



Science, Faith & God

Distant elephants

What is science about?

Is there a fundamental contradiction with religion

Cosmology & carbon. The Anthropic Principle.

Where God might fit and where God won't fit

Evolution and genetics: Religion meets Darwin?

Archaeology: Science meets the Bible?

A synergy of purpose?: back to the beginning..



Introduction

“ scientists“
(like most people)

eventually get banished from
useful work and into

“ *management* “

Maxim learned in Management Course:

**"Never take responsibility for
a "distant elephant "**

An example of a “ distant elephant “
could be for instance:

*a seminar on
Science and Faith 3 months hence.....*





This is why one should avoid them...

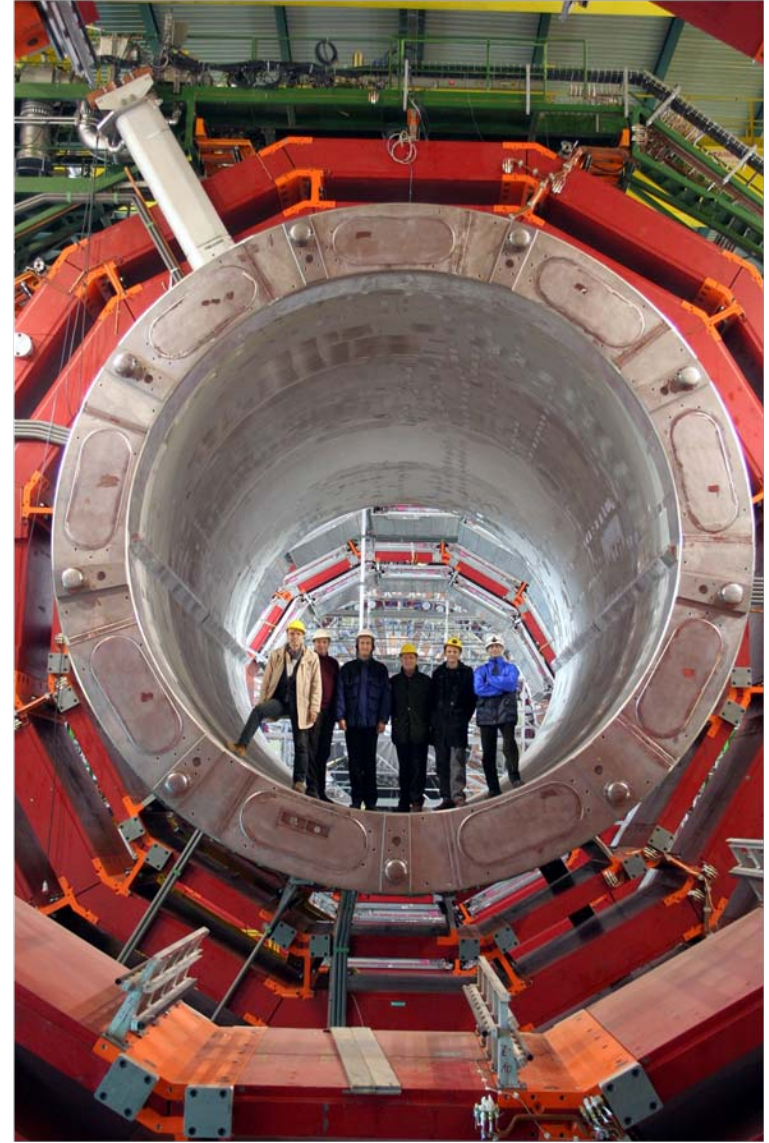




more big things: CERN

Try to understand the fundamental nature of matter and energy, by probing the smallest scale structures of matter and re-creating conditions of the early universe:

World's biggest scientific instrument
Truly a worldwide effort (~60 countries), united by a common language (physics) and aim...





Complex science....and life

Parts in a Jumbo jet:	6,000,000
Parts in CERN LHC complex	~50,000,000
Cells in elephant body:	1000,000,000,000,000
Cells in Human body	100,000,000,000,000
Cells in Human Brain*	100,000,000,000 (count at one per second takes 3171 years)
Memory capacity of 1 Human brain	1,000,000,000,000,000 bytes
Estimated Data generated by CERN LHC experiment	1,000,000,000,000,000 bytes

* An elephant never forgets, but his brain is only 0.08% of body weight, cf Human 2%



Life the Universe and Everything?

