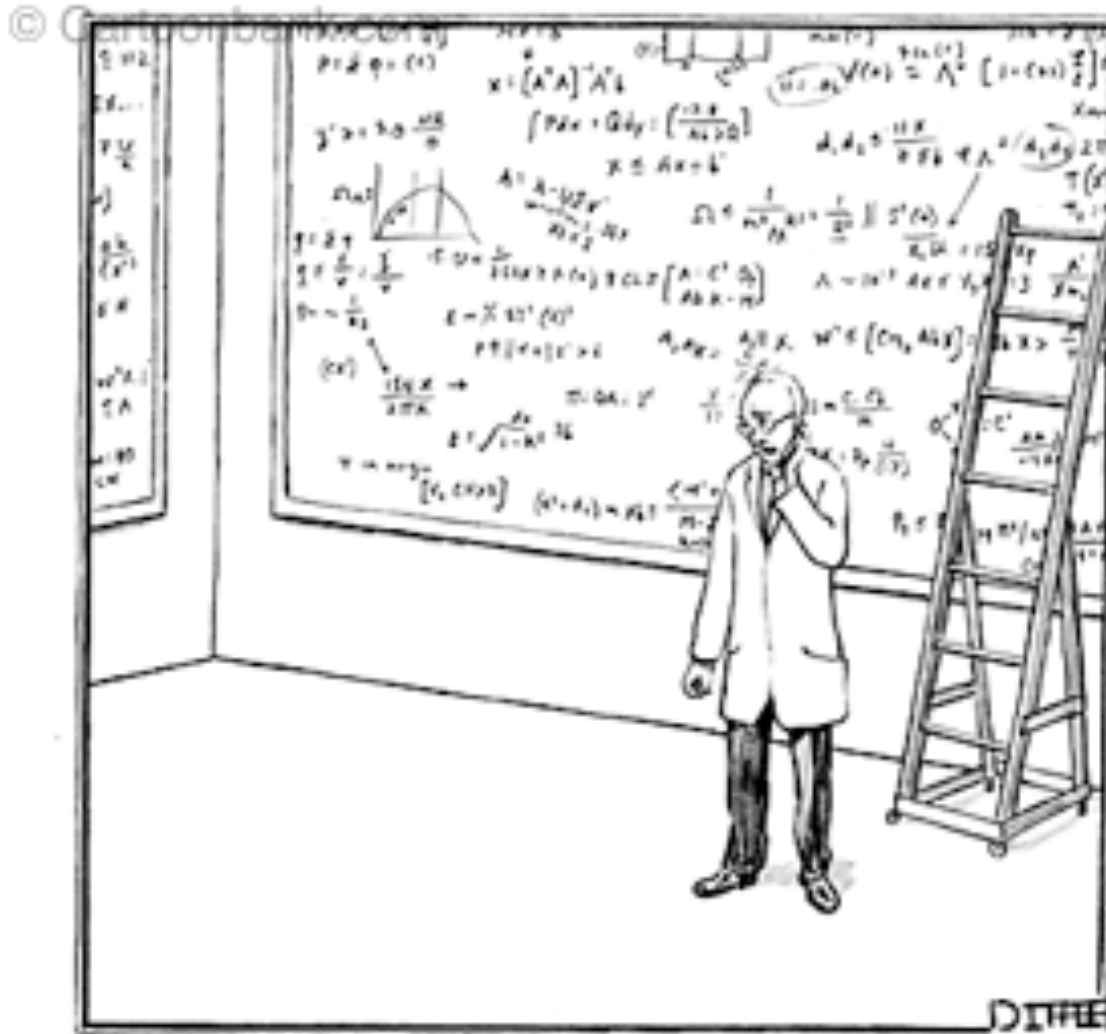
Self-assembly with legos?



Science is fun!



Science is fun!



"I just figured out why we've never had girlfriends."

Will science explain everything?

Will we one day understand how the flagellum assembles or evolves?

- I think yes -

Will science one day explain everything?

- let's see! -

Science & Ultimate Questions



Stephen Hawking
Cambridge U

- How can we understand the world in which we find ourselves?
- Did the universe need a creator?
- Why is there something rather than nothing?
- Why do we exist?

Traditionally these are questions for philosophy, but philosophy is dead... Scientists have become the bearers of the torch of discovery in our quest for knowledge

The Grand Design: new answers to the ultimate questions of life
S. Hawking (2010)

Science & Reliable knowledge?

- Ultimately the science/faith debate is really about: *How do I obtain reliable knowledge about the world?*
- Stephen Hawking and I agree that science is incredibly powerful
- We disagree that it can answer ultimate questions.

Key assumptions that science needs

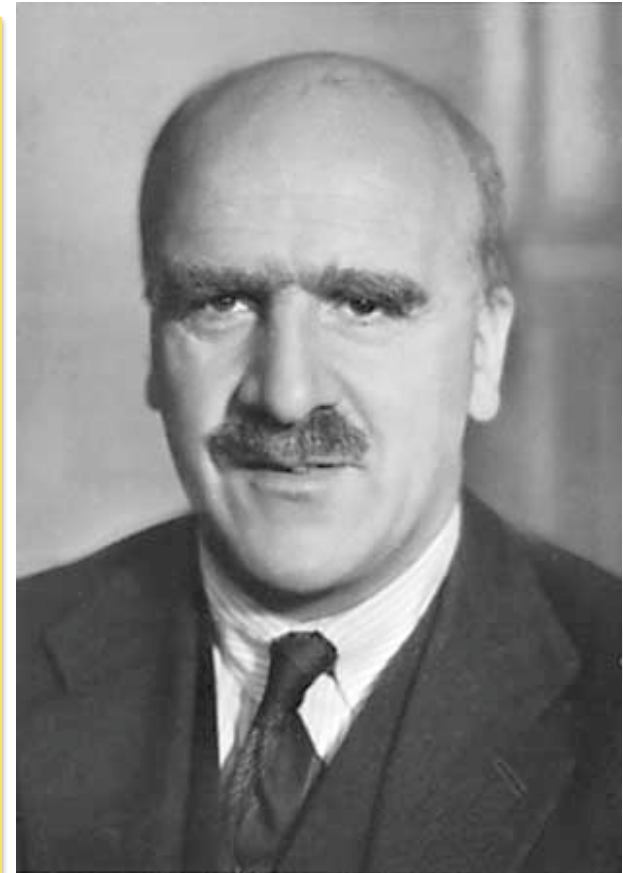
- Uniformity
- Rationality
- Intelligibility
 - Applicability of mathematics

