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Candidate session number

Candidate name

School number

School name

Examination session (May or November)

May

Year

2013

Diploma Programme subject in which this extended essay is registered: Biology

(For an extended essay in the area of languages, state the language and whether it is group 1 or group 2.)

Title of the extended essay: How and to what extent are religious beliefs compatible with the scientific belief on how the universe began?

Candidate's declaration

This declaration must be signed by the candidate; otherwise a grade may not be issued.

The extended essay I am submitting is my own work (apart from guidance allowed by the International Baccalaureate).

I have acknowledged each use of the words, graphics or ideas of another person, whether written, oral or visual.

I am aware that the word limit for all extended essays is 4000 words and that examiners are not required to read beyond this limit.

This is the final version of my extended essay.

Candidate's signature:

Date:

Supervisor's report and declaration

The supervisor must complete this report, sign the declaration and then give the final version of the extended essay, with this cover attached, to the Diploma Programme coordinator.

Name of supervisor (CAPITAL letters)

Please comment, as appropriate, on the candidate's performance, the context in which the candidate undertook the research for the extended essay, any difficulties encountered and how these were overcome (see page 13 of the extended essay guide). The concluding interview (viva voce) may provide useful information. These comments can help the examiner award a level for criterion K (holistic judgment). Do not comment on any adverse personal circumstances that may have affected the candidate. If the amount of time spent with the candidate was zero, you must explain this, in particular how it was then possible to authenticate the essay as the candidate's own work. You may attach an additional sheet if there is insufficient space here.

This student spent some time revising his original focus to include more biology in his paper. He seemed to have a connection to the material, and had a very thoughtful approach to his arguments. He did expand his resources, and really improved his approach to the material over time.

This declaration must be signed by the supervisor; otherwise a grade may not be issued.

I have read the final version of the extended essay that will be submitted to the examiner.

To the best of my knowledge, the extended essay is the authentic work of the candidate.

I spent 2 hours with the candidate discussing the progress of the extended essay.

Supervisor's signature:

Date:

Assessment form (for examiner use only)

Criteria	Achievement level			
	maximum	Examiner 2	maximum	Examiner 3
A research question	2	0	2	
B introduction	2	1	2	
C investigation	4	0	4	
D knowledge and understanding	4	1	4	
E reasoned argument	4	1	4	
F analysis and evaluation	4	0	4	
G use of subject language	4	1	4	
H conclusion	2	0	2	
I formal presentation	4	1	4	
J abstract	2	0	2	
K holistic judgment	4	0	4	
Total out of 36		5		

How and to what extent religious beliefs are compatible with the scientific beliefs on how the universe began?

May 2013

Extended Essay

Word Count: 3,392

Abstract

There has been an ongoing debate and question as to where everything came to be and exactly how we as humans came into existence. The first theory presented includes a single divine creator, known in western societies as God, and the other theory suggests that through chemistry and biology the world as we know it came to be. Both sides have evidence to support their claims as well as counterclaims as to why the other is unlikely to be the basis for argument. Evolution and Creationism are two polar concepts that both try to explain the same occurrence and evolutionary theists such as Francis Collins present facts and ideas in an attempt to bring the two ideas into one. I believe that this is a subject that should be taught from both perspectives regardless if an individual is religious or not. Some students say they're religious and refuse to study evolution likewise but nonetheless should consider both theories. This investigation ultimately will assess **how and to what extent religious beliefs are compatible with the scientific beliefs on how the universe began.**

Word Count: 181

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Introduction

The beginning of the universe dates back about 13.7 billion years ago according to Edwin Hubble who proposed the idea of the Hubble constant in 1929 which is the ratio that involves velocity to the distance in the expansion of the Universe that makes it clear that our universe is constantly moving outwards in a constant rate from a single point. However the debate of creationism versus evolution continues over the question as to how humans came to be. Many evolutionists rely on the work of Darwin, a Christian who studied the religion and followed and practiced Christianity accompanied to the Bible. Ironically he was the man who thought there might be a different explanation of where humans came from. His investigations introduced a new way to look at how humans came to be by examining fossils to show how humans relate to primates. He theorized that all humans evolved from a series of advancements from the previous species, such as walking on all fours to evolving to a biped species that walks on two legs. Creationism is based on the word of God as stated in the Bible and teaches that God created mankind. Though many non-Christian religions around the world aren't based upon a single God, most believe that a higher being did create the world and humans. Evolutionists state that Creationism is absolutely wrong because there is no way to prove it. Creationists believe evolutionists can't prove their theories if the only evidence they can stand on are fossils and rock layers. In 2006 a group of anthropologists met at Westport, Connecticut with a group scientific evolutionists to propose their claims and evidence to try to come to a conclusion on our origins. Ironically both admitted to using fossils and rock layers in an attempt to prove their side of the question and still to this day essentially neither side is able to successfully prove its claims. They each lack evidence and are both faith-based systems which try to debunk the other side.

