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## The Co-Existence of Evolutionary and Creationist Ideas in a Post-Darwinian Society

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## ABSTRACT

(Evolution, Creation, Darwin)

Ever since Darwin published *The Origin of Species*, creationists have offered a competing explanation for the diversity of life on earth and its features. This paper addresses several commonly encountered topics of controversy between creationists and evolutionists. It proceeds to point out the scientific reasoning that allows the evolutionary theorists to draw their conclusions, and how the creationists respond accordingly to these facts as presented. It will use the example of the age of the earth as determined by radiometric dating, as well as the relationship of extinct to extant species, to examine creationist arguments in light of scientific discovery. Specifically, it will address creationist interpretations of the fossil record supporting these relationships and creationist discussion of the morphological continuity between related, extinct taxa. Finally, this paper addresses the place of creationism in today's society, both in the classroom and in the chapel, and its likelihood of persistence into the future.

THE FLORIDA STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

THE CO-EXISTENCE OF EVOLUTIONARY AND CREATIONIST IDEAS IN A  
POST-DARWINIAN SOCIETY

By

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A Thesis submitted to the  
Department of Biological Sciences  
in partial fulfillment of the  
requirements for graduation with  
Honors in the Major

The members of the Defense Committee approve the thesis of Corinne M. Brack defended on November 15, 2013.

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This thesis is dedicated to my father, Randy Brack. His steadfast faith coupled with my education at Florida State inspired me to search for a much deeper understanding of the seemingly limitless complex interactions of religion and science. I love you dad, even if you still believe that *Archaeopteryx* was on the Ark with Noah.

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## I. Introduction

The polarization between creationism and evolutionary science has two main sources of conflict. First, there exists an argument over what information is surely fact, and second, how to interpret known facts as presented. The main argument of determining what is fact in this paper is the decision of the age of the earth. A literal interpretation of Genesis would lead one to believe that the earth is only several thousand years old, while radiometric dating has figured the earth to be 4.5 billion years old (Allegre, 1995). Here Creationists attempt to point out flaws in the methodology of dating in order to discredit its findings and instead promote the Biblical age of the earth as the factual age. The debate also exists about whether or not dinosaurs walked the earth alongside man. Fossil dating would suggest that man and dinosaur were separated by millions of years, yet current creationist literature depicts man living alongside the giant dinosaurs of prehistory.

The second argument addressed in this paper is based on the interpretation of ideas that both Creationists and evolutionists have agreed upon as facts. Specifically, the interpretation of certain aspects of the fossil record will be brought up for analysis. Both creationists and evolutionists concur that the fossil evidence of extinct species exists, but the conflict lies in the interpretation. Darwinian evolution promotes a change over time including speciation events and transitional species. Scientists claim that the fossil records have shown a graded change between species, as well as the presence of transitional species such as *Archaeopteryx*. Creationists deny this relatedness despite the fossil record, claiming that there are too many gaps in the fossil record to make any valid inferences. There is, however, a division in the creationist belief that has produced a set of so called creation-scientists. This division of creationists is willing to blend

new scientific discoveries with their knowledge of the Bible, and it is this branching off that might represent a future accommodation of Darwinian evolution by creationist religion.

## II. Arguing Over Facts

One of the most well-known examples of arguments over facts where creationism and evolutionism is concerned is the age of the earth. Since Marie Curie's work with radiation in the early 1900's, science has utilized radioactive material as a means of procuring the true age of nonliving organic matter. Known now as Carbon 14 "<sup>14</sup>C" dating, all decaying matter contains amounts of <sup>14</sup>C, which is an atmospheric radioisotope accumulated during the life of all organic creatures. The carbon decays spontaneously at a known rate, allowing an extrapolation to the length of time since the organic matter died (Robertson, 2011). There is a limit to carbon dating, since it has a half life of approximately 5,700 years, however, so it is not the chosen method to date something as aged as the earth (Chiu, 2006). Instead, scientists utilize Uranium-Lead dating, which has a half life of around 207 million years, and can date objects from earth's advent. Through this dating, earth has been given an age based on one of the oldest meteors to date: the Allende meteorite (Webb, 2011). Found in Mexico, the uranium decay of this meteorite pinpoints its age at around 4.57 billion years old. Subsequently, science has deemed the earth to be 4.53 billion years old, when one considers earth fully formed at the time at which it possessed both a core and some semblance of atmosphere (Allegre, 1995).

