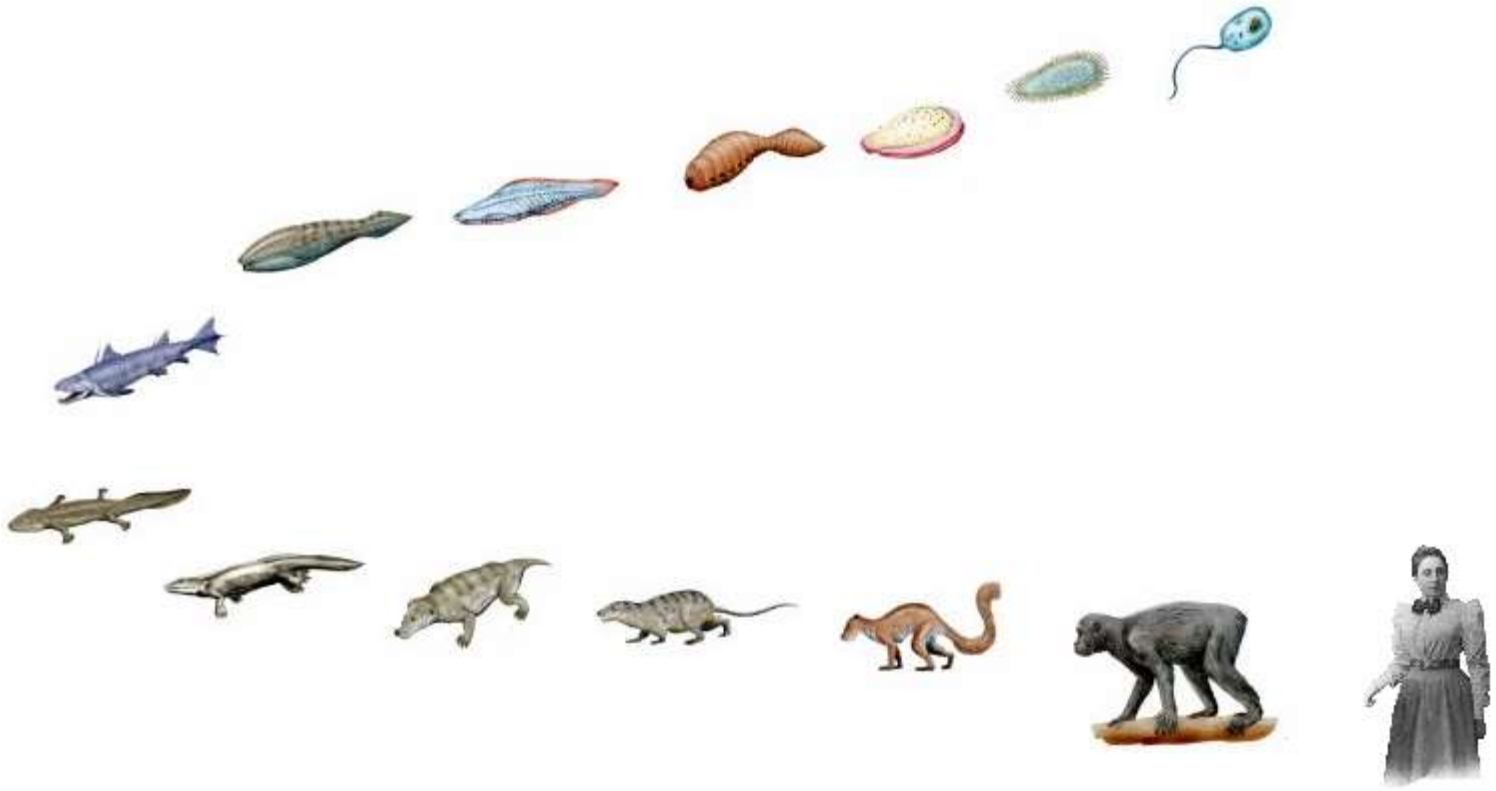


Religion and Evolutionary Biology

Is humanity an accident, or made in God's image?

