

## **ABSTRACT**

CARNEIRO, LARISSA SOARES. *Divine Technology: How God Created Dinosaurs and People* (Under the direction of Jason Swarts).

This study investigates how Creationism is socially, materially, technologically, and rhetorically produced. Simply put, the task is to scrutinize what is required to transform a religious folk tale into a scientific fact—how technological devices (material culture in a broader sense) and scientific rhetoric translate and materialize the pages of the Book of Genesis into what Creationists regard as scientific truth. Creationism or, as it was later rhetorically relabeled, Creation Science, is one of the major Creationist schools of thought. According to Creation Science, what is narrated in the first chapter of the first book of the Christian Bible is factually true as a record of what occurred during the divine creation of the universe in six days, and the subsequent event of Noah's Flood. If religion was supposed to vanish in a more "enlightened" era, as suggested by Max Weber and other advocates of a rational modernity, the Creationist movement has survived in a highly modern, technological, and scientific era. As a matter of fact, it remains a major force in the most developed country in the world, the United States. So this study begins by asking why Creationists are still around and how they have constructed a science that has steadily defied the secular worldview regarding the origin of the universe and humankind. In the search for answers, I found that, in fact, religion, science, and technology have not been historical strangers to one another. Furthermore, it is a mistake to characterize Creationism as an anti-modern movement. Creationists do not oppose scientific progress or technological development. To the contrary, they embrace them. Regarding its scientific, technological, and material construction, Creationism is not always very different from its secular

counterparts—evolutionary and uniformitarian accounts. For example, Creationists conduct research and submit their data to technological scrutiny. They sometimes work in laboratories and they write technical books and scientific articles. They attend Creationist conferences, where they present their work, and they have founded natural science museums. However, if all these elements (books, articles, lectures, museums, and laboratories) have been overlooked as isolated artifacts by scholars studying Creationism. This dissertation demonstrates the ways in which these various enterprises operate as technologies that take shape in an assemblage of different actors, working together to produce scientific truth.

In this study, following the suggestion of the sociology of science and the rhetoric of science, I proceed from two major premises. First, whereas scholars such as Stephen Jay Gould (2002) have advocated the idea of religion and science as non-overlapping magisteria (NOMA), I challenge the claim that religion and science belong to different realms. One of the major critiques to both the rhetoric of science and the sociology of science is that science cannot be compared to religion as a social construction. For Latour (1993), the myth of modern purification - placing human and non-humans in different realms and separating the natural from the supernatural - never happened. Therefore, following Bruno Latour's Actor Network Theory, this project aims to demonstrate that scientific progress has influenced religion as much as religious premises have long colonized science. Then, assuming that science cannot be studied as an isolated and single identity, but materially constructed through rhetorical procedures and established protocols, I scrutinize different tools and technologies used to transform religious belief into fact. By identifying these different features, it is

possible to describe the rhetorical strategies employed to fabricate a sense of scientific truth. The method for investigating science is not only about the study of the production of knowledge. It is actually the analysis of the processes of translation, in which different actors are assembled in order to create a single version of reality.

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Divine Technology: How God Created Dinosaurs and People

by  
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## **DEDICATION**

To David, who is my inspiration and an endless source of motivation. I only made it  
because of you.

## **BIOGRAPHY**

From master's study to the present, my research interests have occupied the intersection of media, science, and religion. This consists of three overarching themes involving the relationship between science and technology, religion and technology, and the ways in which media and technology contribute to the production of both religion and science (material culture, in a broader sense).

I took an MA in Communication in Brazil, focusing on the technological construction of the sacred on Islamic websites. More specifically, I argued that affordances of the digital environment (temporality, multimedia, and memory/database) allowed it to imbricate older media (icon painting and manuscript illumination) that were traditionally used to visualize sacred persons in a way that suited the production of online hagiographies of suicide bombers. This research on the relationship between religion and technology led me to North Carolina State University, where I finished my doctoral program. At NCSU, my studies have concentrated on the rhetoric of science, agency of technologies, and the role that science and technology play in religious worldviews.

## ACKNOWLEDGMENTS

It is not uncommon to hear that a ‘dissertation process’ is a long and lonely journey. I could not agree more with the first adjective. While in a doctoral program, one will intensively live each day of what seems to be an endless succession of weeks, months, and years of hard and absorbing work. But the second adjective could not be more incorrect. A dissertation is never a solitary activity. It is a succession of conversations, suggestions, revisions, support, and learning with many people. Therefore, it is necessary to express my deep gratitude to several professors and colleagues who offered me suggestions, recommended literature, read my work, made me think through my own writing, and corrected my (many) mistakes. In fact, I can hardly count the number of people who made my research possible.

But let me try. First, I would like to thank North Carolina State University for accepting me as a doctoral student in the Communication, Rhetoric, and Digital Media program. I could not have been luckier in joining a program with such kind, helpful, and intelligent faculty. Over the course of my journey, I took classes that changed the way I understood and approached communicative practices. Perhaps there is nothing more powerful and gratifying than meeting people who change our mind and the way we think. Melissa Johnson was the best mentor that anyone could dream of. Patiently and generously, she guided me through my first publications and paved the way to begin my career as a teacher in the United States. Steve Wiley, Jeremy Packer, Nick Taylor, Carolyn Miller, and Adriana Souza Lima taught me a great deal. Victoria Gallagher made

possible for me to write a dissertation engaging the rhetorical perspective and concepts. William Kinsella was always right when recommending books that I should read. As a matter of fact, all the books he suggested ended up in the list of references of this dissertation. I also would like to thank the people from the ‘other side’ of my research field—religious studies. Todd Ochoa from the University of North Carolina and Jason Bivins from North Carolina State University. Bivins, one of the members of my committee, conducted me through the maze of the historical and political life of fundamentalist Christians in the US, of which, I must confess, I had known very little. I also want to thank James Bielo from Miami University who generously guided me through a visit to the fascinating Creation Museum in Kentucky.

One scholar deserves special acknowledgment: my advisor, Jason Swarts. Although I have been trained in Communication, I did not hesitate to ask Swarts, from the English Department, to be my advisor. And I am glad that I did. An attentive and generous reader, Swarts knew exactly what I wanted to argue and knew even better how to improve my work, making me seeing the many gaps I had missed. I enjoyed all the conversations about technology and Actor-Network Theory we had in his office, and I will always be very thankful for that. Bruno Latour became a much easier enterprise through Swarts’s mediation.

Finally, I want to thank David Morgan, my husband, partner, and all-time favorite scholar in material culture and religious studies. The truth is that this dissertation would not exist without David. First, he is an example of hard work and persistent

writing. Second, he taught me how to write in English by patiently reading all my chapters, checking for grammatical mistakes and for sentences that I had written in what he called '*Brazinglish*.' Sometimes, these corrections met with a fight – but, alas, 'it was always my fault' in a frustrating struggle at learning to write in a language that only slowly has become my own. But David did even more than that. He never failed to encourage me, believing, sometimes more than I did, that the goal was in sight. Sometimes, all we need is someone to tell us that. Because I trust him with my life, I believed him. And so here I am. From the bottom of my heart, thank you, David Morgan. I do not know enough words in English or in Portuguese to convey the depth of my gratitude.

Last, but not least, I must add to this list of important people three furry, little, non-human creatures. Flor, my angel, passed away in June 2015, leaving behind a wound in my heart. She and her beautiful sister, Fada, were always at my feet during long hours at my computer. With them, the journey ended up to be much easier and cozier. And then, Louie "the brown bear," the new addition to our family, helped me to cope with my loss at a time when I desperately needed reasons to laugh.

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## Introduction: The Social, Rhetorical, and Technological Construction of Creationism

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In 1929, in *A Preface to Morals*, Walter Lippmann expressed intense scorn for Fundamentalists and their belief that God had created all things. For him, Fundamentalism was a retrograde reaction against all the premises of modernity, which, in varying degrees, cast doubt on the truth of divine creation and on the miraculous life of Jesus and its project for human salvation. “This movement has become entangled with all sorts of bizarre and barbarous agitations, with the Klu Klux Klan, with fanatical prohibition, with the anti-evolution laws, and with much persecution and intolerance,” Lippmann charged (Lippmann, 1929, p. 31). He was not alone in his feelings.

Just a few years before, the famous Scopes Trial had called national attention to the Creationist cause. Although the Creationists won in court, at the end the trial was considered by many observers to have been a “victorious defeat” for the movement led by the prominent Presbyterian William Jennings Bryan (Lienesch, 2007, p.168). All the media attention produced an unexpected collateral effect: the trial also highlighted evolutionary principles for the American nation. Americans began to wonder about the validity of a theory that relied on the biblical account to explain the origin of everything.

By the close of the trial, the devout Bryan admitted that his answers about the veracity of Noah's Flood, the precise age of the earth, and the beginning of the universe and humankind could have been better. His lack of scientific and technical knowledge to answer the questions posed by Clarence Darrow, a lawyer and member of the American Civil Liberties Union, had placed him in a position in which he found himself having to defend his own intelligence and intellectual formation. For many, Bryan ended up as an ignorant and narrow-minded man. H.L. Mencken, one of the most influential journalists of the early twentieth century, described Bryan as a "yokel" whose words had an undisguised appeal to the prejudices and superstitions of Southern people. "The Bryan I shall remember is the Bryan of his last weeks on earth – broken, furious, and infinitely pathetic," concluded Mencken. "It was impossible to meet his hatred with hatred to match it. He was winning a battle that would make him forever infamous wherever enlightened men remembered it and him."<sup>1</sup> His sudden death, only five days after the end of the trial, only increased speculation that his passing had been hastened by the broken heart of a deeply humiliated and pathetic man (Lienesch, 2007).

Amidst this atmosphere of public dishonor, Lippmann concluded (perhaps too fast) that if this obscure viewpoint were not yet completely dead, it was certainly no longer a significant force in America. After all, it did not appeal "to the best brains and the good sense of a modernity community" (Lippmann, 1929, p.31). Not without a share

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<sup>1</sup> Mencken, H. L. (1925, July 27). Bryan. *The Baltimore Evening Sun*.

<sup>2</sup> Pew Research Center's Religion and Public Life Project (2013). *Public Views on Human Evolution*. Retrieved from Internet at <http://www.pewforum.org/2013/12/30/publics-views-on-human-evolution/> on November

of arrogance, the cosmopolitan Lippmann and Mencken wrongly presumed that the Fundamentalist movement was largely born in rural and isolated areas and was, therefore, a product of country and uneducated people. Actually, as pointed out by Ronald Numbers (2006) and Michael Lienesch (2007), Fundamentalism began in the most prestigious academies in the urban and industrialized North and it was there that it carried out some of its most important campaigns. But labeling Fundamentalism a countryside phenomenon has not been the only misunderstanding of Creationism and is definitely not the most important. In fact, almost one century later, Creationism is still an important force in the United States with no empirical evidence to support the claim that the movement is destined to fade away.

Almost one century after Lippmann's prediction, a Pew Research Center analysis (2013) concluded that one-third (33%) of Americans reject the idea of evolution and believe that "humans and other living things have existed in their present form since the beginning of time."<sup>2</sup> On February 4, 2014, at the Creation Museum in Kentucky, Ken Ham, president of *Answer in Genesis*, and Bill Nye, popularly known as the "science guy," debated the question "Is Creation a Viable Model of Origins?" The encounter was billed as a contemporary version of the famous (infamous, for Creationists) debate between Bryan and Darrow at the Scopes Trial. Mediated by Tom Foreman, a journalist from CNN, the Ham/Nye debate received all kinds of media attention. On his Facebook page on January 6, Ham apologized "Sorry, all tickets for the debate with Bill Nye sold out

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<sup>2</sup> Pew Research Center's Religion and Public Life Project (2013). *Public Views on Human Evolution*. Retrieved from Internet at <http://www.pewforum.org/2013/12/30/publics-views-on-human-evolution/> on November 30, 2014.

within minutes!”<sup>3</sup> Those unable to attend could follow it live on Internet. *HuffPost Religion* affirmed that the “widely-publicized” television debate “was handily dominated by Nye, most agree. But Ken Ham may have the last laugh” (HuffPost Religion, 2014). This time, ironically, the collateral effect of the media attention worked in favor of the Creationists, calling attention to their cause and even stimulating fundraising required to help build a life-size replica of the mythical Noah’s Ark. The Fundamentalist movement in the United States – and one of its most important branches, Creationism – doesn’t show any sign of disappearing. On the contrary, at present, Creationists continue to be significant actors in the American political agenda. Indeed, those who have been tracking their efforts insist they are actually stronger now than ever (Carpenter, 1997; Numbers, 2002; Lienesch, 2007).

If Creationism was supposed to vanish in a more “enlightened” era, as suggested by Lippmann and Mencken, how has the Creationist movement survived in a highly modern, technological, and scientific era? Moreover, how does it remain a major force in one of the most developed countries in the world? After all, also supported by secularization theory popularized by Max Weber (1976 [1930]), the advance of rationalization (scientific and technological development), with its rational vigor, criteria, empirical observation and experimentation, ought to undermine religious authority and with it, all the superstitions and myths that were built upon religious principles. In modern societies, religion was condemned to wither away or, at least, to

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<sup>3</sup> *Ken Ham Facebook page*. Available at < <https://www.facebook.com/aigkenham/posts/684204221609937> > Retrieved from Internet on May 2, 2015.

survive only in the private domain, a simple matter of individual belief totally removed from the public sphere. But instead of evaporating, religion is still here.

So this study begins by asking why Creationists are still around. How have they constructed an alternative to mainstream science that has steadily defied the secular worldview regarding the origin of the universe and humankind? In the search for answers, I found that, in fact, religion, science, and technology have not been strangers to one another. For David Noble (1999), for instance, there is no contradiction in finding that religion has survived in a rationalized, scientific era. Contradicting Weber, Noble actually sees a close relationship between the revival of religion worldwide and widespread technological advance that has stoked increasing confidence in technology and science. Since the ancient world, religion and religious authorities have promoted faith and practice by using all manner of technologies. The matter is no different with Fundamentalist Protestantism. Since the advent of the printing press, Protestants have been pioneers in applying various media, formats, and rhetorical styles (Eisenstein, 2003; Hatch, 1989; Morgan, 1999). Traditionally, Fundamentalists have successfully mobilized the most sophisticated technological means to disseminate their message (Lienesch, 1993). As a matter of fact, fundamentalists prospered and survived precisely “by being flexible and making accommodations to Modernity” (Hendershot, 2004, p.5). As Joel Carpenter observed, “modern times demanded modern technology,” so what the church needed was to adapt to contemporary times (Carpenter, 1997, p.234).

Therefore, it is a mistake to characterize Creationism as an anti-modern movement. Creationists do not oppose scientific progress and technological development. Rather, they embrace them. Nor is it a point of view to be dismissed by science in the way that religious superstition was supposed to be dispelled by Enlightenment. If we want to understand their resilience and influence in the United States, it is not helpful to caricature them, as Lippmann once did. Creationists comprise a subculture that seeks to keep religious values in an increasingly urban, secular, and modern society. Living in this 'betweenness,' they negotiate (and reconcile) their values with contemporary reality. Far from being the products of an outmoded worldview, they were forged by modern society and represent a fascinating outcome of the encounter of religion with science and technological progress.

Creationism has been the subject of many investigations and passionate debates. Historians have variously analyzed the intellectual roots of the anti-evolution movement (Ruse, 1979; Moore, 1979; Conkin, 1998; Numbers, 2006). Among them, Ronald L. Numbers has told the most detailed history of modern Creationism as an alternative scientific field. Ethnographers have studied its communities and sociologists have described how organizations were created and members mobilized (Nelkin, 1982; Eve & Harrold, 1990; Tourney, 1994). Political scientists have investigated how activists learned to influence public policy (Gray, 1970; Lienesch, 2007). Rhetoricians have studied the suasive aspect of the Creation Museum (Lynch, 2013), and science educators have examined the influence of Creationism in the classroom (Moore, 2002).

Yet, despite so many studies, there is still much to do in order to understand how Creationism remains an important influence in American society. More specifically, it is important to understand the social and rhetorical construction of Creationism in order to know how to address it. To that end, it is essential to investigate the rhetorical transformations, adaptations, and negotiations Creationists have had to undertake in order to thrive.

As a researcher who has studied the relationship between religion and media/technologies, I noted a gap in the scholarship on Creationism. No one seems to have examined the role that the combination of scientific rhetoric and technological progress has played in the construction of Creationism as a scientific field. The many actors it takes to make a working scientific discourse and enterprise comprise a sprawling network in Creationist circles, and this has gone largely unexamined. Regarding the materiality of its construction, Creationism is not very different from its secular counterparts—evolutionary and uniformitarian accounts. Creationists conduct research and submit their data to technological scrutiny. They work in laboratories and write technical books and scientific articles. They attend conferences and have founded natural science museums. However, all these elements (books, articles, museums, and laboratories) have been overlooked as isolated artifacts instead of studied as the intermingled technologies that construct Creation Science. Simply put, I intend to investigate how Creationism is socially, materially, technologically, and rhetorically produced in order to resituate Creationism as a participant in the discourse on the

development and history of humankind and the universe. Moreover, I want to investigate what is required to transform what was previously a religious folk tale into a scientific fact; how technological devices (material culture in a broader sense) and scientific rhetoric have been engaged to translate and materialize the pages of the Book of Genesis into what Creationists regard as scientific truth. In doing so, my objective is to scrutinize the rhetorical implications and social actions of this Fundamentalist Christian enterprise.

### **1.1 The social, rhetorical, and material making of Creation Science**

The logo of the Creation Museum alerts visitors to “prepare to believe.” The announcement implies that inside the 70,000 square feet complex the pages of Genesis will come to life before the viewer’s eyes. Visitors will see Adam and Eve enjoying the Garden of Eden, where all the animals – dinosaurs, penguins, predators and prey altogether - lived in peace before the Edenic Fall. Indeed, in the museum, Biblical scenes and characters are represented in theatrical settings. Among wax sculptures of prophets and disciples, in one of the galleries, an animatronic dinosaur looks as if it had been lifted from a scene of *Jurassic Park*. In another room, an impressive “world-class dinosaur skeleton” of *Allosaurus fragillis* – “one of the six or seven best-preserved” – lures the attention of the museum’s audience. According to the museum’s website, the

completeness of the gigantic bone structure materially testifies that its present integrity may only plausibly be explained by its extremely rapid burial.<sup>4</sup>

In the Creation Museum, this skeleton and replicas of other famous dinosaurs are used to warrant the veracity of a sudden global catastrophe caused by a flood of worldwide proportions. Fossils and other artifacts are rhetorically used to support the idea that the world and humankind were created no more than 6,000 years ago, consistent with how many Christian Fundamentalists read the biblical narrative. In another room, in an unintended irony, the representation of an archeological site shows visitors how material artifacts can lead to faulty scientific conclusions. Videos and 3D experience contribute to the “dramatic finale” of the museum experience. The *Six Days of Creation Theater* takes visitors on a journey of “6,000 years into the past to view the dawn of history.” In this panoramic theater, the “Creation Act” is literally illuminated and brought to the present by special effects. In a flow of pixels, the audience is allowed to see a vision of how the universe was divinely created in a span of six days. The Museum’s website states that the audio-visual narrative “will move [visitors] to consider the wonder and diversity of God’s Creation.” High definition and digital technology enable the audience to soar “through the solar system or far beyond the Milky Way” just to find out that, at the end, amidst the infinitude of the universe, God chose this planet to stage the sacrifice of His son, Jesus.<sup>5</sup>

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<sup>4</sup> *Creation Museum website*. “Facing the allosaurus.” Available at < <http://creationmuseum.org/whats-here/exhibits/allosaur/> >. Retrieved from Internet on May 2, 2015.

<sup>5</sup> *Creation Museum website*. Theater Presentation. Accessed at < <http://creationmuseum.org/whats-here/theater-presentations/> > on September 6, 2014.

