

## Intersections of Religion, Art and Science Whence?



Michelangelo, *Creation of Adam*, Sistine Chapel, 1512

Last week we considered the creation of the universe. Today we shall talk about the creation of man.

This is Michelangelo's representation of the creation of Adam.

The woman in the cloud with God has been interpreted in various ways. She may be Eve, or the Virgin Mary, or Sophia (Wisdom).

### Genesis 1: 26

So God created man in his own image, in the image of God created he him; male and female created he them.

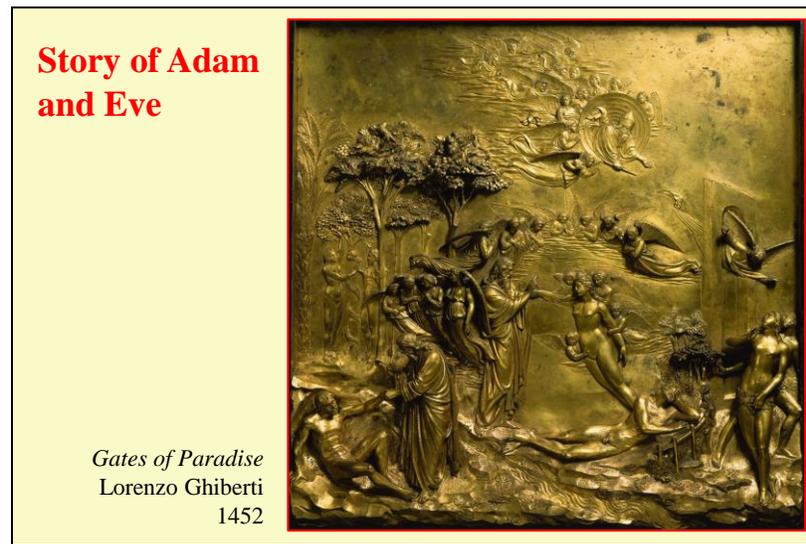
### Genesis 2: 7

וַיִּצַר יְהוָה אֱלֹהִים אֶת־הָאָדָם עֹפָר מִן־הָאֲדָמָה וַיִּפַּח בְּאַפָּיו  
נִשְׁמַת חַיִּים וַיְהִי הָאָדָם לְנֶפֶשׁ חַיָּה:

*way-yiser Yahweh elohim et ha-adam apar min ha-adamah way-yippah  
be-appaw nismat hayim wayhi ha-adam lenepes hayyah*

And the LORD God formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul.

Genesis contains two different version of the creation of man. These are attributed to two different authors. The second version is the more striking. It was written by the author called J because he or she referred to God as Jehovah.

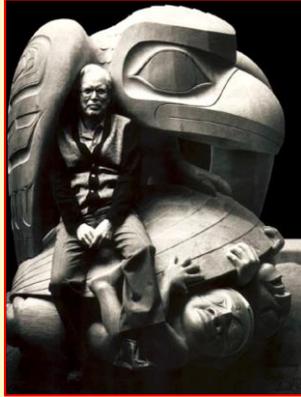


This is the representation of the story of Adam and Eve on *The Gates of Paradise*. The creation of Adam is shown at the lower left. Eve is brought forth from the side of Adam in the center. The temptation by the serpent is at the left in low relief. The expulsion from Eden is at the right.



The story of Adam and Eve is just one of many creation myths. This slide shows Bill Reid's carving of *Raven and the First Men*. The Raven opens a giant clam-shell to release the Haida people.

### The Raven and the First Men



Bill Reid (1920-1998)

...It wasn't long before one, then another of the little shell brothers, timidly emerged. Some of them immediately scurried back when they saw the immensity of the sea and the sky and the overwhelming blackness of the Raven. But eventually curiosity overcame caution and all of them crept or scrambled out. Very strange creatures they were, two-legged like the Raven. There the resemblance ended. They had no glossy feathers, no thrusting beak, their skin was pale and they were naked except for their long, black hair on their round, flat-headed heads. Instead of strong wings they had stick-like appendages that waved and fluttered constantly. They were the original Haidas, the first humans.

The quotation is from Reid's 1984 book *The Raven Steals the Light*.



Bill Reid  
1994

This sculpture shows Raven steering the people and the animals to the Haida Gwaii Islands. In the center of the canoe is the spirit of the people. From front to back along the starboard side of the canoe are Bear, Frog, Eagle, Wolf, Human and Raven. Bear resolutely faces backward and refuses to consider the future. Wolf gnaws on the wing of Eagle, who attacks the paw of Bear. Despite these antagonisms, the canoe makes headway, with Raven controlling the tiller. In the words of the sculptor

Here we are at last, a long way from Haida Gwaii, not too sure where we are or where we're going, still squabbling and vying for position in the boat, but somehow managing to appear to be heading in some direction; at least the paddles are together, and the man in the middle seems to have some vision of what is to come.



William Paley (1743-1805)  
Portrait by George Romney

### Natural Theology, 1802

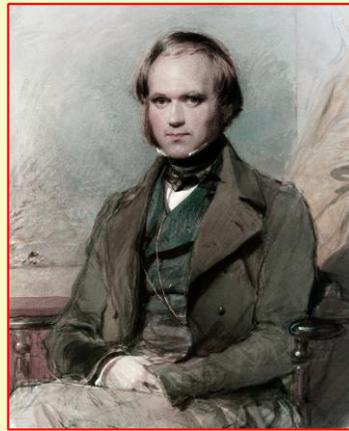
Paley imagined finding a watch upon the ground and discovering its intricate workings, so clearly different from a simple stone

“... the inference, we think, is inevitable, that the watch must have had a maker: that there must have existed, at some time, and at some place or other, an artificer or artificers who formed it for the purpose which we find it actually to answer; who comprehended its construction, and designed its use”

At the beginning of the 19<sup>th</sup> Century, science was rapidly increasing our understanding of the world. The universe was so well designed and regulated that it must have been created by a supreme intelligence.