There exists a division on this topic within the creationist dogma. One group, the literalists, as one might refer to them, argue that only the strict Biblical interpretation of the flood-age of the earth is accurate. These young earth creationists take a literal seven day



approach to the creation of the earth in Genesis making radiometric dating implausible (Yang, 1993).

When presented with the mechanism of radiometric dating, literalists focus specifically on carbon dating, claiming that the atmospheric carbon content of the earth fluctuated with the flood and subsequent solar radiation, and therefore the dating is not valid. This argument is then parlayed into a battle against all decay dating methods, and denies the validity of all methods accomplished this way, including Uranium-Lead dating. All scientists who know anything about radiocarbon dating would wholeheartedly agree with these literalists that Carbon dating is entirely inappropriate as a means of dating artifacts as old as the earth or Allendale meteorite. The incongruence lies in the “umbrella” approach to radiocarbon dating that literalists have taken, calling all methods of decay dating to be inaccurate. When presented with the much longer decay rate of Uranium-Lead dating, and it’s ability to date the earth in its earliest years, the creationists still find fault. They claim that Uranium-Lead dating is inaccurate because science does not know how much of the daughter material was available at the initiation of decay, and that any type of decay rate can only be accurate in a closed system (Woodmorappe, 1999). Conveniently enough, since literalists have deemed the methods of dating to be faulty, they feel that it is just an easy step to then negate the scientifically dated age of the earth in lieu of a much younger age based on the earth being created in six twenty four hour days.

Because of the scientific method’s tendency to revisit and test the accuracy of methodologies, the process of accurately obtaining and recording radiometric dating data is one which modern scientists do not take lightly. In a recent dig site in the Caribbean, nearly 80% of the analyzed dates recorded were either inaccurate or void due to inefficient methods or inaccurate technology (Fitzpatrik, 2013). This type of data collection certainly gives rise to the

literalist opinion of radiometric dating that it is an imprecise method. Current research advancements, however, have set up multi-faceted databases in which samples from each region can be updated and cross checked by each scientist as they analyze the region (Fitzpatrick, 2013). Although some dig sites are not fully digitized and cross checked, there have been enough sites with concurrent evidence to corroborate the claim that there are artifacts, such as the Allende meteorite, that have been around for over 4 billion years.

The previously mentioned concept of a fluctuating atmospheric carbon percentage is a valid argument which has also been addressed by modern science. Research by Tsu Chiu on corals in Barbados has concluded that the greatest influence on  $^{14}\text{C}$  levels is the intensity of the geomagnetic field (Chiu, 2006). The fluctuation of the field causes slight deviations in the Carbon content of the atmosphere from century to century. These deviations have caused discrepancies in projected ages of corals in Barbados when compared with laboratory analysis for age. The previously accepted half-life value determined in the 60's for  $^{14}\text{C}$  dating was 5730 years. New methods such as calorimetry decay measurements have suggested a "new" half life as 6030 years (Chiu, 2006). This difference is only approximately a 5% fluctuation, which shows that Creationist criticism of the methodology of dating is valid, but once researched, the resulting error is too small to make a substantial difference in previously published radiometric dates. Since it's utilization in the second half of the 20<sup>th</sup> century, radiometric dating continues to go through intense scrutiny as a means of improvement by the scientific community. This system of checks and balances promotes the reliability of dating methods as a whole.