- Science has deeply Christian roots,

See e.g. Alfred North Whitehead, Stanley Jaki; Rooijer Hooykaas; Peter Harrison

Materialism & self-consistent rationality

- For if my mental processes are determined wholly by the motions of atoms in my brain I have no reason to suppose that my beliefs are true... And hence I have no reason for supposing my brain to be composed of atoms.
-
- -J.B.S. Haldane, "When I am Dead "



J.B.S. Haldane
1882-1964

Science has deep Christian roots



- *"This most beautiful system of the sun, planets and comets could only proceed from the counsel and dominion of an intelligent being."*
- Sir Isaac Newton

Science has deep Christian roots



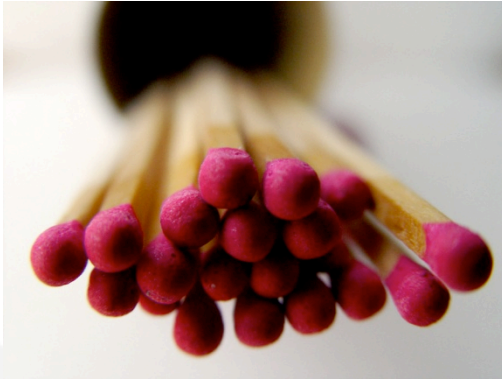
- Wrote "The Wisdom of God Manifested in Works of Creation",
- Was governor of the "Corporation for the Spread of the Gospel of Jesus Christ in New England"
- Sir Robert Boyle (1627-1691)

Science and questions of value

- **What is the value of a human life?**
 - chemist – value of the elements?
 - physiologist – size of your brain
 - psychologist – how smart you are
 - anthropologist – how the community values you
 - economist – how much economic value you produce

Nothing Buttery

humans are collections of chemicals:



enough P for 2000 matches



enough Fe for 1 nail



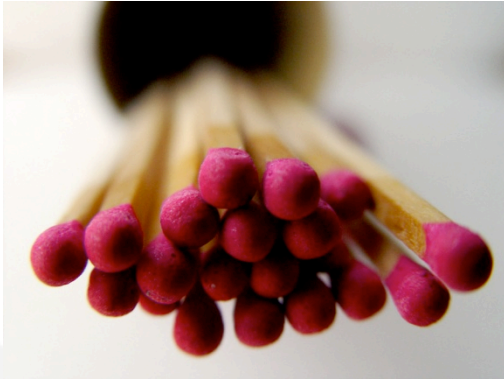
enough Cl to disinfect
a swimming pool



enough fat to make
10 bars of soap

Nothing Buttery

humans are collections of chemicals:



enough P for 2000 matches



enough Fe for 1 nail



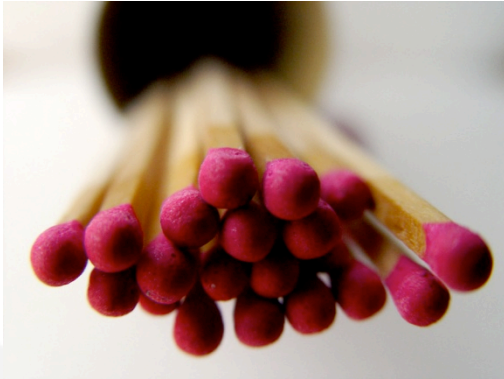
enough Cl to disinfect
a swimming pool



enough fat to make
~~10~~ bars of soap

Nothing Buttery

humans are collections of chemicals:



enough P for 2000 matches



enough Fe for 1 nail



enough Cl to disinfect
a swimming pool



enough fat to make
0.1 bars of soap

Dawkins on being human

- "The individual organism ... is not fundamental to life, but something that emerges when genes, which at the beginning of evolution were separate, warring entities, gang together in co-operative groups as 'selfish co-operators'. **The individual organism is not exactly an illusion. It is too concrete for that. But it is a secondary, derived phenomenon,** cobbled together as a consequence of the actions of fundamentally separate, even warring agents."
- - Richard Dawkins, *Unweaving the Rainbow*, (Penguin, London, 1998) p 308.



Prof. Richard
Dawkins (Oxford)

Mechanism does not exhaust meaning



why is the water boiling?

Is science the only way to reliable knowledge?



Bill Newsome
Stanford U.



Monument to irrationality?

“The most important questions in life are not susceptible to solution by the scientific method”

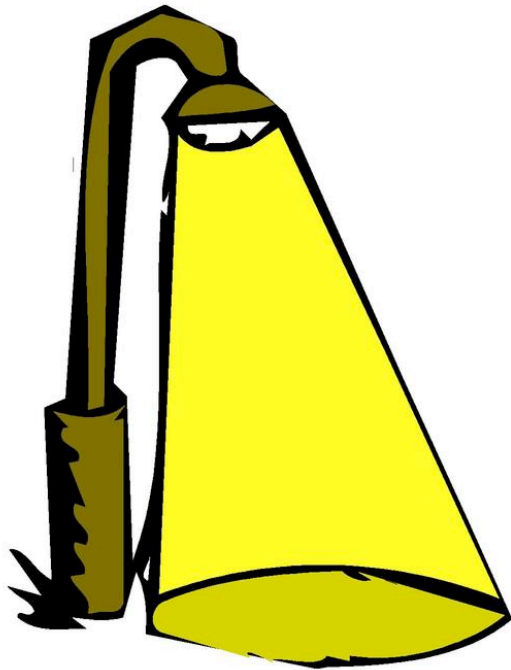
The scientific method ...

- Science deals with things that can be systematically tested etc... Usually that means things that are repeatable under controlled conditions.
- It's strength comes from imposing strict limitations on the questions it allows.

Limits are not a sign of weakness

- Sir Peter Medawar, The Limits of Science, (Oxford University Press, Oxford (1987))

Science & the ultimate questions



Alvin Plantinga

Science's great success comes from self-imposed limits

Unfortunately it can't answer Hawking's ultimate questions:

- How can we understand the world in which we find ourselves?
- Did the universe need a creator?
- Why is there something rather than nothing?
- Why do we exist?