Ancient theories of origins

- Plato was a (kind of) creationist, teaching that biological species were abstract ‘Forms’ existing in a realm that could only be accessed through rational thought.
- Actual organisms were created by a (divine) craftsman (‘demiurge’), using the Forms as templates.
- The species were therefore fixed, since the Forms are eternal and unchanging.

Teleology vs. chance

- Aristotle also rejected the idea that living organisms were due to chance, as did the Stoics.

- It seemed clear to these thinkers that organisms, and especially parts of organisms, had *purposes*.

E.g. Teleology in Socrates

With such signs of forethought in these arrangements, can you doubt whether they are the work of chance or design?

(concerning sex organs being for the purposes of procreation, he concludes:

Undoubtedly these too look like the contrivances of one who deliberately willed the existence of living creatures.

-- as reported by Xenophon in *Memorabilia* (I, iv, 6-7)

Ancient atomism

- Atomists rejected the notions of design and purpose in biology, since the world was simply atoms moving in the void. There were no gods or other beings to do the designing.

- Atomists appealed to chance to account for the first organisms. Most of these would have been ‘monsters’, quickly eliminated by natural selection. The relatively few viable organisms are the ones that remain with us.

St. Augustine (354-430 AD)

(“The African Doctor”. Catholic bishop, philosopher, theologian. Very influential in the middle ages, and among Catholics and Protestants today.)

- Augustine understood that the meaning of a text is the author’s intention, which may be different from a literal reading. E.g. There may be metaphors, hyperbole, poetic license, etc.
- Augustine thought that there couldn’t be any contradiction between valid science and scripture properly interpreted. (Aquinas agreed with this.)
- Hence scripture should be interpreted in a manner that is consistent with (proven) science.

St. Augustine (354-430 AD)

"Often, a non-Christian knows something about the earth, the heavens, and the other parts of the world, about the motions and orbits of the stars and even their sizes and distances, ... and this knowledge he holds with certainty from reason and experience. It is thus offensive and disgraceful for an unbeliever to hear a Christian talk nonsense about such things, claiming that what he is saying is based in Scripture. We should do all we can to avoid such an embarrassing situation, which people see as ignorance in the Christian and laugh to scorn."

[Augustine, *The Literal Interpretation of Genesis*]

Lamarck

- Lamarck developed the first modern theory of evolution (1802).
- At that time, evolution was known as ‘transmutation’, and was the view that descendents could be very different from their ancestors, to the extent of being distinct kinds.
- Thus transmutation was opposed to Plato’s and Aristotle’s essentialist view of species.
- There was some kind of ‘life force’ (*Le pouvoir de la vie*, *la force qui tend sans cesse à composer l'organisation*) that drove organisms to evolve into ever more specialised forms. Yet, oddly perhaps, this life force was *purely physical*, and grounded in the principles of alchemy.
- Lamarck’s theory included ongoing spontaneous generation of simple living organisms, and inheritance of acquired characteristics.

“The rapid motion of fluids will etch canals between delicate tissues. Soon their flow will begin to vary, leading to the emergence of distinct organs. The fluids themselves, now more elaborate, will become more complex, engendering a greater variety of secretions and substances composing the organs.

Lamarck, *Histoire naturelle des animaux sans vertebres*, 1815.

George Cuvier (1769 – 1832)

- French biologist of great authority and prestige
- Christian
- Rejected transmutation, saying that:
  - the anatomic parts of living organisms are too interdependent—too finely designed—for the whole to evolve piecemeal
  - the fossil record showed no sign of transitional forms.

- N.B. transmutation was seen as a materialist idea, and how could material processes accomplish simultaneous, coordinated changes across the organism?

George Cuvier (1769 – 1832)

- Cuvier was a fossil expert, and saw *many layers of rock, each containing a different set of species*. Each was wiped out by a flood, he thought, and then new species were created (by God) in the next epoch.
- (Noah's flood was merely the last of many such floods.)

Geology and the book of Genesis

- Christian geologists in Britain and America tried to reconcile geological knowledge with the Genesis account. In 1814, Scottish natural theologian Thomas Chalmers proposed that a gap existed in the Genesis narrative between the book's first and second verses. This opened unlimited time for geologic epochs between "the beginning" and God's creation of current species.
- Scottish geologist Hugh Miller suggested that the days of creation in Genesis symbolized geologic epochs. Yale University geologists Benjamin Silliman and James Dwight Dana (a father-in-law, son-in-law team) championed the "day-age theory" in the United States.