Discussion and Reasoning

Francis S. Collins, a writer and egocentric chemist, wrote a novel about the true meaning of life and how he saw it based on his past experiences. Collins's childhood was founded on the principles of chemistry, not on the views of creationism, which influenced most of his ideas. In his novel *The Language of God* there are a set of graphs that show the similarities between human genomes and other animal genomes which are sets of genes from chromosomes that are inheritable. The result was that humans are 100% related to chimpanzees and 99% related to dogs. The studies Collins carried out were based on "junk" DNA which is found in-between the genes and is essentially a neutral mutation that has absolutely no effect on motor functions or cognitive thinking. The only job that junk DNA plays is being so abundant and introducing a variety of itself which all create the same amino acids for inheritable genes which make the system for decoding genes difficult when they create the same amino acid. This same "junk" DNA is also found in all animals which means that all humans and other animals share a common ancestor just based upon our genetic correlation.

Collin's research raises the question of why humans aren't related to other animals as much as to chimpanzees. The answer is simply that the existence, for example, of fruitflies has been much longer than any human or chimpanzee, because over time their junk DNA has been completely erased. Only the genomes needed to function are present and on the other hand humans haven't existed long enough to get rid their junk DNA. So in essence the older the species the more unlikely it is related to new emerging species. In other words the genomes of all organisms are based on their genes and junk DNA. According to Collins, humans have always

been genetically different from almost all other creatures but with the provided information from Collins about junk DNA and genomes it seems that all the creatures in the world came from the same ancestor, and have a common ancestry. In terms of religion we all are related as brothers and sisters through genetics. According to the Bible we are all essentially generations past down from Adam and Eve who came to be from this character of God. The question is if God meant for humans to be related to all animals as well.

Religious people around the world may also question the theory of creationism as a truth-seeker in a quest to find how to prove if any of the Gods existed. The idea at first seems impossible but with help of the Bible, the story becomes clearer by how each event is described in depth. In society today there are a great handful of people that also include Christians who strive to prove belief in such a way that the information can be brought out into the open, many wish to be able to prove such a being or such an occurrence as “The Big Bang”. Creationism and evolution are both nearly impossible to prove being that one consists of believing in a supernatural entity and the other is based on theories that seek answers. Creationism might not initially be able to prove God as our divine creator as they say, but there are still many theories of sciences that seem logical enough to be categorized as truth but again the evidence is faulty. One view that Collins has is how creationism point the finger to God as the creator but they can’t find a way to prove it to anyone when all they rely on is the bible. The same scenario goes for evolution as they point the finger to the Big Bang theory and also in an attempt to prove its true they rely on the concepts of physics.

One of the most remarkable ideas Collins presented was his stand point in the quest for our origins is as a scientific believer that both combine and considers the views of science and faith. His idea is known as “Theistic Evolution” or “Evolutionary Creation” which blends the theories of the beginning of humans and planets. Though many believe Collins uses illogical reason to bring his beliefs to what he calls the truth and after reading the novel he certainly does use true information to prove his points. He took what people call “The Big Bang” theory and did intensive research to come to a conclusion and as far as he knows scientists have only discovered up to the point of the expansion. In theory our universe is continuously moving

farther and farther away from the initial explosion which is supported greatly by using physics and determines our constant movement.

In addition, terms of Christianity are about how the universe and all its features were all brought from a single God. This idea of creation is supported by the Bible, however some groups see the Bible as a simple fairy tale to give believers reason to why we exist. This case supports the fact that this higher supernatural entity could have formed the “Big Bang” there couldn’t be any other possible way for scientists to determine what happened before the bloom but one thing is for sure, the “Big Bang” couldn’t have created itself. Collins states “I have to agree. The Big Bang cries out for a divine explanation. It forces the conclusion that nature had a defined beginning. I cannot see how nature could have created itself. Only a supernatural force that is outside of space and time could have done that.”