In the museum's store, visitors can also acquire "technical and academic" books written by "bible-believing" scientists. This scholarship will help the scientific understanding of how the creation of humankind did not happen by chance billions and billions of years ago, as defended by secular science, but followed the plans executed by God in six literal days. Among the most influential examples of such work is *The Genesis Flood*, first published by John C. Whitcomb and Henry M. Morris in 1961. Cherished by Creationists as the milestone that marked the birth of modern Creation Science, this book has a twofold purpose. First, it ascertains "*exactly* what the Scriptures say concerning the Flood" (Whitcomb & Morris, 1961, p.xxxvi – italics added). Second, it examines the "anthropological, geological, hydrological and other scientific implications of the Biblical record of the Flood" (Whitcomb & Morris, 1961, p.xxxvi).

Inside the book, figures of speech work as epitomes of anthropological and paleontological argument in favor of the events described in the Bible. A pyramid-graph shows the timeline for the decreasing water level during the 221 days of flood. The sudden drop in the age of patriarchs after the Flood is demonstrated by a multi-axis graph composed of dots and lines. A tree-diagram illustrates the differentiation of species from Creation until the present day according to the Creationist perspective. Photographs of the Grand Canyon, the San Juan River in Colorado, and the famous "bone bed" at Agate Springs in Nebraska are displayed as material and visual forms of evidence of a sudden catastrophe that jumbled together fossils of rhinoceros, camels, giant boars, and "numerous other exotic animals" in geological strata (Whitcomb &

Morris, 1961, p.161). Questions about the theory of catastrophism, the implications of uniformitarianism, the phenomenon of sedimentation, volcanism, the exact date of the deluge, and how Noah could fit the land animals inside the Ark are methodically answered by the combination of systematic examination of biblical records and the application of scientific procedures.

Complex scientific observations and mathematical calculations that support the Creationist framework can also be found in the academic journal, *Acts & Facts*, published by the Institute for Creation Research (ICR), in the *Creation Research Society Quarterly*, a peer-reviewed journal published by the Creation Research Society (CRS) and in the *Answers Research Journal*, another peer-reviewed journal published by Answers in Genesis. There, scientific articles, appropriately authored by PhDs, translate into words and graphs the evidence produced in Creationist laboratories to support the idea of a recent creation and a catastrophic worldwide flood. No matter whether secular or based on fundamentalist Christian principles, science has depended inherently on texts, documents, files, articles, and graphics to transform what was first an opinion into a fact (Latour, 1987).

For Bruno Latour (1987), science is neither the direct product of logical reasoning nor the result of the objective observation of nature per se. Rather, science is socially, materially, and rhetorically constructed. Laboratories, technical procedures, scientific books and articles, technologies for precision and visualization, and natural science museums constitute the apparatus of a dynamic network for constructing

scientific facts. When combined, all these devices work to hide that, in reality, scientific facts are fabricated rather than given by nature. In this sense, Creationism is no different.

If, from a secular standpoint, Creationism is considered no more than an amalgamation of fairy-tale, myth, and fetish, in this study I demonstrate how Creationism, as a product of modernity and deeply interconnected with the history of scientific development, engages the same actants and employs the same rhetorical strategies used by secular science to construct scientific facts. However, there is a substantial difference between the way the divine act of creation is described in the Bible and the divine act of creation as described by modern Creationists, though they themselves might not like to concede the difference. It resides precisely in the distinction between two different forms of Creationism. The first relies on ancient folklore and allegory. The second is a social construction, technologically mediated, and rhetorically erected upon the topoi of the Enlightenment and scientific thought. Modern Creationism differs from its biblical roots by virtue of its technological embodiment and its happy marriage with science. This is the premise of my thesis.

In order to problematize secularism, particularly the theories of evolution and uniformitarianism, Creationism makes use of rhetorical, scientific, and technological strategies to 'bring forth,' to make visible and, consequently, to prove logically and materially the act of creation described in the pages of the book of Genesis. The strategies include the use of laboratories, experiments, empirical observations,

technologies for precision (microscopes, telescopes, and geochronologies), and the subsequent production of scientific articles and books that convert the collected data into scientific prose. Other material resources are composed of two additional kinds of technologies that have, no less, rhetorical affordances: ‘technologies of imagination (natural science museums) and ‘recalcitrants’ (material artifacts of nature, such as fossils, bones, sedimentation, water, and the like). In my dissertation I want to understand how these different technologies, the assemblage of different actors, as suggested by Latour (1985), work together to produce scientific truth. So, by emphasizing the role that materiality plays in the social and rhetorical construction of science, I reject the idea that only the “human masses” have contributed to the construction of Creationism. In agreement with Latour (1987), John Law (1986a, 1986b), Michel Callon (1986), Lawrence Prelli (1989, 2006), and Alan Gross (2006), I want to incorporate into my account the “missing masses” composed of nonhuman actors, in this case, all kinds of material artifacts and technologies that have contributed to the construction of Creationism as a scientific field.

It is important to stress that I understand rhetoric and technology in a broader sense. On the one hand, rhetoric is more than written and spoken words (Gross, 2006; Hill & Helmers, 2004 Prelli, 2006). It includes visual and material artifacts that, when assembled in different networks, can reveal the way people construct and make sense of their world. On the other hand, technologies are more than modern devices that began to be developed in the nineteenth-century. With the philosopher of technology

Don Ihde, I understand that “material culture [is] technology in the very broadest sense” (Ihde, 1990, p.13). In short, in this study, rhetorical artifacts and technologies have much in common and I consider them synonyms. Technologies, such as microscopes, cameras, and computers, but also ‘things,’ such as fossils and replicas displayed in natural science museums, have rhetorical affordances that help them to convey meanings in compelling ways. In science, for instance, technological artifacts for precision and visualization are understood to support more sophisticated and accurate techniques of investigation (Fleck, 1979). They are supposed to reveal the truth, accessing what unaided human senses cannot perceive.

Technologies are rhetorical for at least two reasons. First, they are used as rhetorical instruments for scientific argumentation. Modern science has been historically supported by developing increasingly more sophisticated techniques for investigation. Second, since the path for the disclosure of a scientific truth is more than just observing what is revealed through technological mediation, technologies can only reveal what is already programmed by the social and cultural contexts in which they exist. “Seeing” rests on a complex foundation of assumptions, values, and cultural, historical, and social contexts (Burke, 1954; Fleck, 1979; Morgan, 2012). Paraphrasing David Morgan, human vision is social, biological and technological (Morgan, 2012, p.60). Human biology can provide the means for the sense of vision, but how we see is conditioned, disciplined, and trained by cultural and social frameworks. Therefore, as rhetorical instruments, technologies do not reveal only one thing. They can tell multiple

stories according to the worldview of those who are looking through it, manipulating it, and interpreting its generated data (Collins & Pinch, 1993).

Consequently, in order to understand the construction of Creationism, it is necessary to observe how these material artifacts and technologies are assembled and work together to reify a hybrid of scientific and religious truth, in which experiments and results are conducted to fit the Fundamentalist Christian worldview.

## **1.2 Theoretical framework**

In *Science in Action* (1987), Bruno Latour contends that there are two (at least) approaches to start the study of science. One begins “on the more grandiose entrance of ready made science,” in which the researcher will tell the stories of heroic scientists who, alone in their laboratories, ingeniously discovered new microbes, sequences of DNAs, and the laws that rule the universe (Latour, 1987, p.4). The other approach, subscribed to by Latour, rejects the idea that science is the product of individuals who, by the objective observation of nature, decipher the secrets of matter. As his fellow researchers Michel Callon, John Law, and Arie Rip (1986) affirmed, the idea that there is a “special scientific method” that can reveal the truth apart from other social institutions is a myth (Callon et al., 1986, p.4). Latour argues that in order to unveil the “black box” of science, investigators must go through the back door of science, where they will find science while “in the making” (Latour, 1987, p.4). Only by following scientists, observing technical and technological procedures, and scrutinizing the role of

textual, visual, and material rhetoric, will it be possible to trace the complex process of constructing scientific facts.

Therefore, the approach necessary to investigate the construction of scientific facts requires observing the juxtaposition of multiple and heterogeneous elements. Multiple because this approach implies that the facts of nature do not exist outside a network of multiple actants that, when differently assembled, produce diverse results. For example, fossils cannot reveal anything if buried or lost in the ground. They need to be desired, searched, found, and submitted to scientific procedures. Their existence as material evidence for scientific inquiry will also depend on the budget for research, relying on the generosity of private sponsors or on the bureaucracy of the state for national grants. Scientists will also rely on available (and increasingly expensive) technology to read, measure, dissect, and interpret the data. Different and new technologies will produce different results. They will have a better lens and consequently will be able to 'see' invisible matter in more detail. They will be more sensitive to physical and chemical reactions, identifying with greater accuracy the organic components of inanimate things. In case of computers, machines will be able to perform more and more complex calculations that will be transformed into readable data.

Based on results technically and technologically produced in laboratories, academic papers and books will be written, published, and distributed; research will be presented at conferences and the eventual material evidence of such scientific findings

will be exhibited in natural science museums. Finally – and no less importantly - the way a piece of bone will be interpreted by technologies, described by academic texts, and displayed in museums as evidence will be intrinsically associated with the cultural, social – and religious, of course - contexts in which it was produced. In science, worldviews matter. The way the world is rhetorically and technologically described is not universal, but varies deeply according to different frameworks. Eventually, submitted to a certain worldview and to its scientific scrutiny, the original artifacts will get folded into representations that stand for reality. Each step in this direction is a ratcheting up until the onlooker can discern reality at a greater distance from the recalcitrant upon which that view was originally developed.

In order to take up my research question – how Creationism is socially, materially, and rhetorically constructed as a scientific field – I will primarily orient my inquiry within a multi-method framework that combines the ‘scientific branch’ of Actor-Network Theory’s (ANT), the ‘sociology of science’ as proposed by Bruno Latour, Michel Callon, and John Law, and ‘rhetoric of science’ as recommended by Alan Gross (2006) and Lawrence Prelli (1989). Together, ANT and the rhetoric of science will be the guidelines that will allow me to investigate the assemblage of multiple elements, which taken together, produces Creation Science. However, in order to better support my study, I will also use two other auxiliary frameworks: *material rhetoric* and *philosophy of technology* (or *media theory*). The combination of different theoretical frameworks has three major justifications: first, their assembly fits Latour’s claims about which

features should be investigated to unveil the material and rhetorical construction of science, 2) they share important similarities, and 3) they complement one another.

### **Sociology of science and rhetoric of science**

Latour is celebrated for his defense of the role that non-humans play in the sociotechnical construction of reality. He has spent his academic career arguing for a kind of sociology of “mundane artifacts” (Latour, 1992a), better known as Actor-Network Theory, in which the French sociologist investigates the influence that non-humans (machines and all sort of artifacts) play in social life. Throughout his work, Latour has argued against the idea of – on the one hand - a social constructivism that only considers the role that humans have played in the social construction of reality and – on the other hand – the belief in technological determinism. For him, the way of solving these misunderstandings is, first, to acknowledge that technologies, things, and machines are intrinsically part of ordinary life. Second, if technologies cannot determine individuals’ behavior, the material world affects comportment, it creates possibilities, and it offers resistance because of its design, affordances, and physical structure (Latour, 1992a).

However, a less discussed aspect of Latour’s work is related to the field of rhetoric, which, in many aspects, shares similarities with the work later developed by rhetoricians of science (Gross, 2006; Latour, 1979, 1987; Prelli, 1989). According to his own definition, ‘rhetoric’ is the field that, since ancient Greece, studies how people are

made to believe, behave, and persuade others. “People start using texts, files, documents, articles to force others to transform what was at first an opinion into a fact” (Latour, 1987, p.30). In both *Laboratory Life* (1979) and *Science in Action* (1987), the father of ANT discusses the important role that rhetorical artifacts play in the construction of science. For Latour (1987), in the investigation of the fabrication of scientific facts, researchers should not ignore the rhetorical strategies present in a scientific text, which, in his own words, is one of the most important rhetorical vehicles.

For Latour, scientific texts are rhetorical for more than one single reason. First, they are rhetorical because they are constructed in a way to hide any trace of ownership, construction, time, or place. A text describing the behavior of a cell, for example, will not imply that the observed behavior was conducted and stimulated by the hands of scientists, in a highly controlled environment, and in a very specific moment (*kairos*) of scientific development. The reader will be persuaded that the microscopic cell was objectively observed and described no matter the procedure, the place, and the applied knowledge characteristic of certain historical time. For instance, a sentence in which we read that “cells dispose of worn-out proteins to maintain normal function” does not suggest an external authorship, but urges that the cell itself performed the action (Grant, 2015). The phenomenon is described in a way that sounds as something that has always universally happened since the beginning of time. Also, rhetorically, the affirmative and direct statement implies that the phenomenon that was

artificially produced and observed in a laboratory will happen exactly in the same way in the natural world. That is what scientists discovered: what cells factually do.

Similar to Latour, Prelli (1989) acknowledges the immense importance of rhetoric in diminishing the awareness of the process of constructing scientific facts. They are written in a way that claims the discovery of facts originated in the impartial investigation of phenomena that have an independent, objective, and undeniable existence. Through rhetorical strategies, the scientific text acquires the aura of objectivity. However, the selection of materials, procedures, data, and style is always a response to an ongoing history that happens in a certain place and specific time.

However, Latour continues, in an academic text, rhetoric does not work only in the way sentences are constructed. The rhetoric of the text also may be seen in the argument of authority associated with 'who' wrote the scientific text. For instance, an academic article published in *Nature* and written by a Nobel Prize winner carries more weight or rhetorical force. To contradict or review this published (and accepted) information is not the task of a layperson or an amateur. Another scientist, with appropriate credentials, a team of colleagues, access to financial support, and high tech laboratories will be necessary to challenge that idea. Moreover, in order to be taken seriously as an academic piece, this text must refer to previous literature; it must have many citations, quotations, and footnotes. The status of a statement always depends on previous statements; what is said now is connected with what was said or established before. Scientific texts must refer to the literature alleged to contain scientific facts,

adds Prelli (1989). The effect of references as a rhetorical tool for persuasion is not limited to the prestige of cited scholars. "It is a question of numbers," provokes Latour (1987, p.33). Scientists have to demonstrate rhetorically that they are masters of the subject. They have to show that they know the literature and can control the required means for scientific investigation. The standardization of procedures, concepts, and techniques is, at least by and large, established through conferences, books, and scientific articles states Ludwik Fleck: "This network in continuous fluctuation is called reality or truth" (Fleck, 1979, p.79). In order to have a work recognized, it must be followed by other articles and books with the appropriate citation. Any paper establishes its connections with the *vademecum* of science as proof that the author can talk for and to his intended community (Fleck, 1979; Latour, 1985).

It is by the invocation of past sources of knowledge that a scientific text reveals that it is not an isolated piece, but part of a community of thought (Gross, 2006). Citations are rhetorically applied not only to legitimize the current investigation, but also to place the text into a larger scenario (the network of authority) composed of scientific journals, books, laboratories, conferences, and peers. They are the index of an ongoing history and research program. To be part of a scientific community, one has to submit to an existing authority. Science does not depend on individual intellectual achievement but on agreement among its practitioners.

For Latour (1987), Prelli (1989), and Gross (2006), the distinction between fact and fiction ultimately is a matter of how a paper is rhetorically designed. It is the text

that links all the heterogeneous elements that compose the scientific world: scientists, laboratories, experiments, conferences, and publications. John Law has summarized the process by pointing out that by configuring these multiple elements, the scientific text imposes a structure on the world (1986a). Because of its incredible capacity to translate into inscriptions all these multiple elements into one single readable, mobile, and reproducible piece, the text is a key element for the process of constructing scientific facts.

Therefore, the field of the sociology of science, as proposed by Bruno Latour, is not distant from the rhetoric of science (Gross, 2006; Prelli, 1989). But the rhetorical analysis of scientific texts is not the only feature shared by both fields. Their similarities and partnership go beyond written words. For instance, the sociology of science and the rhetoric of science rely on methods that examine connections and associations. John Law, for example, emphasizes that objects do not have a meaning per se, but “are an effect of stable arrays or network of relations (Law, 2002, p. 91). The assumption is that objects possess a meaning as long as these relations do not change. Similar to ANT, rhetoric also highlights the relevance of investigating the interaction of material and symbolic features. Words, spaces, artifacts, and images perform together different forms of communication according to the way they are assembled (Foss, 2004; Gallagher et al, 2012). Consequently, in tandem with ANT, the rhetorical study of non-human actants does not endorse the idea that ‘things’ have an immanent value or meaning that resides within them or can technologically determine behaviors or beliefs.

The work they perform is the result of an assemblage of contexts, materials, and agents that produce symbolic meanings while in interaction. “Images do not determine their own interpretation but require interpretation,” affirms Sonja Foss (Foss, 1994, p.216). Their consequential meaning and function is a combination of their physical materiality and the context of their exhibition. “The making of objects,” continues Law, “has spatial implications.” Spaces themselves are not singular entities, but can enact “spatial conditions of im/possibility” (Law, 2002, p.92). It is the flow, the work, the movement, and the arrangement of many variables that produce effects.

Both fields even share the same premise: science is not made of discoveries through passive observation, logical rationality, and objective experimentation on natural reality. In this regard, sociologists and rhetoricians of science are not afraid to compare science to religion, “facts” to “fetishes.” The common sense would defend that both realms cannot be understood in the same terms. After all, science refers to a real and material world, it can be observed, measured, tested, and replicated through the right procedure while religion refers to the immaterial and ungraspable realm (which is another kind of common sense). However, science has another realm: scientific knowledge does not imply an absolute, universal, and acceptable truth. For instance, different theories about the same subject can coexist, mostly because different theories imply different ways of seeing and framing the world. In science, it is hard to find an agreement about an essential point (like *how the universe was created*), not because a

scientific fact is uncertain or incapable of proof, but because the deed appears differently to different people, to different audiences and communities of thought.

Hence, here we have another point of contact between the rhetoric of science and the sociology of science: in order to understand the rhetorical construction of science, the social, cultural, and historical contexts cannot be set aside from its evaluation (Farrel, 1991; Gross, 2006; Kelso, 1980; Prelli, 1989). Likewise, science is not a pure and distinct realm discovered by scientists in sealed and isolated laboratories, but a hybrid that exists through interaction with other arenas of life, such as politics, economics, culture, and – of course – religion (Latour, 1993; 2010). As Kenneth Burke argued in “Scope and Reduction” (1969 [1945]), science is an activity that fits a certain claim, a certain worldview – a “terministic screen,” as Burke conceptualized this framework of moral evaluation. As proof, the disagreement over Darwinist and Creationist points of view exposes deeper conflicts between two different paradigms, two distinct communities of interpretation regarding basic principles about life and existence. As Thomas Kuhn stated in *The Structure of Scientific Revolutions* (2012 [1962]), “normal science... is predicated on the assumption that the scientific community knows what the world is like” (Kuhn, 2012, p.5). However, secular science often presents the dissemination of important novelties because they subvert its accepted and established principles. Thus, scientific theories do not explain ‘reality,’ but are devoted to fitting the brutal facts of nature into a reasonable theory.

Rhetorician Allan G. Gross (2006) and sociologist Latour (2010) go even further in dismantling the purity and self-determination of science by claiming that all sciences depart from what was once only a belief, a fetish. This argument is more than appropriate for the investigation of Creationism. For Gross, drawing from Burke's concept of 'terministic screen' (which can be understood as a concept for distinct 'worldviews'), in order to understand the rhetorical construction of science, rhetoricians must take into account the values of the social context in which a certain scientific theory is produced. Scientists are not persuaded by *logos* alone. They are influenced by their *ethos* and *pathos*. The embodied values and beliefs of a certain community of interpretation affect the way its science is conceived and designed. *Ethos* and *pathos* are even more evident in Creationism because its scientific claims are directly based on the principles of a religious community of faith. In Creationism, Christian values and beliefs act as a 'terministic screen,' a worldview that regulates the results of scientific enterprises. Conclusions and interpretations are constrained by what is written in the Book of Genesis. Therefore, the same fragment of bone displayed in a Creationist museum will not have the same scientific meaning as a fossil exhibited in a secular natural science museum. This bone will be part of different network in which fossils act as witnesses that testify to the veracity of what is narrated in the Book of Genesis.

