

The Extravagant Creator of Junk DNA

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Abstract

Denton proposes a hypothesis of frontloaded teleological evolution while Denton suggests that a vast amount of junk DNA is incompatible with his model of teleology and perhaps any model of teleology. This paper outlines a hypothesis for a vast amount of junk DNA with no selective constraints, and proposes that the junk DNA is compatible with teleological evolution that included occasional intervention during the history of adaptive evolution. And this paper introduces a hypothesis for the necessity of intervention in the history of adaptive evolution. And both the hypothesis of junk DNA and the hypothesis for the necessity of intervention meet the criteria of falsifiability according to Popper.

1. Introduction

Geneticists debate if there is any significant function related to fitness in over 95% of the deoxyribonucleic acid (DNA) in eutherian genomes. Many use the terms “non-genic DNA” or “junk DNA” when referring to vast amounts of non-transcribing DNA with no evolutionary conservation in many multicellular species. And roughly 98% of the DNA in eutherians is non-transcribing DNA while studies suggest that roughly 1% of the non-transcribing DNA had conserved during human-mouse divergence.¹ This 1% of conserved non-transcribing DNA includes regulatory DNA that was preserved by selection, but the roughly 99% of the non-transcribing DNA in humans and mice that lacked evolutionary conservation might have lacked selective constraints. This lack of selective constraints in roughly 99% of the non-transcribing DNA in humans and mice supports a hypothesis of junk DNA. Other support for a hypothesis of junk DNA includes the large-scale deletion of purported non-genic DNA in mouse lineages that survive.² Such evidences of junk DNA poses a challenge to the Denton and colleagues hypothesis of directed evolution and evolution by natural law,³ which we will now refer to as *evolution by natural law*. In the words of Denton, “If it were true that a vast amount of the DNA in higher organisms is in fact junk, then this would indeed pose a very serious challenge to the idea of directed evolution or any teleological model of evolution.”⁴

Denton proposes evolution by natural law, which implies that the Creator frontloaded the universe, where frontloaded teleological evolution means that the initial conditions of the universe contained all of the direction for the emergence of intelligent life. The Denton hypothesis includes evidence of biochemical natural laws while Denton claims that evidence for biochemical natural laws is intrinsic evidence for evolution by natural law. Additionally, Denton says that a vast amount of junk DNA may be incompatible with any model of teleological evolution. Evidently, Denton suggests that evolution by natural law might be incompatible with hypotheses that indicate random mechanics generated the majority of DNA in many animal genomes. This paper proposes that such random mechanics in genome evolution are compatible with a model of teleological evolution when we consider a model of teleological evolution with intervention, where intervention means that the Creator of the universe or related agents

occasionally interfered from the outside of the initial conditions. Additionally, this paper introduces a hypothesis for the necessity of intervention in the history of adaptive evolution.

2. The Mechanics of Junk DNA

Here we describe a potential cause for the generation of putative junk DNA, where we define “junk DNA” as sequences of DNA with no selective constraints. Understanding the cause of some junk DNA assumes a basic understanding of molecular evolution and population genetics. For example, a basic concept of molecular evolution indicates that the rate of neutral mutations roughly equals the rate of fixation for neutral mutations.⁵ In the case of junk DNA, neutral mutational insertions and random drift have helped to determine that genome size would expand in many lineages because many DNA sequences have neutrally inserted with comparably less deletion. Perhaps due to mechanical reasons, the rate of mutational insertions related to highly repeated sequences appear to be significantly more frequent than the rate of mutational deletions. For example, transposable elements called retrotransposons that include long interspersed elements (LINEs) and short interspersed elements (SINEs) make up roughly 40% of the human genome. And as long as the mutation rate for the number of neutral nucleotide site insertions exceeds the fixation rate for all nucleotide site deletions, genome sizes will expand over evolutionary time. This appears to be the rule for many multicellular lineages that have little or no constraints concerning genome size.

We clarify that mutational insertions related to highly repeated sequences that insert into coding regions or regulatory regions are mostly deleterious in regards to fitness. And there were some occasions of transposable elements that formed genes.⁶ But most mutational insertions into junk DNA is neutral in regards to fitness.