Collins expects people, whether they’re an evolutionist or not to deeply think about the origins of life and the universe and the work of the Human Genome Project. This project includes the ideas of chemistry, physics and biology to figure out the more important facts about DNA and to help determine the code of life or where we come from. The conclusion to the findings is that the genomes of humans and all other animals have an eerily similar genetic code and the differences found are simply because the species has lived longer and has had the opportunity to evolve to a higher being; junk DNA is reason for these occurrences in genetic codes which is the only difference human have with all other animals which is the amount of junk DNA they still carry. So in theory for both creationism and evolution animals are all related to a single ancestor who can be easily explainable by religion as a God, or it can be explainable

by evolution as a series of genetic families that separated from an initial point and created this diverse world of similar genes humans live on today.

Both sides of the issue are able to argue for hours on end and over which one is correct but the idea that Collins made creates an interesting standpoint and leads to the theory that both are equally alike. At first the thought of that even existing has to be impossible, but thought of a higher being is too unlikely for scientists and the thought of evolution is too unlikely for creation. For this reason Collins is attempting to give the best of both worlds and is essentially attempting to bring peace to both parties and bring a conclusion to where they can co-exist with one another. This relativity again between animals all points to junk DNA, the name itself is a mere deception of the truth. In fact "Junk DNA" was given simply because they are non-coding genes and don't have codons to produce amino acids. The junk DNA itself is found to be more than 90% of our entire DNA and it literally serves no purpose as to what our phenotypes or genotypes represent or produce. Though in recent studies, junk DNA has in fact led leading researchers to believe that through the organization of the codons that originally produce junk DNA to have a much higher purpose. Junk DNA is now being seen as playing a role in the inheritance of diseases as well as other phenotypes; junk DNA is the switch for our genes as previously mentioned and controls the organism. This DNA to the simplest cannot be explained at all which is where the debate again arises.

Around September of 2008, James Noonan, a geneticist from Yale University and a member of the World Science community found more insight on the ideas of junk DNA. Junk DNA was first given its name because there is so much of in genetic codes that did absolutely nothing at all; they weren't able to produce proteins like other genes and could be removed without a risk to animals. Junk DNA was found to have thousands of bits of genetic sequences, and the amino acids produced serve as genetic switches that basically control other genes in terms of turning them on or off. For instance, around six million years ago both human and chimpanzee branched off the animal kingdom for have distinct differences from all other animals which was their ability to be at a higher advantage, these types of animals are today known as vertebrates. Vertebrates were given these qualities because of Junk DNA; only humans gained the advantage of a higher intelligence, the primordial thumb, and the big toe because through the ages certain codes in human Junk DNA turned on these genes and therefore created a new function. Furthermore all vertebrate species remained similar to each other, but for humans we the underlining evolutionary success is due to the junk DNA mutating the genes to create us ankles, knees, thumbs etc.

Noonan also found the sequence in junk DNA that was the fastest evolving sequence that vertebrates share known as HACNS1 which is responsible for human and other primate limbs. In recent studies Noonan found that in mouse embryos this junk DNA sequence is present and shows connection between primates, and humans. In mouse embryos scientists are able to point out that HACNS1 is controlling gene activation during development. However an uncertainty about Noonan's research existed and that was that he couldn't come to a conclusion as to whether or not HACNS1 was changing gene expressions or just creating human-like limbs on its

own using the other genes. A recent study that took place at Georgia Institute of Technology by Professor John McDonald and graduate students on October 25, 2011 attempted to figure out the extent that Junk DNA affected the human evolution. To do this McDonald tested the DNA of both chimpanzees and humans and studied the gaps in between the genes. He also found that the gap where junk DNA is located has direct control over the surrounding genes. Even though this was already known about Junk DNA his team also found that human and chimpanzees' gaps correlated with each other. The only difference was the genetic expressions caused by junk DNA that were trying to adapt to the environment give the animal a survival advantage. At the end of the experiment McDonald stated "Our findings are generally consistent with the notion that the morphological and behavioral differences between humans and chimpanzees are predominately due to differences in the regulation of genes rather than to differences in the sequence of the genes themselves." McDonald was merely clarifying that the differences between humans and chimpanzees such as our behaviors, and structure aren't because of the way genes are placed in their sequences but how they are used in sequence, in other words how they are each activated by junk DNA at different times.