## **Why material rhetoric and philosophy of technology**

As previously said, one of the major issues raised by Actor-Network Theory is the relevance of what Latour calls 'non-humans' in the construction of social life. Things, artifacts, and technologies contribute as much as the human masses to the way we construct our sense of reality. For instance, in ANT a text is not only important because of its content, but also for its materiality. A text is portable, mobile, reproducible, and it can last for many centuries (Latour, 1987; Law, 1986a, 1986b). In the same vein, rhetoricians Gross (2006) and Lawrence Prelli (1989; 2006) – and even before them, Burke (1969) - do not only argue for the power of written words on the rhetorical invention of science. They argue for the importance of the role that materiality – recalcitrants, laboratories, and technologies - plays in the way scientists make the world scientifically plausible. According to these authors, any study in the construction of science should investigate the nature and the social effects of materials, as prescribed by material rhetoric and philosophy of technology.

In "The Art and Symbols of Ice Age Man," the archeologist Alexander Marshack (2010) associates material artifacts and technologies. Marshack contemplates the idea that material artifacts (stone and fossils) may look silent, but through the mediation of technologies, they can speak. Microscopic examination can detect information that naked eyes cannot see. Marks, hidden messages, and new kind of data are brought forth through the use of technological artifacts. But Marshack is not alone in his observation. Before them, the rhetorician Kenneth Burke implied that the brutal facts of nature,

when associated with technology and scientific procedures, could talk. As long ago as 1945, Burke affirmed that the “use of scales, meters, controlled laboratory conditions, and the like, can set up situations in which speechless things can hand down accurate judgments” (Burke, 1969, p.38).

Burke had a concept for these “things,” the “brutal facts of nature:” recalcitrants (Prelli et al, 2011). For him, recalcitrant materials are incorporated into scientific discourse in order to *substantiate*, to materialize, and prove a certain point of view. They turn into ‘flesh’ what would otherwise be immaterial. However, Burke continues, what things reveal through the mediation of technologies is not universally accepted, but determined by the cultural context in which they are made to talk. In Burke’s work, the concept of “recalcitrance” cannot be understood separately from his notion of “terministic screen.” Therefore, recalcitrants are not only used objectively to prove a claim. They also “can enable ‘opportunistic’ revisions that could either substantiate or correct a point of view or both, whether one’s own or some other’s” (Prelli, 2011, p.102). If it is true that things can ‘talk,’ they also can tell different stories. According to Gross (2006), the elements of nature can contradict, and therefore challenge, a statement, putting it in jeopardy. For example, a Wikipedia entry states that “based on evidence from radiometric age dating of meteorite material,” “the age of the earth is 4.54 billion years.”<sup>6</sup> However, a scientific article in the Creationist journal *Acts & Facts* challenges the correctness of the secular geochronological technology and, based on

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<sup>6</sup> *Wikipedia*. Age of Earth. Retrieved from [https://en.wikipedia.org/wiki/Age\\_of\\_the\\_Earth](https://en.wikipedia.org/wiki/Age_of_the_Earth)

Christian technologies, promotes the idea that the earth “is relatively young, little more than 6,000 years old” (Cupps, 2014b, p.11).

Science and technologies are intrinsically imbricated. As Martin Heidegger once said, “technology is entrenched in our history” (Heidegger, 1992, p.86). How can experiments be done without technology, asks John Law (1986). How can science be created without technologies of visualization? How to translate scientific results into scientific inscriptions without the mediation of technologies for precision? Modern science presupposes that practices confined and technologically controlled in laboratories yield information about actual processes in nature. The accuracy of observation was transferred to the machine. The complexity of nature is comparable to an instrument that always works in the same way according to predictable laws. “This ‘machine,’ continues Heidegger, “imposes its own use” (Heidegger, 1992, p.86). According to Law, the secret weapon of science is the “simplification” caused by the technology: the capacity to convert the diversity of living bodies, chemicals, procedures into a set of figures written or printed on sheets of papers (Law, 1986; Fleck, 1973). “In the world as we know it, it is to the technologies of inscriptions that we owe the possibility [of translating the facts of nature into a readable and simpler form]” (Law, 1986, p.46).

However, if the ‘nature,’ the ‘essence’ of technology simplifies complex relationships in nature, its ‘function’ can attend political and moral interest. Similar to Burke (1954), Madeleine Akrich (1992) acknowledges the relevance of worldviews in

the way technologies are engaged in scientific research. According to her, technical objects can be prosthetic extensions of our bodies, enhancing our senses, revealing more visual details, new orders of causality, and new forms of knowledge. However, although pervasive and entrenched in our history, technology does not determine the way the universe is revealed. What is 'brought forth,' what is 'made visible' is rather the translation of a series of negotiations between the machine and the viewer. Therefore, it is the combination of technological development and worldviews that shapes the way individuals perceive and explain their world. What a microscope reveals in a science laboratory is not the same as what is discovered in a Creationist one. The question of the relativism of technological truth notwithstanding, secular *and* religious scientists both rely on results produced by modern technology.

But, as Latour points out, no matter how differently recalcitrants and machines are engaged according to different worldviews, natural elements persist in any scientific theory, 'saying' what they are made to say. "We expect a final answer by using Nature's voice," affirms Latour (Latour, 1985, p.96). Nature is part of the battlefield for opposite scientific worldviews. That is why, he concludes, as science progresses, we increasingly get larger collections of artifacts in natural history museums - the consecrated place for the technological display of scientific truth. However, in spite of acknowledging the role that natural science museums play in the construction and naturalization of scientific facts, Latour (1985) does not go deeply in this investigation.

In order to investigate the construction of Creationism as an equivalent field, it is crucial to undertake the analysis of the materiality of the Creation Museum, a Creationist technology for visualization and imagination. Traditionally, museums belong to a clearly established rhetorical genre. They are epideictic places to tell the audience how the past 'truly' happened. Museums of science, specifically, create a rhetorical display that intends to prove, make manifest (showing valued and selected artifacts), and enact a concept of truth. Such places operate with the motive of displaying collective beliefs and shared worldviews. Inside the Creation Museum in Kentucky, artifacts and all sorts of technologies are carefully selected and used to display what happened in those miraculous six days of creation and what happened afterwards to cause the differentiation of species and to fashion the world in the way that we observe today. The rhetorical motive of the Creation Museum is to make visible what has remained invisible, even for those who believe that God created the universe and humankind. Its purpose is to translate the linguistic medium of biblical events into material, demonstrable, and objective facts. Therefore, as part of their scientific project, Creationists are currently constructing a full scale, all wood replica of the biblical Ark, supposedly based on the "real dimensions provided in the Bible (Genesis 6), using the long cubit, and in accordance with sound established nautical engineering practices of the era."<sup>7</sup> The major goal of this enterprise is to demonstrate the material viability of such a vessel. By constructing the 'real' replica, Creationists intend to prove to the

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<sup>7</sup> *Ark Encounter website*. "About." Available at < <https://arkencounter.com/about/> >. Retrieved from Internet on July 10, 2015.

world that a man and his family, guided by God, could actually have constructed such an enormous boat.

### **1.3 Methodology**

Following the suggestion of the sociology of science (Latour, 1987) and rhetoric of science (Gross, 2006; Prelli, 1989), in order to investigate how Creation Science is socially, rhetorically, and technologically constructed as a field, I will depart from two major premises. First, if scholars such as Stephen Jay Gould (2002) advocate for the idea of religion and science as non-overlapping magisteria (NOMA), following Latour's Actor Network Theory, I will challenge this principle that claims that religion and science belong to different and separated realms. One of the major critiques to both the rhetoric of science and the sociology of science is that science cannot be compared to religion as a social construction. For Latour (1993), the myth of modern purification - placing human and non-humans in different realms and separating the natural from the supernatural - never happened. Therefore, the aim in this project is to demonstrate that scientific progress has influenced religion as much as religious premises have long colonized science. People continued to explain their relation with nature based on their religious beliefs and to adapt their religion to scientific discoveries and new theories about the universe. Moreover, according to Gross (2006), science, as much as religion, are social constructions, in which forms of communication are developed in order to persuade members of the community.

Second, by assuming that science cannot be studied as an isolated and single identity, but materially constructed through rhetorical procedures, rituals, and established protocols, I will scrutinize different tools and technologies used to transform what was previously understood as a religious belief into an observable fact of the material world. By identifying these different features, it is possible to describe the rhetorical strategies employed to fabricate a sense of scientific truth. The method for investigating science, states John Law (1986b), is not only about the study of the production of knowledge. It is actually the analysis of the processes of translation, in which different actors are assembled in order to create one version of reality.

Therefore, to investigate how Creation Science is constructed, I will investigate what I previously called “technologies of precision” and “technologies of imagination.” In order to see how these technologies are engaged by the Creationist project, I will focus my study on three different empirical sources: texts (the Bible and scientific books and articles), laboratories (the Institute for Creation Research in Texas and the Creation Research Society in Arizona), and the natural science museum (The Creation Museum and the Ark Encounter in Kentucky). As Latour (1987) pointed out, that is the picture of technoscience: even the weak scientific view becomes stronger as time passes, as books are written, papers published, laboratories outfitted, and new resources, such as museums, are constructed.

## **The object: Flood Geology, Creationism, or Creation Science**

Flood Geology, “Creationism,” or, as it was later (and rhetorically) relabeled, “Creation Science” is, beside Intelligent Design, one of the major Creationist schools of thought. According to Creation Science, what is narrated in the first chapter of the Christian Bible is absolutely true. “Its [the Bible’s] unique, plenary, verbal inspiration guarantees that these writings, as originally and miraculously given, are infallible and completely authoritative on all matters with which they deal, free from error of any sort, scientific and historical as well as moral and theological.”<sup>8</sup> Therefore, the Bible constitutes the framework – the ‘terministic screen’ -- for the Creationist worldview. In a Kuhnian way, it establishes the paradigm, the borders, the constraints, and possibilities for what can be scientifically found in nature (Kuhn, 2012 [1962]). The account of the six-day-creation, the Garden, Adam and Eve, the Fall, Noah’s Ark, and the Flood are considered factual and historical records. Therefore, the commitment with the paradigm of Creation Science requires that no scientific discovery can contradict or challenge biblical revelation.

In contrast to the Mertonian norm of skepticism that guides scientific practice (Merton, 1973 [1942]), there are five principles of Creation Science that are taken for granted and cannot be challenged. They are five in number: 1) Creation Science includes and pursues scientific evidence that proves the sudden creation of the universe, energy, and life from nothing in literally six days; 2) accordingly, the physical

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<sup>8</sup> *Institute for Creation Research* website. “Core Principles.” Retrieved at < <http://www.icr.org/tenets> > on November 14, 2014.

universe has not always existed but was supernaturally created by the Creator, who alone existed from eternity; 3) biological life did not evolve according to natural processes as asserted by evolution theory; God specially created humans and animals in their final form; 4) fossils, stratified rocks, and all other kinds of geological sedimentation originated from the brief period of the deluge and its aftermath; 5) and finally, the history of life and the earth is compressed into less than ten thousand years.

According to Creationists, the scientific accuracy of the Scriptures can be demonstrated by recent geological and paleontological investigations. Thus, proving the inerrancy of the Bible is Creationists' major project, which they undertake by 1) developing research in Creationist laboratories, 2) writing scientific results in academic books and articles, and 3) exhibiting their evidence in their version of the natural science museum.

### **Laboratories and technologies of precision**

Laboratories are workplaces for scientific practice. They are legitimated places for the construction of science, to observe science while “in the making” (Latour, 1987). Laboratories also feature technologies that generate the data we find reported in scientific papers. As ironically suggested by Latour (1985), therefore, if they have instruments, laboratories do not lie. Latour considers technologies of precision as

any set-up, no matter what its size, nature, and cost, that provides a visual display of any sort in a scientific text.... The instrument, whatever its nature, is what leads you from the paper to what supports the paper, from the many resources mobilized in the text to the many more

resources mobilized to create the visual displays of the text (Latour, 1987, p.68-69).

So, what is behind a scientific text? Inscriptions. How are inscriptions produced? They are fabricated by technologies of precision, such as technologies of measurement, and technologies of visualization, such as microscopes. These technologies are in charge of generating arguments and evidence that a certain scientific fact is true. They do it by producing data that will be eventually translated into texts, pictures, maps, graphs, and charts. In a scientific paper, Latour (1987) concludes, what we really find is a technological and rhetorical construction that began in a laboratory.

Therefore, it is the laboratory and its technologies that make recalcitrants, or the brutal facts of nature, to talk. There, what were previously observations as well as assertions, ideas, and beliefs become 'things.' The invisible becomes visible. The world we live in is dissected into organic and inorganic properties. The earth – a complex entity that we can barely grasp – is divided into academic disciplines, sections, fields, and strata in order to be measured and explained. Thus, laboratories are a powerful milieu in which to define reality (Latour, 1987). They can be characterized as a site in which heterogeneous and an apparently disconnected range of elements are brought together and “assembled into a hopefully coherent whole” (Law, 1986, p.39).

In like fashion, the Institute for Creation Research (ICR) and the Creation Research Society (CRS) fulfill the objective of generating data in order to explain the Creationist view of reality. Geochronologies, physical particles, genetic code, fossils record, microorganisms, and meteorology are among the resources to demonstrate that

the “Creator speaks to us through the things He has made.”<sup>9</sup> Experts in physics, astronomy, biology, and geology are part of the ICR and CRS teams. There, technical procedures conducted by scientists intend to confer scientific authority on the Creationist cause.

In order to capture what happens inside Creationist laboratories, I have attended a Creationist conference and have investigated the methodology employed in Creationist scholarship. My interest was to describe the methods and analysis employed in Creationist research. My goal was to discern how a certain worldview (Christian Fundamentalism) shaped and determined what could be found through scientific procedures.

## **Texts**

It is through the text that the laboratory can expand the scientific network by reaching out to the rest of the world – at least, the world that shares the same values and principles. If, as mentioned before, laboratories can be defined as a site where a heterogeneous and apparently disconnected range of resources are brought together, it is the text that links these heterogeneous actants into a coherent whole. The text translates scientific and technical procedures; it connects and regulates points of contacts among researchers, nature, instruments, and laboratories; it is what sets up a material, readable, and cohesive structure for a worldview. Academic papers and books

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<sup>9</sup> *Institute for Creation Research* website. “Resources.” Retrieved from < <http://www.icr.org/creation-resources> > on November 19, 2014.

are keys for the construction of science because of their ability to translate a complex reality into a readable one.

In a text, the strength of the translation lies in what is selected to be narrated and how the linkages between different actants are built (Law, 1986). Prelli (1989) asserts that scientific discourse is always a form of selection. It resides precisely in the selection of procedures and the eventual translation of results obtained in controlled laboratories into words and graphics that make clear how scientific discourses are rhetorical constructions (Prelli, 1989; Latour, 1987).

Texts are crucial for the construction of Creationism as a scientific field. First, the vast production of Creationist books, journals, and magazines allows Fundamentalist Christian institutions and homeschooled children to read only what is considered appropriate for their Christian belief. Also, as a controversial hybrid of the religious-scientific field, the burden is on Creationists to demonstrate scientifically the veracity of the Scriptures. Accordingly, the more they fight to be recognized as a legitimate scientific field, the more they produce technical and scientific texts.

Since Creationist academic productions do not have access to “big science” journals, Creationists founded their own scientific journals - *Acts & Facts*, *CRSQ Quarterly Journal*, and *Answers Research Journal* – in order to publish their findings. For my investigation, I analyzed seminal books and academic articles on Creation Science. Among the books, the seminal *Evolutionary Geology and the New Catastrophism* written by George McCready Price in 1927 and *The Genesis Flood: The Biblical Record and its*

*Scientific Implications* written by John C. Whitcomb and Henry M. Morris in 1961, are considered landmarks for the contemporary (and more scientific) Creationist project. I have paid special attention to scientific rhetorical style such as the role of language and textual and visual argumentation.

## **Museums**

But the network of actants assembled to construct Creation Science does not only include laboratories, books, and journals. Creationists also have their own version of what Latour calls the ultimate appeal of nature: a natural science museum. Therefore, another important strategy used by scientists to transform what was previously understood as belief into a fact-based science is to present Nature's voice. Museums are technologies where recalcitrants are displayed in order to demonstrate what they previously revealed through scientific procedures in laboratories and academic texts. "Once the controversy is settled, Nature is the ultimate referee" (Latour, 1987, p.97). And it is precisely "nature" in the form of plaster dinosaurs, replicas of bones and fossils, that it is found in natural science museums.

It is not easy to be a Creationist in a world dominated by secular science and its discourses. One must deploy the same weapons used by Big Science's scientists. Displays such as the Creation Museum and the Ark Encounter project unveil the Fundamentalist Christian worldview audits "truths" behind, in, and through what is technologically, visually, and materially revealed.

In The Museum of Creation and in the Ark Encounter, my analysis will rely on material rhetoric and the philosophy of technology (media theory). Sonja Foss (2004) and Victoria Gallagher (2006) point out that the process of investigating the rhetoric of material artifacts must have at least three major areas of focus: *nature*, *function*, and *motive*. As in media theory, the investigation of 'nature' deals with the components, qualities, and characteristics intrinsic to material artifacts. Technologies (material culture in a broader sense) have properties. These standardize the set of operations that people must obey. They have politics, according to Langdon Winner (1989). Ihde (1990) and Latour (1992a) insist that the properties of technologies must be a central theme of inquiry. It is essential in material rhetoric and media theory studies to address the implications of the distinctive features of a certain technology, its substance "and the formal, structural features that audiences use to make meaning" (Gallagher, 2006, p.179). It is necessary to explain all their rhetorical affordances and constraints. As with Marshall McLuhan's famous statement, "the medium is the message," in rhetorical criticism it is important to acknowledge that different media convey different forms of messages. Diverse technologies (material supports) such as paper, wax, metal, pictures, films, or digital media are made of different substances, leaving different traces, each of which varies in permitting possibilities for representation while constraining others.

A second focus is the *function* that a rhetorical artifact contextually serves for an audience. The function is the action the technology communicates. Foss (2004) and Gallagher (2012) emphasize that function is not the same as purpose, which can be

understood as the effect that is intended or desired by the rhetor. In rhetorical studies, as in ANT, there is no fixed meaning. Once an object or a place is created, it is part of a network that sometimes produces a rhetorical effect that is independent of its creator's intention. But even if the rhetor does not have control over desirable or intended meanings, the investigation of the act of display can disclose the *motives* behind symbolic dramas. As Kenneth Burke (1969 [1945]) stated, the selection of a certain form of display is already a deed, a motive, an "act of faith, with the definition or interpretation of the act taking shape accordingly" (Burke, 1954, p.84).

Moreover, material rhetoric takes into account an important feature that is not contemplated by media theory or the philosophy of technology. It implies that the selection and organization of all sorts of technologies and artifacts for the purpose of display are not neutral, but a political, social, ideological, and moral product that rhetors create for communication. In other words – to use Burke's concept -- what is 'brought forth' is formulated according to the "terministic screen" of a certain culture and social setting, through which individual members of a certain community identify themselves. That is why the scholarship of material rhetoric can help me to conduct my investigation. It implies that what was selected to be shown – what was assembled in a network of multiple elements - is a reflection of the cultural ground upon which the discourse was erected. By investigating what is present (and also absent), this field examines the "cultural projections of different groups that compete for public attention and approval" (Gallagher, 2006, p.179). Displays such as the Creation Museum unveil

worldviews represented as “truths” behind what is visually and materially revealed. As Gallagher (2006) has stated, the rhetorical examination of such places and their artifacts can explain not what “is,” but what “comes to be” through networks of materiality.