Disagreement over the validity of radiometric dating leads directly to divergent assertions about which sets of organisms lived contemporaneously. The most prominent example of this disagreement is the coexistence of humans and dinosaurs. When examining the fossil data, one

finds the earliest examples of dinosaurs were seen in *Eoraptor*, approximately 230 million years ago (Langer 2010). Some of the earliest fossil records of even distantly human like species were found around only 3.2 million years ago in the form of the australopithecine Lucy (Edgar 2007). However, Creationist literature by Ken Ham is filled with illustrations in which Adam and Eve are in the Garden of Eden, partaking of fruit alongside lions, sheep, and a friendly *Avaceratops* standing in the background (Ham 2001). *Avaceratops* is a relatively small, boar sized dinosaur that has been dated back to the Late Cretaceous Period, which was over 66 million years ago (Science News, 1987). In this book, Ham makes bold statements such as “Adam and Eve and the Dinosaurs were created 6,000 years ago together” (Ham 2001). If radio-dating is accurate, as expressed in the aforementioned passages, then there is a serious disconnect between scientific data and assertions made by Ham’s book. Although dinosaurs are not expressly mentioned in the bible, literalists are willing to cede the fact that these fossilized beasts did exist, due to the rock-solid evidence seen in nearly every museum. What they will not concede, however, is that they existed over sixty million years before the appearance of humans.

Outside of his illustrations in creationist literature, Ken Ham is known for his displays in the creationist museum in Kentucky. Similar to *Avaceratops* in his books, this creationist museum displays extinct dinosaur species are portrayed alongside man as well as extant animals we see today (Moll 2007). This is an example of the young earth creationist ideals that contrast so starkly with evolution.

In another attempt to promote the coexistence of dinosaurs and man even in current day, there is adult literature written by creationists in light of their own paleontological discoveries in Alaska. A group of creationist explorers survived subzero Alaskan conditions to uncover what they claim to be rotting, un-fossilized dinosaur bones which were recently deceased (Davis

2006). This would be a specimen previously thought to be prehistoric, but actually coexisting with mankind. Unfortunately for these adventurers, the sample was later confiscated by governmental authorities and dated correctly to be millions of years older than the adventurers had hoped. This fact was not included in the Davis story, however, and this book, similar to many others in the genera of creationist literature, is often cited as proof of science's gross error regarding evolution and the steadfastness of creationism. ChristianAnswers.net cites the book as "Evidence of the Creator's hand at work....through completely un-petrified dinosaur bones" (Creation Superlibrary, 2007).

As stated by the National Academy of Sciences, "...rejecting the evidence for these age estimates would mean rejecting not just biological evolution but also fundamental discoveries of modern physics, chemistry, astrophysics, and geology" (NAS, 2008). When presented with the concepts of radiometric dating and dinosaurs predating mankind, we see a divide in the creationist dogma. Rather than argue over the accuracy of repeatedly proven scientific methods, these creationists step back from this literalist interpretation and instead incorporate dating measurements into their understanding of the Bible. To find solace between these scientific facts and the Bible, many often take a more vague interpretation any time scripture mentions a length of time. These Creationists have deemed the concept of exact dates to be irrelevant, and rather a symbol of "periods", rather than literal days or years (Ruse, 2005). When it comes to dinosaurs, these "old earth" creationists are much more willing to cede that man walked the earth after the dinosaurs.

Even in religious areas accepting of the aforementioned "old earth" creationism, there is a line drawn in the sand regarding scientifically determined facts that they will acknowledge. They too have select inviolable topics when it comes to conflicting views provided in their faith and

research. The concept of man being created in God's image is often an untouchable topic for these old age creationists, as they feel that man was created special, and we are the only ones God chose to bestow with a soul. It is important to note that, although these creationists will take a liberal approach to dating methods given current science, they draw a line that shall not be crossed when man's exceptionalism is questioned. It is not often an issue that emerges, however, as science has yet to quantify a soul, and therefore has no means to dispute the theology of these old age creationists.

### III. Arguing Over Interpretation

After one looks past arguing how we decide what information can be deemed fact, the second, and often more prevalent controversy surfaces. This is the conundrum of deciding exactly how to interpret information that both parties have accepted as fact. More often contested, because the facts act as a puzzle in the room that both parties will attempt to solve in a light favorable to their respective tenets. Rather than being able to highlight "faulty" methods in an attempt to avoid facing a paradigm shifting discovery, these facts are accepted and must instead be interpreted.

