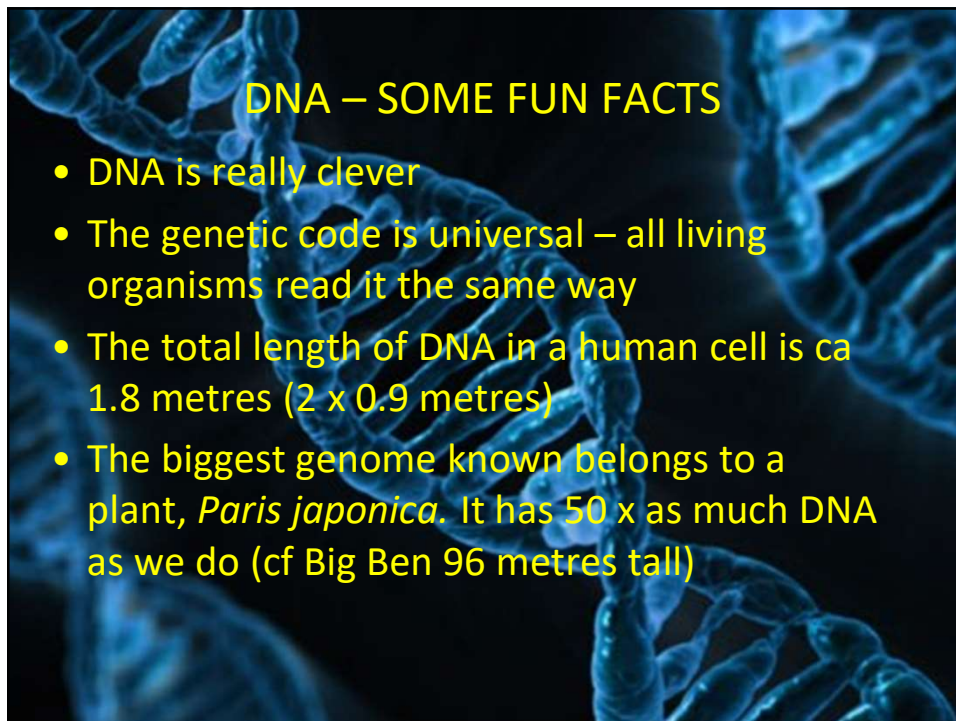




John Bryant
 j.a.bryant@exeter.ac.uk
 @JohnBryant1404
 www.bigbangtobiology.net

More than our genes?

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DNA – SOME FUN FACTS

- DNA is really clever
- The genetic code is universal – all living organisms read it the same way
- The total length of DNA in a human cell is ca 1.8 metres (2 x 0.9 metres)
- The biggest genome known belongs to a plant, *Paris japonica*. It has 50 x as much DNA as we do (cf Big Ben 96 metres tall)

GENES AND EVOLUTION



GENES AND EVOLUTION

- Life depends on an information-carrying, self-replicating molecule
- Both those features are important in evolution
- The information gives rise to the features of the organism on which natural selection acts
- 'Self-replication' ensures that those features are passed on



GENES AND EVOLUTION

Over many millions of years, the processes involved in evolution have given rise to a vast array of living organisms

Further, those living organisms are interconnected in many different and often wonderful ways

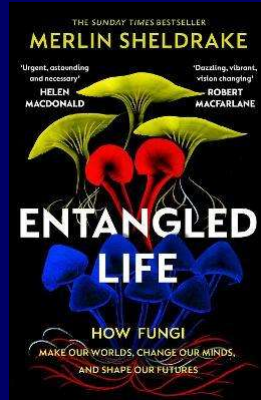


INTER-DEPENDENCE IN NATURE THE INTERNET OF LIVING THINGS

- Huge numbers of examples
- Photosynthesis and life on earth; oxygen
- Invasion of the land by plants – global cooling
Role of fungi
- ‘Explosion’ of flowering plants linked with pollinating insects (first flowering plants were insect-pollinated)
- More complex relationships – ecosystems
- Eg Rainforests

THE INTERNET OF LIVING THINGS

THE WOOD-WIDE WEB



WALKING ECOSYSTEMS



FLOWERING PLANT AND POLLINATOR EVOLUTION ARE INTER-LOCKED



THE AMAZING LIFE OF *YUCCA*



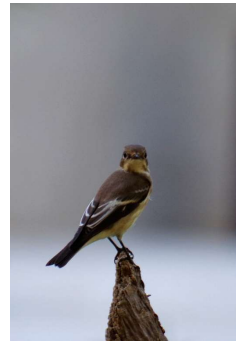
Yucca moths and Yucca plants
Are totally inter-dependent

HARDWICKE'S WOOLLY BAT



PITCHER PLANT

Bird Migration



LET EVERYTHING ...

