

## Darwin's theory of evolution

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**Abstract:** Darwin's theory of evolution has been around for more than 150 years. However today it is being challenged and there are many foundational and problematic issues that have led scientists to deviate from the many of its original formalism of the theory. The predictions of Darwin's theory do not show up in the actual field. [Bhakti Vijnana Muni. **Darwin's theory of evolution.** *Academ Arena* 2016;8(4):60-65]. ISSN 1553-992X (print); ISSN 2158-771X (online). <http://www.sciencepub.net/academia>. 8. doi:[10.7537/marsaaj08041608](http://dx.doi.org/10.7537/marsaaj08041608).

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Darwin's theory of evolution has been around for more than 150 years. However today it is being challenged and there are many foundational and problematic issues that have led scientists to deviate from the many of its original formalism of the theory. The predictions of Darwin's theory do not show up in the actual field. We will discuss a few of them very briefly here.

### *Different Opinions about the Life and Evolution*

In history so many conceptions of evolution have been floating around that it is worthwhile to know a few basic developments that led to the Darwinian hypothesis. Thales, Anaximander, Anaximenes, Xenophanes, Empedocles, Epicurus, Socratism and Aristotle all had wide range of thoughts and differed with each other in many ways. Among the pre-modern theorists were Francis Bacon, Swammerdam, Demailet, Maupertius, Bonnet, Linnaeus, Buffon, Hutton and Erasmus Darwin who was the grandfather of Darwin. Thereafter in modern evolution theory there are a large number of them. Sir Charles Lyell supported the concept of Uniformitarianism and this became one of the early pillars of Darwinism in terms of the interpretation of the fossil records found in the strata (which has been invalidated by Guy Berthault's experiments).

On the other hand the theory of Biogenesis was supported from the experimental works of Francisco Redi, Spallanzani and Louis Pasteur. But scientists soon proposed that conditions on the earth billions of years ago were presumably different from those that exists in the earth today. So again they (Haeckel and a long string of chemists like Haldane, Oparin, Miller and Urey) continued to propose the theory of spontaneous generation in terms of a scenario billions of years ago as a onetime fortunate chance incident. Of course this is a big field of research and in spite of the effort and enthusiasm there is very little to prove the hypothesis and so we can say it remains just an ideological motivation that keeps a section of chemists push such an idea as otherwise their house of cards will fall down in no time.

### *What is the motivation for Darwin*

Bringing back the focus to Darwinism, what motivated Darwin to propose his idea of evolution? Michael Denton writes a very illustrative article [1] about this. One of the main reasons was that the works of comparative anatomists like Owen who was a follower of Cuvier did not yield any natural law of forms. The pre 1859 biology held a different concept of the basic forms of the natural world. They were called types and were immanent in nature. They were determined by a set of natural laws which they called *laws of form*. They had already noted that there are deep homologies and a vast amount of biological complexity was really of an abstract nature and which did not change over time and were of non adaptive nature. Sometimes they would notice that there was a numerical and geometrical order to them that was very striking. Moreover they remained robust and invariant over the period of millions of years in diversity of lineages. Denton [1] wrote a paper in which he summarized this dilemma.

But the frustration was that the scientists could not exactly say what these natural laws of form were. They could not give any law like the law of crystals for these organic forms. Although the law of forms as an idea is traceable to Platonic thoughts, yet these were naturalists and not Platonists and they could not elucidate their opinions in terms of exact natural laws about forms. Among this rising frustration in being unable to describe the theory of forms for organic forms of life, people of early 19<sup>th</sup> century were already looking for an alternative. And we know that this was an era of mechanization. With Descartes, Newton and others, the rise of chemistry, it became attractive to think alternatively. The contemporary people of Darwin saw that when Darwin gave that theory, with error accumulation and natural selection as the guiding principle it became possible to attempt explanations of biological forms from a new foundation, i.e. in terms of a blueprint for life. Mechanization requires a blueprint and so what was the blueprint of life. Naturally they were looking for

ideas like code and when Mendel did his experiments it only further reinforced their belief that they could predict the biological traits in terms of a blueprint and gradually the gene theory became popular and finally it led to the idea of Central Dogma in post 1953 era. Then the whole Darwinian paradigm was reinterpreted in terms of the Central Dogma and it was just an attempt to reinforce the code view of life. So genetic code idea became in vogue for last 70 years or so and the gene concept for about a 100 years or a little more. The Central dogma has since been proven partial and not a fundamental blueprint of life.