The most debated example of factual interpretation lies in the existence of transitional species. For the purpose of this paper, we will define a transitional species as an organism with features shared with both an extinct ancestor and an extant descendant, but is classified independently. To evolution, a transitional form represents "evolution in action", and a sort of road map to where a phylogeny has been, and how it looked on its way to the current morphs seen today. The diapsids are an ideal candidate for this topic because current fossil evidence

suggests a close relationship between extant groups which Linnaeus had purposefully classified as very different: birds and crocodilians.

Based on morphological and fossil evidence, it is thought that the diapsids emerged from the anapsids. The diapsids skull is characterized by a temporal bar which separates paired temporal openings on each side of the post-orbital region of the skull. Diapsids made their debut in the Carboniferous period. The group includes, among other reptiles, crocodilians, and dinosaurs inclusive of birds (Kardong, 2006). These groups share similarities in skull structure but also often share other similarities that have changed throughout the periods.

Looking towards the fossil record for evidence of this common avian ancestor, the most often touted name that will emerge is *Archaeopteryx*. It is important to note, that *Archaeopteryx* is not the only Jurassic bird with reptilian features, but it was the first discovered, and remains the basal-most bird or very close to it in comprehensive phylogenies. *Archaeopteryx* is the iconic reptile-bird and as such is the prime target for critics of evolution. *Archaeopteryx* was discovered in Germany in 1861, two years after Darwin published “The Origin of Species”, and it served as a prime candidate for evolution frozen in time (Kardong, 2006). Huxley, Darwin’s bulldog, used *Archaeopteryx* in his debate against Wilberforce, as it was a prime example of evolution fossilized in time. *Archaeopteryx* is still used today as a symbol of the similarities between reptiles and birds.

Based on the pristine nature of the *Archaeopteryx* specimen, it was readily apparent this feathered creature had the capacity for flight. Placed in the category of Archaeornithes, better known as “ancestral birds”, *Archaeopteryx* has several qualities that make it very similar to its avian successors. The feathers of *Archaeopteryx* contain an asymmetrical vane, which prompts

the idea that it was a creature capable of powered flight, much like our extant volant birds (Kardong, 2006). Similarities to the extant crocodylians, which also belong to the Archosauria, include but are not limited to a long, bony tail, and socketed teeth. Socketed teeth are distinct in separating *Archaeopteryx* from modern birds, which possess a beak, or ramphothecae, rather than teeth.

*Archaeopteryx* also has some interesting morphological features that are themselves an intermediate between the morphological structures of birds and reptiles. The tibia and the fibula of reptiles and modern birds have similar positions in the legs, but the fibula is extremely reduced and bowed inwards in the birds, while it is thick and bowed outwards in the reptiles. *Archaeopteryx* shows an intermediate structure; its fibula is an intermediate thickness and stands completely erect with very little bowing in either direction (Kardong 2006).

The creationist reaction to the fossilized *Archaeopteryx* interpretation is seen in various hypotheses, but most notably the reaction has been denial of this bird-crocodylian connection. Specifically looking at the topic of *Archaeopteryx*, Ken Ham's book states that there is absolutely no correlation between the progression of dinosaur to *Archaeopteryx* to our modern birds. They feel like the fact that *Archaeopteryx* had both avian and reptilian features makes it no more reptilian than our common parrot (Ham 2001). This absolutist approach is useful when attempting to exclude certain evidence from consideration. In this case, it would not matter that *Archaeopteryx* had socketed teeth, as he was already decidedly a bird. Going even further in this absolutist concept, in the Evolution Cracker, under the title of *Archaeopteryx*, it simply states that it was a small bird like fossil found in Germany but later proven to be a fake (Ferrell 2001). With *Archaeopteryx*, we have both a disagreement about interpretation of fact, as well as denial of facts as a whole.