Only blind Faith?



Richard Dawkins
Oxford U

"Faith is the great cop-out, the great excuse to evade the need to think and evaluate evidence. Faith is belief in spite of, even perhaps because of, the lack of evidence."

<http://richarddawkins.net/articles/89>

The professional debate



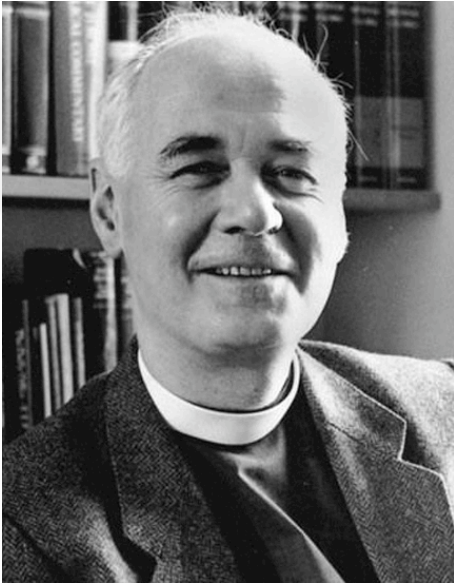
Quentin Smith
Western Michigan U

“The justification of most contemporary naturalist views is defeated by contemporary theist arguments”

The Metaphilosophy of Naturalism, by Quentin Smith, Philo 4, vol 2 (2000)

Compare this to Dawkins et al.,

Brute facts



John Polkinghorne
Cambridge U

*If we are to understand the nature of reality, we have only two possible starting points: either the **brute fact of the physical world** or the **brute fact of a divine will and purpose behind that physical world***

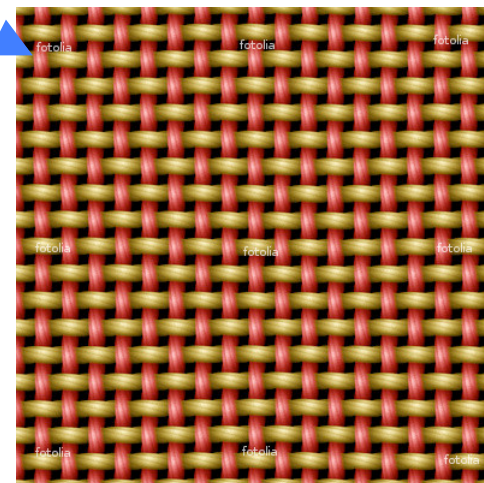
John Polkinghorne, Serious Talk: Science and Religion in Dialogue, (1995).

Evidentialism or tapestry arguments?

BRUTE FACTS:

In the beginning God, or in the beginning nothing?

- Morality
- Basis for modern science (rationality, uniformity)
- Beauty
- Intelligibility (unreasonable effectiveness of mathematics)
- Fine tuning of the universe



*I believe in Christianity as I believe that the Sun has risen—
not only because I see it, but because by it, I see everything else.*

C.S. Lewis, *The Weight of Glory*, (1942).



Paul Dirac
1902-1984

Unreasonable effectiveness of mathematics

Quantum Mechanics + Relativity = antimatter

$$H\psi(\mathbf{x}, t) = i\hbar \frac{\partial \psi}{\partial t}(\mathbf{x}, t)$$

Schrödinger equation (Quantum Mechanics)

+

$$E = \sqrt{(mc^2)^2 + \sum_{j=1}^3 (p_j c)^2}$$

Energy-Momentum (Special Relativity)

$$= \left(\alpha_0 mc^2 + \sum_{j=1}^3 \alpha_j p_j c \right) \psi(\mathbf{x}, t) = i\hbar \frac{\partial \psi}{\partial t}(\mathbf{x}, t) \quad \text{Dirac Equation (1928)}$$

$$\psi(\mathbf{x}, t) \equiv \begin{bmatrix} \psi_1(\mathbf{x}, t) \\ \psi_2(\mathbf{x}, t) \\ \psi_3(\mathbf{x}, t) \\ \psi_4(\mathbf{x}, t) \end{bmatrix}$$

Electrons

Positrons (antimatter) discovered 1932

Unreasonable effectiveness of mathematics, a wonderful gift which we neither understand nor deserve, E. Wigner (1960)

See also: "The applicability of mathematics as a philosophical problem", Mark Steiner HUP (1998);

Science and Beauty



Henri Poincaré 1854 – 1912

A Scientist does not study nature because it is useful; he studies it because he delights in it, and he delights in it because it is beautiful. If nature were not beautiful, it would not be worth knowing, and if nature were not worth knowing, life would not be worth living.

What is your fundamental belief?
Dirac: the laws of nature should be expressed in beautiful equations.

Is the creator redundant



Stephen Hawking
Cambridge U

Why is there something rather than nothing?

The Grand Design: new answers to the ultimate questions of life
S. Hawking (2010)

Fine Tuning of physical constants: Goldilocks Enigma ... why just right?

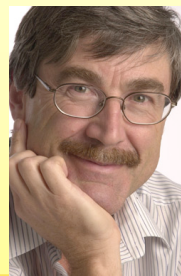
If the [fine structure constant] were changed by 1%, the sun would immediately explode
-- Prof. Max Tegmark, MIT



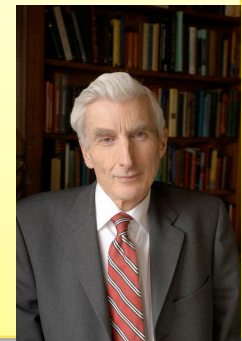
"The universe is the way it is, because we are here" –
Prof. Stephen Hawking,
Cambridge U



The Goldilocks Enigma: Why Is the Universe Just Right for Life ...
Paul Davies (2006)



Just Six Numbers
Sir Martin Rees
(2000)