*Activities at CERN are part of the search for a "theory of everything"
This branch of science (fundamental physics and cosmology) provokes deep questions*

If we can understand exactly how we and our surroundings behave, and how they came to be as they are: is there room for God? is there a proof or repudiation of God

*From : A Brief History of Time: p174,
Stephen Hawking, Professor of Mathematics at Cambridge*

"Even if there is only one possible unified theory [here he's talking about the unification of quantum mechanics (describes very small things) with an understanding of general relativity (very big things)], it is just a set of rules and equations.

What is it that breathes fire into the equations
and makes a universe for them to describe?

But later in the same book...

..... if the universe is really completely self- contained,
having no boundary or edge, it would have neither beginning nor end:
it would simply be. What place, then, for a creator?"



Life, the Universe and Everything

Is religious belief a relic of wishful thinking left over from a scientifically ignorant age?

1) Steve Weinberg: "The more the universe seems comprehensible, the more it also seems pointless."

2) Laplace to Napoleon (on God): "I have no need of that hypothesis"

3) (Sir) John Polkinghorne FRS:

(Another Professor of Mathematics at Cambridge & later an Anglican Clergyman):

"Science confines itself to considering solely the processes by which things happen, without asking whether there is a meaning and purpose behind what is going on"

"Ask a scientist, as a scientist, to tell you all that he or she can about music. They will reply that it is a neural response to vibrations in the air. That, of course is true, but hardly the whole story"

"Questions of value and purpose that science brackets out are issues that religion certainly addresses."

Science generally answers 'how' questions and theology answers 'why' questions



Life the Universe and Everything

We could leave it there!: consider science and religion to have the same relation as, say, watch-making and gardening. Stalemate!

or..... we could look for compatibility...or conflict.....

The branches of science which most frequently interact with religious ideas are:

- 1) Fundamental Physics (elementary particle physics and cosmology)
- 2) Archaeology/Palaeontology: what do ruins, buried artefacts and fossils tell us about the past and how we got here?
- 3) Modern Biology: Genetics, Evolution & the molecular chemistry of living things

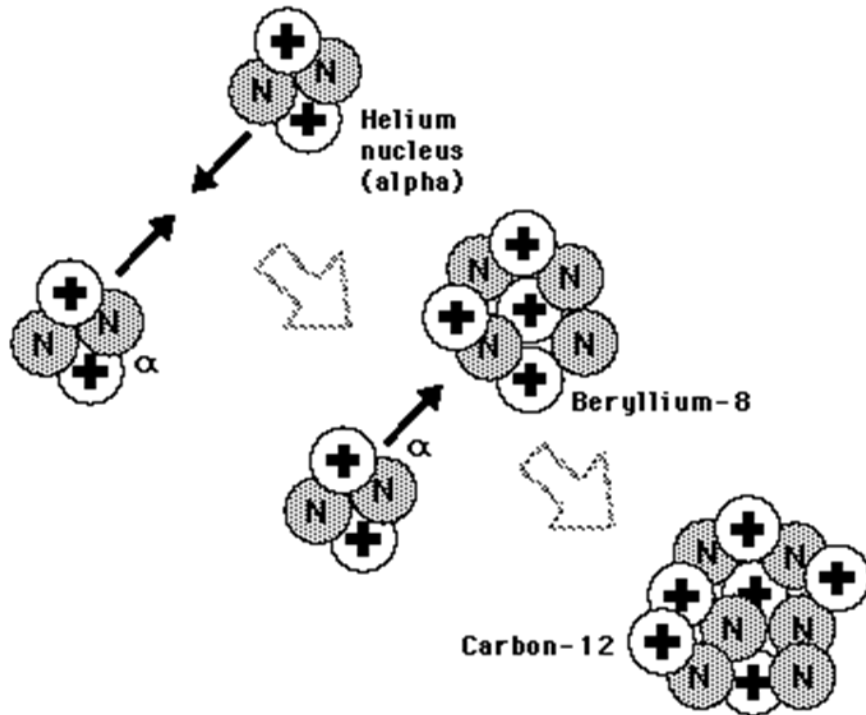
Actually 1) and 3) turn out to be intimately linked



Cosmology and carbon

We are all made of stardust

The first “everyday” things in the universe were hydrogen and helium gas, but we know we are made of carbon : the only place to make it is in stars
 If the central temperature of a star exceeds 100 million degrees K, as may happen in the later phase of the stars called [red giants](#) and [red supergiants](#), then helium can fuse to form beryllium and then carbon.