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The premise to this investigation of the social, rhetorical, and technological construction of Creationism cannot be isolated from the historical context of the subject. Therefore, in chapter 2 I conduct a historical and critical analysis of the relationship between modern science and religion. Creationism is rooted in its own time. The purpose of this chapter is to argue that Creation Science, far from being a product of the Dark Ages, is a scientific and technologically based on modern project. Moreover, it is a hybrid fashioned in the encounter of religion and science. Religion is not alien to the scientific world. Francis Bacon, Robert Boyle, Isaac Newton, among others, are the scientific/religious guides for the Creationist enterprise. This chapter draws its critical analysis from Bruno Latour’s ideas of “purification” (1993). The endeavor of “purification,” which is supposed to define modernity, intended to create a division between nature and society, natural and supernatural, science and religion, setting apart natural sciences from human actions and politics. According to this account – endorsed by Max Weber (1973) and secularization theory - before modernity, so-called pre-modern people had never compartmentalized knowledge before. Back then, in the “Dark Ages,” everything was confusedly connected: natural

phenomena, deities, disease, spirits, ancestors, harvest, sexuality, death, life, and seasons were related and directly affected one another. Nature was animated. However, Latour's core argument is that this attempt to split the material from immaterial realms never actually happened. "No one has ever been modern. Modernity has never begun. There has never been a modern world" (Latour, 1993, p. 47). As everything else, the "Great Divide" was an artificial construction.

Chapter 3 argues that Flood Geology, in order to exist, had first to challenge the authority of scientific discourse, its premises, and inscriptions. Second, it has to rearrange the brute facts of nature – "shuffle the cards," as Latour (1986) put it – in order to re-construct new inscriptions, but now dedicated to serving the scope of conservative Christianity. In order to demonstrate my claims, I show that contemporary Creationists make a very postmodern rhetorical move in seeking to discredit the veracity of metanarratives (Lyotard, 1979). In this case, they target the progressive and evolutionary theory that explains both the creation of the universe and the development of humankind. Using the same arguments employed by Ludwig Fleck (1979), Bruno Latour (1987), Lawrence Prelli (1989), and Alan Gross (2006), Creationists argue that evolution is not a scientific discovery but a rhetorical invention. They claim that the socially endorsed scientific truth (evolution) is, in fact, conditioned by theoretical speculation and tied to a certain worldview. By unveiling "how" Creationists deconstruct Darwinism, I will also contemplate "why" they do it, what interest moves them. Therefore, this chapter will end by considering how the ideas of a

universal Flood and catastrophism rhetorically serve the global scope of conservative Christianity. This scope emerged from Evangelicalism's history of universal missionary aims and the Millennialist conception of the nation (Britain and the US) as God's latter day Israel. As God's chosen vehicle of eschatological purpose, the "Christian nations" of Britain and the United States (where Fundamentalist Protestantism originated) each understood their place in the world as unique and divinely ordained. They believed that by testifying to everyone on earth, the Second Coming of Jesus would be hastened. The Flood had therefore to be universal because there is no other God running the universe than the Christian one.

Chapter 4 conducts an analysis using Actor-Network Theory combined with the concepts of rhetoric developed by Kenneth Burke. One of the major characteristics of Creationism is the engagement of paleontological, biological, and geological data to demonstrate that the events described in the Book of Genesis really happened. I show how this assemblage takes shape by comparing two different networks in which the brute facts of nature (ice, water, rocks, fossils, etc.) are assembled according to two different worldviews and made to produce different "truths." One network is oriented by the principles of secular geology and evolution; the other by the principles of Creation Science.

Chapters 5 and 6 investigate the technological strategies employed by Creationists to make factual what is contained in the book of Genesis. Chapter 5 scrutinizes the role that "technologies of precision" (geochronology technologies and

technology of visualization) play in the technological and rhetorical construction of Creation Science. More specifically, by analyzing secular and Creationist technologies that measure time and magnify visualization (telescope and microscopes), the chapter examines what motivates technological activity in science. Do scientists regardless of their affiliation commonly exhibit the desire to achieve pure observation and the objective description of the world? Or does their work evoke 'collateral realities' that are both material and metaphysical, as suggested by John Law (2014)? This chapter discusses to what extent technologies are designed with motives of generating results that justify a certain worldview. Chapter 6 examines "technologies of imagination:" museum settings that display what happened in a distant past. In the Creationist enterprise, technologies of imagination are "divine" because they make visible, concretizing the mythical and miraculous events described in the Bible. They materialize with richness of detail what is only scantily suggested in the pages of the Book of Genesis

Finally, chapter 7 concludes this study by comparing two distinctive ways in which Creationists are described: as either *apostles* or *heretics* of science. In the first account, Creationists describe themselves as the new apostles of Jesus Christ and predict that one day the Bible will include their descriptions of natural systems and how God created the world. In effect, what would be heresy from the orthodox Protestant perspective, they argue that the Bible is a book that is not yet finished. However, regardless of how Creationists grandiosely perceive their own work, the

relevance of scientizing the Bible is not translated to the secular world. If Creationists rhetorically construct themselves as the new apostles of science, the secular response is to regard their representation as *heretical*. In order to show how this takes place, chapter 7 returns to the issue of purification to discuss how the 'crossed-out God' – the rhetorical and institutional separation between religion and science - determined the borders separating what is considered science from what is not. The relevance of this study resides in the struggle for authority: not over the definition of what science or reality truly is, but rather the implications of what science and reality rhetorically *came to be*.

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### Modernizing the Bible: The Translation of God's Word into Scientific Inscription

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Robert Boyle was not distinguished by the nobility of birth, affirmed Richard Boulton in his preface to *The Philosophical Works of the Honorable Robert Boyle* (1715). Asked how Boyle gained notoriety, most of us will associate his name with the foundation of modern science, procedural experimentation, the invention of the air pump, and the visual demonstration of the phenomenon of the vacuum in a laboratory. We will find it convenient to ignore his demonic visions, carnal temptations, and his fierce resolution to dedicate his life to the cause of Reformed Christianity. Who will want to talk about his religious devotion and theological interests? Nevertheless, Boulton confidently insisted that the “promising blossoms of his early piety, which afterwards shone out in full perfection and the specimens of his great capacity, and large endowments of mind,” should not be set aside from his scientific achievements (Boulton, 1715, p.6). Boyle was a pious man and a devout Christian. He believed in the approaching millennium, a period of time (usually 1000 years) during which the earth would experience the reign of universal righteousness and justice culminating in the return of Jesus Christ (Jacob, 1988). While travelling in France, Italy, and Calvinist Geneva, Boyle experienced a severe storm and identified it with the end of the world

described in the Book of Revelation (Noble, 1999). Yet, relying on the early piety grounded in his “well disposed mind” (Boulton, 1715, p.6), Boyle pledged to pursue a more religious life, with modesty and purity. Instead of giving himself up to the lure of a sinful life, “he put him[self] chiefly on the study of the Scriptures in the original languages, which he for several years pursued with so much exactness.” He not only probed the knowledge of natural things, but also sought to discover the bright apprehensions of a God and His attributes, because both forms of knowledge were integral.

In his venerable narrative, Boulton calls the reader’s attention to the role that the Christian religion played in Boyle’s life fully committed to the investigation of the mysteries of nature. For Boyle, empirical observation was a kind of spiritual devotion. He believed that when God gave great intellectual ability to someone, it was that person’s duty to investigate “the properties of an atom, and... the attributes of the Great God, that *formed all things*” (p.11 – italics in the original). Where must someone go to find religion “when we question the truth of a proposition in statistics; about the centre of gravity; or in Geometry, about the properties of a curve line”? (p. 11). Boyle knew the answer to this question for he “searched the Scriptures daily, whether those things are, Acts 18:2 [sic]” (p.12).

In this brief sketch of one of the fathers of modern science, we can see the extent to which religious and scientific inquiries went hand in hand in the rise of modernity. If modernity has long been defined by the purification of science from religious forces

and, consequently, by the increasing secularization of the world, I propose to challenge the assumption. My aim is to demonstrate historically that Creationism is not a deviation, but has its foundation in the upsurge of modern science. As in a coordinated *pas de deux*, scientific rhetoric has influenced religion as much as religious premises have long colonized science. My analysis focuses on how from the beginning Protestantism shaped and was dialectically shaped by scientific discourses, which has continued down to the early twentieth century in the United States, culminating with Creation Science. In order to develop this argument, I will argue that modernity and the Reformation did not free science from religious influences. On the one hand, enchantment with the natural sciences and the inquiry into the creation of the universe were rooted in religious imaginings. On the other hand, fascinated by the scientific enterprise, nineteenth-century American Protestants inaugurated a process of transforming the Bible into a factual book that could, like nature, be measured, analyzed, and submitted to scientific investigation. By establishing a cult of the written word – the Scriptures - “Old School” Protestantism re-scripted the Bible and named the result of this process “literalism” or “inerrancy.” For conservative Protestants, the book of nature mirrored the book of God. Even before the theory of evolution entered the scene, American Protestants, inspired by John Calvin and arguing against Catholicism, removed the agency and the self-determination of things to evolve. They reduced nature to a state of brute, inanimate artifacts and called this process of disenchantment “modern science.” However, in doing so, they did not insulate religion

from scientific investigation. Rather, by engaging in the study of the lifeless facts of nature, they endowed dead matter with the ability to obey the command of God and to be no more than passive witness to His work.

## **2.1 Modernity, purification, and the death of fetishes**

In a dominant narrative, the term ‘modernity’ has two important rhetorical implications. First, the word marks a transition; it defines time. Before modernity, there is a remote, archaic, and dark past made of superstitions, fears, and fetishes endowed with power. Back then, natural phenomena were perceived as omens; magical signals that augured something bad that had happened; or a foretoken of things to come, a divination of what was going to happen. In this scheme, the division between ‘before’ and ‘after’ modernity also implies that what occurred afterwards was better: individuals were better; civilization was better; knowledge began to progress toward superior terms. Rhetorically, modernity delimits the end of a period and the beginning of a new, revolutionary age constituted by scientific progress, technological progress, and the predominance of man’s reason.

The second suggestion is associated with its humanistic project. Modernity put *man* in the center of the historical narrative.<sup>10</sup> Humans had agency. They could do and affect things. Men were capable of critical thinking, rationalism, and the empirical observation of nature, which would lead to the revelation of its secrets. The concept of

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<sup>10</sup> The choice of the word *man* in this sentence is not casual. The major actors of the modern narrative are overwhelmingly composed by masculine figures.

modernity rhetorically implies that the supernatural had been expelled because humans had overcome the belief in and fear of supernatural powers.

But there is something wrong with a narrative that generates so many implications and premises hidden behind a word. For Bruno Latour (1993), 'modernity' is an invented concept. It never actually existed. "We have never been moderns," Latour claims provocatively in the title of one of his most famous books. For instance, while this narrative emphasizes the role that humans played in the construction of society, it ignores – at the same time - the simultaneous rise of non-human forces – the brutal facts of nature – to explain natural phenomena. With modernity, came the recognition of the power of gravity, the laws of planetary motion, blood circulation, and the discovery of cells. It was also when fossils became devices that could uncover the basis of stratigraphy and tell about the distant past. It was an age when technologies were constructed and celebrated for their power to reveal things. Barometers, air pumps, microscopes, and telescopes could see what the naked human eyes could not perceive. And if we take into account the power and agency of the printing press, modernity was also the period that witnessed the birth of the first peer-reviewed scientific journal, *Philosophical Transactions of the Royal Society*, in 1665.

Therefore, the hegemonic concept of modernity grew from the artificial distinction between individuals, nature, and things and the deceptive separation between what happens *in this world* and in the other, *above*, the "equally strange beginning of the cross-out God, relegated to [the] sidelines" (Latour, 1993, p.13). Latour

called this process of placing humans and non-humans (things and the supernatural) in different realms 'purification.' However, while the Western world embraced this hegemonic theoretical framework as a premise for defining modernity, Latour emphasized that all kinds of hybrids continued to multiply, creating entirely new types of beings, including those composed of nature, science, and religion. With modernity, religion was not "relegated to the sidelines." On the contrary, the religious schism initiated by Martin Luther, John Calvin, and Huldrych Zwingli, among others, spread around Europe, helping to create a violent arena of religious fanaticism and theological radicalism. People continued to explain their relation with nature based on their religious beliefs and to adapt their religion to scientific discoveries and new theories about the universe.

The historian of religion Thomas Tweed has suggested that "theories" are not neutral. Each theoretical approach leads scholars on different trajectories, toward new ways of describing and inscribing the world, to distinctive ways of framing and seeing reality (Tweed, 2008). For instance, the idea that religion and science are incompatible is indebted to the 'secularization theory' initiated by the sociologist Max Weber (1973 [1930]). It was Weber who turned the desacralization - or the 'disenchantment' - of the world into a major narrative. Under this perspective, the advance of rationalization, with its rigorous procedure, criteria, empirical observation and experimentation dismissed religious authority and with it, all the superstitions and myths based on outdated cosmological principles. The God of the pseudo-scientific narratives had to be

surpassed. If He survived at all, it was only as a platitude or, at most, as a chastened and deistically minor character. Almighty science had freed humankind from the oblivion of dark ages. Finally, released from the forces of medieval Catholicism, nature could be understood by careful and methodological scientific observation. The entire world could be apprehended and captured by mathematic calculation. Therefore, having entered the golden gate of the modern era, men of refined intellect (whom Weber implied were the sons of the Reformation) would not assume that the earth functioned according to divine power but obeyed the laws of nature as revealed to methodical scientific scrutiny.

Max Weber helped rhetorically to invent the idea of a secular world. Based on his trajectory and framework, modernity and the forces of Reformation had banished the supernatural and the concept of an enchanted nature where things – non-humans - had magical power. Images, previously credited with miraculous efficacy did not provide protection anymore. The collapse of the worship of saints – an integral part of the fabric of medieval society – would create a different society organized around rational principles. No more witch-hunts, not because sorceresses had been exterminated by the action of the Catholic Church, but because materialists like Thomas Hobbes and the followers of Descartes rejected the whole idea of incorporeal substances. Ghosts, fairies, and spirits did not have a purpose anymore. “The belief in such spectres,” Reformers held, “had only arisen in the first place because the Popish clergy had seen it as a means of exploiting popular credulity in order to enhance their wealth and authority”

(Thomas, 1971, p.589). Whether rendered by a wizard or an alchemist, magic could not provide an explanation of the facts of nature. Metaphysical elucidations about existence belonged to the past. Religion and magic were finally fading away.

Deprived of animism, the magic that was supposed to be present in all things, nature existed to be mastered by the rational mind, and therefore, dominated, counted, measured, and replicated in laboratories. That became the 'metaphysics' of the world moderns lived in (Heidegger, 1997). As Martin Heidegger later said, one of the characteristics of the modern age was the loss of the gods. And when the gods were lost, the empty vault of heaven was compensated by science and technology with the new world-picture (Heidegger, 1977). In this 'new world,' astrology, sorcery, magical healings, practices of divination, sacred objects, miraculous images, and all forms of false idols were "now rightly disdained by intelligent persons" (Thomas, 1971, p.ixi). These were fetishes and fetishes were despicable fairy-objects (Latour, 2010).

For Latour (2010), an appropriate synonym for 'Moderns' (the people who believed and endorsed the project of purification) is 'anti-fetishists.' The 'Moderns' were those who began to invoke the existence of two different sorts of objects—fairy tale-objects (fetishes) and factual-objects (facts). Regarding the first, Latour describes two different although related meanings of the word *fetish*. Their origin was in the encounter of Portuguese explorers with the inhabitants of coastal Guinea. The Catholic colonizers are thought to have used the word "feitiço," from the past participle "feito" ("made" or "done" in English) to describe both the magical practices and the objects

used for sorcery. Accordingly, a fetish was something that did not exist per se, but was fabricated, constructed, a handmade object, and, therefore, no more than human invention. However the word *feitiço* also implies that the object – the fetish - has magical power. It refers to an object that although constructed by human hands could perform magic. The object could actually *talk*. “Yes. The fetish is a talk-maker” (Latour, 2010, p.4), provokes Latour. It was not without historical irony that the same Catholics who accused African people of being idolaters were simultaneously accused by Protestants for being worshipers of false idols.

For ‘Moderns’ (and now I am using this concept as interchangeable with ‘Protestants’), to believe that a hand-made object could talk – no matter if a pagan talisman or the statue of Our Lady - was a sacrilege against the ‘real’ God, the one who *actually exists*. Any form of “fetishism was to be destroyed as prerequisite for Enlightenment and progress” (Meyers, 2012, p.16). That is why the modern Protestant was so important: this heroic figure incarnated in the bodies of prominent scientists and theologians such as Francis Bacon, Robert Boyle, Isaac Newton, Martin Luther, and John Calvin came to life to emancipate people from their blindness and illusion by showing the path of science, reason, and the true religion – Protestant Christianity. Moderns thought they knew the difference between fetishes and facts. In the evolutionary scheme of religions – in which fetishist religions were identified as low – they saw Protestantism as a higher step (Meyer, 2012).

However, Protestantism and modern science were far from marking the end of fetishes. First, in order to believe that the Bible was the only means for human salvation, Protestants had first to turn it into a fetish: a supernatural object that not only contained the word of God, but *was itself* the very word of God. To do that, they transform an object into an oracle of truth – a factual book. Second, as discussed in chapter 4, modern science did not mean that things – the brutal facts of nature - could not talk anymore. They continued to talk – maybe more than ever - but saying different things according to different worldviews and the assistance of technological mediation.

In the next section, I will argue that in pursuing a purest and truest form of Christianity, Protestants transformed the Bible into a modern fetish that could only exist amidst a new technological revolution: the printing press. The printing press allowed the content of the Bible to be mass-produced, read, and distributed in one's one long. However, the mechanical reproduction did not erase the sacred aura of the Bible. To the contrary, the manufactured artifact was professed to be the magical receptacle of the words of God, whose consumption was necessary to open the gates of heaven. The Bible – a hand-made artifact - was the means for salvation for those who possessed it, as other fetishes had promised before. But, created in an era marked by technological development and scientific progress, this fetish was not only perceived as the medium for the true teachings of Jesus, but also celebrated as a record of the facts of nature. In order to disguise the fetishist character of the Bible, Fundamentalist Protestants transformed it into an oracle of truth – a book of scientific evidence.

## 2.2 The rise of Protestant fetishism and the mobile messengers of God's words

The Bible has been specially cherished by Protestants. While Catholics relied on a larger range of objects to mediate their relationship with the supernatural world, the cult of God's words as the true means of human salvation was at the center of Martin Luther's theological revolution. No more priesthood, imagery, or relics to mediate this world and the other. The Bible was the only medium able to provide access to God.

The Reformation was born amidst the Renaissance cult of letters and the technological means to print and reproduce them. Its success is connected with the distribution of Luther's German translation of the Bible and the flood of his sermons and tracts that issued from the printing press. Luther - and other reformers - was conscious of the power of the printing press for his project of magnifying the influence of the (Protestant) Bible and the spread of new ideas about the Christian faith. He described the new technology as "God's highest and extremist act of grace, whereby the business of the Gospel is driven forward."<sup>11</sup> The printing press facilitated the God-given mission of disseminating the Gospel and, with it, the expansion of the Protestant realm. Suddenly, from the local community of Wittenberg, Luther was miraculously addressing all of Europe. In *The Printing Revolution in Early Modern Era*, Elizabeth Eisenstein (1983) flatly maintained that the modern and religious project of Reformation couldn't be understood apart from the advent of the printing press as its agent for

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<sup>11</sup> Luther's remarks cited by Elizabeth Eisenstein, *The Printing Revolution in Early Modern Christianity*, p.165.

transformation. “[The printing press] provided the stroke of magic by which an obscure theologian in Wittenberg managed to shake Saint Peter’s throne” (Eisenstein, 1983, p.171). The affordances of the new technology met the interests of Protestants: multiplied like in the miracle of the five loaves and two fishes (Matthew 14:13-21), the Bible could feed the truth to everybody who had access to it. With the assistance of the printing press, the Protestant Bible could be printed, re-printed, and distributed across different spaces without losing its sacred content.