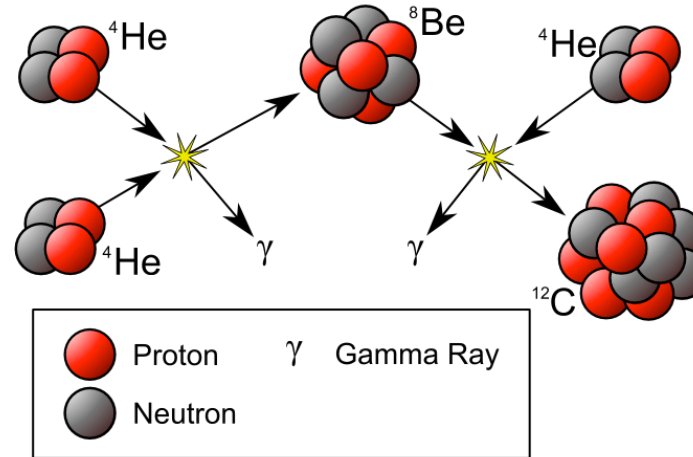


We are made of stardust

He  C through a resonance



Sir Fred Hoyle,
Cambridge U



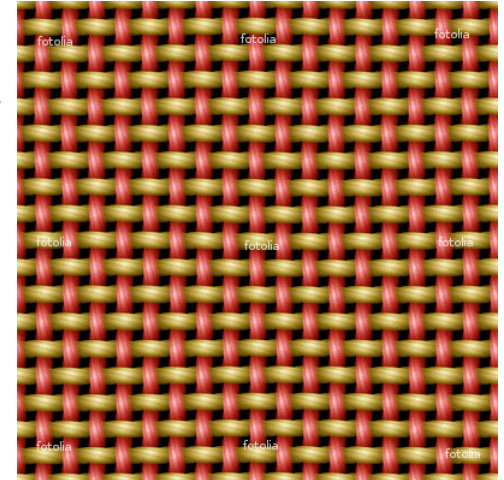
- “A common sense interpretation of the facts suggests that a superintellect has monkeyed with physics .. and biology”
- His atheism was “deeply shaken”

BRUTE FACTS and TAPESTRY ARGUMENTS

BRUTE FACTS:

In the beginning God, or in the beginning nothing?

- Morality
- Basis for modern science (rationality, uniformity)
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*I believe in Christianity as I believe that the Sun has risen—
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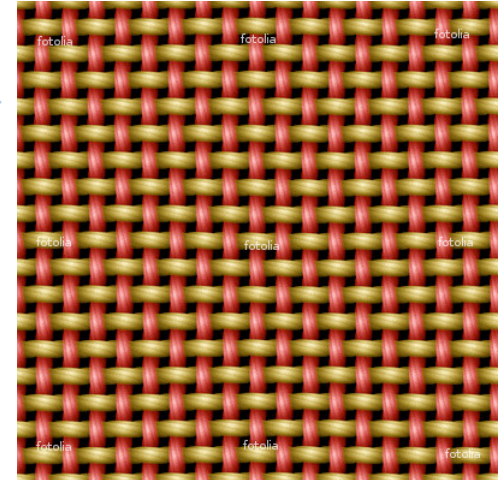
C.S. Lewis, *The Weight of Glory*, (1942).

Tapestry arguments and Christian faith?

Why do I believe in Jesus Christ?

--tapestry arguments--

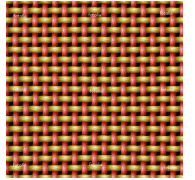
- Bible
- Resurrection
- Life and teachings of Jesus Christ
- Just a great teacher?
- Experience of God in myself and friends



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C.S. Lewis, *The Weight of Glory*, (1942).

Tapestry arguments for Bible



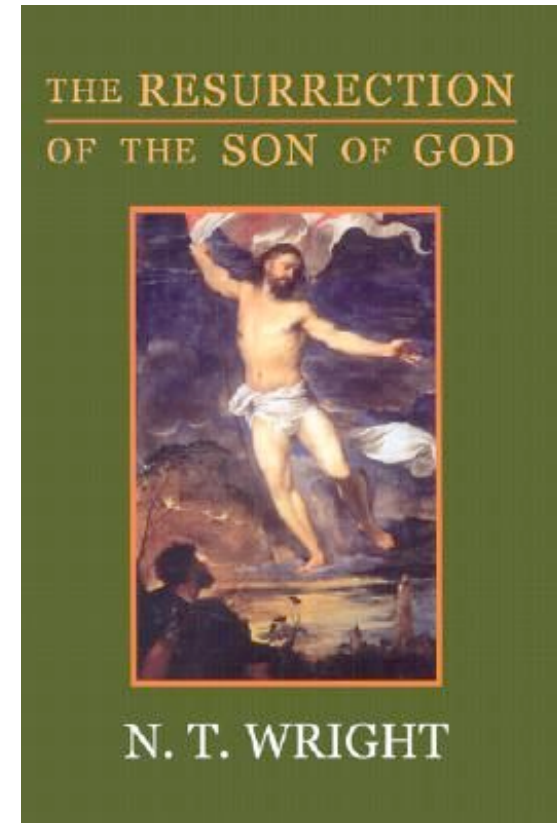
C.S. Lewis
1898-1963

I have been reading poems, romances, vision literature, legends and myths all my life. I know what they are like. I know none of them are like this. Of his [gospel] text there are only two possible views. Either this is reportage .. or else, some unknown [ancient] writer .. without known predecessors or successors, suddenly anticipated the whole technique of modern novelistic, realistic narrative.

Resurrection



N.T. Wright



Jesus: Liar Lunatic or Lord?

- Jesus's teaching
- Jesus claimed to forgive other people's sins ...
- Jesus claimed to be God

A man who was merely a man and said the sort of things Jesus said would not be a great moral teacher. He would either be a lunatic – on a level with the man who says he is a poached egg – or else he would be the Devil of Hell. You must make a choice. Either this man was, and is, the Son of God, or else a madman or something worse... but let us not come up with any patronising nonsense about him being a great human teacher. He has not left that open to us. He did not intend to.