Thus we can say there are two opposing moments in this debate about biological forms. One is the materialist view that has continued in accord with Darwinian evolution theory for past 150 years or a little more and it is known as the functionalist view. The other is the pre-Darwinian view which is a non-selectionist view and was known as the theory of biological forms and it is a Structuralist view. The Darwinian view is really a reaction for the failure of the structuralist views to describe forms. There are a number of differences between the two views. The structuralist view held that number of forms was fixed in nature. But because Darwinian view was a pan-selectionist view, it had to accommodate the idea that new forms could emerge from old forms. It was compulsion of that kind of thinking. But if we hold the Darwinian view is rational then we have to also hold that the structuralist view is also perfectly rational on its own merit. Darwin denied forms their naturalness and life its fundamentalness and reassigned them from being integral to nature to the realm of artifacts of time and chance. However the fact remains that the adaptations are ubiquitous in nature but the attempt to reduce all organic order to the realm of artifacts is not at all convincing. We have failed to find the genetic blueprints that can convincingly explain the Darwinian paradigm of functionalism. Cellular structures are very robust and so are the cellular organelles. The advances reemphasize the developmental robustness. Further the deep homologies do not change even after millions of years. Then the natural question is that what selective advantage is there to keep them unchanging over a millions of years.

Thus we see that both these views, i.e. the structuralist view as well as the functionalist views have their problems and in this century the dialectical movement between these two opposing theories indicates we need a superior paradigm to explain the deeper reality of the biological phenomenon. We cannot explain the phenomenon of day and night if we do not have the idea of the Sun. Similarly we cannot describe the structure of biological form without its comprehensive concept.

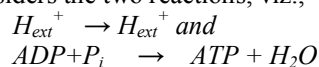
*Problems in Evolution Theory of Darwin – how large is the sampling space from where to select*

Douglas Axe wrote a paper [2] where he lists many examples of this dilemma. The main puzzle is that as mentioned earlier the code implied that a vast number of proteins could be manufactured by the genetic mutations. So why nature which did not have an infinite amount of time to select the best fits, still discovered from an incomplete sampling from a vast space the set of proteins that we find now and it turned out to be highly successful. How did selection know that the impressive array of proteins required was just what it found out and these performed all the functions perfectly? The evolutionary process could have only sampled a miniscule number of proteins out of the totality. Axe gives many examples to indicate this sampling problem is real and it does provide significantly serious challenges to the Darwinian model. Then how do we explain protein origins, given that there are no shortcuts to the protein folds and that means a rethink of biological origins as a whole. We need to understand the structural complexity w.r.t. many of the particular protein functions. The functions are precise and intricate. Normally the sizes of the enzymes are much larger than their active sites. For example the active sites are deeply buried within the enzymes and molecules like  $H_2O_2$  must pass through long channels before they can be catalytically converted. By replacing amino acids in these enzymes it has been demonstrated that the electric potential gradient has an important role in these catalytic processes. In this way the enzyme has important interactions with substrate which are some distance away from the place where the chemical conversion occurs. Thus enzymes not only have a catalytic function but also a guiding function on the reactants and products in these processes. Thus it is more than chemistry. It is teleology. It requires a structure that extends well beyond the active sites. Further in these function direct coupling of processes occurring at many different active sites of enzymes are necessary. Such direct coupling cannot be provided by simple diffusion alone. This direct coupling requires mediation by different structural connections between the sites that are being coupled. And this further requires more extensive protein structures.