Protestants believed the Bible, now a modern magical device that could be materially reproduced and distributed, conveyed everything people needed to know to be saved. The printing press, with its affordances, came to be seen as the generator of the universal means for disseminating God’s word. Technological progress was in tandem with the Christian cause. Protestants thus enthroned the printing press as the new medium for the voice of the Creator as illustrated on a certificate produced by the American Tract Society (Fig.2.1).

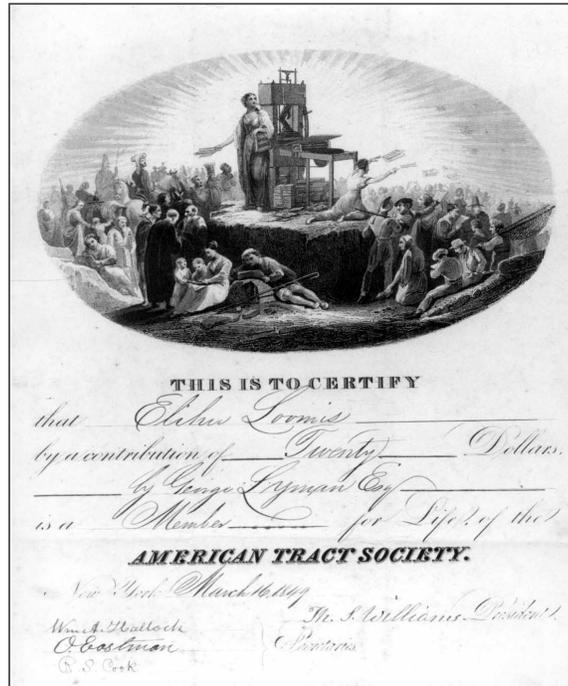


Figure 2.1: The printing press, American Tract Society Membership Certificate, 1840.

Morgan (2007) argued that this image conveys the objective of the Protestant printing enterprise. On the top of a knoll, a printing press irradiates divine light over a crowd of people gathered from different parts of the globe. Two neoclassical females figures - one of them holding under her arm the “Holy Bible” - look up to heaven, as if responding to a celestial request to disseminate the sacred printed text. The Bible was not simply a mass-produced artifact, but the result of a supernatural and technological revelation. It was not a hand-made idol, but miraculously inspired and delivered by God. “The infallibility and divine authority of the Bible are due to the fact they are the word of God because they were given by the inspiration of the Holy Ghost,” asserted Presbyterian theologian Charles Hodge (Hodge, 1872, p.153). The Bible could never be wrong. Its

aura was not destroyed by the action of mechanical reproduction, as wrongly suggested by Walter Benjamin (2009 [1936]). The copies remained as infallible as the original revealed by the Creator. Therefore, the Reformation created a new form of fetish: the modern cult of the printed words and the worship of the Bible as an object of divine power.

By regarding the Bible as a single and sovereign source of authority for faith and as containing no errors, conservative Protestants elevated its accounts of history above all human judgments, including science and philosophy. They turned the Bible also into a factual book whose methodological investigation would lead to scientific discoveries about nature and the creation of all things. For fundamentalists, if nature was a divine creation, the Bible was the record of scientific facts. God would not require that faith should be blind, but supported by reasonable evidence. The facts described in the Scriptures and the facts of nature were isomorphic.

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In the remaining sections of this chapter, I will argue that modernity did not cause the disenchantment of nature, as suggested by secularization theory. Indeed, in the next section, I will demonstrate how, at its origin, modern science was deeply intermingled with religious beliefs. In doing so, I will demonstrate that far from being a retrograde reaction against the premises of modernity, as suggested by Walter Lippmann (1929), Creationism, in fact, embraced and followed the principles established by the founders of modern scientific thought: they engaged the Bible as a

correct record of facts. The fathers of modern science saw scientific development as a way to correct humanity's precarious circumstance caused by the Fall into sin from paradise. Moreover, the Calvinist theological scheme of studying the Scriptures afforded the necessary structure for the modern model of scientific investigation developed in Reformed England. Inspired by Francis Bacon, religiously formed as a Puritan, the 'Moderns' believed that only through empirical, systematic, and methodological observation could the work of God (nature) be revealed and, along with the revelation, the absolute answer for the creation of the universe be found. Calvinist thought, the "defenders of faith," helped to create an important model for modern science: one that believed that the 'Book of Nature' was a mirror of the 'Book of God' and, subsequently, the Book of God was the only trustworthy factual guide for the investigation of nature.

Then, in the next section, I will demonstrate the influence that Francis Bacon exercised on the American Old School and, consequently, on then current scientific thought in the United States. The so-called Old School was composed of conservative and prominent Presbyterians, mostly from Princeton Theological Seminary. They enthusiastically adopted Baconianism as a way of interpreting the Bible as a book of facts. In so doing, they maintained that the "correct" interpretation of the Bible (which means their own interpretation), like the Baconian inductive method for scientific investigation, could solve the mysteries of the material world. Baconian inductive method would become the core of modern American Creationism. Finally, in the last section of this chapter, I will talk about the impact that uniformitarian and evolutionary

theories on the American academy and on reinforcing the boundaries of conservative Protestant identity. In doing so, I will show that Creationism, far from being a product of medieval religious thought, is a direct outcome of modern science, as prescribed by Francis Bacon, Robert Boyle and other Puritan scientists.

### **2.3 Modernizing the Bible and scientifying religion: religion and science hand-in-hand**

The legacy of Weberian theory, which argued for a decreasing importance of religion in contemporary life, remains an influential framework in the study of the relationship between science and religion. But what if narratives about the desacralization were exaggerated? What if modern scientific progress and technological development have not disenchanting the world, but merged with religious practices to create other forms of sacrality, other forms of fetishes? In such a case, religion would not have vanished but endured in a more complex world that cannot be described as lacking spiritual significance.

Talking about the relationship between “primitive” religions and science, Durkheim (1995 [1912]) interweaved both when he stated that science was born in religion and religion began by serving as science. However, this tight relationship did not finish with the rise of modernity and a more ‘rational’ religion. People continued to rely on religion to explain their place in the universe and the creation of all things. If that is so, then Bruno Latour (1993) was correct to assert that we never became

moderns. The relationship between religion and science cannot be represented, as Weber suggested, as succeeding stages of human enlightenment and development, in which Protestantism, and eventually secularism, would loom at the very end of this evolutionary line. They are more merged, imbricated, and intermingled than the 'Moderns' would expect. However, it would not be fair to insist that Weber was absolutely wrong when he detected that the process of rationalization, technological development, and scientific progress had in some way affected religion. Of course, it did. Religion has never been apart from other realms of ordinary life. Weber fell short when he concluded that in this encounter, the sacred had been displaced from nature. He missed that if on the one hand the sacred has not been immune to scientific thought, on the other hand, science has not been exempt from religious influence. As a matter of fact, in the seventeenth century, during the rise of modern science, there was an intimate relationship among the facts of nature, scientific observation, conservative Protestantism, and the Bible. Indeed, the modern scientific enterprise was a religious endeavor.

Latour (1993) chose the chemist Robert Boyle to describe the constitution of modernity as a project of splitting nature from other realms. According to Latour, Boyle and his followers were directly responsible for the idea that nature was something distinctive and, therefore, should be investigated apart from other entities. They believed that by using the correct scientific procedure, natural phenomena could be apprehended in controlled laboratories independent of politics, private interests,

culture, and religion. For Latour, the creation of separate categories for distinctive fields of investigation became the major rhetorical structure upon which modern thought was founded. Of course, Latour did not endorse this idea and throughout his career has vehemently emphasized that no matter the belief in the myth of modern purification, in real life all kinds of hybrids continue to proliferate. Yet, it is curious that he elected to use Boyle and the case of the air pump to support his argument. This choice is interesting because if there is a 'Modern' who cannot be acknowledged as a purist, it is precisely the pious Calvinist Robert Boyle, the prominent fellow of the newly founded Royal Society who, among other things, used to donate money to fund lectures refuting atheism (Boyle, 1744).

Neither Boyle nor his contemporaries intended to isolate science as a unique category from other realms, especially religion. As a matter of fact, for the founders of the Royal Society it would have made no sense to split science and religion into different categories. Natural philosophy was then a way to harmonize the teachings of the Bible – now available with the new scientific enterprise. Boyle, Robert Hooke, Isaac Newton, Joseph Glanvill, John Wilkins, Walter Charleton, and before them, Francis Bacon, all believed that scientific efforts and mechanical procedures should be employed in order to reveal the missing link between men and the divine (Noble, 1999; Walsh, 2013; Szerszynski, 2005). Moreover, during the English Reformation, immersed in Calvinist theology, "Christian gentlemen were under pressure to prove they had been elected to salvation by performing good works that bore fruit for the commonwealth"

(Walsh, 2013, p.67). For Calvinists, only God, not human beings, could determine who would receive the gift of redemption. To do science, to pursue scientific knowledge was a vocation, and consequently to accept the divine call was both a Christian duty and a sign of God's goodwill (Szerszynski, 2005; Walsh, 2013).

In the Protestant view, the advance of science and technology was connected to human salvation in two different ways. First, as explained in the previous section, the technological revolution caused by the advent of the printing press met the Protestant mission of disseminating God's word and provided the necessary means for Christian triumph overseas. But that was not all. Technological progress had been developed amidst a context of questioning the loss of the Adamic condition of man and potential mechanisms to restore it. The fathers of modern science saw scientific experiments as a way to correct humanity's precarious circumstance caused by the sinful Fall from paradise. Science could achieve anything if driven by Christian purpose. Medicine, for example, could restore to mankind the longevity of the biblical patriarchs. Once illuminated by scientific knowledge, nature could provide food without the burden of extra work, thus recapturing something of Eden's plenty. New technological inventions would both augment deficient human senses and capacities. The founders of the Royal Society saw technological artifacts as the appropriate means to correct sensory defects imposed on humans since the Fall (Hooke, 1665; Walsh, 2013; Hendershot, 2004). Science was the route to reclaim the original likeness to God (Noble, 1999). This point was clearly made by Robert Hooke and Robert Boyle. Hooke, fellow of the Royal Society,

was the first man to publish a book based on observations made through magnifying lens and microscopes. In the preface of *Micrographia* (1665), Hooke stated that

By the addition of such artificial instruments and methods, there may be, in some manner, a reparation made for the mischiefs, and imperfection, mankind has drawn upon it self, by negligence, and intemperance, and a wilful and superstitious deserting the Prescripts and Rules of Nature, whereby every man, both from a deriv'd corruption, innate and born with him, and from his breeding and converse with men, is very subject to slip into all sorts of errors (Hooke, 1665, preface).<sup>12</sup>

By the sole action of our deprived senses, even the “bodies of the most simple nature” could not be distinguished by naked eyes. “But... with a very good microscope,” scientists may find the true essence of all things (Hooke, 1665, p.1). Technology was the means to enhance, among other features, ineffective naked vision and, consequently, to reveal the complex design of the work of the creator. In his profusely illustrated book, Hooke revealed the microscopic structure of cork showing in great detail the cell walls. He exposed the beauty of the delicate six-pointed structure of snowflakes in a time that this design was unknown. His fascination with the hidden miniature world led him to use his microscope on every possible common item of nature, from mosses, leaves, and herbs to stinging needles in plants.

Preoccupation with the hidden and invisible world was also at the center of the work of Boyle. In *New Experiments Physical-Mechanical, Touching the Spring of the Air and its Effects* (1682), Boyle reports 43 separate experiments with the air by which he wanted to prove the existence of the invisible vacuum. However, for Boyle, if scientific

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<sup>12</sup> *The Project Gutenberg eBook.* “Micrographia,” by Robert Hooke. <  
<http://www.gutenberg.org/files/15491/15491-h/15491-h.htm> >

and technical procedures could reveal the world of invisible matter, it also could demonstrate what was previously known only by the pledge of blind faith. For instance, Boyle argued that when God decided to resurrect His son, He probably did not mean to perform an act that could be knowable and empirically demonstrated. But, if the resurrection could not be directly proven, the study of the physical and chemical properties of bodies could be examined in order, at least, to propose whether the resurrection would be possible by merely physical agents and means. Even acknowledging the role the supernatural played in the resurrection of Christ - “nothing shall prove impossible to God” - in one of his last works, Boyle proposed the idea that scientific observation and experimentation could indeed support the “possibility of the *general resurrection*” (Boyle, 1991, p.192-193 - italics in the original). Boyle knew that the task of such bold scientific enterprise would not be simple. “That is no such easy way... to determine what is absolutely necessary and but sufficient to make a portion of matter, considered at different times or places, to be fit to be reputed the same *body*” (Boyle, 1991, p.193 - italics in the original). Despite the challenge, by observing and experimenting with the transmutation of the brutal facts of nature (decomposition of dead bodies, insect and plants life cycles, the laws of thermodynamics), Boyle concluded that the human body was not a fixed entity (“as a statue of brass or marble”), but a perpetual flux of conditions. For instance, in spite of all transmutations, both gold when melted and insect larvae when mature retain their intrinsic properties. Consequently, since the human body consists of bones, which are of an enduring nature, and since

small particles of matter preserve their own nature under various physical conditions, it is reasonable to consider that the human body after its death can be conjoined to its previous identity and form.

For men like Hooke and Boyle, modern science was born precisely when men of learning had ceased to trust their deceptive senses or rely only on their blind faith and began developing instruments and methodological procedures to overcome their limitations (Walsh, 2013). Inspired by Francis Bacon, the 'Moderns' believed that only through empirical, systematic, and methodological observation could the work of God (nature) be revealed and, along with the revelation, the absolute answer for the creation of the universe be found.

However, it was not only against physical limitations that scientific progress and technological development could work as an antidote. The old and wrong conceptions about the Book of Nature and the Book of God had allowed the establishment of the grossest superstitions in a place that should be supplanted by modern and Protestant science. According to Bacon, there were two systems to investigate nature whereby to discover the truth. One "hurries on rapidly from the senses and particulars to the most general axioms." These axioms will become principles (theories) that will be, then, used to explain the findings of the "supposed indisputable truth" (Bacon, Book I, aphorism 19, p.346). In this case, the facts of nature would be forced to fit into invented schemes. Bacon warned that this was "the way [currently] in use" (Bacon, Book I, aphorism 19, p.346). The other system constructs "its axioms from the senses and particulars, by

ascending gradually, till it finally arrives at the most general axioms, which is the true but unattempted way” (Bacon, Book I, aphorism 19, p.346). Both methods began with the senses and particularities and end in generalities. But according to Bacon, they were immeasurably different. One merely touched the limits of experiment while “the other gradually rises to those principles which are really the most common in nature” (Bacon, Book I, aphorism 22, p.346). Bacon condemned the first for producing “idols of the human mind” and praised the other for ascending to the essence of the “divine mind” (Bacon, Book I, aphorism 23, p.346).

When exposing the right and wrong modes of science, Bacon was indeed making a clear reference to John Calvin who held that the “human mind [was]... a perpetual forge of idols” (Calvin, 1.11.18). In the *Institutes for Christian Religion*, Calvin associated the existence of false deities to humans’ fragility, fears, and needs. Calvin insisted that to believe in some sort of God or gods was part of human nature. Therefore, the manifestation of so many idols, false deities, was the result of an irrational instinct (Calvin, *Institutes*, 43). Religiously formed as a Puritan, Bacon clearly associated his inductive method with Calvinist systematic theology. Bacon contended that the methodological and inductive procedure for scientific investigation, inspired by Calvin’s systematic rigor, would defeat the old fetishes of pseudo-science. Like Calvin, Bacon believed that the human mind was a fickle thing, “given to the buffeting of the passions, of an unruly immoral nature, of the deceptions of imagination, a faculty in service to selfishness and pride” (Morgan, 2015, p.112). Consequently, principles founded on the

erratic human imagination and opinion would only produce idols that would obstruct instead of assist in the revelation of the facts of nature. It would be vain to expect any great progress in the sciences by superimposing matter upon old dogmatic assumptions (Bacon, Book I, Aphorisms 23-31).

Thirty-four years after his death, Francis Bacon's methods for scientific investigation served as the inspiration for the foundation of the Royal British Society. In *Scientists and Prophets*, Lynda Walsh (2013) demonstrates his influence by analyzing the frontispiece to Thomas Sprat's *The History of the Royal Society of London* (1667), in which Francis Bacon is one of the central characters. In a public lecture offered at the Royal Society in London, Michael Hunter (2014) emphasized the relevance of this image, which he considers a most revealing picture about the restoration of science in the seventeenth century (Fig.2.2).<sup>13</sup>

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<sup>13</sup> Hunter, Michael (2014). *The image of Restoration science: the frontispiece of Sprat's 'History of the Royal Society*. Public lecture at the Royal Society, London on March 28, 2014. Available at < <https://royalsociety.org/events/2014/sprat/> > Retrieved from Internet on March 11, 2015.

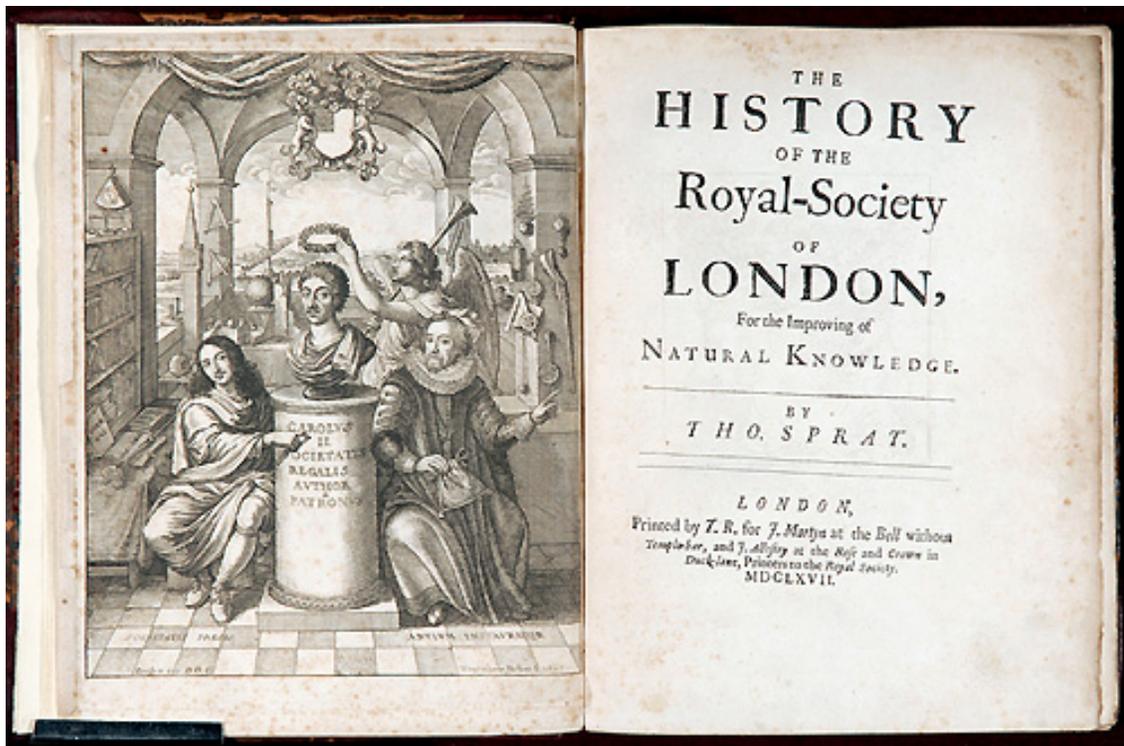


Figure 2.2: The frontispiece to Thomas Sprat's *The History of the Royal Society of London*, 1667, from a design by John Evelyn.