When Fred Hoyle saw that carbon could be made in stellar interiors only because there was an enhancement (a resonance) at exactly the right energy to make it possible, he is said to have remarked that the universe was a ‘put-up’ job.

Hoyle could not just believe this was a happy accident, with nothing more to be said about it.

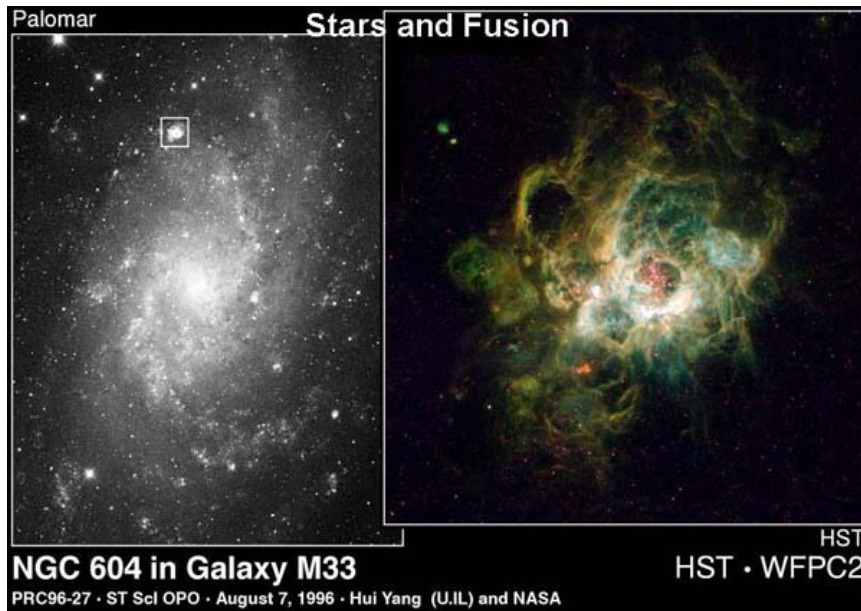
.....there are more such accidents



Cosmological fine tuning

The three and a half billion year history of life on Earth has only been possible because all that time the Sun has been shining steadily, supplying the energy needed. We understand what enables star to burn steadily and for long periods like that, and if the forces of nature had been only slightly different from what they are, it would not have been possible.

A universe exactly the same as ours except that in it gravity was three times stronger, would have been sterile because its stars would have burnt themselves out in a few million years, long before any life could get going on an encircling planet.



In fact the level of such “fine tuning” is extreme



Carbon comes to life?

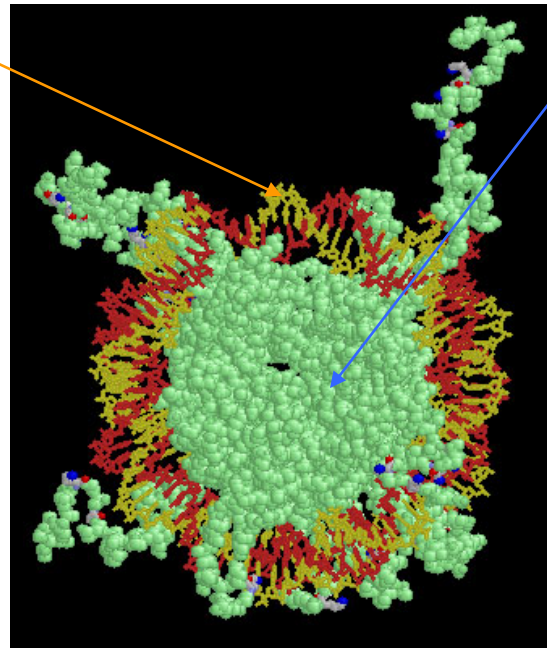
Actually we are some sort of mutual alliance between 2 complex carbon-based compounds

Nucleic acids

Instructions on how to build cells.