Awareness of species extinctions

- By the 1820s it became clear that species both appeared and disappeared over time.
- There was simply no place where the newly appearing species could have migrated from: They must truly be new.

Buckland, 1836

- Buckland envisioned a good God creating a progressive succession of species, each perfectly designed for the climate of its particular geologic epoch and all pointing toward the ultimate creation of humans in God's image when conditions became right.

(When encountering an alleged miracle of martyr's blood perpetually wetting the floor of a Roman Catholic cathedral, Buckland tested the hypothesis by licking the spot with his tongue. "Bat urine," the Anglican cleric pronounced.)

Adam Sedgwick, 1845

"Now, I allow (as all geologists must) a kind of progressive development. For example, the first fish are below the reptiles; and the first reptiles older than man ... I say, we have successive forms of animal life adapted to successive conditions (so far, proving design), and not derived in natural succession in the ordinary way of generation" [i.e. by transmutation or organic evolution].

- According to Sedgwick, God lovingly designed new populations perfectly fitting the ever-cooling, ever-improving terrestrial climate while mercifully destroying the preceding populations when they no longer fit.
- This was known as 'catastrophism'

Idealists

- Idealists (e.g. Louis Agassiz, Richard Owen) saw the connections and similarities between successive organisms (during the history of life) as the result of the *developing ideas* of their creator.
- E.g. motor vehicles have developed, but later models develop out of earlier ones at the level of thoughts, or ideas, not physically. There is no *transmutation* of motor vehicles.
- For Agassiz, the progressive appearance of increasingly specialized species solely reflected their origin in the mind of God, not the impact of environmental factors or evolution.

Charles Lyell

- Lyell is known for his role in establishing ‘uniformitarian’ geology. Also known as “steady state vulcanism”. No overall direction to geological history, the past basically the same as the present.
- He had at least two motivations.
  - He thought that science should only employ known naturalistic causes operating in observable ways to explain natural phenomena. Invoking larger-than-life past catastrophes smacked of religion.
  - He believed that a nondirectional geologic history would undermine Lamarckism, which he saw as dangerously subversive of human dignity.

- Uniformitarianism explained geological features in terms or ordinary processes we can observe now, operating over vast periods of time.
- In *Principles of Geology*, Lyell offered the gradualist view that God (or a “Presiding Mind”) continually created species to fit local environments.
- According to this view, those species would spread out from their “centres or foci of creation” to occupy suitable territory for so long as environmental conditions permitted, and then become extinct.

Darwin and Lyell

- Darwin and Lyell were close friends and allies.
- Darwin read Lyell's *Principles of Geology* on the Beagle expedition, and became a convert to uniformitarianism.
- Darwin spent much of his time during the Beagle expedition looking for the Lyellian "centres of creation" for individual species, and interpreting the distribution of various plants and animals accordingly.

Other theories of transmutation

- There were other theories of transmutation, e.g. the publisher Robert Chambers wrote *Vestiges of the Natural History of Creation*, published anonymously in England in 1844.
- A popular best seller, but criticised by scientists for its scientific errors. (Trashed by Sedgwick, Lyell, etc.)
- Prepared the ground for Darwin's *Origin*.

Distanced himself from Lamarck

- "Now it is possible that wants and the exercise of faculties have entered in some manner into the production of the phenomena which we have been considering; but certainly not in the way suggested by Lamarck, whose whole notion is obviously so inadequate to account for the rise of the organic kingdoms, that we only can place it with pity among the follies of the wise."
- Chambers, *Vestiges* (1844), p. 231.

Charles Darwin

As a geologist, Darwin was initially a catastrophist like Sedgwick, but then converted to Lyell's uniformitarianism during his voyage on the Beagle (1831-1836).

He rejected Lyell's views in biology however, after observing Cape Verde and Galapagos and comparing them with the nearby mainlands.