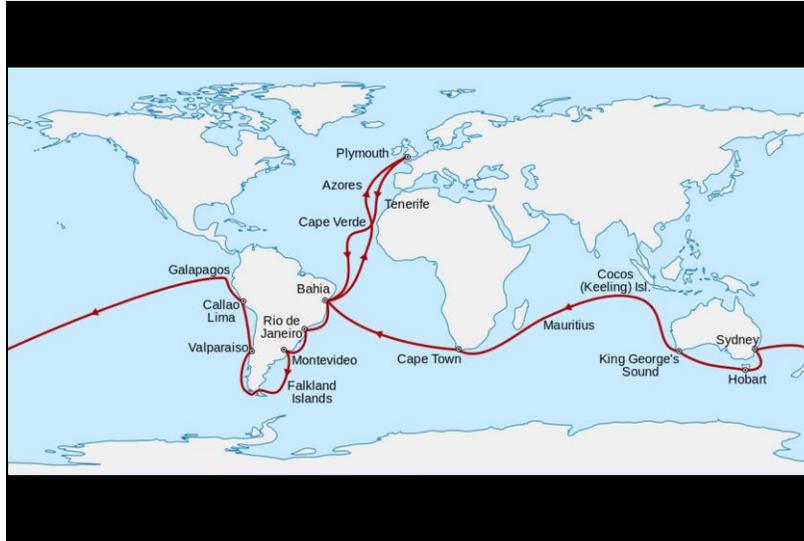
### Charles Darwin (1809-1882)

Darwin was born into a prominent family – his grandfathers were the abolitionist Erasmus Darwin and the industrialist Josiah Wedgwood. He initially studied Medicine in Edinburgh, but found science more interesting. His father then sent him to Christ’s College in Cambridge to study for a career in the Church. Darwin was impressed with recent work explaining God through the world He had created – Natural Theology. He spent almost five years as a naturalist on HMS Beagle on its voyage around the world (1831-1836).



Watercolor Portrait by George Richmond, about 1837

Darwin initially thought that the Natural Theology promoted by scholars such as Paley could explain the marvels of nature. However, his studies led him around the world and away from god.



The voyage of the Beagle took almost five years from 1831 to 1836. The main goal of the voyage was to provide the admiralty with more accurate charts of the sea and coastline, particularly around South America. Charles Darwin was taken on as a supernumerary naturalist and geologist. He had just graduated and wanted to travel before settling down to be a parson. The voyage changed his life completely and provided him with observations that would lead to the Theory of Evolution.

**Plankton**

from Darwin's journal  
January, 1832



Polyps, plankton, jellyfish. Sea butterflies, the pteropods.  
'So low in the scale of nature, so exquisite in their forms!  
You wonder at so much beauty – created,  
apparently, for such little purpose!'

   
Ruth Padel

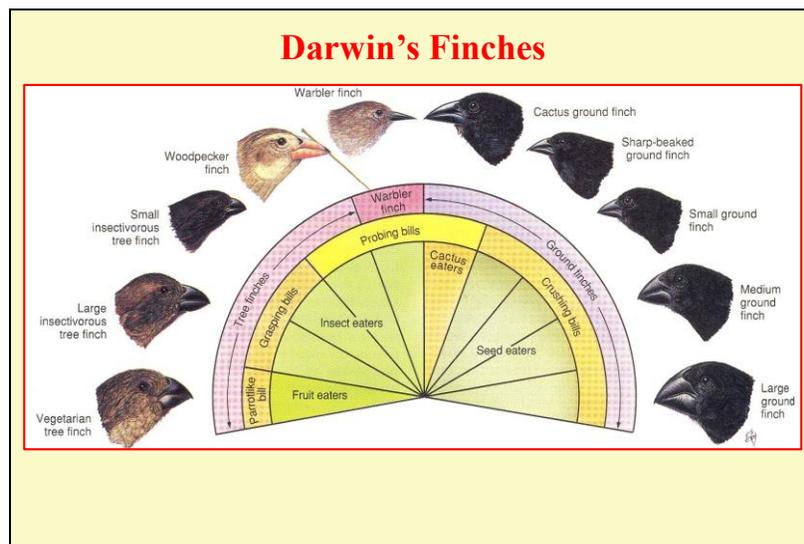
Ruth Padel, the great-great-grandchild of Charles Darwin, wrote a book of poems based on the writings of her ancestor: *Darwin: A Life in Poems* (2009). These are basically just the words of Darwin, broken up into lines of poetry. The following is the complete poem:

The deck is dazzle, fish-stink, gauze-covered buckets.  
Gelatinous ingots, rainbows of wet flinching amethyst  
and iridescent cream. All this  
means he's better; and working on a haul of lumpen light.

Polyps, plankton, jellyfish. Sea butterflies, the pteropods.  
'So low in the scale of nature, so exquisite in their forms!  
You wonder at so much beauty – created,  
apparently, for such little purpose!' They lower his creel

to blue pores of subtropical ocean. Wave-flicker, white  
as a gun flash, over the blown heart of sapphire.  
Peacock eyes, beaten and swollen,  
tossing on lazuline steel.

The pteropods are free-swimming sea snails also known as sea butterflies.  
Darwin had experienced sea sickness for the first part of the voyage and this episode occurred  
near the Caped Verde Islands when he was finally feeling better.



One of the foundations of the theory of evolution is the idea of natural selection. One of the clearest demonstrations of this concept involves the finches of the Galapagos Islands. "Darwin's finches," as they are now called, are similar except for their beaks, some of which are long and narrow and others short and strong. Recent research has shown how the beaks are specifically adapted to the diets available on the different islands. Some of the finches eat insects, others open seeds, and others suck the nectar from cactus flowers. Given the variation in the shape of the beak and the differential benefit to survival of different beaks in different ecologies, natural selection has made the beaks more and more appropriate to the islands on which the finches reproduce.

