

Natural selection and the effects of environmental change



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Human beings-as is every form of life on Earth-are the product of millions of years of random, unintentional mutations to the DNA of, at every stage, a less complex and more poorly suited organism. It is a process whereby something of low entropy keeps decreasing; whereas in the physical world, the general rule is the opposite, and things become less ordered as time unfolds, increasing in entropy¹. There exists many qualms as to the origin of life on Earth, how it got here in the first place being the question scientists fail currently to categorically answer.

But the defiant achievement to be even at the starting line is just the first improbable event (although a different topic to evolution) that allows such biodiversity, immensely complex structures such as the human brain (the most complex structure, in the universe, known to man) and a universal law, describing how every known organism got to the state it is at, to even exist at all, let only be, via completely unconscious mutations to DNA (a nucleic acid), malleable to its environment. The theory of evolution began with the work of an Austrian born scientist, whom used the freedom of being a monk to carry out genetic research in plants. His work provided the means to eliminate the idea of blending inheritance (this theory possessed flaws that simply don't match reality, such as the differentiation in human, say, height, would gradually decrease, thus over many generations everyone get more like each other, to an eventual crescendo where everyone are clones of one another, this theory failed also to answer how several generations later, a trait unseen for 5 generations, suddenly turns up). This was a concept widely accepted until the importance of Mendel's work was discovered in the early 20th century (which meant his work, although it existed, was never used in

Lamarck's theory). It also helped dispel an earlier theory Darwin had called Pangenesis.

Fig. 1 Many theories have been suggested, in an attempt to understand reproduction, and its role in passing on hereditary traits. One of the most famous theories, although wrong, was Jean-Baptiste Lamarck's theory, the first logical and consistent theory of evolution. He noticed that life got more complex, he called this the complexifying force, he also noticed that life seemed to be very much adapted to its environment; he called this the adaptive force. But he made fundamental mistakes; he disregarded modern chemistry, and ran with traditional alchemical science that rested on the foundation of the world being made of 4 elements, earth, water, air and fire.

He believed that animals got more complex as they learned certain things, while living, that enabled them to be more suited to their environment, such as the giraffe learning a long neck was advantageous, so it grew longer, this trait was passed to its offspring, the organism got more complex as it learned to be better suited. Whereas Darwinian evolution, basic, simple organisms² are forced to grow more complex (in this context, that of the most basic life forms, complexity would be something such as a way of absorbing more light to carry out a greater rate of photosynthesis) as the DNA gets mutated, the more simple and less capable organisms cannot compete, and get wiped out as the organisms in a slightly more advantageous position surpass the more simple life form's ability. Lamarck saw adaptation as something intentional, each stage with there being a goal in mind. Darwinian evolution is a process that is governed by random

mutations, but the natural selection process is completely non-random, the <https://assignbuster.com/natural-selection-and-the-effects-of-environmental-change/>

organism with a mutation acquired by random that is advantageous is the more suited organism, and is obviously a stronger candidate to proceed and reproduce and for the product of that reproduction to have this mutated DNA structure that corresponds to a benefiting new trait. Examples of natural selection can be seen today, an example is of the Halibut, a flat fish³.

It became more beneficial for the fish to hide in the sand, as a fish is more likely to be eaten in a race with the predator, but if the predator can't see the prey, there is no race to be had. Via mistakes in DNA replication the 'piece of coding' in the DNA that codes for the development of the eye in the Halibut contained mistakes and so over many generations the "eye migrated around the other side" (-Richard Dawkins) so instead of one eye being redundant, and looking into the sand it is now being useful ergo the Halibut can see more. Now you have Halibuts with two eyes on the top and others with 1 out of 2 eyes in the sand. The fish with 2 useable eyes can thus see more and in this case gain an advantage as they may see a predator to hide from, or see some food as they have +50% extra vision. This is the stage where the random DNA mutation has happened and the process of natural selection is not random.