In the early 1980's, cladistics had not yet entered the scientific world as a means of recreating phylogenetic relationships, and what was often utilized was a much more vague approach to estimating relationships. Known as Romerian bubblegrams, these charts showed only that the birds branched somewhere near the cladogenesis of crocodilians, and left much room to interpretation as to when this divergence occurred (G. Erickson, personal communication, September 23, 2013). Bubblegrams served as a sort of guideline for evolutionary theory without pinpointing anything as specific as a common ancestor or utilization of genome comparisons. Methodology such as this left much room for the creationists to deny speciation concepts regarding the aves and crocodilians, as scientists themselves were unsure of exactly where common ancestors were present, and what branches produced such unique creatures as the aves .

Genome sequencing, DNA comparisons, and cladistic methodology soon replaced bubblegrams, and allowed a more precise classification of extinct species. Dinosaurs are a group of archosaurian reptiles (the group that includes crocodilians, dinosaurs, pterosaurs, and several other groups) that are divided up into two categories, the Ornithischia, and the Saurischia. The Saurischians were characterized by a pelvic girdle with three distinct radiating bones. Among the Saurischian dinosaurs are the theropods, classified by being predominantly bipedal, carnivorous, and having hollow bones. *Archaeopteryx* is classified as an archosaur, and is accompanied by birds and crocodilians. Along with very close relatives, birds and crocodilians are the only reptilian archosaurs to survive the Mesozoic into our current day (Kardong 2006). Instead of dotted lines of the Romerian Bubblegram, we now see the distinct lineage that roots birds and crocodilians with a distant common ancestor. The addition of fossils shows *Archaeopteryx* is a theropod dinosaur.



Similar to the argument about the relationship between extant birds and crocodilians, another area of conflict regarding facts lies in the interpretation of the fossil record of extinct diapsids. There is a graded change in similarities between these extinct ancestors as they evolved from the anapsids, but it is not continuous and contains gaps both in time period and morphological continuity. Creationists and evolutionists interpret these gaps and areas of continuity in two very opposite ways.

In a book titled “The Evolution Cracker”, Vance Ferrell explains that since there are gaps in morphological changes between extinct taxa, there is no fossil evidence for large scale macroevolution which would result in speciation (Ferrell 2001). If this train of thought is followed, there would instead be many different “micro-creations” of sort that led to the various differences in otherwise similar creatures.

Scientists would disagree with that point for a distinct reason. To begin with, we are very lucky to have any fossil record, and it tells us volumes despite what creationists might call gaps. The most important thing that the fossil record tells us is that evolution remained steadfast between geological strata. Evolutionary biologist Richard Dawkins feels that the disproval of evolution would be simply done with one piece of evidence. If archaeologists were ever to unearth an anachronistic fossil, evolution as we know it would go out the window (Dawkins, 2009). As science stands now, however, the discovery of such a fossil has never happened. Everywhere on the earth, fossils are always found in their proper geological strata, with no creatures ever “jumping” ahead in the evolutionary timeframe.

An interesting resolution to this conflict regarding gaps was brought up by professor Peter Senter on the topic of Classic Multidimensional Scaling (Senter, 2010). MDS is a means of

quantifying the morphological gaps in the fossil record between seemingly related species. Since some species have no gap, they would be essentially a perfect transitional example of evolution. To put it simply, if gaps mean that evolution does not work, then the absence of gaps must mean that evolution is in action. An example of MDS in the diapsids would be *Archaeopteryx* and the presence of both hollow bones and feathers. As a transitional species, it has the hollow bones of the theropod dinosaurs, but also the feathers of the subsequent aves. This graded change in morphology would be, according to Senter, evidence for evolution since it closes a gap that creationists claim would otherwise eliminate the possibility for evolution.

When faced with MDS of extinct species, the creationists are then left to either accept the data as presented by their own specifications, or go back and recant evidence that they earlier used against evolution (Senter 2010). The purpose of such a method would be to promote a logical, quantitative approach that would allow evolution one step closer to consideration by those who had once closed off their minds to the idea due to religious background alone.