**Alfred Russel  
Wallace  
(1823-1913)**

Wallace was a naturalist who became interested in the way in which different species developed. He worked in the Malay Archipelago – islands are wonderful laboratories for studying speciation.



Wallace corresponded with Darwin and they realized that they had come to similar conclusions about the origin of different species. They both gave talks at the Linnaean Society in 1858. These were published as *On the tendency of species to form varieties; and on the perpetuation of varieties and species by natural means of selection*. This motivated Darwin to finish his book.

The title of the paper by Darwin and Wallace provides the two main factors underlying evolution: variation and selection.

The picture shows Wallace with two Birds of Paradise. The plumage of the male birds of these species develops into quite striking forms due to sexual selection. Wallace was not rich. He had to make his living by selling biological samples to rich collectors. Wallace never became as famous as Darwin. Most likely this was due to Darwin's writing – his two books *On the Origin of Species* (1859) and *The Descent of Man* (1871) are easy to read and speak of general principles. Wallace's *The Malay Archipelago* is far more specific. However, part of Darwin's fame may also have been due to his connections through his aristocratic and academic family.

Towards the end of his life Wallace became a believer in spiritualism, something which was very common in the early 1900s but something that detracted from his scientific prestige.



This is a part of the Wallace collection of golden birdwing butterflies in the Natural History Museum in London. These specimens show the individual variations that provide the raw material for natural selection. Photograph by Robert Clark in an article by David Quammen “The Man Who Wasn’t Darwin”

<http://ngm.nationalgeographic.com/2008/12/wallace/quammen-text>

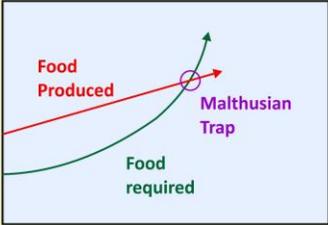
The first requirement for evolution is the spontaneous variation in the characteristics of offspring. Neither Darwin nor Wallace understood how this occurred. The main cause of variation is mutation in the gene sequence in the chromosomal DNA in the germ cells (sperm and ova).



Thomas Robert Malthus (1766-1834)  
mezzotint by John Linnell, 1834

### An Essay on the Principle of Population (1798)

“The power of population is so superior to the power of the earth to produce subsistence for man, that premature death must in some shape or other visit the human race.”



Both Darwin and Wallace had been impressed by Malthus’ ideas on population growth. He proposed that population increases geometrically until it exceeds the ability of the Earth to sustain it. At this time (the Malthusian trap) war, famine, and pestilence intervene to decrease the population. In the theory of evolution this idea became the competition for limited resources. Because of this competition, only the fittest survive to reproduce a subsequent generation.

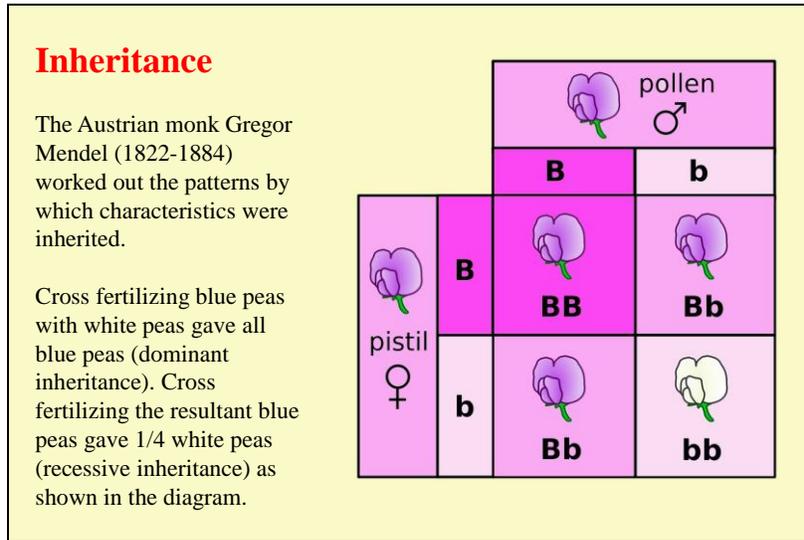
Evolution therefore rests on four principles:

- spontaneous variation
- competition for resources
- natural selection of traits leading to survival
- inheritance of selected traits

Natural selection is not creative. It is a negative force. The fecundity of nature leads to more life forms than can survive in a hostile world. Only those species that can generate more offspring continue into subsequent generations. Nature’s very abundance leads to the widespread death of individuals and the continual extinction of species that cannot compete: “Mother Nature is a wicked old witch.” (G. C. Williams)

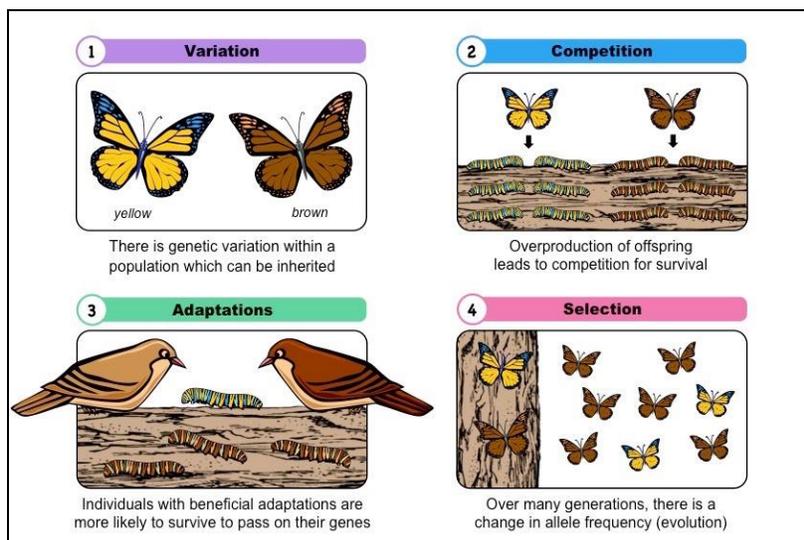
The creativity of evolution comes from the spontaneous variation in the characteristics of the offspring.