Proteins

Building blocks for cells made of smaller blocks called amino acids.





Fine-Tuning & the Anthropic principle

Summing up:

The basic equations governing the behaviour of all physical things (or as close as we can get to them so far), allow for some tuning of parameters

.....particularly the relative strengths of the fundamental forces

Many different universes are theoretically (= mathematically) possible:

Most of them, maybe all but this one, fail to produce carbon-based life forms.

Anthropic principle:

This universe is special: it has to be like it is, or we would not be here to observe it.

....but is the converse a satisfying explanation?

"the universe is as complex and finely tuned as it is because we are here to observe it"

..... *we're here because, we're here because, we're here because, we're here...*



Fitting God into Science?

1) The pseudo-deity: used as an explanation of last resort.
When all other attempts at understanding fail: “God did it”.

“God the Cheshire cat” , always fades away with the advance of knowledge

or

2) A God interwoven with creation and subsequent evolution, a possible answer to questions like:

why can we understand the universe so profoundly?

why is science possible at all?

why is mathematics so (unreasonably) effective?

why are the basic parameters of the universe so finely tuned for life?

Is the “Mind of God” what lies behind the wonderful order of the world?

Is the structure of creation a real sign of the Creator’s presence?

.....a hypothesis worth testing? ...but hard to do.



Testing God Scientifically?

Religion makes assertions such as: "Jesus Christ is the Saviour of the world"

This cannot be tested, or even addressed scientifically

In general testing the existence of God is difficult (even if one ignores the Bible's warnings not to do it!)

ie "send a lightning bolt or I don't believe in you"

No-one would reasonably expect this experiment to work on an omnipotent entity...

However, there are assertions, such as the resurrection, on which eg Christianity could be scientifically tested, if new compelling evidence became available.

(eg Jesus was removed from the cross alive
the resurrection was an (enlightened) fabrication of the disciples

A scientist can of course *believe* what he/she wishes, consistent with the evidence.



Science and Belief (not "faith")

Science attempts to find explanations of the universe around us (often using the language of mathematics) supported by and constantly tested against the hard evidence of artefacts or experimental observation. Once a theory is not supported by experiment, it's abandoned or modified.

The work of the last ~400 years has built an impressive understanding of how things came to be as they are.

Surprisingly, science contains, and leaves room for, a large element of belief, founded on solid evidence, and always open to be tested:

"I believe that quarks exist inside the protons and neutrons in a nucleus even knowing that the mathematical theory which proposes them leaves no room for any experiment to isolate one, or see its track".

I believe the universe originated in a Big Bang (actually, instinctively I don't.....)

I would argue that claiming science and (enlightened) religion are incompatible is a symptom of an age largely ignorant of the aims, principles, methods, and achievements of science.



Science meets the Bible?

Polkinghorn:

“When we read the Bible we have to figure out what we are reading: it is not a book but a library with all sorts of different kinds of writing in it – history and stories, poetry and prose, etc. If you get the genre wrong, you can make some bad mistakes. (‘My love is like a red, red rose’ does not mean that Robbie Burns’ girl friend had green leaves and prickles.) Genesis 1 and 2 are not divinely guaranteed textbooks of science, but deeply theological writings whose purpose is to assert that nothing exists except through the will of god (‘God said Let there be ...’)”.

“So-called ‘creation scientists’ are actually misusing the Bible and making a bad theological mistake”.

but still, it has long been tempting to archaeologists.... and why not encourage them?

eg

The Bible contains many folk tales and myths found in several cultures
...notably the Great Flood...and The Garden of Eden



Science meets the Bible?

Genesis 2 10-14

“A river watering the garden flowed from Eden; from there it was separated into four headwaters. The name of the first is the Pishon; it winds through the entire land of Havilah, where there is gold...The name of the second river is the Gihon; it winds through the entire land of Cush. The name of the third river is the Tigris (Hiddekel); it runs along the east side of Asshur. And the fourth river is the Euphrates (Perath).”