In religious views the word "Junk" was faulty because what junk DNA does is worth so much to human life and in many views deserves a better name. Junk DNA in religious views needed a better title being that it is found in almost every animal around the world. What scientists today call junk DNA is really valuable because essentially humans wouldn't be human without it. Going back to Collins, he saw God as the master of creation who would never create junk. Evolutionists call this natural selection, a term derived from Darwin's research to which the top surviving animal in the region will achieve a greater reproductive success, but what they fail

to see is that junk DNA is scattered all over the animal kingdom and does indeed lead to one ancestor that scientists fail to explain. This relativity between animals all points to junk DNA, the name itself is a mere deception of the truth. In fact "Junk DNA" was given simply because they are non-coding genes and don't have codons to produce amino acids. The junk DNA itself is found to be more than 90% of our entire DNA and it literally serves no purpose as to what our phenotypes or genotypes represent or produce. Though in recent studies, junk DNA has in fact led leading researchers to believe that through the organization of the codons that originally produce junk DNA to have a much higher purpose. Junk DNA is now being seen as playing a role in the inheritance of diseases as well as other phenotypes; junk DNA is the switch for our genes as previously mentioned and controls the organism. This DNA to the simplest cannot be explained at all which is where the debate again arises.

Another fact that gives the theory of evolution a drawback is the Cambrian explosion which completely disproved Charles Darwin's theory that it takes millions upon millions of years for evolution to naturally occur. Around 526million years Phyla being the simplest of organisms, along with phytoplankton and other animals were all single celled organisms that thrived in colonies. Calcimicrobes are the fossils of these prehistoric animals to show as factual evidence to that of the organisms, but what is so dramatically significant about this time period is that only a period of about 20 to 40 million years their evolution was accelerated beyond belief up to the point where they began to resemble the multicellular organisms that we still see to this day such as trilobites. Some evolutionists would say that it essentially give a more exact time period to which Darwin could only predict but this situation happened in a diversity of single celled organisms such as trilobites, mollusks, and echinoderms all were a result of this unnatural

occurrence. Some evolutionists such as Simon Conway Morris argue that in the time of the Cambrian explosion the planet would have created selection pressure that would have created similar animals to that of today anyways.

Conclusion

Though the ideas of Simon Conway are probable it is important to include the development of our complex eyes as they are the most remarkable tool many animals share, specifically vertebrates. The earliest signs of the development of these eyes include the anthropoids of Planarian, and trilobites. Trilobites were one of the many multicellular marine organisms, only the trilobite used calcite, a type of mineral rock that it evolved into its protective armor and its significant eyes. The eyes of the trilobite used calcite to develop a crystallized elongated prism similar to most insects we see today such as the dragonfly. These eyes were the most simplest of eyes as they were only able to distinguish the intensity of light, this calcite also helped trilobites produce a hard armor so without calcite the trilobite would have been not only blind but defenseless as well. Some trilobites in fact developed internal doublet structures which provided a spectacular view to distinguish the depth of field as founded by French scientist René Descartes and Dutch physicist Christian Huygens in the 17th century. As for the Planarian, it is the root of all vertebrates in a sluggish form that developed eyes as well using retina cells that could as well recognize the intensity of light, but with the Planarian its fossils of developed eyes only date back to the time of the Cambrian explosion as well as trilobites, and to this day there is no trace of eyes before the Cambrian explosion.

Some Creationists use the Cambrian explosion as a basis to prove that there was an intelligent designer who provoked the formation of all animals during this time period. There is ultimately a search to find the truth for both sides and in sync are using the Cambrian Explosion to lead to conclusion of finding an answer to where everything started. A limited number of

scientists believe that the bible is nothing but a made of story used to have hope over the impossible in everyday lives, however science and Biblical studies all are attempts of the human race to find the answers of the unknown and having evolutionary theists such as Collins are those type of people who those who are looking for answer need to be, and take in all possible information there is out there in the world. In science itself there have been many people who have stated “a scientist is never a good scientist if one doesn’t use all possible results are considered”. This statement alone defines how humanity is persistent in regards of finding the unknown and debate only slows down the process of getting answers.

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