The cause of other putative junk DNA may have involved DNA duplications apart from highly repeated sequences, for example, gene duplications. And many gene duplications preceded gene silencing.⁷

Some people say that introns are mostly junk DNA because gene transcription involves both introns and exons that generate messenger ribonucleic acid (mRNA), but after transcription, splicing removes the mRNA derived from introns while the translation of proteins involves only the mRNA derived from exons. Consequently, many intron nucleotide sites apart from start-stop sequences have no selective constraints and may be unneeded in regards to fitness. However, some intron sites other than start-stop sequences have a function because of alternate readings such as alternative splicing, nested genes, and frame shifting.⁸ So some intron sites have selective constraints while other intron sites have no selective constraints. And many introns in multicellular species accumulate more insertions than deletions so many introns continue to expand, but exceptions include birds because birds may have better fitness when their gene sizes are compacted.⁹

And apart from gene functions from alternate readings and anything else we do not yet know about introns, introns contributed to the grand scheme of common descent. For example, a review by Patthy indicates that an increase in the size of introns has facilitated the mutational process of exon insertions while the rise of exon insertions coincided with the evolutionary creativity during the metazoan radiation.¹⁰

Some may ask why the Creator would create with mechanisms that leave vast quantities of apparently unneeded byproducts. The prerogatives of the Creator, however, allow the Creator to create in any way that the Creator wishes, no matter how extravagant the means may be. And

a putative vast quantity of junk DNA is just one of many examples of extravagance in teleology. For example, various models of teleology conclude that a primary purpose of the sun is to provide the earth with heat and light, which are foundational for our eco-systems. But only a small proportion of the sun's heat and light ever reach the earth while most of the sun's energy dissipates into space with no benefit to humanity or any other life.

3. Teleological Models of Evolution

Here we discuss teleological models of evolution, but we clarify that we are not focusing on the role of *Homo sapiens* in evolution. For examples, humans select against pests and germs while humans select in favor of various agricultural plants and animals. And recently, humans started to splice genes from one species to another. All of the above are examples of teleological evolution. But for the rest of this paper, all discussion of teleological evolution implies teleology apart from the purposeful work of *H. sapiens*.

And in this brief paper, we do not propose new material evidence for teleology but we agree with Denton¹¹ and others such as Leslie¹² that teleology is the best explanation for the initial conditions while there is nothing close to a scientific consensus for a natural explanation of the initial conditions. And Carroll suggests that we are not sure if science will ever find a natural explanation for the initial conditions.¹³

As previously cited, Denton suggests that the existence of a vast amount of junk DNA is a challenge to evolution by natural law. Denton also suggests another challenge to evolution by natural law,

Then there is the difficulty of knowing how stringent the evolutionary constraints may be in moving from a [prokaryotic] cell to *Homo sapiens*. Perhaps the cosmos abounds in trees of life, but perhaps only one in a million trees grows at all like our own on Earth to reach the higher primates and eventually a species like *Homo sapiens*. Perhaps only in a cosmos of the size and age of our own is there a probability of one that *Homo sapiens* will arise. Science cannot yet say.¹⁴

Denton is looking for a probability equal to one for a species like *H. sapiens* to arise from evolution by natural law in a universe with 10^{22} stars. And here is a hypothetical probability study for the evolutionary emergence of intelligent life in our universe. If since the origin of prokaryotes there were at least 12 vital events of evolution in *H. sapiens* ancestry that had a .01 probability, including any potential multiple trials and various pathways that would lead to a similar end, then a species like *H. sapiens* most likely would not have emerged in our universe with roughly 10^{22} stars.

Denton's probability problem concerns the emergence of *H. sapiens* or other potential intelligent life. And we define *intelligent life* as a species with brain wiring that enables the development of scientific theories and religious practices¹⁵ while intelligent life must also have manual dexterity and deft locomotion that enables the species to act upon its intelligence, which would give the intelligence a selective advantage. And in this hypothesis that starts with the existence of a prokaryotic cell, we narrow the subject to "nucleotide-based" intelligent life while all other use of the phrase *intelligent life* implies nucleotide-based intelligent life. And when we mentioned "various pathways that would lead to a similar end," we imply that a similar end can include other potential species of intelligent life. For the sake of simplicity, we will generalize two models for Denton's probability problem. Model 1 hypothesizes that the origin of intelligent

life by natural mechanics alone is likely. And Model 2 hypothesizes that the origin of intelligent life by natural mechanics alone is unlikely.