Variation creates. Competition selects.



A major requirement for evolution is the process whereby offspring inherit traits from their parents. The general idea of inheritance was well known, but the actual process was unknown to Darwin and Wallace. Mendel published his results in 1865 but they were completely ignored. Other researchers recognized the importance of his results in 1900.

Note that for this particular trait (flower color) the heterozygote Bb is the same as the homozygote BB. Sometimes the heterozygote may show some aspects of the non-dominant gene.

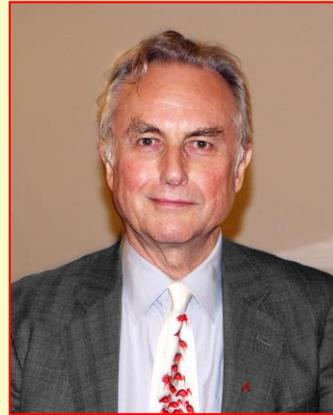


In summary the four essential aspects of evolutionary theory are

- variation in the characteristics of a population
- competition for resources such that only some of the population can be supported
- the selection of characteristics allowing their possessors to produce further offspring
- the inheritance of these selected characteristics.

### The Origin of Species

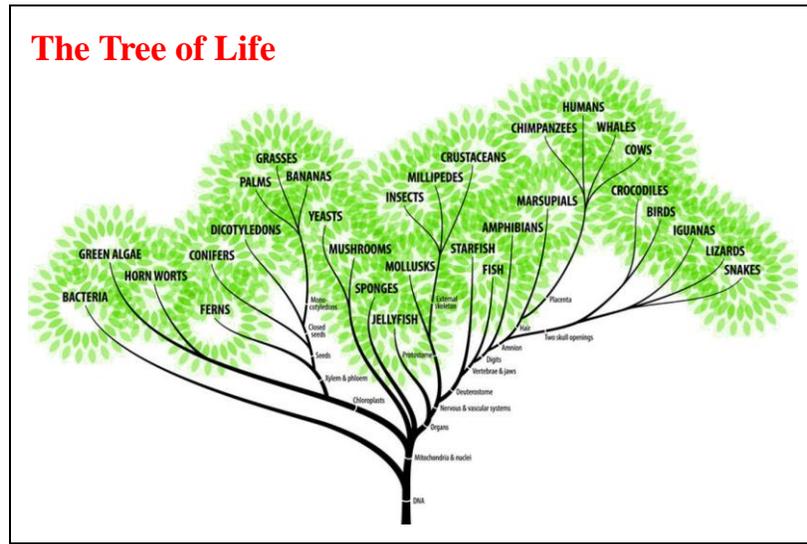
“Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved.”



Richard Dawkins, 2010

The reading from Darwin’s book is by Richard Dawkins, whose pink-flamingo tie is by his wife Lalla Ward. He also wears an atheist-pin in his lapel.

The phrase “by the Creator” was not present in the first edition, but only added in the subsequent editions. Richard Dawkins suggests Darwin bowed to religious pressure and quotes a letter wherein Darwin regretted the addition. However, the expression “breathed by the Creator into” echoes the wording of Genesis 2, and suggests some creative force more than spontaneous generation. Nevertheless, the laws of survival in the natural world seem a far cry from the purpose of a divine creator.



Evolution has resulted in a great variety of life forms from bacteria to plants to animals. Within the animal there are branches that are as disparate as the octopus, which is one of the mollusks, and the human being, which is one of the mammals. Over the years the tree has formed and lost many different branches. The branch of the dinosaurs has long since dropped off the living tree.

**Emma Darwin (1808-1896)**

In 1839 Darwin married Emma Wedgwood, a devout Christian. The marriage was a very loving one. Darwin’s investigations into the evolution of species led him away from Christianity. His religious skepticism was reinforced by his grief at the deaths of several of his children, which he could not reconcile with a loving God. Emily wrote her husband a note worrying about his salvation:

I thank you for all the affection, which makes my happiness more and more each day. But everything that concerns you concerns me. I should be most unhappy if I thought we would not belong to each other for eternity.



watercolor portrait of Emily, George Richmond, 1840

The text of the note was made into a poem by Ruth Padel. The full text follows:

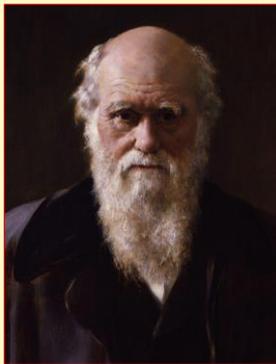
‘When I talk to you face to face I cannot say exactly what I wish.’ Her back aches all the time; she never goes out. His friend’s wife has died

in childbirth. ‘You say you are uncertain about Christian Revelation but your opinion is still not formed.’ He’s told her his discoveries:

she’d love him to be right in everything. She’s very afraid he’s not. ‘Faith is beyond our comprehension, not provable in the scientific way you like. I believe you sincerely wish to learn the truth. But there are dangers in giving up Revelation and Christ’s offer of eternal life. And in the sin —

I know you will have patience with your own dear wife — of ingratitude for His suffering, casting off what has been done. For you, for everyone. I do not wish an answer. It is satisfaction for me just to write. My fear is for the afterlife. I cannot say how happy

you make me in this one, nor how dearly I love you. I thank you for all the affection, which makes my happiness more and more each day. But everything that concerns you concerns me. I should be most unhappy if I thought we would not belong to each other for eternity.’