Galapagos Islands

Close to America

Cape Verde Islands

Close to Africa

Galapagos - Cape Verde comparison

- Similar geography
  - Volcanic origin
  - climate
  - soil
  - size, height

- Different species
  - Galapagos species similar to *American*
  - Cape Verde species similar to *African*

“The most striking and important fact for us in regard to the inhabitants of islands, is their affinity to those of the nearest mainland, without being actually the same species. Numerous instances could be given of this fact. I will give only one, that of the Galapagos Archipelago, situated under the equator, between 500 and 600 miles from the shores of South America. Here almost every product of the land and water bears the unmistakeable stamp of the American continent. There are twenty-six land birds, and twenty-five of those are ranked by Mr Gould as distinct species, supposed to have been created here; yet the close affinity of most of these birds to American species in every character, in their habits, gestures, and tones of voice, was manifest. ...

(Darwin, *Origin*, Chapter XIII, section 4.)

“Why should this be so? why should the species which are supposed to have been created in the Galapagos Archipelago, and nowhere else, bear so plain a stamp of affinity to those created in America? There is nothing in the conditions of life, in the geological nature of the islands, in their height or climate, or in the proportions in which the several classes are associated together, which resembles closely the conditions of the South American coast: in fact there is a considerable dissimilarity in all these respects.

“On the other hand, there is a considerable degree of resemblance in the volcanic nature of the soil, in climate, height, and size of the islands, between the Galapagos and Cape de Verde Archipelagos: but what an entire and absolute difference in their inhabitants! The inhabitants of the Cape de Verde Islands are related to those of Africa, like those of the Galapagos to America. **I believe this grand fact can receive no sort of explanation on the ordinary view of independent creation; whereas on the view here maintained, it is obvious that the Galapagos Islands would be likely to receive colonists**, whether by occasional means of transport or by formerly continuous land, from America; and the Cape de Verde Islands from Africa; and that **such colonists would be liable to modifications; the principle of inheritance still betraying their original birthplace.**”

Darwin, 1844 essay

"The creationist [must consider these] as so many ultimate facts ... He can only say that it so pleased the Creator…that the inhabitants of the Galapagos Archipelago should be related to those of Chile…and that all its inhabitants should be totally unlike those of the similarly volcanic and arid Cape de Verde and Canary Islands. ... but it is absolutely opposed to every analogy, drawn from [physics] that facts, when connected, should be considered as ultimate and not the direct consequence of more general laws."

(N.B. See the similarity to Copernicus's arguments?)

- This is evidence of transmutation, at least on a small scale. (It shows that Galapagos finches are probably descended from a different species of finch in South America).

- But what *mechanism* drives evolutionary change?

Natural Selection, 1838

- Darwin discovered selection after reading Malthus on population growth and catastrophe.

- "As many more individuals of each species are born than can possibly survive; and as, consequently, there is a frequently recurring struggle for existence, it follows that any being, if it vary however slightly in any manner profitable to itself, under the complex and sometimes varying conditions of life, will have a better chance of surviving, and thus be naturally selected. From the strong principle of inheritance, any selected variety will tend to propagate its new and modified form." (*Origin*, 1859)

William Paley's IBE 'design argument' (1802)

1. A watch shows the marks of design, such as having parts with obvious purposes, etc.
2. Watches couldn't have come about any other way. (E.g. not by self organisation.)

∴ Watches are obviously designed

(And similar reasoning applies to living organisms.)

Were there no example in the world, of contrivance, except that of the eye, it would be alone sufficient to support the conclusion which we draw from it, as to the necessity of an intelligent Creator. It could never be got rid of; **because it could not be accounted for by any other supposition** ...

Its coats and humours, constructed, as the lenses of a telescope are constructed, for the refraction of rays of light to a point, which forms the proper action of the organ; the provision in its muscular tendons for turning its pupil to the object, similar to that which is given to the telescope by screws ... these provisions compose altogether an apparatus, a system of parts, a preparation of means, so manifest in their design, so exquisite in their contrivance, so successful in their issue, so precious, and so infinitely beneficial in their use, as, in my opinion, to bear down all doubt that can be raised upon the subject. (Paley, *Natural Theology,* 1802)

"I do not think I hardly ever admired a book more than Paley's 'Natural Theology'. I could almost formerly have said it by heart."