An example is the enzyme named carbamoyl phosphate synthetase (CPS). It is a remarkably complex enzyme and utilizes bicarbonate, glutamine, and ATP to make carbamoyl phosphate. It uses internal molecular tunnels for efficient transfer of reactants and by this uses it to couple the reactions occurring at its three active sites. For this purpose CPS uses two protein chains which has a total length of more than 1,400 amino acid residues and this way it

forms a highly orchestrated coupled multi site tunneled architecture.

Now Axe [2] gives a very nice example. He considers the two reactions, viz.,



The first reaction describes the movement of proton from the exterior of a membrane enclosed compartment to the interior and the second describes the conversion from an ADP molecule and inorganic Phosphate to ATP. There is no general principle in physics and chemistry by which the transfer of proton fluxes and ATP synthesis has anything to do with each other. However by an engineering process it is possible to combine different phenomenon by using devices like the solar cells. In life processes there is a dependence of many such intricate devices. In this particular case these two reactions are coupled by a highly efficient energetic coupler called proton-translocating ATP synthase. This is a rotor structure, an engine built from more than eight types of proteins some of which are used a multiple times to form symmetrical substructures. And various versions of this device are found in all the different life forms. These are fascinating and underlie the key point that the biological processes utilize very large structures for even simple reactions. This makes in a very tough sampling problem and the Darwinian evolution fails here. Even it requires such intricate orchestration with enormous amount of physical and spatial complexity involved makes one wonder that how even in a small space such a substantial protein structure could be placed.

This example provides an opportunity to refine the connection between protein size and the sampling problem. Further the components in themselves cannot perform any useful function. Rather it requires the whole suit of protein components acting precisely in the assembled complex. This increases the space size required to search to find the structure when a protein chain is useful only in combination with others. It is always a set of distinct proteins which commonly provide for a function. This makes the search space even more challenging. But even functions of more typical complexity amply demonstrate that the challenge of sparse sampling goes all the way back to the origin of protein-catalyzed metabolism and genetic processing. The many functions involved in gene expression had to be in place from the outset, and because these functions require large protein structures, this means the sampling problem appeared as soon as the genetic code appeared.

Now considering the above difficulty it is extremely difficult that even in the entire lifetime of the earth planet, the evolution of the structure of proteins can occur in a purely Darwinian manner due

to the enormity of the sampling involved. But even a slight change in the function of the proteins, which is a smaller problem will also be enormously difficult. Axe has argued that even have 6 changes to produce the necessary change would be enough to outdo the time required of the age of the earth. Darwin has to explain the whole suit of components of the transition involved. He cannot be just happy to state that simply some transition occurs. That is unscientific if we do not comprehend the enormity of the problem. Darwin cannot just count on the similarities, he has to focus on the difference and understand what that means for evolution to achieve, in terms of both complexity and time and search based upon unguided and error prone random changes. Accidental and random changes are almost always harmful for the organisms as so many experiments with X ray mutagenesis prove. Durett and Smith have shown that even to achieve a two step mutation process requiring inactivation of a binding site and then create a new binding site will require millions of years and what to say if those changes in step 1 are harmful as that will just prolong the process to 100s of millions of years. So how plausible is it just to flick a few switches and convert say a fruitfly to a butterfly.

The enthusiasm of modern synthesis after the discovery of the DNA was purely imaginary and hypothetical. The actual results convinced though after much resistance that DNA is not a fixed blueprint of life. Early 20<sup>th</sup> century biology was too simplistic and now we are just beginning to see how enormous is the problem. How does the gene confer itself to the phenotype. How large is a gene and even a genome and how large an information content you require to encode a single protein fold. All evidence is against Darwinian theory. Scientists and members in this forum should learn to accept the evidence from the frontier. The simplistic biology and evolution theory and genetics is simply misleading. We did not know what that junk DNA was. What was its function? What is our knowledge; we simply did not know and preferred to call it junk. This is naïve. We know very little about metabolism, enzymes, protein folds, chemistry and its difference from biology. And yet we want to be creators of our knowledge. This is like a child crying for the moon.