Charles Darwin (detail)  
John Collier 1881

He kept her note all his life. He must have said something then, but he wrote to her too on the outer fold. (No one knows when. He was maybe quite old. He wasn’t blind to where his thought led, what she thought she’d lose.) ‘When I am dead, know I have kissed and cried over this many times.’



This video intermission represents the huge variety of plankton in the sea  
Video is from *Ocean Drifters* by Richard Attenborough  
<https://vimeo.com/84872751>

Music is Delius *Aquarelles*

### Evolution of Evolution

1893: Weismann. Germ cells distinguished from somatic cells.

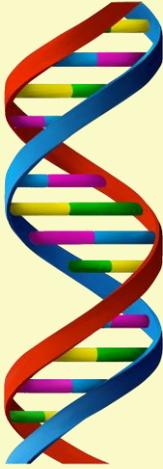
1900s: rediscovery of Mendelian genetics

1930: R. A. Fisher *The Genetical Theory of Natural Selection*

1953: James Watson and Francis Crick: *A Structure for Deoxyribose Nucleic Acid.*

1966: Marshall Nirenberg and others: the genetic code

2001: The Human Genome (Francis Collins, J. Craig Venter)



Germ cells carry inheritable information and are not influenced by what happens to the organism during development. Various factors determine the survival of an organism to reproductive age. However, the offspring can only inherit characteristics that are determined by information in the germ cells.

R. A. Fisher found population genetics and evaluated sexual selection processes. He was also a major contributor to statistics. He was involved (with many others) in the eugenics movement.

The concluding paragraph of the Watson and Crick paper is a marvel of understatement: It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material.

**Sexual Selection**

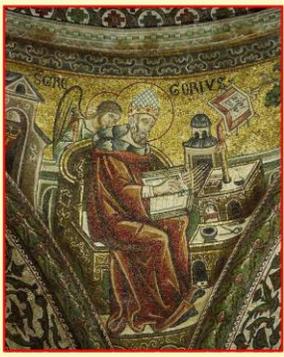
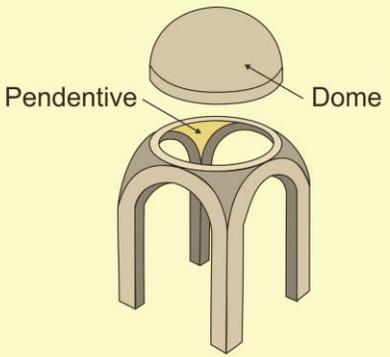
Evolution requires variation and selection. One of the difficulties with attributing variation to spontaneous changes of the genetic material is that most genetic mutations are not beneficial and many are lethal. Sexual selection whereby material is combined across the two parents provides a much safer means for variation.



Sexual selection brings another factor – desire – into evolution. Females can choose to mate with males who fulfill certain qualifications. This can lead to strange and wonderful effects, such as the tail of the peacock. However, it can lead to consciousness having an effect on evolution. Human females may choose males who are intelligent and considerate over others and thus promote the survival of those qualities in our species.

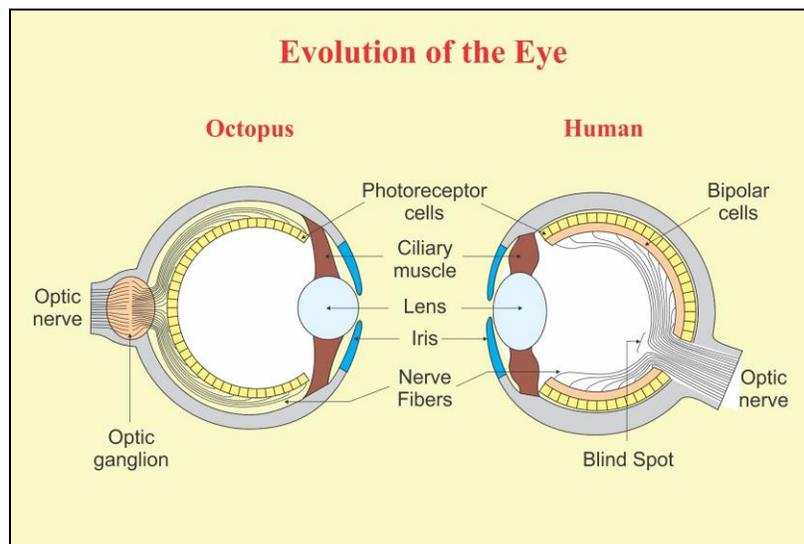
The peacock’s tail may not just be beautiful to the eye. It may indicate that the male who can flaunt such a tail has sufficient strength and health to overcome the burden of a tail which in itself decreases his ability to escape predators and requires great metabolic support.

**The Spandrels of San Marco**

One of the main problems of evolution is how to explain the development of a complex characteristic when the component parts of such a trait do not in themselves provide any benefit to survival. How for example does a wing develop? A proto-wing that does not yet allow flight does not enhance survival – so why would it develop?

Stephen Gould and Richard Lewontin suggested several mechanisms for developing such complex traits. One of them they termed the Spandrels of San Marco. Something with no present survival benefit may be selected together with something else that has survival value. Later on in evolution this will be available to combine with some other components to produce a complex trait. When placing a round dome on a rectilinear base, an architect will use curved triangular shapes called pendentives or spandrels. In San Marco cathedral, these were decorated with mosaics. However, the spandrels were not made for these mosaics. They were just a necessary part of fitting a round dome onto the square walls. The mosaics came later.