In this print by John Evelyn, we see on the right side the mathematician William Brouncker, viscount, and first president of the Royal Society. In the center stands the bust of King Charles II, who is given the title of “Society Patron.” On the right side of the bust sits Bacon, depicted in his lord’s robes. He looks straight at viewers, catching their eyes. His finger points to an array of technological artifacts: a compass, a gun and gunpowder, and what seems to be silk-making equipment. It is possible that these artifacts make a reference to *Advancement of Learning* (1605), an address to King James I, in which Bacon praised the progress of knowledge for the glory of God and the King in terms of national expansion, security, and industry. At Bacon’s feet appears the motto *Artium Instaurator*, “the Restorer of Arts,” which was meant to urge that Bacon played a

major role on the rise of modern science.<sup>14</sup> In the background, the air pump developed by Robert Boyle epitomizes the importance of technology for scientific experimentation and indicates how far modern science could go. On the left side, other instruments for measurement and calculation (compasses and scale) contribute to the composition of the print.

The image does not bear an original design. The triangular motif at its center is very common in religious paintings during the Renaissance. As a matter of fact, Hunter suggests that the print is a piece of “blunt plagiarism.” Yet this is not entirely fair to Evelyn, since in the seventeenth century the practice of copying other works was quite common and copyright law did not yet exist.<sup>15</sup> However, beside the accusation of plagiarism, the image contains many other influences from Renaissance’s paintings: the landscape in the background, the arcade, the checked pavement in the foreground, and the presence of such classic elements as draperies and the Roman style of the king’s bust. The bookcase on the left also echoes a common motif in Renaissance style, as in the classic painting of Saint Jerome by Jan van Eyck (1442). For Hunter, these rhetorical devices for composition were not selected by chance by the craftsman. They were assembled to create the effect of a sacred space, which is increased by the presence of the angel carrying the trumpet of Revelation while crowning the Protestant king of England. In a historical context in which churches had been cleansed of false idols, a

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<sup>14</sup> Here, the word *arts* stands for science and technology.

<sup>15</sup> Michael Hunter points out the outstanding resemblance of Evelyn’s drawing with the work by Nicolas Chaperon, a French painter who worked in Rome in the mid of seventeenth century. The work in question is one of the frontispieces featuring the paintings of the Vatican Lodges (1649).

temple to knowledge was conceived to match the new form of sacrality based on the cult of printed words and the inductive method for scientific observation.

The Baconian influence on the conception of the Royal Society is not exhausted by this print. The biggest inspiration came from an idealized institution that Bacon described in his fictional and utopian book, *New Atlantis* (2010 [1627]). In this short novel, Bacon describes an expedition that, sailing across the Pacific, by the mercy of the Lord found its way to the island of Bensalem, which the European explorers discover is inhabited by a most generous, enlightened, and pious people. The inhabitants surprise the voyagers by asking if they were Christians. The Europeans are relieved to reply that they are, “fearing the less, because of the cross” they had seen printed on a manuscript held by one of the natives. Their surprise is followed by a gracious invitation: “If ye will swear, all of you, by the merits of the Saviour, that ye are no pirates; nor have a shed of blood, ... you may have license to come to land” (Bacon, 2010, p.11). The visitors learn that the moral principles that guided this people was a book composed of the canonical Old and New Testaments, miraculously inscribed before the New Testament was even written. For Bacon, this ideal commonwealth meant to be the magical place of origin – or rebirth - of the true Christianity, a dream he wished to be fulfilled by his own country, England. But most important of all, in the island there was a brick building that occupied the center of the social, political, and cultural life and was called Solomon’s House, “an institution of an order, or society, ... the noblest foundation... that ever was upon the earth and the lantern of this kingdom” (Bacon, 2010, p.33). The building was a

temple of knowledge dedicated to the study of the works and creatures of God through observation and experimentation, whose sacred mission, carried on by the “interpreters of nature,” was to find the “plain demonstration of causes, means of natural divinations, and the easy and clear discovery of the virtues and parts of bodies” (Bacon, 2010, p.63).

The founders of the Royal Society saw themselves as the interpreters of nature and Reformed Protestant England as the new Atlantis. The first charter of the Society issued in 1662 embraced the magnificent mission of Solomon’s House. The founding leaders of the Royal Society identified themselves as the true “Defenders of the Faith,” the “universal lover[s] and patron[s] of every kind of truth.” England was destined to be the Christian island described in Bacon’s narrative.<sup>16</sup> Science and the fine arts that “[had] not hitherto been sufficiently brilliant in any part of world, may shine conspicuously among our people.” To excel at the arts and sciences was the way to expand the boundaries of the Empire and a way of providing certain answers amidst so many uncertainties.

Cara Finnegan (2006) suggests that the rhetoric of a certain period must include the understanding of history itself, the people who were involved, the events, and the entire contextual situation. If one were to study the emergence of the Royal Society as a powerful rhetorical event, such approach would entail an investigation of the world around the Society. England was becoming steadily richer. Trade and commerce were

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<sup>16</sup> *Royal Society* website. The first charter (1662). < [https://royalsociety.org/~media/Royal\\_Society\\_Content/about-us/history/Charter1\\_English.pdf](https://royalsociety.org/~media/Royal_Society_Content/about-us/history/Charter1_English.pdf) > Retrieved from Internet on March 10, 2015.

growing and industries such as glass, coal mining, brick making and iron were expanding. Towns grew much larger and in the 1680s the streets of London were lit for the first time. But the mid 1600s were also not a peaceful time for England. The country was paying for its crowded city and financial progress. London had faced the bubonic Plague in 1665 and at the time no science could explain the cause of the mortal disease. In 1666, the Great Fire of London consumed the City for four long days, destroying thousands of houses, many public buildings churches – including St. Paul’s Cathedral, sustaining a loss of more than £10,000,000. Conflict and rivalry over the control of sea and trade routes led the country to a war with the United Provinces (1665-1667). In spite of its victory, England suffered consequences of the war. The restoration of the monarchy led by Charles II incited rebellions, dissidence, and a wave of discontented immigrants to the new world, America. The foundation of the Royal Society aimed to rise above the uncertain times by providing hope through the systematization of knowledge and the discovery of ultimate answers (Walsh, 2013). The theological Calvinist scheme for studying the Scriptures afforded the necessary structure for the modern model of scientific investigation embraced by the Society. The deductive Aristotelian method based on what the founders of modern science considered unsupported speculations and uncertainties was to be banned. The role of scientists – the prophets of nature – was not to spawn hypotheses or theories, but to reach certain conclusions on the basis of careful and systematic observation and experimentation. Induction had to begin with the hard facts of nature and be guided by the systematized

Christian Bible. Role model of the Society, Bacon warned that theoretical speculations were mere idols that should be banished from the scientific sphere.

In *Science, Technology and Society in Seventeenth Century*, Robert Merton (1938), developing an insight from Weber, concluded that Puritanism, as a structure of values, was crucial for the emergence of modern science. According to Merton, it was Puritanism that directed individuals to the investigation of nature. Merton argued that Weber had already demonstrated that the Protestant ethos exerted a “stimulative effect upon capitalism.” Finding a gap in Weber’s account, he concluded, “since science and technology play such dominant roles in modern capitalistic culture, it is possible that tangible relationships likewise exist between the development of science and Puritanism” (Merton, 1938, p.418). Yet the historian of science Piyo M. Rattansi (1972) challenged Merton’s conclusion. For him, the idea of studying nature to glorify God and benefit mankind was already a commonplace by the time Francis Bacon made it the “dominant theme of his reformation of all learning” (Rattansi, 1972, p.12). In Rattansi’s view, the singular attribution to Puritan doctrine of the commitment to the study of nature was a mistake. Hermeticists, alchemists such as Paracelsus, and Neo-Platonic thinkers during the Renaissance had already regarded the study of nature and technological achievement as analogical instruments in the work of God (Rattansi, 1972; Noble, 1999).

But it is rash to dismiss completely the effect of Puritan ethics on experimental science and the impact of scientific methodology on Protestant beliefs. Influenced by

Calvinist thought, the “defenders of faith” helped to create an important model for modern science: one that believed that the ‘Book of Nature’ was a mirror of the ‘Book of God’ and, subsequently, the Book of God was the only trustworthy factual guide for the investigation of nature. For these theologians, nature should be read with the same methodological approach that Calvinists employed to read the Scriptures: removing all the fetishes by the systematic and methodological investigation of the word of God. In doing so, Puritans not only theologically re-interpreted the Bible, but also modernized it. They transformed it into a book that, like nature, could be apprehended, measured, and empirically proved. In the hands of Calvinist theology, the Bible became more than a fetish; it was believed to be an accurate inscription of *facts*.

As discussed in chapter 1, this rhetorical movement makes clear that even what we define as facts cannot be taken for granted. Their existence is not exempt from values, external influences, or material condition. With Latour (2010), the rhetorician Allan G. Gross (2006) dismantles the purity and self-determination of science by claiming that all facts depart from what was once only a belief, a fetish. The fathers of modern science were not persuaded by *logos* alone. They embodied the values and beliefs that permeated Calvinist English thought in the seventeenth century. The Christian values they held acted as a framework that determined the path of their scientific enterprises. Therefore, conclusions and interpretations of results were not free from what was written in the Bible. Suddenly, the Bible was more likely to be “real” because its described events that could be tested and even reproduced under the same

mechanical conditions. They could be 'seen' (Latour, 2010; Heidegger, 1977). Latour asserts that the scientific process is precisely the construction of facts and the posterior denial of this construction, which places science very much in alignment with the world of illusions. Actually, instead of "facts" and "fetishes," he proposes another concept, "factishes," to help us to recognize the hybrid "beings" that make rhetorical and social constructions to be a synonym of truth. "Thanks to factishes," Latour writes, "construction and truth remain synonymous" (Latour, 2010, p.28). It was through the action of factishes that the 'Moderns' could find a way of doing science in tandem with their fervidly religious commitment.

## **2.4 The systematization of the Bible and the rise of Baconianism in America**

In 1849, standing before the board of trustees of Hampden Sidney College in Virginia, the Presbyterian minister Lewis W. Green delivered his inaugural address as president. In his speech, he described the departure of British Puritans to America as a new beginning. Burdened by "a despotic Prince – an ambitious and fanatic clergy – a degenerate aristocracy and an obsequious Court," England had failed to fulfill the promise of becoming the New Jerusalem (Lewis, 1849, p.3). According to Lewis, "the class of men" who were at the anchor in the Thames belonged to the best category of men in all England (Lewis, 1849, p.3). Recalling the famous sermon by John Winthrop, "A Model of Christian Charity" (1630), those "whose morals rebuked the corruptions of

the Court” (Lewis, 1849, p.4) were destined to found the ‘city of upon hill,’ watched by the world as a Christian and enlightened ideal.<sup>17</sup> It was not England, but America – the New World - that would fulfill the ideal of becoming a new Garden on earth (Marx, 2000) - the new Atlantis described by Bacon. Lewis was clear: the doctrine carried by that special “class of men” rejected false rituals and superstitions and was finally freed from “all those illusions of imaginations...which usually mingle with and distort our judgments.” In this new land these men were already “habituated to observe, to analyze, to compare, to arrange, to classify the phenomena of external nature.” They were ready to master “Natural Philosophy, Astronomy, or Chemistry itself” (Lewis, 1849, p.14). But, wondered Lewis, what was the point of engaging telescopes, microscopes, the world of matter, and all the mathematical calculations if “the existence and authority of the Supreme and Universal Legislator” was not recognized? (Lewis, 1849, p.15). Like so many Calvinists before him, Lewis acknowledged that the study of the laws of nature and the investigation of facts was a duty and the “sublime exercise of the faculties of man” (Lewis, 1849, p.16). But he went on to assert that if the universe is composed of matter, there are still vaults, mysteries, and frontiers, in “which the unaided eye can never penetrate” (Lewis, 1849, p.16). Only the Bible could work as a primordial source for scientific investigation because “*The Gospel is a Religion of Facts*” (Lewis, 1849, p.17 – italics in the original). This Bible as a book of records represented the finest

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<sup>17</sup> “A city upon a hill” is a sentence that comes from Jesus’s *Sermon on the Mount* (Matthews, 5:14), in which he tells to his audience “You are the light of the world. A city that cannot be hidden.” This sentence became the embryo of what Alexis de Tocqueville (1835) coined “American exceptionalism,” which implies that America is different from other nations and watched by them as a model for moral and spiritual achievement.

contribution of Christianity to scientific inquiry: “it is the Evidence against Speculation. It is the Inductive Philosophy against the Hypothesis. It is the ascertained gravitation of Newton, against the imaginary whirlpools of Descartes” (Lewis, 1849, p.19).

It did not take too long for Baconian philosophy to cross the Atlantic and sink roots in the United States. Francis Bacon’s ideas about science and religion found a welcome home among American scholars who enjoyed the most prestigious rank (Bozeman, 1977; Marsden, 1980). If there is a misconception about conservative Protestantism in the United States, it resides precisely in the belief that this school of thought was born in the rural and provincial South rather than the rational, urban, well-educated, and modernized North. Actually, it was in the North that the effort to prove the scientific factuality and the inerrancy of the Bible took place (Lieniesch, 2007). What came to be known as “Scottish Realism,” or “Common Sense philosophy,” or simply “Baconianism,” was committed to providing an urbane and intellectually sound Christian message to the American nation (Bozeman, 1977). In contrast to Evangelicalism’s loud and vulgar revivalisms, populist strategies, and callous preachers who proudly expressed scorn for orthodox belief and style (Hatch, 1989; Heyrman, 1997), the Protestant Old School - led by Charles Hodge of Princeton Theological Seminary - insisted that ministerial candidates should be thoroughly schooled in liberal arts and sciences (Bozeman, 1977). Christianity should not be set apart from an increasingly scientific academia or associated with uneducated people. To the contrary, it should be endorsed by those with intellectual credentials.

Recognizing the danger of being set aside by academic discussion, "Presbyterian churchmen coupled their attention to doxological science with an urging that the devices of Christian theology itself be reshaped in part to accord with scientific modes of thinking" (Bozeman, 1977, p.133-34). That was the way of gaining the hearts and minds of people who were increasingly fascinated by scientific progress and technological development, while, at the same time, drawing a definitive line between lowbrow evangelicals and the highbrow Christians born among the American intellectual elite. In the religious marketplace, Christianity should not be sold as a vulgar commodity but fashioned as an upscale value akin to Modernity (Hatch, 1989; Lieniesch, 2007).

The effort to differentiate their theology from Evangelicalism was not the only struggle waged by the Princeton Calvinists. The front of the second - and most important - war took place right inside the American academy. The problem encountered by the Old School was both to find a persuasive way to harmonize, rhetorically and theologically, the Scriptures with science and to avoid the danger of abstract and theoretical speculations over the forces governing the cosmos and the role that humankind played in the universe (Bozeman, 1977; Marsden, 1980). Science should respect the authority of the Bible. The Scriptures should stand as the beacon guiding scientists imperiled by the dangerous waters of their investigations. Without the assistance of the Holy Book, what kind of reliable scientific truth could possibly emerge?

About the same time, Unitarians and Transcendentalists such as Ralph Waldo Emerson, George Putnam, and Frederic Henry Hedge were claiming that religion was not a set of theological dogmas but a matter of intuitive and inner perception, the outcome of the application of pure reason. The human mind was immortal and should be properly praised as the only means to achieve spiritual enlightenment. God could be translated - and reduced - to human intelligence. For Calvinists, dwelling on the power of human mind was a dangerous prospect. Such praise of human nature was in fact atheistic humanism and could only mean that the mind was forging idols all over again (Lienesch, 2007).

Therefore, the appeal that Bacon exercised on the Calvinist side of American academy rested on two premises: first, his science was not supported by deductive methods and was, therefore, secure from the threat of metaphysical speculation about the origin of life and the universe; second, the Calvinist Bacon provided a safe and legitimate scientific ground on which theologians could walk without the menace of heresy. Bacon was one of their own. For the Old School, Baconianism offered the necessary scope, the framework that would establish the limits for scientific inquiry. Bacon's method was the way that orthodox Protestants could join the enthusiasm toward science and technological progress. "Common Sense philosophy affirmed their ability to know 'the facts' directly. With the Scriptures at hand as a compendium of facts, there was no need to go further" (Marsden, 1980, p.56). Scottish Realism ended up to be a powerful and convenient rhetorical instrument, which allowed Calvinists to

harmonize the attractiveness of science with the theological restrictions imposed by the Scriptures (Bozeman, 1977; Marsden, 1980; Lienesch, 2007).

The prominent figures of Charles Hodge and Lewis Green enthusiastically embraced and encouraged the adoption of Baconian philosophy, as did many others. As a result, the nineteenth century became the golden age of Baconianism in the American academy. The texts of Francis Bacon, Robert Boyle, and William Whiston – Isaac Newton’s disciple - were appropriated, consumed, devoured, and adapted to American purposes. Bacon was everywhere. By 1860, his name had been invoked “to bless and harmonize nearly every cause in the republic. Poetry, science, philosophy, religion, psychology, medicine, law, agriculture - all found plenteous use for the quickly formalized magic of the name 'Lord Bacon'" (Bozeman, 1977, p.24). In *The Letters of the British Spy* (1855), William Wirt remarked that he “had not met with more than two people in this country [United States] who have ever read the work of Bacon or of Boyle” (Wirt, 1855, p.244). Wirt described Bacon as the “father of experimental philosophy,” “the champion,” the one who, with his inductive methodological weapons, had defeated “the idolized chimeras of Aristotle.” Lord Bacon was the Calvinist hero who had rescued the world from “darkness, jargons, perplexity, and errors.” How could someone not read and sanction the ideas of such genius? “I am astonished that literary gentlemen do not court his acquaintance, if not through reverence, at least through curiosity” (Wirt, 1855, p.245). Bacon was rhetorically represented as a comet that, in a collision with the planet, had changed its orbit forever. Why such acclaim? Because

Bacon did not speculate but stressed the relevance of “facts” and facts were the antidote for theological and scientific liberality.

In his intellectual history of the age, Bozeman wonders if what came to be called Baconianism was not an American rhetorical invention. Concerned about the path that science could take, conservative Protestants really stressed that the Bible was a book of facts and that Christianity was a faith that was friendly to evidence. For instance, both Old and New Testaments were full of material signs about miracles. Did God only suggest that He would part the Red Sea? No, the Jews could physically cross it to the other side. Did Jesus require that the apostles simply accept the claim that he had resurrected after his death? No, he physically manifested his presence allowing them to see and touch his body. Did Jesus fool people when he said he would turn water into wine? No, the guests could taste it. “Without an external sign from God no man can certainly distinguish a Divine Revelation from what is purely human,” the Presbyterian minister and educator William Henry Ruffner assured his audience at the University of Virginia (1859). “An external evidence is necessary to distinguish genuine history from ingeniously wrought fictions.” He continued: “my subject is miracles, their nature, their susceptibility of proof and the evidence which they afford of the Divine origin of Christianity” (Ruffner, year, p.61-62). Thus, for conservative Protestants, theology and natural science were made of the same matter: both dealt with the currency of substantial, reliable, and verifiable facts (Bozeman, 1997). “The Bible is true,” proclaimed Arthur T. Pierson. It was “*photographically* exact forecasting of the future”

(Pierson, 1887, p.17). For Pierson, nothing should be accepted if not supported by evidence. The facts contained in the Bible, if correctly interpreted and correlated with nature, would speak for themselves.