- That has DNA ...
- Praise the Lord

GENES AND EVOLUTION

- 'DNA neither cares nor knows. DNA just is. And we dance to its music.'
- *River Out of Eden* Richard Dawkins
- But even within this essentially determinist view, there are contradictions

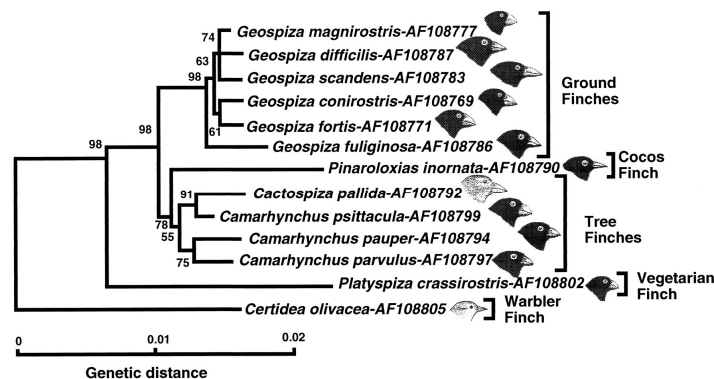
WHAT ABOUT HUMANS?

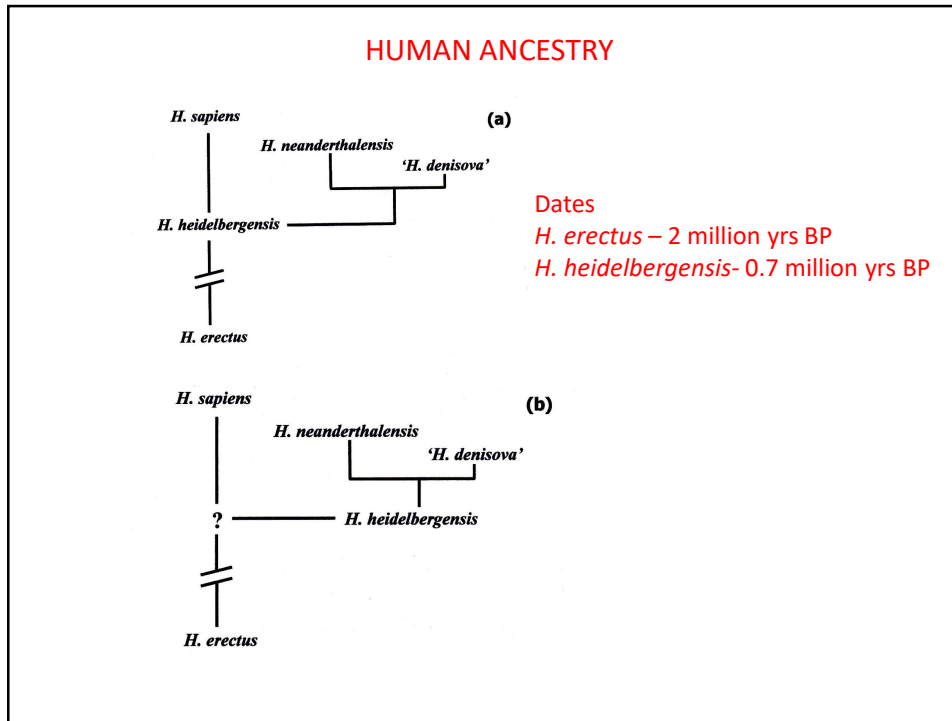
- Have we evolved in the same way?
- Are we separate from nature or part of it?
- If part of it, how do we fit into the network of networks that exist in the biosphere?
- How **independent** and/or **inter-dependent** are we?



WHAT ARE HUMANS?

- Within the evolutionary paradigm, human lineage split from the chimpanzee lineage about 5 million years ago. The traces are in our genes





WHAT ARE HUMANS?

- We are upright, bi-pedal apes with a large cranium
- 'Modern' *Homo sapiens* arose in Africa and subsequently spread to the rest of the world
- The colonisation of different areas has been accompanied by genetic change – and this is still happening
- We are part of the evolutionary paradigm