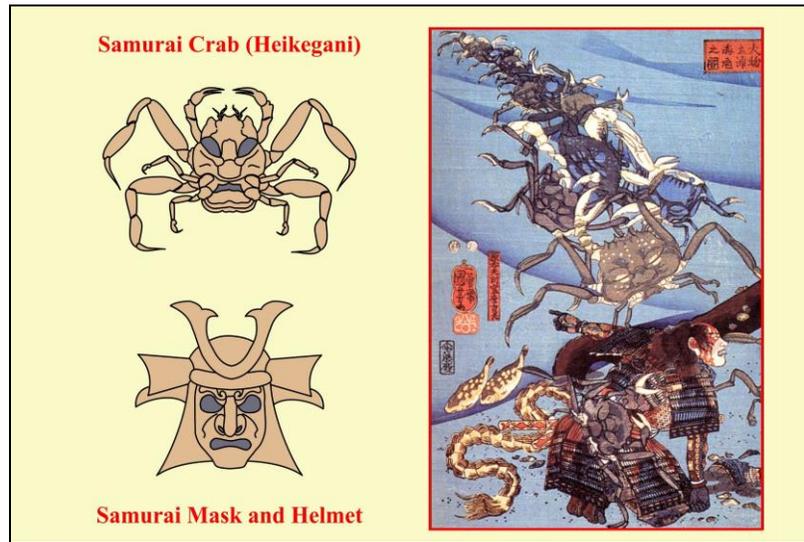
The octopus eye is remarkably similar to the human eye even though the two species are really far apart on the evolutionary tree. They both act as pinhole cameras to focus images on the photoreceptors. The octopus eye has a pupil, lens and muscle to operate the lens just like the human eye. However the light falls directly on the photoreceptor cells in the octopus eye. It does not have to go through the nerve cells as it does in the human eye.

The embryological development of the two eyes is different. The octopus retina develops from an invagination of the skin whereas the human retina develops from an outpouching of the brain.

There are two fascinating conclusions.

First, evolution can settle on a good design even in completely different species – “parallel evolution.”

Second, we are not sure whether there is any benefit to the backward structure of the human eye (or whether it is a design-flaw).



One must beware of evolutionary just-so stories – post hoc explanations for why animals develop in the way they did. (Kipling wrote many of these tales – such as how the elephant got its trunk). A flagrant just-so story was the explanation for why flamingos were pink. Supposedly this color camouflaged them when seen against the setting sun and thus preserved them from attack by predators who came in the evening to drink at the lake. Yet a flamingo of any color standing in front of the setting sun will appear black.

Another evolutionary just-so story is the explanation for the patterns on the shell of the samurai crab found in the Inland Sea of Japan. The dorsal shell looks very similar to the face of an angry samurai. A local myth is that these crabs contain the souls of the samurai warriors who drowned in a great sea battle in 1185. On the right is a print showing a drowning warrior changing into a crab. Evolutionary biologists have claimed that samurai crabs evolved to have this facial pattern because fisherman would not eat those that looked like samurai for fear they might disturb the ghosts. These crabs were therefore thrown back into the bay. These rejected crabs then survived to reproduce more crabs with human faces on their shells. This explanation is completely false. Since samurai crabs are only 1 to 2 cm in body size, they are too small to eat, and fishermen throw all the crabs back into the bay. There is no selection.



Recent evidence from a dig in Morocco suggest that Homo sapiens may have existed as long ago as 400,000 years and may have been more widely distributed in Africa than we thought.

<http://www.nature.com/news/oldest-homo-sapiens-fossil-claim-rewrites-our-species-history-1.22114>

**Fundamentalism** 

The five pillars of the Protestant Reformation were:

- sola scriptura
- sola gratia
- sola fide
- solus Christus
- solus Deo gratia



At the end of the 19<sup>th</sup> and beginning of the 20<sup>th</sup> Century, Protestants found themselves challenged by the new developments in science and art. They found comfort in a return to basics – “old-time religion.” Between 1910 and 1915, the Bible Institute of Los Angeles published a series of essays on the basic beliefs of Protestant Christianity entitled *The Fundamentals*. These essays affirmed that the Bible was inspired by God and should be accepted as literal truth.

Like heliocentrism, evolution questioned our belief that humanity was special. The Christian church had great difficulty accepting that human beings had not been created by God but had developed from other animals. This was especially true of that branch of Protestantism that had decided to return to the fundamentals of the Reformation.

The five pillars were:

by scripture alone – Biblical inerrancy

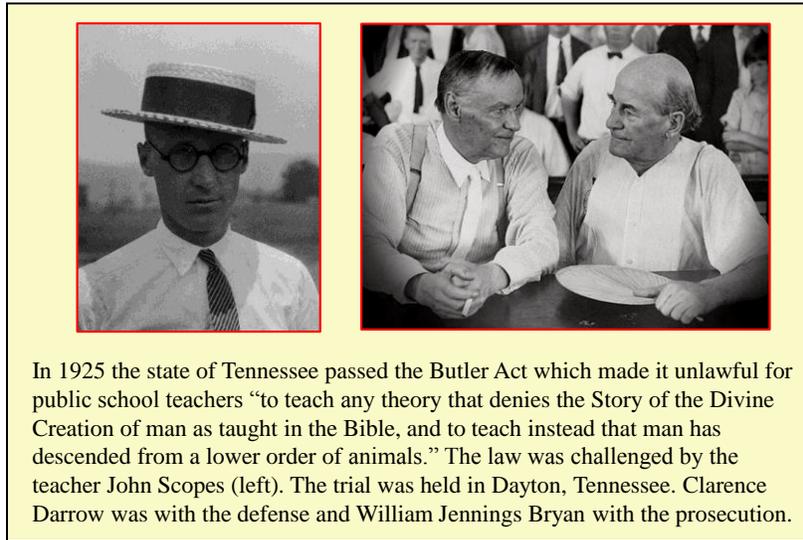
by grace alone – salvation is granted by God not earned by man

by faith alone - not by good works nor by indulgences

through Christ alone – Christianity is the only path to salvation

for the glory of God – not for any temporal power

The song “Give me that old time religion” is sung by Leslie Uggams. It is used at the beginning of the movie *Inherit the Wind*.