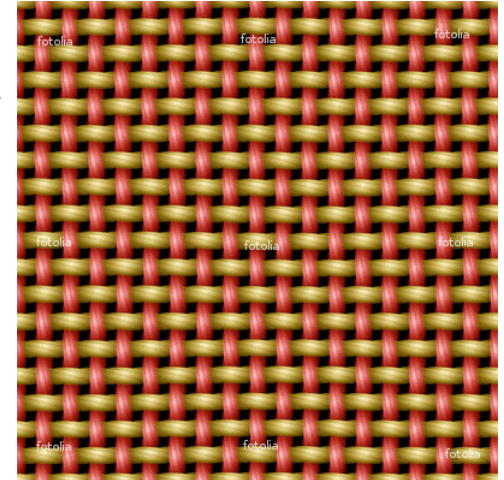
-- C.S. Lewis in Mere Christianity

Tapestry arguments and Christian faith?

Why do I believe in Jesus Christ?

---tapestry arguments---

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C.S. Lewis, *The Weight of Glory*, (1942).

Gene language

[Genes] swarm in huge colonies, safe inside gigantic lumbering robots, sealed off from the outside world, communicating with it by tortuous indirect routes, manipulating it by remote control. They are in you and me; they created us, body and mind; and **their preservation is the ultimate rationale for our existence.**

v.s.

[Genes] are trapped in huge colonies, locked inside highly intelligent beings, moulded by the outside world, communicating with it by complex processes, through which, blindly, as if by magic, function emerges. They are in you and me; we are the system that allows their code to be read; and their preservation is totally dependent on the joy that we experience in reproducing ourselves. **We are the ultimate rationale for their existence.**



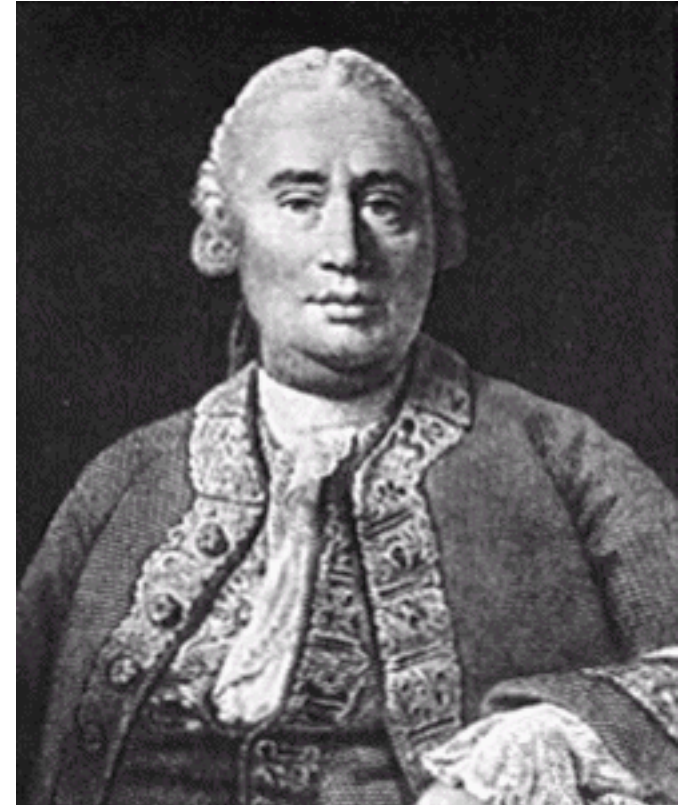
Richard Dawkins --
The Selfish Gene (1976)

Denis Noble --
*The Music of Life:
Biology Beyond the
Genome* (OUP 2006)



Deriving an ought from an is

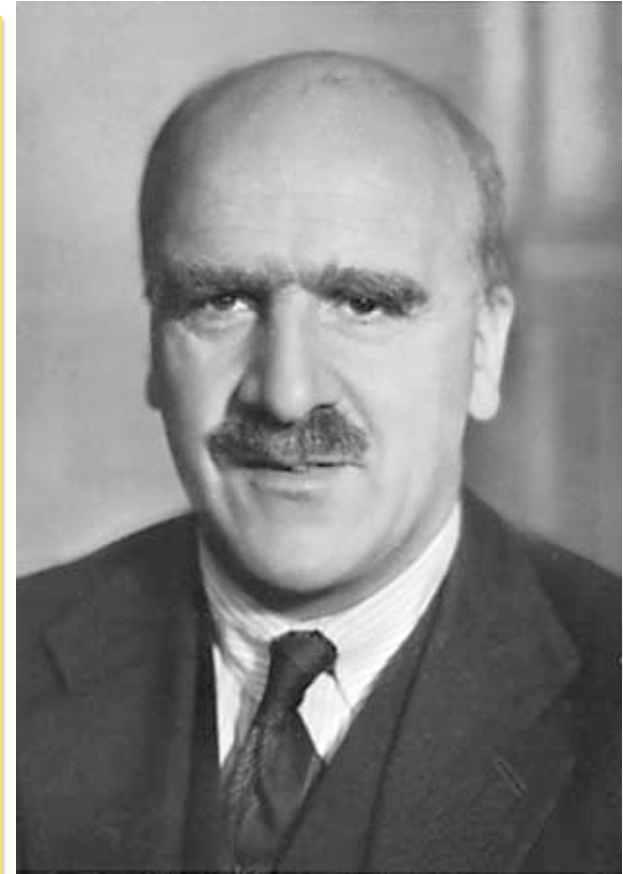
- when all of a sudden I am surpriz'd to find, that instead of the usual copulations of propositions, **is**, and **is not**, I meet with no proposition that is not connected with an **ought**, or an **ought not**.
- D. Hume in "A Treatise of Human Nature"



David Hume
(1711-1776)