Many different attempts to interpret this.

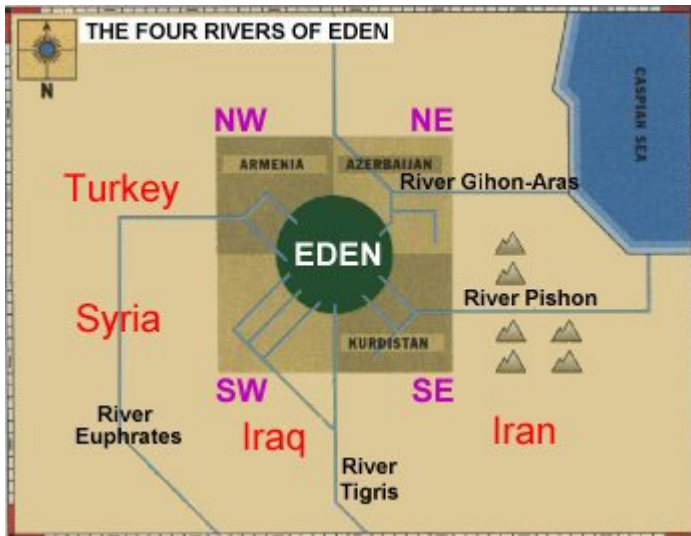
Perhaps the most convincing/exciting for me is from David M. Rohl of Univ College London

see book

"Legend: The Genesis of Civilisation"

so where was Eden?

10 miles from Tabriz in NW Iran
Gan Eden= Walled Garden



In my view, such links to real history only lend authenticity to the Bible...



Science meets the Bible?

Rohl believes . . . the ancient Sumerians, Babylonians, and Assyrians *all knew of an earthly paradise that had once lain beyond what they called the Seven Heavens.* (mountain passes).

At this time Eden was still very much an earthly place.

Only later Judeo-Christian tradition bestowed heavenly status on it.

The Garden described in the Bible places the headwaters of four rivers in it: the **Tigris**, the **Euphrates**, the **Gihon**, and the **Pishon**.

Rohl has identified the **Gihon**, and the **Pishon** as the **Araxes** and **Uizhun** which puts the headwaters of all four rivers in his Eden.

The Uizhun, Rohl's equivalent to the Pishon which the Bibles identifies with gold, is known locally as the **Golden River**, and meanders between ancient gold mines and lodes of lapis lazuli.

"Land of Cush." :just north of the Adji Chay river valley and over the **Kusheh Daugh** - the **Mountain of Kush**.

The Araxes (Gihon) winds through it.



Religion meets Evolution & Genetics

According to Darwinism, evolution largely reflects the combined action of random mutation and natural selection acting on very basic primordial organisms over very, very long timescales.

The much more modern discovery of DNA provides the bio-molecular mechanism by which random mutation happens.

There is direct evidence that no creator need be involved at the detailed level:

Note however, the five founding fathers of twentieth-century evolutionary biology

Ronald Fisher: devout Anglican

Sewall Wright: practising Unitarian

J. B. S. Haldane: dabbler in Eastern mysticism

Ernst Mayr: atheist

Theodosius Dobzhansky Russian Orthodox author of a book on religion and science.

At the outset, Charles Kingsley (an Anglican clergyman), stated a powerful way to think theologically about evolution. He said that God could no doubt have brought into being a ready-made world, but in fact the Creator had done something cleverer than that in making 'a creation that could make itself'.



Social Darwinism etc :religion & moral codes

Religion (Christianity) says a lot: Love thy neighbour as thyself
Thou shalt not kill

etc etc

Science says, mildly anarchicly : we got here through survival of the fittest

Here there should be peaceful co-existence:

However, Carl Popper has made the point that although people have done terrible things using the fruits of science, no one has ever gone to war on behalf of a scientific principle, or exterminated whole populations because they disagreed on a point of science.

Science leaves plenty of room for a moral framework, as long as it doesn't attack or pervert the basic methods which science uses to arrive at understanding



Religion meets Darwin: an aside

Life which evolves itself can be used to cast light on the problem of the evil and suffering that we see present in creation.