In the United States, Baconianism became a way of engaging the Bible as a correct record of facts. As such, a “voice as certain and unmistakable as the language of nature,” the Christian Bible could be tested and scientifically proven if studied under correct methodological procedure (Lamar, 1860, p.176). In *The Organum of Scripture: The Inductive Method of Biblical Interpretation* (1860), James Sanford Lamar affirmed that the Bible admitted of being “studied and expounded upon the principles of the inductive method” (Lamar, 1860, p.176). After all, “the whole Bible is founded upon facts.” The sacred tome, he emphasized, did not “create” an idea or a theory of truth; it did not speculate. It was the “revealer” of the truth (Lamar, 1860, p.191). In order to find answers about nature, Lamar detailed the methodological steps involved in the Baconian approach:

We shall begin with the definition and general explanation of the Inductive Method; then, by the aid of the lights thus furnished, inquire whether this method may be followed in the interpretation of the Holy Scriptures; having determined this affirmatively, we shall proceed to a particular analysis of the method, giving illustrations of the use and applications of the several steps, drawn both from science and revelation (Lamar, 1860, p.177).

Although the Bible was not represented in a systematic form, the Baconian method was supposed to organize it in a scientific way. Baconians were utterly convinced that it was possible to take the hard facts described in the Scriptures and

carefully arrange and classify them (Marsden, 1980). “The Scriptures present us with divine truth, not in logical or scientific order, but dispersed irregularly under the various forms of history, precepts, promises, threatenings, exhortations, and prophecies,” clarifies James W. Alexander (1832). “The illustration of Lord Bacon is well known: the water of life as contained in the fountain of the Scriptures, is thence drawn and set before us, very much in the same manner as natural water is taken from wells” (Alexander, 1832, p.171).

For Alexander and many others like him, the scientification, systematization, and categorization of the Bible brought many advantages. It was only through this arrangement that people would be able to admire and perceive the harmony of all religious truths. “The system, however brief or imperfect, affords a convenient test of proportions which might otherwise pass unsuspected, and a guide in applying the analogy of faith to interpretation” (Alexander, 1832, p.174). The Bible was not a mere system of theological teachings anymore. It was impossible to understand what God had created unless the proper study of the biblical text was systematized according to the conservative Protestant view. As Hodge explained in *Systematic Theology*,

God does not teach men astronomy or chemistry, but He gives them the facts out of which those sciences are constructed. Neither does He teach us systematic theology, but He gives us in the Bible the truths, which, properly understood and arranged, constitute the science and theology (Hodge, 1872, p.3).

The role of the interpreter of nature was not to raise hypotheses or theories, but to reach conclusions based on the correct classification and organization of the Scriptures.

The Old School re-ordered and re-interpreted both nature and the Bible according to their own agenda. For them, it was the Bible that first inspired Bacon, the father of modern science. The inductive method itself was God's revelation. "The only philosophy which has given to the world a true physical and intellectual science, is itself the product of Protestant Christianity," affirmed the reverend Benjamin Morgan Palmer (Palmer, 1852, p.7) at Davidson College, North Carolina. "There never could have been a Bacon without the Bible" (Palmer, 1852, p.27). Bacon had done with the studies of nature what John Calvin did with the Scriptures: systematic investigation. In the United States, among conservative Protestants, the study of the Bible, science, and the investigation of the brute facts of nature belonged to the same hybrid realm.

## **2.5 Forging new idols: uniformitarianism and Darwinism**

However, inside the American academy, the hegemony of Baconianism did not last forever. As the seminal work of Ludwik Fleck (1979) has shown, science is not a static realm, but always in transformation. Paradigms, previous worldviews that were applied to explain the functioning of the universe fall into disgrace when scientists gradually transfer their allegiance to another explanatory model, another theory, another framework through which nature will be observed and explained (Fleck, 1979; Kuhn, 2012 [1962]). Science is not composed of laws, dogmas, or truths achieved through passive observation and experimentation on natural reality, as naively dreamed by Baconianists. For Fleck – and many other philosophers, sociologists and

rhetoricians of science after him - science is not a “discovery,” but an invention, a social construction. As argued in chapter 1, what achieves the status of a ‘scientific fact’ only exists amidst the historical, social, and cultural context in which they were produced (Collins & Pinch, 1993; Fleck, 1979; Gross, 2006; Latour, 1987; Prelli, 1989). No matter the belief that science is a set of evidence that can be found in nature, science cannot be studied (or understood) as a single and isolated entity. Cultural and social changes will influence (even determine) what will be noticed or not in scientific ‘discoveries.’ Specific cultural and social settings can both provide license and constraints to see the world in a certain way (Collins & Pinch, 1993). What people are prepared to believe is not just a function of what scientists find out about nature but also what can be framed, explained, and seen through of a certain worldview.

In *Genesis and Development of a Scientific Fact*, Fleck (1979) developed a line of thought that recalls Burke’s reflections on terministic screen (chapter 1): ‘thought style’ or ‘thought collective.’ For Fleck, scientific observations and conclusions are conditioned by a certain thought style that belongs (analogous to Burke’s concept) to a community of thought. Yet Fleck stressed that collective thoughts are not immutable. From time to time, a new worldview can replace a hegemonic predecessor. However, this does not mean that these previous frameworks will be forever disproved or dismissed. Some of them will remain restricted to a specific resistant community, but they might cease to occupy the scientific mainstream imagination (Fleck, 1979; Collins & Pinch, 1993). Later, Thomas Kuhn (2012 [1962]), called such replacements

'paradigmatic shifts' or 'revolutions,' which would bring along a change in perceptions, worldviews, and, (as Burke would agree), in the vocabulary used to describe phenomena. As suggested by Tweed in the beginning of this chapter, what individuals 'see,' the way they perceive reality, depends upon what they look at, but, no less important, it relies on what their conceptual framework and worldview - their terministic screen - has taught and allowed them to see (Burke, 1969; Fleck, 1979; Kuhn, 2012 [1962]); Tweed, 2008).

In the late nineteenth century, not only Americans, but also the entire Western academy underwent a paradigmatic revolution that toppled the idea that the universe and mankind were created by supernatural power. The worldview provided by the older theological-scientific project of gaining knowledge about nature through God's word had come under fire in the mainstream of the American academy. As a result, the Baconian inductive method associated with the Scriptures as a scientific framework lost its relevance in the academic world (Marsden, 1980; Campbell, 1990; Whitcomb & Morris, 1961). That is because by the final decades of the nineteenth century two new actors had been added to the network of scientific discourse. This had the effect of changing the game by proving a new framework, vocabulary, and another trajectory through which individuals perceived the world and the origin of all things. The new actors were uniformitarianism, the geological theory popularized by Charles Lyell (1797-1875), and the evolutionary theory formulated by Charles Darwin (1809-1882). The work of Lyell and Darwin progressively eliminated the direct role of God and

looked instead to the central role that randomness and time played in the origin of the universe and humankind. According to Lyell and Darwin, the universe was too old to be contained in the biblical narrative and man was not made in the likeness of His creator, but belonged to a long and progressive lineage of apes.

Lyell's uniformitarianism supplanted at once all the previous catastrophist theories based on the idea that the geological formations of the earth and the biosphere were formed by one or many successive powerful cataclysms defended by conservative Protestantism. Drawing on the millennial view of Baconianism, catastrophism had been one of the major thesis of the nineteenth century. Geologist James Parkinson (1755-1824) and French naturalist Georges Cuvier (1769-1832) were the architects of the idea that the history of the earth and life was marked by geological successions, each one causing an ascending progression. In each era, the existing scheme of geological formation and life forms was destroyed by a divinely engineered cataclysm, through which new geological formations and new forms of fauna and flora were introduced (Marsden, 1980). The legendary Flood of Noah was understood as one of these major cataclysms that had affected the earth's environment, a fact that had been properly recorded in the Scriptures. In *Discourse on the Upheavals of the Surface of the Earth* (1826), Cuvier defended the existence of this enormous flood by arguing that the account about a deluge was a common theme in many folk tales, including, the oral and poetic traditions of the Greeks. According to him, for the scientific benefit of humankind, one people had recorded in written prose the occurrence of this

catastrophe: the Jewish people. For Cuvier, the Bible was the first inscription that preserved and transmitted the factual history of the epic deluge.

This mix of catastrophe and distinct geological epochs suited perfectly the conservative approach nourished by the belief in Millennialism and the idea of multiple dispensations cherished by the Protestant Old School (Bozeman, 1977; Marsden, 1980). Presbyterians such as Lewis W. Green and E.F. Rockwell traced the operations of one vast and comprehensive divine plan composed of many different ages – or ‘dispensations’ - directing the universe through the course of ascending progress towards a natural and glorious new Millennium (Bozeman, 1977). The scientific “discovery” of catastrophism, which fit so perfectly in the dispensational and religious narrative, was interpreted as a concrete sign for the coming millennial age and, consequently, the second coming of Jesus. For Millennialists and dispensationalists, history was divided into distinct periods, each of them dominated by its characteristics and organizing principles. Each age ended in conflict, violence, failure, “judgment of those who rule” and the consequent introduction of a new era. Dialectically, history would go in “dramatic steps toward a final age of peace” – the one thousand years of Christ’s reign (Marsden, 1980, p.64). The major scientific theory that could serve the belief in the supernatural and in sequential dispensations was geological catastrophism, which was then menaced by Lyell’s claim. In contrast to catastrophism, the uniformitarian theory argued for natural laws and long term processes that were constant, gradual, progressing, and had been operating on the conformation of the earth

surface since primordial times. The present materiality of the earth was the key to understand the past, not the Bible.

Gradual rather than abrupt change was also fundamental to Darwin's account of evolution. Since its publication, *The Origin of Species* has been celebrated as a triumph of paradigmatic revolution, a strong integration of biological, geological, and geographical data (Campbell, 1990). In his seminal book, Darwin introduced the concept of "natural selection," the explanatory schema for his evolutionary theory. In summary, the process of natural selection can be described in these terms: 1) if the reproduction of species increases in number and this growth is not facilitated by the food supply, organic lives will compete for survival; and 2) the organisms that sustained adaptations favorable to competition will be those that survive. This process known as natural selection, in which organisms compete, vary, change, and adapt to the surrounding conditions, is the core of evolutionary theory.

Both theories shook the American academy. If, on the one hand, scientists embraced the new paradigm and many theologians increasingly defended that it was possible to harmonize the Bible with Darwinism, on the other hand, evolution fueled conservative claims that the Bible was a book of facts. In the beginning of the twentieth century, the new anti-evolution movement helped fundamentalists to create an even stronger identity (Lienesch, 2007; Marsden, 1980). In the United States, the term 'fundamentalism' was defined by *The Fundamentals*, a set of 90 essays published between 1910 and 1915 by The Bible Institute of Los Angeles and edited by A.C. Dixon.

Some of them addressed the issue posed by evolution. It was with *The Fundamentals* that the Creationist movement began to fashion an identity of “who we are” and “who we are not” (Lienesch, 2007; Marsden, 1980; Numbers, 2006).

Modern Creationism arose from the fundamentalist concern about a theory that removed God from the account of how the universe came to be. Convinced about the total and infallible accuracy of the Bible, fundamentalists considered themselves the only true version of Christianity and assigned to themselves the mission to fight Darwin’s evolution. Back in 1920 and just after World War I, fundamentalists felt that they were undergoing an alarming experience amidst a culture that was “openly turning away from God” (Marsden, 1980, p.3). The rise of evolution became a sign of the end of times. The theory had wrought a catastrophe (not a geological one) that would end by undermining the Biblical foundations of American society. “I believe there is such a menace to fundamental morality,” wrote William Jennings Bryan (1920). “The hypothesis to which the name of Darwin has been given – the hypothesis that links man to the lower forms of life and makes him a lineal descendant of the brute – is obscuring God and weakening all the virtues that rest upon the religious tie between God and man” (Bryan, 1920, p.17). For fundamentalists, evolution was not a verified law as described by Baconianism, but only a demonic hypothesis that challenged the assumption of the inerrancy of the Scriptures. Christianity should not be seen as dependent on historical or scientific fact or be susceptible to empirical disconfirmation caused by fashionable theories. God had built the universe as a system of laws and He

created the mind of people in a way that they could understand His work and the laws He had authored. Common Sense philosophy affirmed that nature could only be known if the Scriptures were taken as a compendium of such facts (Lienesch, 2007; Marsden, 1980; Numbers, 2006)

But apparently American scientists had made their choice: science was determined by the scope of Darwinism. Fundamentalists resented that Christianity – at least their idea of Christianity – had retreated from the scientific community. In the mainstream academy, the Bible no longer guided the scientific enterprise. Until the nineteenth century, the universe had been thought to be *created*. Thereafter, the whole universe was regarded as having *evolved*. For fundamentalists, the mind of secular scientists associated with their instruments for precision had acted again as a forge of idols. “All that the Darwinists, ‘with the best optical instruments’, have actually seen is growth; but they have inferred a whole pantheon,” condemned Henry H. Beach in *The Fundamentals*. “Natural selection is the supreme demiurge; sexual selection and variation are subordinates. A billion years ago there was a God, but He immediately disappeared” (Beach, 1912, p.38). Evolution was a question of “men” versus “God;” theoretical speculation versus fact. According to fundamentalists, there was no such thing as universal and progressive evolution. There could never be a transmutation of species since the “man cell develops into a man and the monkey cell develops into a monkey” (Hague, year, p.83). If it ever occurs, mutation is not evolution, affirmed one of

the first Creationist authors, George McCready Price in 1927. When mutation happens, it does not bring progress or development, only degeneration (Price, 1927).

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Modernity has long been defined by the removal from science of religious forces and the increasing secularization of the world. But from its very birth modern science was deeply influenced by religious beliefs. In the same way and throughout its history, Protestantism was not immune to the emergent scientific ethos. If Durkheim (1995 [1912]) interweaved both when he stated that proto-science was born in primitive forms of religion and religion began by serving as science, in the modern era, this relationship did not cease but assumed another form, one that was marked by the systematization of both nature and religion.

Therefore, despite the rhetorical representation of conservative Protestantism as the pure version of Christianity, Conservative Protestantism was never immune to the influence of profane forces acting in the world. The interpretation of the Bible as 'inerrant' and 'literal' never took place because so much needed to be presumed about the book and its stories before they could be literal or inerrant. Deeply shaped by the rational enterprise of deciphering the secrets of nature, by the exactitude proposed by scientific discourse, Protestants re-arranged the Bible, made new connections between disparate texts, re-organized its content and proposed a new form of reading it based on their own agenda, profoundly shaped by the scientific discourse of Baconianism.

As a matter of fact, there is no moment in history when religion has not been affected by the historical, social, and cultural context in which it developed. Therefore, as a direct product of modernity, Protestantism was always a hybrid moved by a dual emphasis on the supernatural and on the scientific. At its birth, it both inspired and was inspired by the modern philosophical idea that individuals had the right to speak and think by themselves. In this regard, it did not differ much from the humanistic and secular French ideas that Puritans despised so much. Conservative Protestants also claimed they had destroyed all the old Catholic fetishes when they were, in fact, constructing their own: the Bible that was seen as the God's word and an accurate book of facts. They embraced science, praised and endorsed all the technological means that were available in order to convey, fix, and maintain their notion of systematic order designed according to their own 'terministic screen.' The Christian dispensationalist view of history was also akin to certain versions of modern thought. The division of history in different historical periods that would bring dramatic changes did not differ in structure and strategy from what Friedrich Hegel, and Karl Marx after him, did in their philosophical work.

Later, in the United States, dwelling in an era marked by the enchantment of scientific progress and technological innovation, Conservative Protestantism was even stronger when fighting progressive views inside academy. It was the 'other,' 'the enemy,' the 'outside world' and 'outside forces' that helped fundamentalism to construct the boundaries of its identity. It was precisely in this era, characterized by an

increasing faith in science, that the conservative religious movement found it necessary to reaffirm the scientific authority of the Bible.

Therefore, fundamentalist Protestantism is always in a process of negotiating with the “thought style” of its times: religion, as science, should be transformed into the certainty of representation. In order to achieve certainty, fundamentalists blended modern science with the supernatural Millennialism. While supernaturalism was indeed an organizing principle - the spark for the creation of all things – they insisted that it was wrong to assume that the universe could be explained only by an endless succession of miracles. For example, God performed a miracle when He split the Red Sea and held it back for the Israelites to cross it. However, once He released the waters, they hurried back to their original position according to the laws of hydraulics and gravity (Whitcomb & Morris, 1961). There are more facts in the Bible than miracles, they seem to want to say, and the real challenge of faith is to learn to accept that, to take facts on faith no less than miracles. Faith in the word as fact generates certainty that bolsters faith in the miracles that testify to the existence of the creator God and his redeeming son. In the emergence of this complex hybrid, what conservatives did was actually the opposite of their claim: the inerrant and literal interpretation of the Bible. In contrast, immersed in modern sensibility, they transformed a religious book into a record of systematized facts.

Therefore, one of the most important branches of fundamentalism – Creationism - is far from being an outcome of the dark ages. It is a product of modernity and deeply

interconnected with the history of scientific development. Creationism in its present form would not even exist without scientific and technological accomplishments or the emergence of their archenemy, evolutionary theory. Consequently, there is a substantial difference between the way the divine act of creation is ‘literally’ described in the Bible and the divine act of creation as described by modern Creationists. The difference resides precisely in the distinction between two different forms of Creationism. The first is ancient folklore and allegory. The second is a rhetorical construction, technologically mediated, and erected upon Enlightenment and scientific topoi. Modern Creationism differs from its biblical roots by virtue of its happy marriage with science accomplished by the scientification of the Bible. This is the premise of my thesis and what I will demonstrate across my dissertation.

In the next chapter, I will argue that Flood Geology, in order to exist, had first to challenge the authority of scientific discourse, its premises and inscriptions. Second, it had to rearrange the brute facts of nature – “shuffle the cards,” as Latour put it (1986) – to re-construct new inscriptions, but now in the service of the worldview of conservative Christianity. In order to demonstrate my claim, I show that contemporary Creationists make a very postmodern rhetorical move in which they discredit the veracity of metanarratives (Lyotard, 1979), in this case, the progressive and evolutionary theory that explains both the creation of the universe and the development of humankind.

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### Rocks and Clocks: The De-construction and Re-construction of Scientific Inscriptions

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In publishing their seminal book *The Genesis Flood: The Biblical Record and Its Scientific Implications* (1961), John Whitcomb and Henry Morris aimed to restore scientific authority to Creationism, which had been lost after the Darwinist torrent. The authors lamented that in these dark times, when the investigation of natural science had been limited by the evolutionist scope, Christianity had been expelled from the scientific arena. Scientific scholarship no longer regards “the witness and warnings of the Flood with any seriousness” (Whitcomb & Morris, 1961, p.xxxv). The ‘Scopes Trial’ was the tipping point: the belief that God created all things was nationally (and internationally) subjected to scorn and was dismissed as the product of ignorant and narrow-minded religious people. Something different had to be done to save the faith in God’s revelation. The remedy was not for religion to dismiss science, but the avoidance of the split between religion and science by producing an even more powerful hybrid, one in which scientific rhetorical strategies were increasingly integrated with mythical religious narratives about creation. If Morris and Whitcomb did not accomplish the objective of reestablishing Creationism in the American academy, they certainly

invented Creation Science, which they understood to equip believers through scientific research with material evidence about the exactitude of the Book of Genesis.