Scopes was a 24-year old unmarried teacher. He volunteered to be the test case for the American Civil Liberties Union to challenge the Butler Law.

Clarence Darrow was the most famous trial lawyer in the United States. He was 68 years old. William Jennings Bryan was three times a candidate for the Presidency. He served as Secretary of State under Woodrow Wilson. He was 64 years old. The two opponents knew each other. They had both supported progressive causes. However, Bryan was a fundamentalist Christian and Barrow as a confirmed atheist.

The trial was held in July and the temperature in the courthouse was extremely high. The judge allowed the lawyers to take off their coats.



The trial lasted ten days. The judge ruled that defense expert-witnesses on the theory of evolution were irrelevant to the issue of the trial – whether the government could tell teachers what they should teach. The only way that Darrow could make his points clearly was to examine Bryan as a witness on the Bible. Due to the heat and the crowds, the judge adjourned the trial to the lawn in front of the courthouse for Darrow’s examination of Bryan.



Jerome Lawrence and Robert E. Lee wrote *Inherit the Wind*, a fictionalized account of the Scopes Trial in 1955. The title comes from Proverbs 11:29  
He that troubleth his own house shall inherit the wind: and the fool shall be servant to the wise of heart.

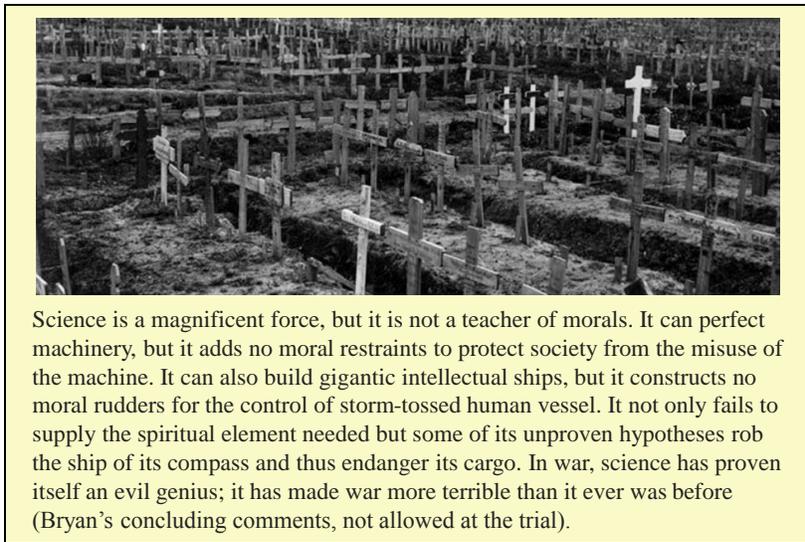
The authors were concerned more with the right to think than with the rightness of evolution. The political context of the time the play was written was McCarthyism and the persecution of those who had supported communism.

Nevertheless the play does reasonable justice to the trial and often quotes from the transcripts. I shall present two clips from the 1960 movie version starring Spencer Tracy as Drummond (Darrow) and Fredric March as Brady (Bryan). Gene Kelly portrayed the reporter (based on Henry Mencken), Dick York the character based on Scopes and Harry Morgan the judge.

The first clip presents an imagined scene of Darrow and Bryan talking on the front stoop of the hotel. The two had actually been friends and the scene plays well. Bryan says that religion provides comfort. Darrow tells how one becomes disillusioned when what we realize that our treasured beliefs are not true.



The second clip is from the trial. The comments from Darrow as to what might have happened had Joshua actually enjoined the sun to stand still make no sense at all. But then miracles do not have to make sense.



Bryan was not allowed to provide his summation to the jury. He handed out his speech to the newspapers. His comment are forceful. The trial was in the aftermath of World War I. No one had yet understood the moral responsibility of science. The problem returned in World War II with the development of the atomic bomb.

The comments in the slide continued:

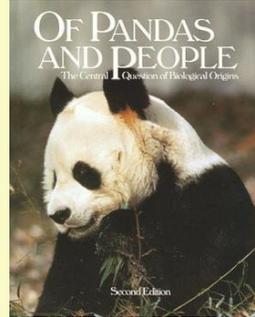
Man used to be content to slaughter his fellowmen on a single plane, the earth's surface. Science has taught him to go down into the water and shoot up from below and to go up into the clouds and shoot down from above, thus making the battlefield three times as bloody as it was before; but science does not teach brotherly love.

### Aftermath of the Scopes Trial

Scopes was found guilty and fined \$100. Because of technicalities, the supreme court of Tennessee set aside the verdict. The Butler Act was not repealed until 1967.

Many states enacted similar laws against teaching evolution. In the 1980s these came to trial, and were defeated on the basis of the Establishment Clause of the First Amendment to the US Constitution forbidding the government from establishing any one religion.

In the 1990s the idea of intelligent design was proposed as an alternate, scientific non-religious theory of the origins of man. The School Board of Dover County, Pennsylvania, proposed that students be made aware that evolution was not fully proven and that intelligent design (as described in the book *Of Pandas and People*) was another way to look at the origins of life.



The actual text of the First Amendment is

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.

In Dover County teachers were required to read the following to their students:

Because Darwin's Theory is a theory, it is still being tested as new evidence is discovered. The Theory is not a fact. Gaps in the Theory exist for which there is no evidence. A theory is defined as a well-tested explanation that unifies a broad range of observations. Intelligent design is an explanation of the origin of life that differs from Darwin's view. The reference book *Of Pandas and People*, is available for students to see if they would like to explore this view in an effort to gain an understanding of what intelligent design actually involves. As is true with any theory, students are encouraged to keep an open mind. The school leaves the discussion of the origins of life to individual students and their families.