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2. Axe, D., D., (2010). The case against a Darwinian origin of protein folds. *BIO-Complexity* 2010(1):1-12. In a few posts Prof Jo had raised a few issues about evolution and we will address a few of them here.

*Finches of Galapagos Island and Evolution*

This set of evidence is often quoted as a proof of evolution. But actually there are many shortcomings in that. The work of Grant shows that finches can adapt the size of their beaks when necessary. For example in 1977 and 1982 there were droughts. During the drought they found that the seeds eaten by the finches became harder. In the situation those birds with bigger beaks were better able to survive and reproduce. But after the drought ended the seeds returned to their normal sizes and so did the beaks which returned to their pre-drought sizes. In other words the effect of drought was offset in opposite direction towards smaller beak sizes in 1984-86. If the examples of finches tell us anything it is that it is an example of natural selection that is oscillating. But these are only small scale changes and not changes in the primary body plans. The finches remain finches and the beaks remained as beaks. It is also observed that many of these so called species of finches also retained the ability to reproduce and interbreed. Of course a few works argue that a sexual isolation is created and this selective force propels evolution. That means that as the birds selected their mates according to their choices it would lead to a bigger separation between in evolving population. But still the data is very little and its long term effects are only speculations. Nothing valid can be predicted especially when the fact remains that the ability to interbreed is not lost among these so called species of finches. These observations are not sufficient to establish that these are anything more than adaptive variations.

One paper in nature [3] reports that it is the ALX1 gene that is involved in the variation of beak shapes and sizes. One variation of ALX 1 is related to pointed beaks and another to blunted beaks. But when authors conducted phylogenetic studies they found important discrepancies with the phenotype based taxonomy. They found extensive evidence for interspecific gene flow throughout the radiation in the case. This only means that there is extensive interbreeding among the finches and how much reproductive isolation has occurred can be easily questioned. These species are very closely related so much so that any gene based phylogeny becomes obscured. A BBC report [4] indicates that these finch species aren't really different species. The article title itself reports 'Genomes reveal Darwin finches messy family tree'. The article says, "The most extensive genetic study ever conducted of Darwin's finches, from the Galapagos Islands, has revealed a messy family tree with a surprising level of interbreeding between species." This has raised questions what does the different species imply here. The article notes. "The study also revealed a surprisingly large amount

of "gene flow" between the branches of the family. This indicates that the species have continued to interbreed or hybridize, after diversifying when they first arrived on the islands. ... When you look at their results, you can see the trees are quite messy, in terms of the traditional species groupings."

3. Peter R. Grant, "Natural Selection and Darwin's Finches," *Scientific American*, pp. 82-82 (October, 1991).
4. Webb, J., Genomes reveal Darwin finches' messy family tree, <http://www.bbc.com/news/science-environment-31425720>.

*Why do the primary body plans not change*

Gerd Mueller explains that we have to consider three kinds of novelties to achieve the full scope of evolution. These three, viz., type I novelty relates to the primary anatomical architecture of a metazoan body plan, type II novelty relates to the discrete new element added to an existing body plan, and type III novelty relates to a major change of an existing body plan character. From experience of homologies, type III novelty must exclude changes that involve only quantitative aspects. These are qualitative changes and require emergence of new units of construction and the standard variation cannot be considered their source. We have to understand that the existing cell and body designs are extremely robust. The genotype and phenotype are inherited in a close correlation, and development is under program-like control. So the evo-devo is forced to speculate that for the emergence of Type III novelties they have to consider a period when there was a pre-Mendelian world and the connection between genotype and phenotype would have been much looser so that it would have allowed for these novelties. So that once these Novelties of Type III occurred and only the cell aggregates, and tissues would have been the decisive determinants of biological form. Thus it implies a segregation of genetic and phenotypic unity in the early phase of evolution [5].