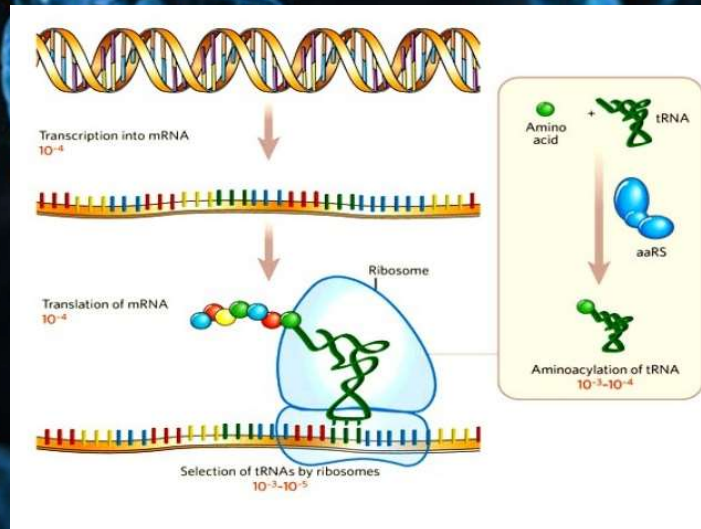
CONSIDER THIS



HUMANS AND OTHER ANIMALS: SIMILAR BUT DIFFERENT

- It is fashionable to emphasise the similarity between humans and other animals
- In respect of essential biochemistry, physiology etc this is reasonable
- So what is it that makes humans different?

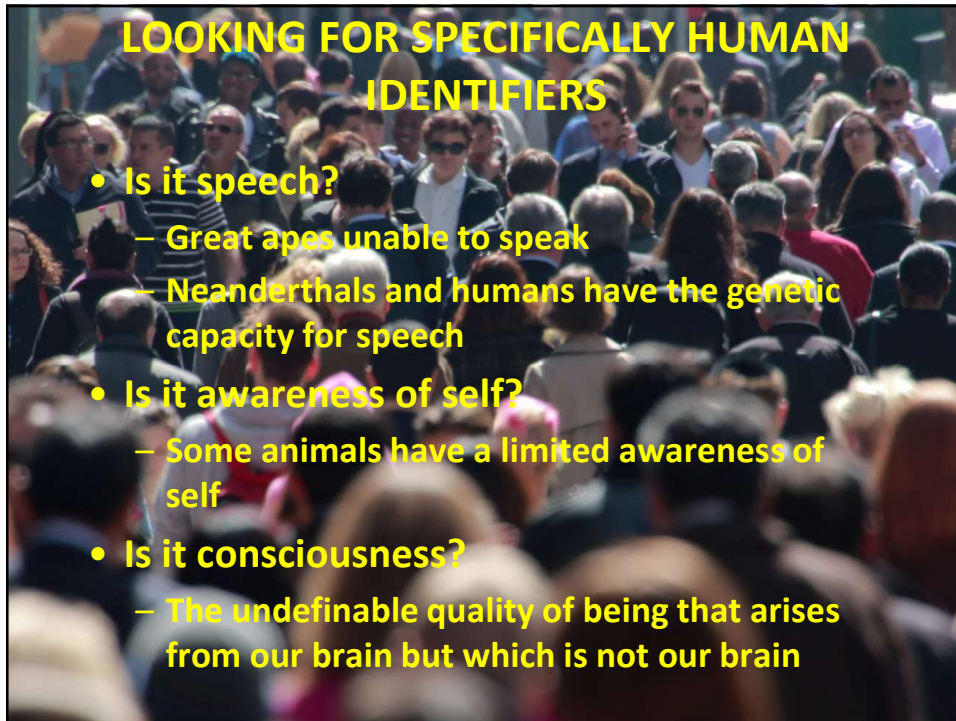
Are humans defined solely by their genome?



WHAT IS THE MOST COMPLEX THING THAT WE KNOW IN THE UNIVERSE?