The idea of the title of the book *Of Pandas and People* is basically that the red panda and the giant panda are biologically very distinct – the giant panda is a bear and the red panda is related to racoons. However, they have similar facial appearance, they both feed on bamboo and they both have a strange “false thumb” (helpful for holding bamboo shoots). (We have already considered a far more striking example of parallel evolution in the eyes of the octopus and the human.) The main argument of the book is that, since the analogies between the “thumbs” of the red and giant panda are not due to common descent, all anatomical arguments in favour of common descent should be regarded as suspect.

Further discussion is at

<https://paulbraterman.wordpress.com/2014/07/05/the-problem-with-pandas/>

**Intelligent Design**

Arguments for intelligent design are

1. the low probability of benevolent mutations.
2. the “irreducible complexity” of evolved systems



The Dover School Board was challenged in 2005 in the *Kitzmiller vs Dover* trial. The final judgment was that

- (i) Intelligent design is not a science in that it is based on supernatural intervention, it is not based on observation or experiment, and its claims are not testable.
- (ii) Intelligent design is simply another name for creationism, and is basically the restatement of the Christian story of human origins. As such its mandatory teaching is against the Establishment Clause.

The full transcript of the trial judgment in Dover County is available at

[https://www.aclu.org/files/images/asset\\_upload\\_file577\\_23137.pdf](https://www.aclu.org/files/images/asset_upload_file577_23137.pdf)

One of the witnesses for the defence was Professor Behe who proposed

By irreducibly complex I mean a single system which is composed of several well-matched, interacting parts that contribute to the basic function, wherein the removal of any one of the parts causes the system to effectively cease functioning. An irreducibly complex system cannot be produced directly by slight, successive modifications of a precursor system, because any precursor to an irreducibly complex system that is missing a part is by definition nonfunctional . . . Since natural selection can only choose systems that are already working, then if a biological system cannot be produced gradually it would have to arise as an integrated unit, in one fell swoop, for natural selection to have anything to act on.

### The Special Creation of the Human Soul

In the Encyclical *Humani Generis* of 1950, Pope Pius XII stated that “the origin of the human body from pre-existing and living matter” may be considered by the faithful, but was not yet proven by the facts. He affirmed that “the Catholic faith obliges us to hold that souls are immediately created by God.”

In 1996, Pope John-Paul II recognized evolution as “more than a hypothesis.” In 2004, he reaffirmed that “the emergence of the first members of the human species ... represents an event that is not susceptible of a purely natural explanation and which can appropriately be attributed to divine intervention.”

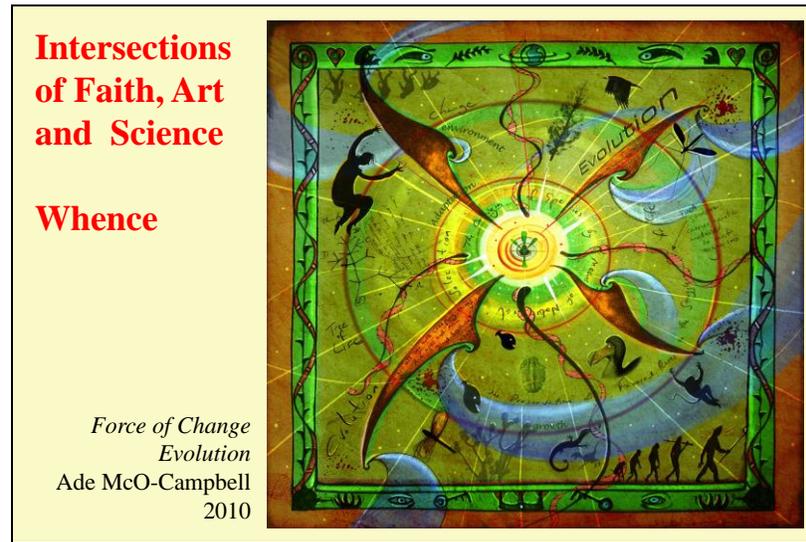


Pius XII (1876-1958)  
elected pope in 1939

A longer excerpt from the 2004 address of Pope John-Paul II entitled *Human Persons Created in the Image of God*:

The structures of the world can be seen as open to non-disruptive divine action in directly causing events in the world. Catholic theology affirms that that the emergence of the first members of the human species (whether as individuals or in populations) represents an event that is not susceptible of a purely natural explanation and which can appropriately be attributed to divine intervention. Acting indirectly through causal chains operating from the beginning of cosmic history, God prepared the way for what Pope John Paul II has called “an ontological leap...the moment of transition to the spiritual.” While science can study these causal chains, it falls to theology to locate this account of the special creation of the human soul within the overarching plan of the triune God to share the communion of Trinitarian life with human persons who are created out of nothing in the image and likeness of God, and who, in his name and according to his plan, exercise a creative stewardship and sovereignty over the physical universe.

We shall return to the church’s concept that the soul is specially created by God next week.



The illustration is available in large size from

<https://upload.wikimedia.org/wikipedia/commons/9/93/Force-of-change-evolution.jpg>

The diagram of the tree of life and the quotation on the left come from Darwin's Notebook B

[http://www.age-of-the-sage.org/evolution/charles\\_darwin/tree\\_of\\_life.html](http://www.age-of-the-sage.org/evolution/charles_darwin/tree_of_life.html)

I think Case must be that one generation then should be as many living as now. To do this & to have many species in same genus (as is) requires extinction. Thus between A & B immense gap of relation. C & B the finest gradation, B & D rather greater distinction. Thus genera would be formed. - bearing relation to ancient types with several extinct forms.

Note the drops of blood on the illustration. The fecundity of nature leads to more life forms than can survive in a hostile world. Only those species that can generate offspring continue into subsequent generations. Nature's very abundance leads to the widespread death of individuals and the continual extinction of species that cannot compete successfully. However, this process results in the adaptation of different organisms to different environments.