Materialism is not self-consistent

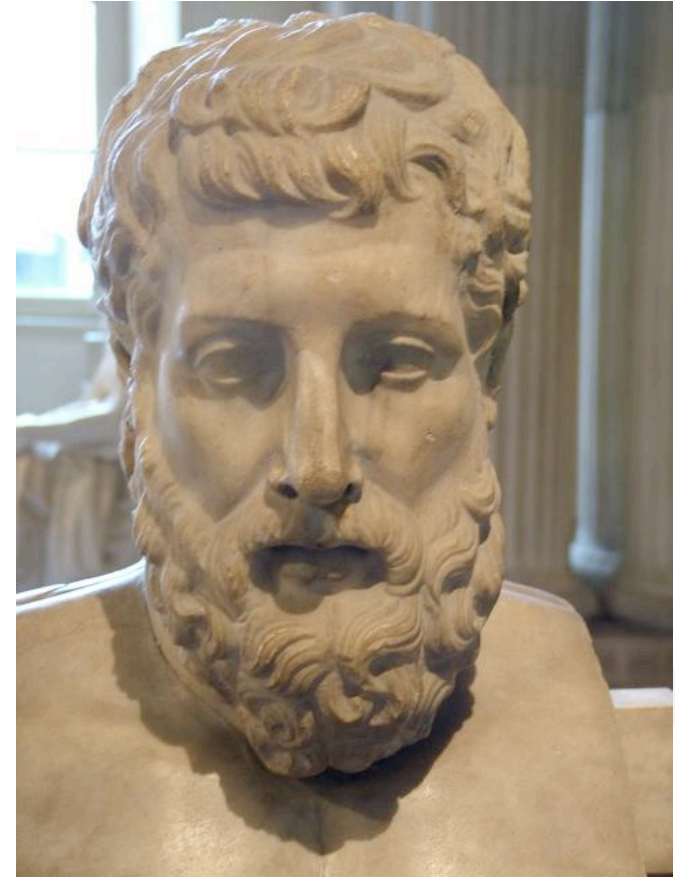
- For if my mental processes are determined wholly by the motions of atoms in my brain I have no reason to suppose that my beliefs are true... And hence I have no reason for supposing my brain to be composed of atoms.
-
- -J.B.S. Haldane, "When I am Dead "



J.B.S. Haldane
1882-1964

Materialism is not self-consistent

- Epicurus: “He who says that all things happen of necessity cannot criticize another who says that not all things happen of necessity. For he has to admit that the assertion also happens of necessity.
- (here it is an argument against determinism, but is linked to the argument against materialism)



Epicurus 341 – 270 BC

Karl Popper (the self and its brain) I do not claim that I have refuted materialism. But I think that I have shown that materialism has no right to claim that it can be supported by rational argument – argument that is rational by logical principles. Materialism may be true, but it is incompatible with rationalism

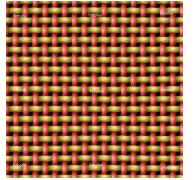
Science on values, meaning purpose

- In matters of values, meaning, and purpose, science has all the answers, except the interesting ones.
- F. Ayala in Darwin's Gift to Science and Religion. (2007)



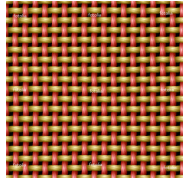
Francisco J. Ayala
UC Irvine

Tapestry arguments and faith



- Bible
- Resurrection
- Life and teachings of Jesus Christ
 - Just a great teacher?

Tapestry arguments for Bible



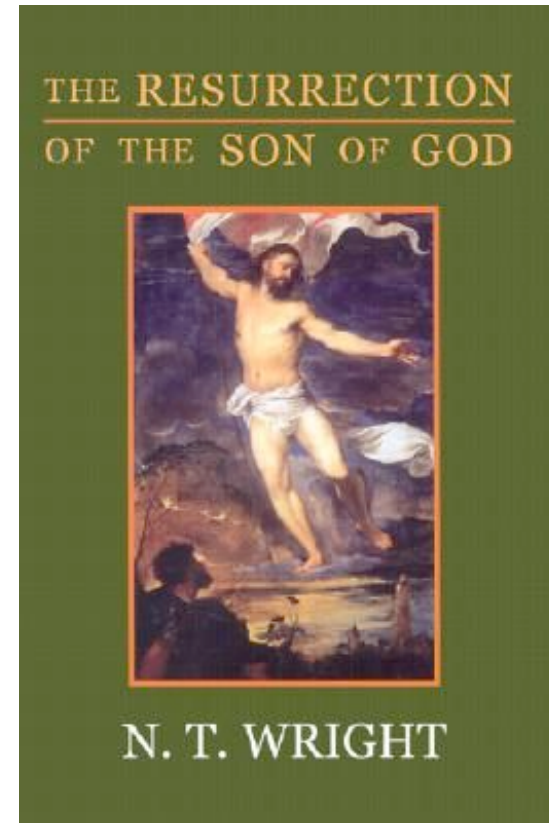
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Resurrection



N.T. Wright

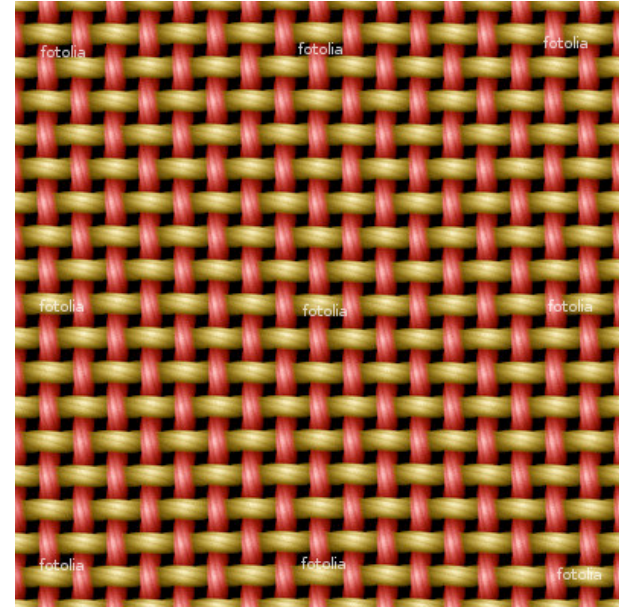


Tapestry arguments and inference to the best explanation

Why do I believe in Jesus Christ?

tapestry arguments:

- Bible
- Resurrection
- Life and teachings of Jesus Christ
- Just a great teacher?
- Experience of God in myself and friends



*I believe in Christianity as I believe that the Sun has risen—
not only because I see it, but because by it, I see everything else.*

C.S. Lewis, *The Weight of Glory*, (1942).

Here are a few popular books I recommend :

Francis Collins, "*The Language of God*"

An honest and easy to read account of how Francis Collins, formerly head of the human genome project and currently director of the National Institutes of Health, came to believe in God, and how he squares his science with his faith.

Alister McGrath, "*Dawkins' God: Genes, Memes and the Meaning of Life*"

http://en.wikipedia.org/wiki/Dawkin%27s_God

McGrath, a prolific theologian with a PhD in biophysics, gives a thoughtful response to Richard Dawkins' arguments against the existence of God.