#### IV. Creation and Evolution in Modern Society

In modern day scientific education, the conflict is no longer between facts or interpretation, but a question of altering the established educational standards set forth by pre-Darwinian education systems. Particularly in Florida, the absorbance of evolution into the school curriculum has caused quite a bit of conflict. It was only in 2008 that a set of standards were approved that contained evolution. Previously, Darwinian evolution was not brought up in the science classroom and was rather presented as biological change over time (Armbruster, 2008). At surface value, this basic concept is able to fit with the established creationism many children grew up with in Sunday school. However, if a student chooses to delve deeper into

evolutionary findings, they find themselves facing a torrent of evolution versus creationism questions that are left unanswered by the education system. It is unfortunate that many science teachers will not bring up the many religious quandaries that teaching evolution will bring to the forefront of a young student's mind. Instead, teachers will often skirt the hard hitting anti religion points and proceed with a more glossed over, Bible friendly version of the theory of evolution (Southerland, 2013). This is disappointing, because it leaves students in a predicament: they must decide for themselves just how to handle this moral dilemma in absence of all the facts. The background of the child as well as personal motivation is the only determination of exactly what sort of "history of the world" they will learn, rather than the presentation of information allowing for interpretation by each individual mind.

This idea also provides an insight into human nature, and how emerging science is received by the non-scientifically trained community. In a long running worldwide study by Allan Mazur, research participants over several years were asked how they felt about evolution (Mazur, 2004). With statistics that remained relatively constant, nearly 70% of persons polled in the United States reported that evolution was probably or definitely not true, and only 30% of the subjects answered that evolution is probably or definitely true. When quantifying the main cause of these statistics, Mazur found an exceptionally strong correlation between religious background and denial of evolution. The lack or presence of education played a very distant second role but was far overshadowed by biblical upbringing (Mazur, 2004). It appears that a vast majority of the of the persons polled are willing to close off evolutionary theory due to their religious background or lack of education, despite what any of the radiometric dating, morphological similarities, or cladistic data might suggest. It is disconcerting to ponder whether mankind is

willing to remain this unmoving in the light of paradigm shifting discovery even if such a discovery might in the end better us all as a species.

The most beneficial product of this creationist-evolutionist struggle would likely be a compromise. This compromise would embody an acknowledgment that both religion and science deal with a distinct set of ideas. No longer can both sides yell from opposite ends of a room, but instead they must come together and learn to coexist rather than fight over the mind of mankind. It is in this concept that blossoms the idea of scientific creationism. The creationist dogma is itself morphing into a more advanced concept which can thrive in the light of evolutionary discoveries. We have seen some evidence of it in the “old earth” creationists who have accepted radiometric dating and integrated it into their biblical time frame figuratively, and will likely see more as the scientific method continues to challenge a literal interpretation of Biblical accounts of earth’s history. Without this change, creationism would surely persist, but to the apparent disadvantage of man’s intelligence and perhaps also a contradiction of man’s exceptionalism. If we are to deny proven truths of God’s earth as we are able to understand it, just how intelligent can we be?

If there is to never be a grand agreement between evolutionary theory and creationist dogmas, then the idea of creationism itself changing arises. R. Pennock poses an interesting perspective as he argues that creationism itself is actually in a state of evolution (Pennock, 2003). The idea of creationism has a long history fraught with battles when confronted with an opposing view. What is happening now is a shift in the paradigm of creationism towards a religious interpretation of creationist literature which might indeed be capable of coexisting with our current evolutionary knowledge and any discoveries that science might allow us in the future. This is accomplished through a figurative approach to the areas of scripture which are challenged

by science. Whether 7 days equates to 4.5 billion years, or the “Leviathan” of scripture is actually a dinosaur, the future of creationism in the modern world has its best hopes when it is integrated with science rather than against it.

## V. Conclusion

As long as evolution challenges the literalist interpretation of Genesis, young earth creationists will continue to refute the validity of evolutionary findings. This black and white interpretation of the Bible is having a much harder time fitting in to our growing scientific world than it has in the past. Those trying to reconcile the beliefs of their upbringing with the evolutionary findings of their future can do so if they take a figurative approach to the Bible and see the ways evolution can fit in. Evolution continues to be re-affirmed, as is the nature of the scientific method. Faith is not validated by the scientific method, however, and if one is to have both a belief in creationism and Darwinian evolution, they must be prepared to analyze facts at face value and decide for themselves how religion and science can coexist to them.

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