A world making itself is a great good, but it is a good that has a necessary cost. The same processes that enable some cells to mutate and produce new forms of life – the very engine driving the fruitful history of evolution – will inevitably enable other cells to mutate and become malignant. You cannot have one without the other.

The presence of cancer in the world is not due to divine callousness or oversight: it is the necessary cost of a creation allowed to make itself.

We all tend to think that had we been in charge of creation we would have done it better!

Keep all the nice things (the flowers, the elephants and the sunsets)!
Get rid of the nasties (cancers, bird- flu and earthquakes).

The more science helps us understand the universe, the more it seems to hang together as an interwoven unity, a kind of cosmic package deal :

Take it or leave it, it's the only show in town!



God and Gaia

The GAIA hypothesis originated by British scientist James Lovelock came up with the perception that "the entire range of living matter on Earth, from whales to bacteria from oaks to algae, could be regarded as constituting or appearing to behave as a single living entity... endowed with faculties beyond those of its constituent parts."

Lovelock had no intention of proposing Gaia as a deity

(but as usual many latched onto this misconception enthusiastically)

However, the resonance with Fine-tuning and the Anthropic principle is evident

and looking after the planet is something that everyone from the devoutly religious to the atheist had better take seriously for their own reasons!!

*this is (likely) the only habitable planet for 300 light-years
.....do we need more reasons to take care of it?*



Back to the beginning

Fundamental physics meets the Anthropic principle and Archaeology
...in the "word" of God?

"En arkhé én ho logos, kai ho logos én pros ton theon, kai theos én ho logos."

a strangely self-contained and final assertion, maybe reproduced in the Gospel
from an older source of wisdom?

Tyndale gave the translation endless care..... *In the beginning was The Word*

The root meaning of Logos comes from a word that means "to collect, to speak, to
express an opinion." It is commonly used to mean "reason" as well as speech.
Heraclitus used it to describe "the principle" which controls the universe ie "the rules".

and The Word was with God...and The Word WAS God

One may seek more to God than this, but few scientists would dispute the existence of:

Rules that were here in the beginning, are here now, and govern every action.



Conclude

Richard Feynman states in his last technical book, *The Character of Physical Law*, "Everything in physical science is a lot of protons, neutrons and electrons, while in daily life, we talk about men and history or beauty and hope. Which is nearer to God - beauty and hope or the fundamental laws?"

"To stand at either end and to walk off that end of the pier only, hoping that out in that direction is a complete understanding, is a mistake."



Footnote: "Intelligent design? "

Advocates of "intelligent design" point to two developments that in their view undermine Darwinism. The first is the molecular revolution in biology. Beginning in the 1950's, molecular biologists revealed a staggering and unsuspected degree of complexity within the cells that make up all life. This complexity, I.D.'s defenders argue, lies beyond the abilities of Darwinism to explain. Second, they claim that new mathematical findings cast doubt on the power of natural selection.

So the claim is that though some evolution by selection may happen, most of the variety we see has been designed in from "day 1" of life on earth.

In my view:

Both assertions can be robustly refuted

"Intelligent design" is naive creationism in disguise:

Unsubstantiated faith masquerading as science is no good for either.



Latest score: Darwin: 2, Intelligent design: 0

Very complex interdependent structures couldn't be naturally selected?

We add new parts like global-positioning systems to cars not because they're necessary but because they're nice. But no one would be surprised if, in fifty years, computers that rely on G.P.S. actually drove our cars. At that point, G.P.S. would no longer be an attractive option; it would be an essential piece of automotive technology. This is how complex interdependent structures evolve naturally.

Natural Selection is more implacable than the intelligent designer.....

If building a sophisticated structure like an eye increases the number of children produced, evolution may well build an eye. But if destroying a sophisticated structure like the eye increases the number of children produced, evolution will just as happily destroy the eye. Species of fish and crustaceans that have moved into the total darkness of caves, where eyes are both unnecessary and costly, often have degenerate eyes, or eyes that begin to form only to be covered by skin—crazy contraptions that no “intelligent agent” would design for day 1.