Model 1 may argue that the ubiquitous evidence of convergent evolution points to an inevitable evolutionary emergence of intelligent life. For examples of convergent evolution such as morphological adaptations in predators, see Conway Morris.¹⁶ And Model 1 may also argue that the science of biochemistry indicates that the capacity for life is intrinsic in matter, so there is no reason to believe that the origin of life and the emergence of all phenotypes required anything other than natural mechanics. For instance, as previously stated, Denton proposes that the evidence for biochemical natural laws is also evidence for evolution by natural law.

On the other hand, Model 2 recognizes that, assuming abiogenesis, the ubiquitous evidence of convergent evolution suggests the inevitable evolutionary emergence of intelligent life in a hypothetical scenario with unlimited time. However, Model 2 constrains itself to the time constraints of multigenerational stars in the universe, which Conway Morris ignores. And Model 2 recognizes that the natural mechanics of both mutation and natural selection are probabilistic while many vital genetic events in human ancestry had a low probability such as adaptive exon insertions. For hypothetical example, a single mutation such as the mutational insertion of an exon from one gene to another that has a 1% selective advantage has a .02 probability of fixation.¹⁷ And natural history had other numerous unlikely events that contributed to the emergence of wise humans. For examples, Gould describes improbabilities in human ancestry that included the origin of the eukaryotic cell, the origin of fauna, the origin of terrestrial vertebrates, the rise of mammals, and the origin of *H. sapiens*.¹⁸ And Gould later clarifies that his perspective includes that the emergence of any type of intelligent life would have been unlikely.¹⁹ And Model 2 agrees with the Denton evidence for biochemical natural laws, but Model 2 does not hold that the evidence for biochemical natural laws suggests evolution by natural law.

Teleological models of evolution can merge with both Model 1 and Model 2. We can merge Model 1 with a teleological model where the Creator or related agents never intervened from the outside during evolutionary origins. Variations of Model 1 include evolution by natural law, but Denton says that evolution by natural law is inconsistent with evidence for a vast amount on junk DNA. Other variations of Model 1 include neo-Darwinism, for examples see Miller²⁰ and Ruse.²¹ And we can merge Model 2 with a teleological model where the Creator of the universe or related agents occasionally intervened in the probabilistic mechanics of adaptive evolution, which is the model that we propose in this paper.

Many scientists and philosophers prefer Model 1 because it can seamlessly merge with neo-Darwinism, which currently dominates biological science. However, some assumptions of neo-Darwinism need reevaluation: 1) neo-Darwinism assumes the absence of teleological direction in the origin of all variation that has been fixed, specifically the absence of teleological direction in the origin of all adaptive mutations; 2) neo-Darwinism assumes the absence of teleological direction in all environmental changes and all selection; 3) neo-Darwinism assumes the absence of saltation in the history of adaptive evolution.

The first assumption focuses on the hypothetical absence of teleological direction in the origin of all variation. But when we acknowledge that DNA properties do not prevent and repair all mutations that cause variation, we are not indicating that the origin of all adaptive mutations were without teleological direction. The second assumption focuses on the hypothetical absence of teleological direction in all environmental changes and all selection. But when we acknowledge that natural properties influence environmental changes, we are not indicating that

all environmental changes that influenced selection were without teleological direction. The third assumption focuses on the hypothetical absence of saltation in common descent. But when we acknowledge that many adaptations were gradual accumulations, we are not indicating that all adaptations were gradual accumulations. And when we acknowledge common ancestry through descent with modification and that in many cases genetic studies significantly measure the influence of positive natural selection,²² we are not indicating that undirected mutations and drift and blind selection and isolation are solely responsible for the history of adaptive evolution in genome lineages. In sum, Neo-Darwinian Theory builds upon conjecture.