John Polkinghorne, "*Quarks, Chaos and Christianity*"

A classic introduction to questions on the interface between science and faith by Sir John Polkinghorne, a former professor of theoretical physics at Cambridge. Also a good starting point to Polkinhorne's work.

- Ernest Lucas – "Can we believe Genesis today"

Tim Keller, "*The Reason for God*"

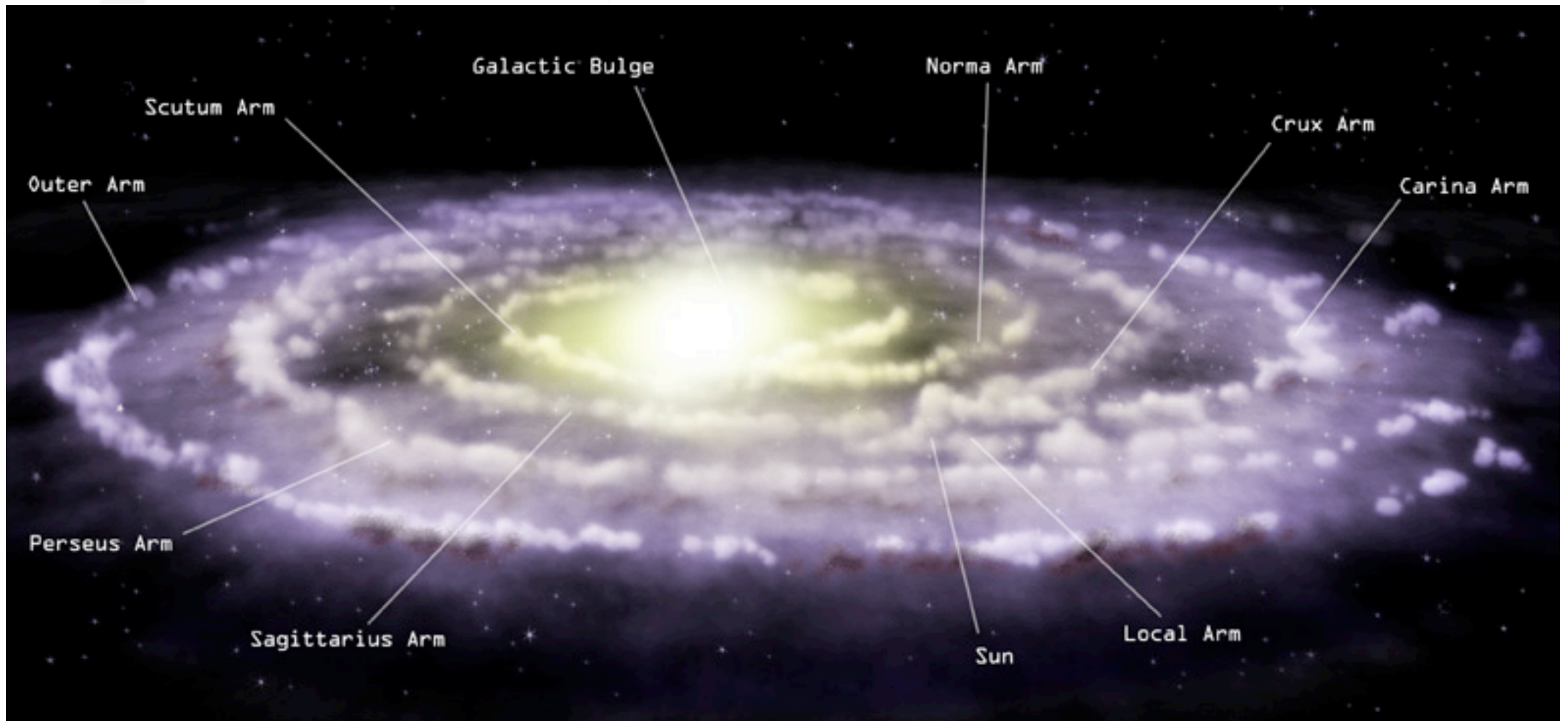
Whereas the other books on this list focus more on science/faith dialogue, here Tim Keller gives a good introduction to a broader set of arguments for the existence of God and the rationality of Christian faith.

Websites I recommend:

www.faraday-institute.org -- The Cambridge University based Faraday Institute for Science and Religion has a treasure trove of excellent online material

www.biologos.org -- An organisation set up by Francis Collins to help counter the shrill public discourse on science and faith with a more thoughtful and reasoned dialogue.

- www.testoffaith.com -- a website with loads of resources for churches, linked to a documentary that Bill Newsome (Stanford) and I participated in.





You Are Here!

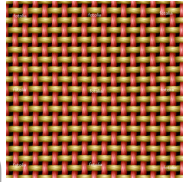


Freeman Dyson
Princeton

As human beings, we are groping for knowledge and understanding of the strange universe into which we are born. We have many ways of understanding, of which science is only one ... Science is a particular bunch of tools that have been conspicuously successful for understanding and manipulating the material universe. Religion is another bunch of tools, giving us hints of a mental or spiritual universe that transcends the material universe.

F. Dyson "religion from the outside, the new york review june 22, 2006 4-8

Tapestry arguments for Christian faith



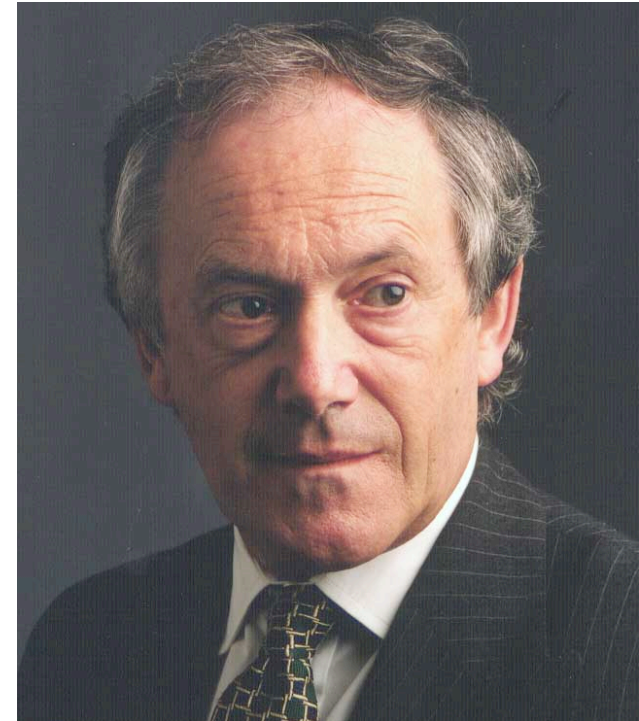
C.S. Lewis
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C.S. Lewis, *The Weight of Glory*, (1942).