We can only conclude that this is highly objectionable speculation and we have no evidence for that in the actual experimental studies. It is like saying there once existed unicorns. Kant's words in his Critique of Judgment are worth pondering here, "Thoughts without content are empty, intuitions without concepts are blind."

5. Mueller, G., B., *Epigenetic Evolution., in Evolution - The Extended synthesis*, Pigliucci, M., Muller, G., B., MIT Press, 2010.

*Why are the number of Species Fixed in Nature*

If the structuralist paradigm for natural forms implies that the order of life came from features of basic physical constraints which arise out of the

fundamental properties of matter, **it constraints to a limit** the way organisms are built. These are limited to a few basic designs which include the deep homologies like the pentadactyl limb. Structuralists have a strictly "non-selectionist, non-historicist" conception of the world of biological forms. Leading scientists of the 20th century include William Bateson, D'Arcy Wentworth, Thompson, Rupert Riedl, Stuart Kauffman, Brian Goodman, Stuart Newman etc. The Darwinian Paradigm is on the other hand a functionalist paradigm and it implies that the main designs of life like the pentadactyl limb, body plans, are a result of specific adaptations built additively by selection during the course of evolution, to serve particular functional ends. They are not a result of physical law or intrinsic physical constraints. This means that there should be no limit to the number of body plans, basic designs and features of organisms. And this is precisely the problem of Darwin's idea of contingent artifacts for organismal evolution. The Vedantic Paradigm agrees with the assertion of the Structuralist paradigm that the number of species in nature is fixed but there are differences in concepts that we can address elsewhere.

#### *Limits of Hybridization Heights*

A sheep-goat chimera is produced by combining the embryos of a goat and a sheep. The wikipedia mentions that these successful created chimeras were a mosaic of goat and sheep tissue. It had traits from both the sheep as well as goats. But the cells did not produce any intermediate structures. The cell lines or the parts that developed from the sheep embryo had woolly features. But the cell lines that came from the embryo were hairy. The chimera proves that each cell (germ line) keeps its own species' identity and does not develop any intermediate being between the parental species. As far as the question of fertility is concerned the sheep-goat chimera passes on to either sheep or goat genes that too depending upon wherefrom the reproductive organs were formed, i.e. whichever germ-line formed the ovaries or testes. Similar evidence is there in the field of paragenetics. Thus nature proves that the species are conserved. The artificial attempts of man do not lead to the production of any new species.

The DNA and genome sequences are naturally restructured by the organism or the cell. Such transposon activity has been observed in every species, but that does not lead to any species change rather it helps in adaptability and response. Barbara McClintock called the cells as smart and thoughtful in this sense. But that does not lead to any evolutionary change in the organism as the organism is not just controlled by the DNA or genome but also the DNA or genome is also under the control of the cell or the

organism. The DNA shuffling therefore does not establish any evolutionary leap beyond the species definition. Rather the experiments in *Drosophila* showed that many of these genetically engineered specimens suffered setback rather than any advantages.

#### *Evolution of DNA has problematic issues*

Regarding DNA code evolution, Koonin writes, "In our opinion, despite extensive and, in many cases, elaborate attempts to model code optimization, ingenious theorizing along the lines of the coevolution theory, and considerable experimentation, very little definitive progress has been made. Of course, this does not mean there has been no advance in understanding aspects of the code evolution. Some clear conclusions are negative, i.e., allow one to rule out certain a priori plausible possibilities. Thus, many years of experimentation including the latest extensive studies on aptamer selection show that the code is not based on a straightforward stereochemical correspondence between amino acids and their cognate codons (or anticodons). Direct interactions between amino acids and polynucleotides might have been important at some early stages of code's evolution but hardly could have been the principal factor of the code's evolution." [6]

Thus even the genome evolution is a big issue that bothers evolutionary paradigms. Hence if we neatly examine the different aspects of biological formalisms we find that they are all even if combined together are massively inadequate. The predictions of Darwinism do not hold in the actual results. In our next post we will consider a few more important issues regarding sentience, where Darwinism is completely lacking.

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