As previously stated, Denton raises questions about evaluating the stringency of evolutionary constraints in moving from the first cell to humanity or other potential intelligent life. Exhaustively researching these constraints and questions about abiogenesis will help to indicate if the origin of intelligent life by natural mechanics alone within the time constraints of multigenerational star life in the universe is likely according to Model 1 or unlikely according to Model 2. However, at this point in the history of scientific thought, there is no consensus for either Model 1 or Model 2. And choosing between Model 1 and Model 2 involves conjecture. We propose Model 2 as stated earlier because of the time constraints of star life coupled with the low probabilities involved with natural evolutionary mechanics. And in the context of teleological evolution, Model 2 implies that all evolutionary direction was not frontloaded. Likewise, in the context of teleology, Model 2 suggests that the Creator of the universe or related agents occasionally intervened in the probabilistic mechanics of adaptive evolution during the history of common descent.

4. Falsifiability according to Popper

The model of occasional intervention includes a hypothesis for the necessity of intervention in the history of adaptive evolution. And both the hypothesis of junk DNA and the hypothesis for the necessity intervention meet the criteria of falsifiability according to Popper.²³ And the failure of attempts to falsify a hypothesis is support for a hypothesis.

We could falsify the hypothesis of junk DNA if we find compelling evidence of selective constraints in most of the purported junk DNA. And we could falsify the hypothesis for the necessity of intervention by at least two points.

First, we could falsify the hypothesis for the necessity of intervention with compelling evidence that the natural emergence of intelligent life was likely. For example, Denton proposes that exhaustive research of evolutionary constraints and evolution by natural law may indicate that there was a likely natural emergence of intelligent life.²⁴ And Denton and colleagues propose additional evidence for evolution by natural law.²⁵

Second, we could falsify the hypothesis for the necessity of intervention with compelling evidence of a World Ensemble that has an unlimited number of universes with initial conditions similar to the observed universe.²⁶ In that case, an unlimited number of universes with initial conditions similar to the observed universe would eventually explore all potential pathways of DNA evolution (assuming the emergence of DNA genomes).

5. Philosophical Considerations

Many have argued that the “Model 1 Creator” appears superior to the “Model 2 Creator” because the Model 2 Creator made natural laws and eventually violated those laws. This long standing

deist argument has appeal, but the argument needs examination. For example, the Creator has divine prerogatives. And the occasional manipulation of indeterminate processes is not a violation of natural law.²⁷ For instance, humans manipulate their environment such as developing irrigation and producing rocket spacecrafts. And these manipulations are by no means a violation of natural law while the capacity for rocket spacecrafts is intrinsic in matter. Additionally, the Model 2 Creator is actually superior because the Model 2 Creator decided to create a material universe with complex life forms that cannot be determined within the time constraints of stars apart from occasional intervention. Likewise, the Model 1 Creator is inferior because the Model 1 Creator decided to limit the creation of the universe to deterministic-like mechanisms.

Many also claim that there is no teleology in the case of an all wise and all powerful and benevolent Creator because there is poor biological design. However, all of the complaints about poor biological design criticize only creationist claims that oppose common descent. The complaints never consider the compelling Model 2 hypothesis that the Creator designed all natural laws including neo-Darwinian mechanics and occasionally intervened in the processes of mutation and selection. For example, if we accept that the Creator or related agents occasionally intervened in natural history, then we can logically adopt the postulate that the Creator decided to limit the origin of phenotypes to descent with modification while every step required a viable lineage. Additionally, we must consider all biological functions. For instance, many criticize the design of the human back and spine, but another designer must consider more than bipedal walking such as spinal cord protection and the potential rigors involved with hunting, gathering, prehistoric farming, infant crawling, playing, resting, sleeping, and copulation. And Model 2 does not claim that intervention immediately preceded all adaptive evolution.

6. Conclusion

Teleological evolution with occasional intervention is compatible with a vast quantity of junk DNA and the Gould perspective that the natural emergence of any type of intelligent life was unlikely. And as described in Section 4 of this paper, empirical research can help to falsify or support the hypothesis of intervention in the history of adaptive evolution. And at this point in the history of thought in empirical research, we can only conjecture about the support or falsification of intervention.

We also note our appreciation to Denton that he framed his teleological hypothesis within the context of common descent. And we support that all hypotheses of teleology in biology should be worked out within the context of common descent and the relevant literature.

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