Darwin, Letter to John Lubbock, 1859

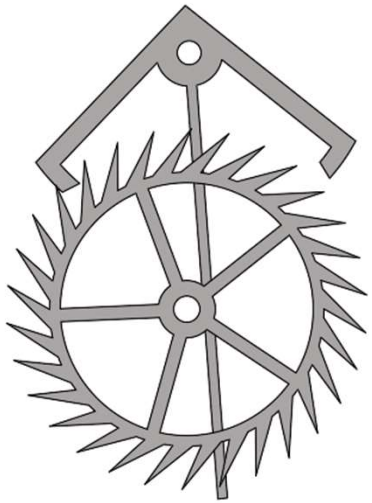
- Nevertheless, Darwin believed that the theory of natural selection allowed the watch-like mechanisms of life to be explained without conscious design.

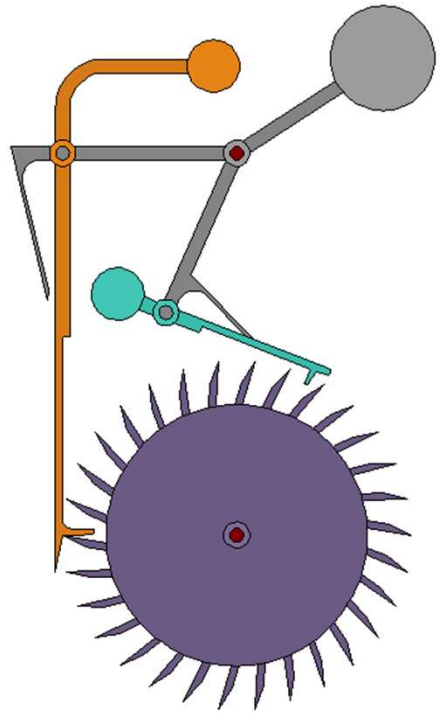
Response to Paley's Watch argument

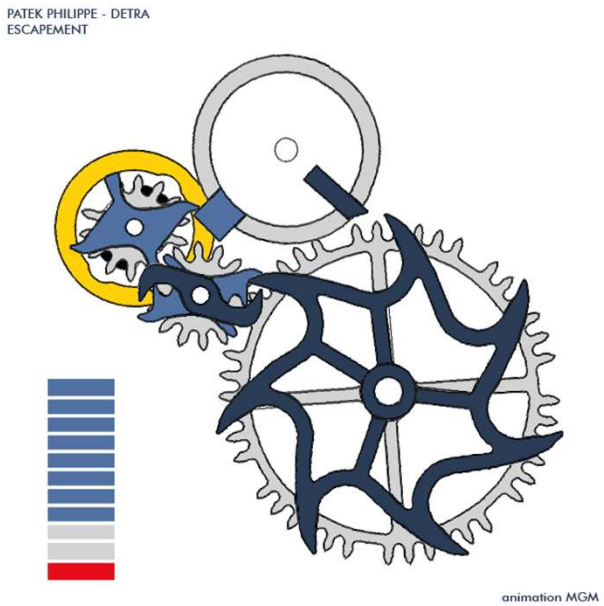
"Suppose, however, that any one had been able to show that the watch had not been made directly by any person, but that it was the result of the modification of another watch which kept time but poorly; and that this again had proceeded from a structure which could hardly be called a watch at all—seeing that it had no figures on the dial and the hands were rudimentary; and that going back and back in time we came at last to a revolving barrel as the earliest traceable rudiment of the whole fabric. And imagine that it had been possible to show that all these changes had resulted, first, from a tendency of the structure to vary indefinitely; and secondly, from something in the surrounding world which helped all variations in the direction of an accurate time-keeper, and checked all those in other directions; then **it is *obvious* that the force of Paley's argument would be gone**."

Thomas Huxley, *Criticisms on "The Origin of Species"*, 1872

Escapement mechanisms







- Is it *obvious* that these could arise in the manner envisaged by Huxley? (Cuvier's problem of interdependent parts?)