Darwinian evolution often faces sceptics for many reason, maybe the person doesn't truly understand it, probably because it is so simple, yet it explains a world of such extensive complexity. In fact Richard Dawkins, now a strong advocate for evolution, admits that as a child he found it difficult to accept, to such an extent he was actually religious. Because of its apparent difficulty to understand many people settle for the easily comprehensible bronze age and pre-medieval (and many other stories originating from other cultures <https://assignbuster.com/natural-selection-and-the-effects-of-environmental-change/>

and tribes) myths and legends that appeal to people as they are intuitive (and comforting as it states their life was started and is guarded by a principle everybody can relate to, human beings), whereas Darwinian evolution is famously and excellently counter-intuitive, as is most genius explanations of the world. Here, Quantum Mechanics, Einstein's theories of relativity and QED spring to mind. Misunderstandings of the Theory of evolution How can the world's life exist solely by chance? This is often considered a reasonable argument, but the fact is something as complex as an eye didn't (and has never been argued by any scientist) occur in one luck step.

No animal was walking around with an eyeless face, then all of a sudden it gave birth to a creature with two fully functioning eyes, able to detect different wave lengths of light, and make out, clearly defined images with perspective and all. The eye is the result of millions of years of accumulative evolution, the key word being accumulative, in that the whole process of the evolution of the eye was made up of many steps that individually is improbably. So an animal may have developed a patch of skin that was unusually highly concentrated with light sensitive cells. This meant an organism could detect light and dark, like an on and off detector.

This is obviously more useful than nothing at all, so that animal is more successful, and passes on its DNA coding for highly concentrated light sensitive cells (this is one stage that individually is improbable, i. e. the mistake in the DNA replication that coded for the concentration of cells is improbable). Then another mistake codes for say the area with a high

concentration of these cells to develop a dint, thus a greater surface area so
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there can be more cells (another stage), until, over thousands of generations an organ capable of detecting different shapes colours etc evolves. It is obvious how at each stage in the evolutionary process it is not only useful for the organism that is at the highest stage of eye evolution (thus eliminating the argument that “ how can the eye evolve when 50% of an eye is not use” as it is, even 0. 001% of an eye is more useful than 0% of an eye⁴), but is also, easily a product of accumulative evolution, that doesn’t require someone to accept such a huge leap of chance and luck.

Evolution needs life, in some form to exist before evolution can take place at all, the chance of a planet like Earth existing in such Goldilocks conditions is too improbable. This argument fails to consider large numbers, which make something that seem far too improbable, actually seem something of a statistical inevitability. The estimated amount of galaxies in the observable universe is around 100 billion and in our galaxy there are around 1 - 30 billion planets. Knocking off a few noughts to allow for a conservative answer, there are a billion billion planet (again that is a conservative answer) left, then consider the origin of life to be incredibly improbable, so improbable that it occurs on let’s say one in every billion planet, that would mean there are, statistically speaking, a billion planet that are following a perfect orbit, around a perfect star resulting in perfect conditions, thus allowing the chance of life to exist. So even with such unlikely possibilities of 1 in every billion, there are still one billion planets that can give rise to life, of which we are one.

And to conclude, the most beautifully logical and consistent theory of how life got from primordial soup to the diversity we have today is the theory of <https://assignbuster.com/natural-selection-and-the-effects-of-environmental-change/>

evolution, conjured up over 150 years ago by an English Naturalist, following his great journeys across the world. Although not all about evolution was known at the time, staggeringly strong evidence has built up in its favour (and in fact every opposing piece of evidence, dissolved), ranging from geographical distribution of fossils though to the relatively modern concept of molecular biology (mainly pointing to DNA). The theory of evolution explains how animals seem to, so perfectly suit their environment, as if they were designed. Appendix An excellent analogy of entropy, albeit, completely unrelated to evolution, is in the BBC, Wonders of the Universe, where Professor Brian Cox uses the idea of a sand castle, subject to the desert winds, and how it, most probably will be blown away into a sand pile. As mentioned, the origin of life to begin with is unanswered, and argued about, and also provides creationists and gap in science to worship, but one of the most likely beginnings of life is that, about 4.

5 billion years ago, pools of “ primordial soup”(-Stephen Hawking) gave rises to life by chance. Literally as the molecules of amino acids (the building blocks of life) collided with each other, over an estimated period of millions of years they gave rise to the most basic for of life we could imagine, less complex, in fact, than a bacteria cell (the argument of how improbable this is, is dealt with later through the use of astronomically large numbers and statistics) . Once DNA existed, evolution can take over, in a surprisingly simple and not so improbable manner.