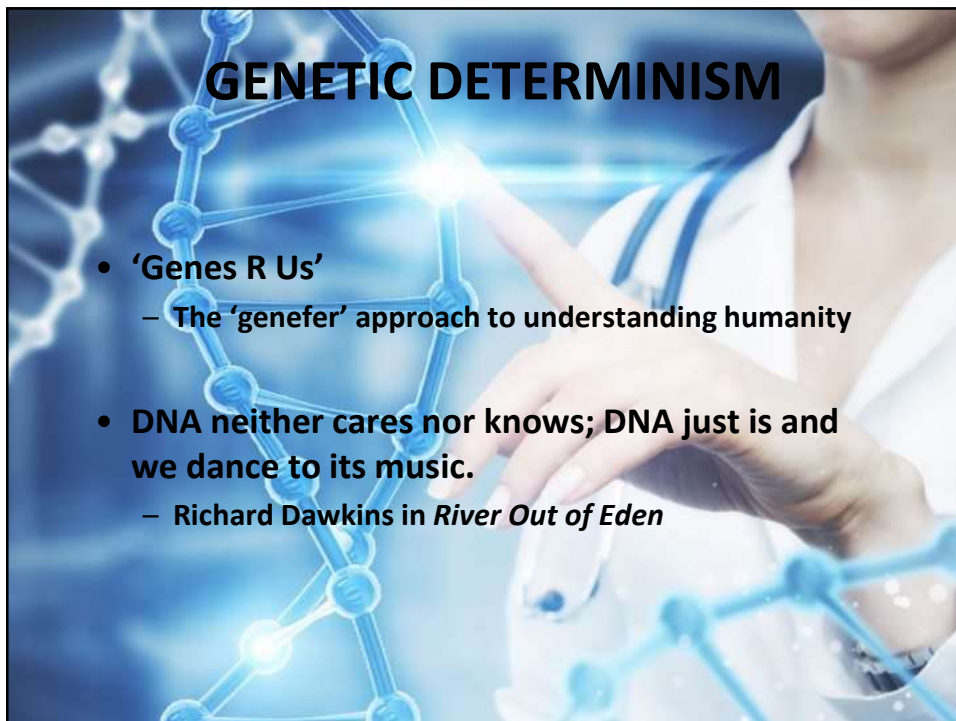


The 'Big Brain' gene – present in Neanderthals, Denisovans and Humans
Brain structure and function is encoded in our genes



LOOKING FOR SPECIFICALLY HUMAN IDENTIFIERS

- Is it speech?
 - Great apes unable to speak
 - Neanderthals and humans have the genetic capacity for speech
- Is it awareness of self?
 - Some animals have a limited awareness of self
- Is it consciousness?
 - The undefinable quality of being that arises from our brain but which is not our brain

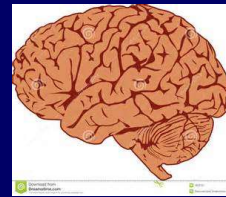


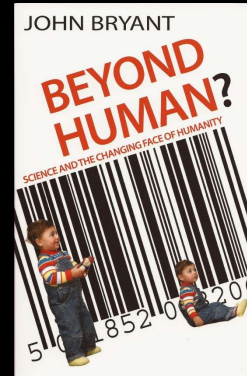
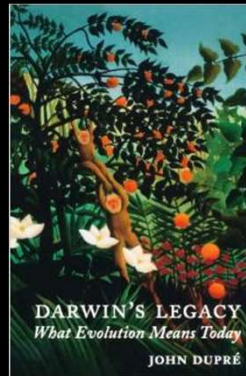
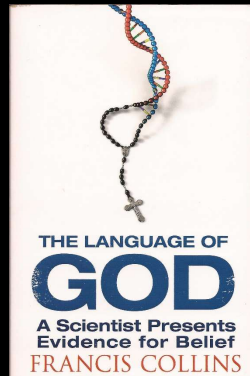
GENETIC DETERMINISM

- 'Genes R Us'
 - The 'genefer' approach to understanding humanity
- DNA neither cares nor knows; DNA just is and we dance to its music.
 - Richard Dawkins in *River Out of Eden*

IDEAS OF DETERMINISM ARE WIDESPREAD

- 'In the deepest sense, *we are* who *we are* because of our genes' **Ines Rothe**
- 'The sequence of the human DNA is the reality of our species' **Renato Dulbecco**
- 'Genome sequence tells us who we really are' **James Watson**
- 'It's all brain stuff' **Richard Dawkins**
- But do 'determinists' live like that?





Helps you know more about yourself
Our genes are a part of who we are

SO, WHAT ABOUT PERSONALITY, BEHAVIOUR, INTELLIGENCE?

- Brain is the centre for mind, consciousness, emotional and thought life. Its structure and molecular make-up are controlled by genes
- The number of possible inter-neuronal connections far exceeds the number of genes – genes cannot directly control these connections but genes make them possible
- Connections are made, unmade, re-made; genome is (more or less) constant

MORE ABOUT PERSONALITY, BEHAVIOUR, INTELLIGENCE?

- Studies on 'identical' and non-identical twins, plus inter-generational studies have shown that intelligence and key features of personality have a high heritability – around 40-50% - but this is a simplification
- However, no individual gene contributes in major way – the inheritance of these features/traits is multi-genic
- 'We haven't the foggiest idea which genes ...'
- 'Nurture' in its widest sense has a key role.
- 'Nurture' – gene interactions are important

WHAT ELSE DEFINES US?

- Is it morality?
Knowing right from wrong, altruism, compassion, empathy
- Is it spirituality?
How do we define this?
- Is it 'the image of God'?
What does this mean?

BUT ALSO

- ... You have made us a little lower than the angels and crowned us with glory and honour.
- You made us rulers over the works of your hand; you put everything under our feet

IN THE BEGINNING WAS THE WORD

Through him all things were made

Humans carry 'the image of God'

Much more to us than our genes

Spiritual beings who relate to the Spirit of God

Holy Spirit can work in us and with us to bring about change

TO PONDER

- He has made everything beautiful in its time. He has also set eternity in the hearts of humankind.
- Does Biology point us towards God?