Science without limits?

*Scientists, with their implicit trust in reductionism, are privileged to be at the summit of knowledge, and to see further into truth than any of their contemporaries... **there is no reason to expect that science cannot deal with any aspect of existence...** Science, in contrast to religion, opens up the great questions of being to rational discussion ... reductionist science is omnicompetent ... science has never encountered a barrier that it has not surmounted or that we can at least reasonably suppose it has the power to surmount.... I do not consider that there is any corner of the real universe or the mental universe that is shielded from [science's] glare"*

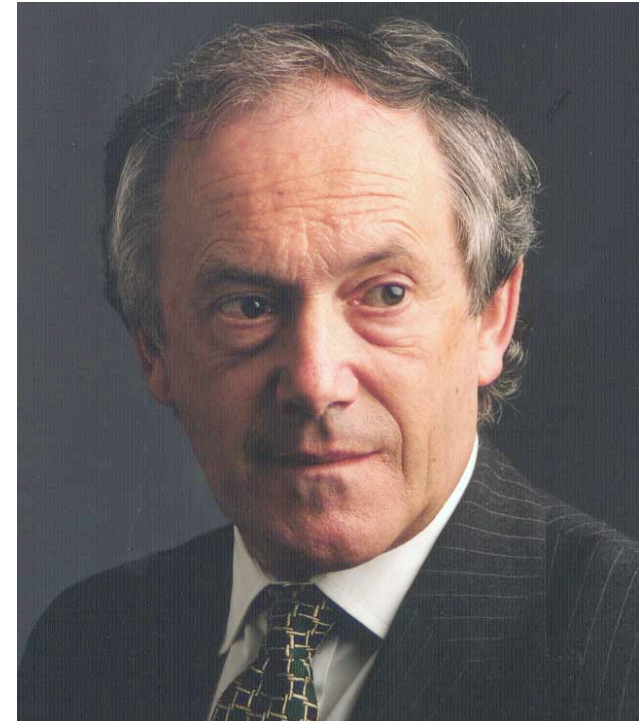


Prof. Peter Atkins
Oxford U

Science without limits?

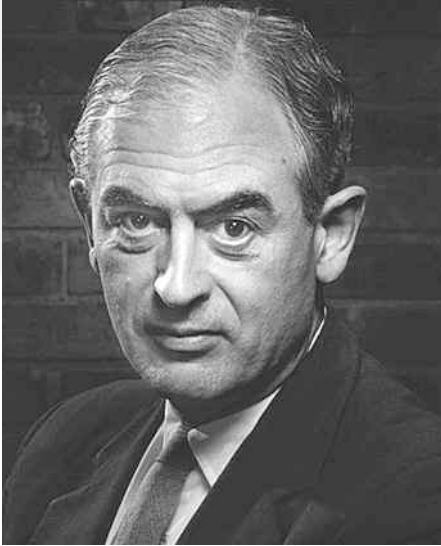
*" ...although poets may aspire to understanding, their talents are more akin to entertaining self-deception. Philosophers too, I am afraid, have contributed to the understanding of the universe little more than poets ...
I long for immortality, but I know that my only hope of achieving it is through science and medicine, not through sentiment and its subsets, art and theology"*

--The Frontiers of Scientific Vision, Ed. J Cornwell.
Oxford University Press, Oxford, 1995



Prof. Peter Atkins
Oxford U

Limits of Science?



Sir Peter Medawar
1915-1987

" That there is indeed a limit upon science is made very likely by the existence of questions that science cannot answer and that no conceivable advance of science would empower it to answer. These are the questions that children ask – the "ultimate questions" of Karl Popper. I have in such questions as:

How did everything begin?

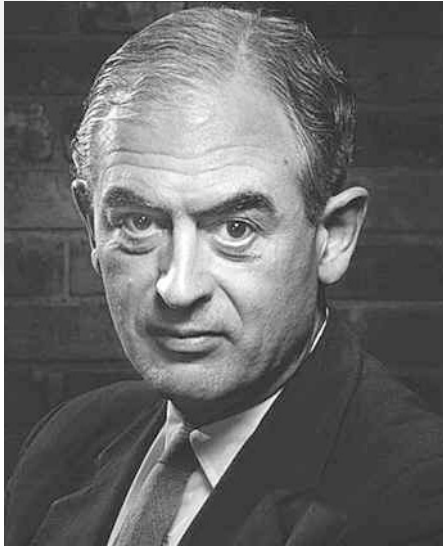
What are we all here for?

What is the point of living?"

" It is not to science, therefore but to metaphysics, imaginative literature or religion that we must turn for answers to questions having to do with first and last things."

-- Sir Peter Medawar, The Limits of Science, (Oxford University Press, Oxford (1987))

Limits of Science?



Sir Peter Medawar
1915-1987

- *Science is a great and glorious enterprise - the most successful, I argue, that human beings have ever engaged in. To reproach it for its inability to answer all the questions we should like to put to it is no more sensible than to reproach a railway locomotive for not flying or, in general, not performing any other operation for which it was not designed.*

-- Sir Peter Medawar, The Limits of Science, (Oxford University Press, Oxford (1987))

Unreasonable effectiveness of mathematics



E. Wigner
1902-1995

"The miracle of the appropriateness of the language of mathematics for the formulation of the laws of physics is a wonderful gift which we neither understand nor deserve"

--Eugene Wigner, *"The Unreasonable Effectiveness of Mathematics"* Communications in Pure and Applied Mathematics, vol. 13, No. I (February 1960).

See also: "The applicability of mathematics as a philosophical problem", Mark Steiner HUP (1998)