Alfred Russel Wallace (1823-1913)

- Wallace was also a believer in transmutation (converted, to some extent, by reading Chambers).
- In 1858 Wallace wrote his 'Ternate Essay' in which he proposed a mechanism of natural selection, very similar to Darwin's, as a cause of evolution.

He sent the essay to Darwin for his comments, and to pass on to Lyell if he liked it.

Human evolution

- Darwin and Wallace remained on good terms until Darwin died in 1882, although they differed on human evolution.
- In 1869 Wallace published a paper on human evolution that appealed to the action of an "overruling intelligence" to produce humans.
- Even before he read the paper, Darwin wrote to his friend:

  "I hope you have not murdered too completely your own and my child."

- Lyell agreed with Wallace about the evolution of the human mind. Darwin's view of human evolution in *The Descent of Man* (1871) seemed rather implausible at the time.

- Among clerics, some were neutral, many hostile. A few were enthusiastic.
- Darwin's health was poor, and it fell largely to Thomas Huxley, "Darwin's bulldog", to defend the *Origin* in public debates. Huxley was a self-described agnostic, and hostile to religion.

Clerical opposition to Darwinism

- A prominent critic of the *Origin* was the geologist (and Reverend) Adam Sedgwick. Sedgwick liked parts of the book, but was very unhappy with the idea of new species being formed through natural selection. This seemed to contradict God's design.

  "It repudiates all reasoning from final causes; and seems to shut the door on any view (however feeble) of the God of Nature as manifested in His works. From first to last it is a dish of rank materialism cleverly cooked and served up"

- Robert G. Ingersoll, (1833–1899). An attorney, and called “the unchallenged king of American orators”.

  This century will be called Darwin’s century. He was one of the greatest men who ever touched this globe. He has explained more of the phenomena of life than all of the religious teachers. Write the name of Charles Darwin on the one hand and the name of every theologian who ever lived on the other, and from that name has come more light to the world than from all of those. His doctrine of evolution, his doctrine of the survival of the fittest, his doctrine of the origin of species, has removed in every thinking mind the last vestige of orthodox Christianity. …

  Charles Darwin destroyed the foundation of orthodox Christianity. There is nothing left but faith in what we know could not and did not happen. Religion and science are enemies. One is a superstition; the other is a fact. One rests upon the false, the other upon the true. One is the result of fear and faith, the other of investigation and reason.

Clerical acceptance of Darwinism

- In 1860 a group of liberal theologians and clergymen wrote in support of Darwin's theory. Their most famous member was Baden Powell, the founder of the Scouts (and also a scientist).
- Powell was opposed to primary causation in natural history. A miracle would mean that God was breaking his own laws, which is absurd.
  - God would surely endow his creation with sufficient powers to produce all forms of life by itself, without any divine meddling.

Asa Gray

- Gray was an American friend of Darwin and Hooker. Gray was a botanist of the first rank and a Christian.
- Gray supported Darwin's theory, e.g. By arranging for the *Origin* to be printed in America.
- Gray tried unsuccessfully to persuade Darwin that his theory was consistent with life being created by God.

“However much we may wish it, we can hardly follow Professor Asa Gray in his belief that “variation has been led along certain beneficial lines,” like a stream “along definite and useful lines of irrigation.” If we assume that each particular variation was from the beginning of all time preordained, then that plasticity of organisation, which leads to many injurious deviations of structure, as well as the redundant power of reproduction which inevitably leads to a struggle for existence, and, as a consequence, to the natural selection or survival of the fittest, must appear to us superfluous laws of nature. On the other hand, an omnipotent and omniscient Creator ordains everything and foresees everything.”

Darwin, *The Variation of Animals and Plants Under Domestication*, 1868, p. 428.

“I cannot see, as plainly as others do, & as I sh^{d} wish to do, evidence of design & beneficence on all sides of us. There seems to me too much misery in the world. …

… On the other hand I cannot anyhow be contented to view this wonderful universe & especially the nature of man, & to conclude that everything is the result of brute force. I am inclined to look at everything as resulting from designed laws, with the details, whether good or bad, left to the working out of what we may call chance. Not that this notion *at all* satisfies me …”

Darwin, writing to Asa Gray, May 22 1860.