A striking result of their efforts was the substantial difference between the way the divine act of creation is described in the Bible and the divine act of creation as described by Whitcomb and Morris or even George McCready Price before them. The first relies on an ancient folklore and allegory. The second is a rhetorical construction, technologically mediated, and erected upon Enlightenment and scientific topoi. I am not suggesting that the first is not a rhetorical construction. In his study of the Bible, the rhetorician Kenneth Burke (1961) scrutinized the rhetoric of the supernatural arguing that magic could be done by textual exercise. However, modern Creationism differs from its biblical roots by virtue of its technological embodiment and its happy marriage with science. Present-day Creationism would not have existed without its counterpart: evolutionary theory. On the one hand, the more science progressed and technology developed, the greater the arsenal of evolutionary arguments increased. On the other hand, in response, Christians felt more compelled to embrace scientific and technological strategies, but in order to argue against the premises of secular arguments.

Although one of these strategies embraced by Whitcomb and Morris sounds quite simple, it was indeed effective for the fundamentalist Christian audience. Morris especially insisted in filling up the lack of scientific credentials characteristic of Creationism in the early twentieth century. Theologians and amateurs alone, such as

Price, would not be capable of persuading many people about their claims. In the preface to his book, Whitcomb relates that, by “discerning that the great Flood of Noah’s day was the cause of the rock and fossil records,” Morris decided to pursue a PhD in the University of Minnesota, to acquire expertise in hydraulics, hydrology, and geology. His goal was to investigate the power of moving water in order to defend that the worldwide cataclysm revealed in the Book of Genesis was the cause of changes on the surface of the globe and in the biosphere. Whitcomb and Morris were aware of the general “hostility” toward the Creationist approach to natural science owing to its unprofessional status. “Geologic evidences for the Great Flood are ignored, and even the possibility of such a catastrophe in the past is ruled out on the basis of *a priori* philosophical reasoning” (Whitcomb & Morris, 1961, p.89). Thus, during the 1960s, doctoral degrees became a condition for Creationists committed to the construction of a theory that was both religious and scientific (Numbers, 2006). In Morris’ view it was essential that conservative Christians acquire scientific credentials in order to re-study, re-evaluate, and re-assemble the great mass of geologic and paleontological data that had been appropriated by uniformitarian and Darwinist scientists. With appropriate qualifications, Creationists would be able to stretch the character appeal associated with academic titles. A Ph.D could allocate values to a group, individuals, and facts as part of a large network. “He is a graduate from Harvard,” I heard once in a Creationist conference. Therefore, this scientist with a Ph.D in geology from the prestigious University of Harvard has authority to move Creationist arguments across the academic

world. For Morris, his certified production would be closer to be accepted by members of the scientific community. It would even cause a scientific revolution. In other words, what Creation Science needed was to create ways for imposing what Latour, Callon, and Law call the process of “translation:” the success of engaging people, procedures, recalcitrants, and technologies that could support their claim (Callon et al, 1986; Law, 1986; Latour, 1987; Law & William, 2012).

In order to construct a scientific Creationism, theological debates over evolution and the teachings of the Bible were not enough. It was decisive to peel off the religious wrappings of creationism and repackage it as science, comments the historian of science Ronald L. Numbers (2006). Research should be done. Creationist natural science institutions should be founded. Academic publications should be produced in order to translate the laboratorial results into inscriptions. Creation Science should also be philosophically supported, so, first, Morris and Whitcomb, and in the late twentieth and early twenty-first centuries, other Creationists selectively engaged three modern heroes who could fit their rhetorical strategies: Francis Bacon, Karl Popper (1902-1994), and Thomas S. Kuhn (1922-1996) (Numbers, p. 274-276).

Relying on Bacon’s teachings, Whitcomb and Morris had two major goals. The first was to legitimize Creationism as the real model for an empirical, inductive science. Second, as discussed in Chapter 2, Bacon, the founding father of modern science, saw the scientific endeavor as a Christian religious duty and enterprise. Therefore, by engaging Bacon, Creationism stressed more the austere scope of science than its

numerous (and dangerous) possibilities. Baconian philosophy was not to “flatter the pride of man” with flamboyant speculations but to “lead to a confession of human ignorance” (Bozeman, 1977, p.14). It was not for theoretical speculation but instead to rely on material evidence. The debate over creation should remind Christians of the dangers of trusting secular stories about origins over the Bible’s inspired creation account. The authors agreed that scientists could – and should - identify the natural patterns of nature recognizing their basic laws. They could name one of these patterns ‘gravity,’ for example, or define the thermodynamic laws. However, it is not their role to ask the ‘why’ underlying the gravitational effect or the behavior of energy. For Whitcomb and Morris, supported by Baconianism, to ask these questions was not science, but metaphysics. With the purpose of keeping the boundaries of the correct science as prescribed by Bacon and for the production of a safe “world-change [Creationist] book,” Morris – the scientist - joined efforts with Whitcomb, the theologian. With science and religion blended together, across their book, they examined the anthropological and geological scientific implications of the Biblical record of the Flood, seeking to re-orient the brutal facts of nature within the biblical framework.

In the Creationist enterprise, the engagement of Popper’s discourse solved the problem of distinguishing scientific facts from what Creationists considered “metaphysics” or mere theoretical speculations. Popper invoked the criterion of *falsifiability* as a substitute for the less rigorous test of *verifiability*. A statement is

considered falsifiable if it is possible to consider an observation or an argument that proves the statement to be false. In order to be qualified as science in Popper's terms, an argument had to be refutable by experience; it must be tested. It also had to be objectively verifiable and have conditions of proof that were indisputable. As described by Duane Gish in an article published in the Creationist journal *Acts & Facts*,

Science is our attempt to observe, understand, and explain the operation of the universe and of the living things it contains. Since a scientific theory, by definition, must be testable by repeatable observations and must be capable of being falsified if indeed it were false, a scientific theory can only attempt to explain processes and events that are presently occurring repeatedly within our observations. Theories about history, although interesting and often fruitful, are not scientific theories, even though they may be related to other theories which do fulfill the criteria of a scientific theory (Gish, 1995).

For Creationists, neither Darwinism nor uniformitarianism satisfied these requirements. At the beginning of all things, there were no humans to testify that a fish evolved into an amphibian or an ape evolved into man, continued Gish. No one can go back in time to prove evolution or simulate in laboratories what happened millions and millions of years ago. Therefore, for Creationists, it would at least be fair if both theories – evolution and Creationism – shared the same status among the scientific community. After all, no one can deny that both are theories similarly based on “circumstantial evidence,” concluded Gish, only with different conclusions. They rely on the same evidence. If both evolutionist and Creationist scientists adhere to the rigors of scientific inquiry established by Popper, then there is no basis for elevating evolution above Creationism. Therefore, it is not ethically correct that normal scientists esteem

evolution as a weighty scientific theory while they consider Creationism as nothing more than “religious mysticism.” But for Creationists, evolution and Creationism should be treated in equal terms and taught as competitive theories (about the same paleontological and biological data) in public institutions. Gish made a point of stressing that Popper himself, “one of the world’s leading philosophers of science,” concluded in his autobiography that “Darwinism is not a testable scientific theory, but a metaphysical research programme” (Popper, 1976, p.195).

Kuhn entered this narrative with his description of scientific progress as competing models and paradigmatic revolutions (2012 [1962]). “As Thomas Kuhn and subsequent philosophers of science have pointed out, scientists typically work within *paradigms*, or accepted explanatory frameworks,” explains David F. Coppedge (2008), a Creationist who, according to his biography, worked at NASA’s Jet Propulsion Laboratory from 1997 to 2011.<sup>18</sup> Creationists see Creationism and Darwinism as two opposing models. The former is in their view the more revolutionary because it can provide a better distinction between facts and theories. Creationism also erases the vestiges of animism and primitivism that still are embedded in evolutionary theory. Most important, its adherents believe that Creationism provides a better explanation for the anomalies present in evolutionary theory. “Anomalies are surprises that don't fit the paradigm,” writes Coppedge. According to Kuhn, “when too many anomalies accumulate, a scientific revolution may occur, and a new paradigm may take its place

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<sup>18</sup> *Creation.com* website. David Coppedge Biography. Available at < <http://creation.com/david-coppedge> > Retrieved from Internet on July 12, 2015.

(Coppedge, 2008, p.15). For Creationists, Creation Science is a revolutionary paradigm waiting to happen. If Creation Science is not yet accepted, as described by Kuhn, it is only because there is still resistance to rejecting the regnant scientific paradigm (evolution). However, once evolution is properly discredited, once there is a willingness among the scientific community to accept another paradigm, Creationism will rise as a model to replace evolution once for all. "If you compromise the Bible with the latest paradigm," Coppedge concludes in his article, " your position could become a casualty of the next one. The Bible has outlasted a great many paradigms. Considering its Author, that's no surprise" (Coppedge, 2008, p.15).

To accomplish the task of displacing evolution to replace it with Creationism, in their scholarship, Morris and Whitcomb, as well as other Creationists after them, made two distinct rhetorical moves. The first one is based on postmodern skepticism, which aims to *deconstruct* the notion of absolute truth; the second is the *construction* of an alternative scientific schema based on incontestable belief in the Bible. In the first move, Creationists challenged the authority and veracity of the hegemonic scientific discourse, in this case, the premises of evolution and uniformitarianism to explain both the creation of the universe and the development of humankind. For creation scientists, these theories, based on progressive and random changes on nature, make no sense. They argue that the "facts" of evolution and uniformitarianism are not actually built on observable and material evidence, but mere social and rhetorical constructions. One of the most noteworthy rhetorical strategies employed by Darwin is his "free use of

analogy” (Campbell, 1990, p.59). For instance, it was through visual analogies between the variation and races of domestic animals that Darwin in his *Origin of Species* attempted to conjecture whether they descended from one or multiple species (Darwin, 1872 [1859]). Based on his own belief in the adaptation of animals to their environment, Darwin invented the trope of “natural selection” and used it to support his theory of evolution and to persuade his academic audience. Hence, Creationist scholarship is first organized to discredit evolution by comparing the currently accepted evolutionary schema and the premises of geological science to the biblical records of creation and the Flood. In fact, what these scientists do is to unveil the network of actors that sustains the evolutionary and uniformitarian theories to reveal inconsistencies in secular scientific interpretation of geological and paleontological data.

By following the strategies of scientific inquiry, the second move proposes to replace the hegemonic schema with the Creationist one, which interprets the same data through another worldview (terministic screen), one that intends to demonstrate the accuracy of biblical records and the scientific validity of the Genesis. It is a move committed with the belief in the final authority of the Bible as a magical artifact that contains God’s words. As Whitcomb and Morris stated at the very beginning of their work, “This book had to declare unashamedly that the Bible, from Genesis to Revelation, is complete and authoritative” (Whitcomb & Morris, 1961, p.xxxi).

The objective of this chapter is to examine the rhetorical strategies employed by Creationists to deconstruct Darwinism and replace it with their own interpretation of how the universe and humankind were created. In doing so, I will also contemplate “why” they do it, what interest moves them, and the rhetorical implications of the Creationist discourse. Therefore, this chapter will end by considering how the ideas of a universal Flood and catastrophism rhetorically serve the global scope of conservative Christianity.

### **3.1 Postmodern skepticism and the deconstruction of science as a metanarrative**

In 1990, the rhetorician John Angus Campbell, while still teaching at the University in Washington, published the article “Scientific Discovery and Rhetorical Invention: The Path of Darwin’s Origin.” In this work, Campbell defended the claim that Charles Darwin had not formulated the major aspects of his theory based on material evidence or logical reasoning. By analyzing Darwin’s notebooks, Campbell concluded that each of Darwin’s theories explained reproduction, geological change, and natural selection only in rhetorical terms, by which Campbell meant the employment of metaphor, analogy, and figurative language. For Campbell, only through the use of rhetorical strategies and vivid imagination was Darwin ingeniously able to engage aspects of biology and geology in order to persuade the membership of the Royal British Society, mostly composed of natural philosophers and devout Christians. Based on Campbell’s conclusion, the persuasion of the members of the Royal Society and the

consequent consolidation of what came to be known as Darwinism owed more to inventive rhetorical strategies than to demonstrable facts. And by persuasion, Campbell was not only referring to textual and visual argumentation but to a wide-ranging process of translation that allowed the natural theologians of the Royal Society to adhere to the new morality proposed by Darwin.

The argument proposed by Campbell is not limited to his own field, rhetoric of science. As a matter of fact, scholars such as Bruno Latour (1979; 1985; 1987), Michel Callon (1986), John Law (1986a; 1986b), Steve Woolgar (1979), Harry Collins and Trevor Pinch (1993), Lawrence Prelli (1989), and Alan Gross (2006) go even deeper in their critique by asserting that scientific facts or material evidence do not exist in nature per se, but are always socially, materially, and rhetorically constructed. Drawing on the postmodernist sensibility that pleaded for the downfall of the great metanarratives (Lyotard, 1979), these scholars were committed to deconstructing the assumption of a hegemonic 'truth' and, therefore, to showing the lack of certainty inherent in scientific facts. As Latour explained, what this de-constructivist project wanted was to "emancipate the public from prematurely naturalized objectified facts, ....to detect the real prejudices hidden behind the appearance of objective facts " (Latour, 2004, p.227). Hence, the first task of sociologists (and rhetoricians) of science was to fight the common notion that science was the product of a logical rationality, the direct expression of nature and reality, or the outcome of objective observations and scientific methodologies Their mission was to reveal how people are made to believe

and scrutinize the rhetorical mechanisms for persuading others about a certain worldview. Nevertheless, in a lecture held at Stanford University, Latour (2004) offered a public *mea culpa* about his role in the postmodern de-construction of science. “While we [sociologists of science] spent years trying to detect the real prejudices hidden behind the appearance of objective statements,” now, it is time to “reveal the real objective and incontrovertible facts hidden behind the illusions of prejudice,” because “dangerous extremists are using the very same argument of social construction to destroy hard-won evidence that can save our lives” (Latour, 2004, p.227).

The countervailing use of constructivism is precisely what Creationists in the United States have been doing since the early twentieth century. They have used these same premises established by sociology and rhetoric of science to revise and undermine evolution in order to replace it with Creation Science, which suits their religious worldview and political agenda. When Campbell (1990) argued that Darwin did not formulate his theory based on actual facts, but in “an intuitive leap,” that employed material evidence in a rhetorical way (such as the case of the two ostriches in Darwin’s first notebook), Campbell was not acting without bias (Campbell, 1990, p.62).<sup>19</sup> Later, after his retirement as a professor of rhetoric, he began to be openly involved with the Center for Science and Culture, a branch of the Discovery Institute, a Creationist Christian think-tank, whose mission is to restore the “religious, political, and

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<sup>19</sup> Campbell argues that when Charles Darwin began to speculate about evolution, he began his argument by comparing two ostriches and imagining how the second might have emerged from the first. Darwin wrote in his diary: “Speculate on neutral ground of the two ostriches, bigger one encroached on smaller.” See Campbell, 1990.

economical liberty” that the “Judeo-Christian culture ha[d] established.” According to its website, the Institute is committed to defending what it considers American and Christian principles currently under threat by the “materialistic worldview [that] denies the intrinsic dignity and freedom of human beings and enfeebles scientific creativity and technological innovation.”<sup>20</sup> Rhetorically, what the members of this organization – Campbell included – are arguing for is a “critical evaluation” or simply a revision of the place occupied by evolution as the mainstream view for the creation of the universe and mankind. According to Campbell, Darwin himself, “to his great credit,” argued for critical evaluation of his scientific hypothesis. In the way it is currently presented, Darwinism, according to Campbell, is only a theory resting loosely on a large body of geological, anthropological, and biological facts. As evolution is a mere theoretical speculation, for the sake of progress of science, it is incumbent upon “thoughtful people” to take issue with the view (Campbell & Meyer, 2005).

By arguing for a revision in the evolutionary paradigm, Creationists make a very important rhetorical move, in which Creation Science - or “scientific Creationism” - becomes a framework that does not stand for the “old,” but for the “new.” The old refers to “modern geology,” which Creationists describe as a past and surpassed theory that, arrested by the dark forces of superstition, believes that things – the brutal facts of nature - can have self-determination and evolve by themselves. In contrast to this old worldview, the “new catastrophism” or the “new geology,” as coined by George

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<sup>20</sup> *Discovery Institute*. Mission. Available at < <http://www.discovery.org/about/mission> >. Retrieved from Internet on April 6, 2015.

McCready Price (1927), is a legitimate attempt to develop “new” interpretations of biological and geological data, “which will be in harmony with the Biblical account of Creation and the Flood” (Whitcomb, 1961, p.209). If their science has not still convinced the mainstream academic world, it is not because Creationism sounds more like a folktale that cannot be scientifically proven. Rather, as described by Kuhn (2012 [1962]), it is because the scientific community is not yet prepared for such revolutionary innovation brought by this advanced phase of scientific development. “Pioneer work is always difficult,” bemoans Price in the preface of *Evolutionary Geology and the New Catastrophism*. “In science,” writes Kuhn, “novelty emerges only with difficulty, manifested by resistance, against a background provided by expectation” (Kuhn, 2012, p.64).

In this way, Creationism is rhetorically constructed as a move forward and not backwards. “Some day, when this science [geology] is reconstructed by being built up on inductive principles from the present instead of being postulated from the past, this part of the history of natural science will make a most amazing story for our posterity” (Price, 1927, p.35). For Creationists, the whole idea of uniformitarianism and evolution can no longer be reverentially respected. The construction of evolutionary trees of descent for the various animals and plants “is a sad example of mental inertia,” accuses Price (Price, 1927, p.40). Therefore, what Creationists are proposing is not a return to the past, but a new paradigmatic revolution based on Kuhn’s principles, which, by pointing out the anomalies of evolution and uniformitarianism, would challenge the

established premises of these theories and change the way scientists describe and explain the world. “What if the gigantic dinosaurs of the Cretaceous or the equally marvelous mammals of the ‘early’ Tertiaries of the Western States...are not strictly faunas of epochs or periods of time, but local topographical faunas? .... What if there are possibly contemporaneous with one another?” (Price, 1927, p.221). Besides, what if humans did not evolve, as suggested by Darwin, but actually witnessed all the big geological events, such as the supernatural creation and the Noah’s Flood? What if an enormous flood of global proportion really happened? What if the planet is not old, as defended by uniformitarian theory, but young, and all fossils and geological formations have been wrongly dated by geo-chronological technologies in the service of secular scientists?

For Creationists, the whole idea that the universe is billions of years old and humans have developed from an ape’s common ancestor is no less absurd and bound to dogmatic premises than Creationism. Evolution and modern geology are both socially and rhetorically constructed theories, “invented a hundred years ago in a little corner of western Europe,” by a group of “pseudo-intellectual” people, scorns Price (Price, 1927, p.116). “These wise little fellows noticed that their little world was all green, and they themselves green likewise, and they shrewdly concluded from this that the whole universe must also be green” (Price, 1927, p.117). If both theories still hold together, it is only because they seem reasonable for their own community of thought, which continues to build arguments based on naturalized scientific statements. For

Creationists, it is time to unveil the social, material, and rhetorical construction of evolutionary and uniformitarian facts. That is the first major task of Creationism.

### **3.2 Sociology of science and the deconstruction of evolution and uniformitarianism**

In *Bones of Contention: A Creationist Assessment of Human Fossils*, Marvin L. Lubenow (2004) states that his mission is to demonstrate how the theory of human evolution, mainly supported by fossil evidence, is false “both philosophically and scientifically” (Lubenow, 2004, p.17). The idea of evolution and human fossils can be very confusing, he explains, which poses many problems for the correct understanding of all kinds of preserved remains. Laymen do not have any background in paleontology and, therefore, it is not a surprise that they uncritically accept what scientists have told them: fossils support the theory of evolution.

Likewise, Lubenow sees another problem in the investigation of fossils: the field is full of Latin names, categories, index, and it is often written in a kind of prose that is inaccessible for the majority of people. But this is not by chance. It is precisely when scientific facts are presented surrounded by technical terms familiar only to a restricted group of people that the rhetoric of evolutionary science becomes more evident. When a reader does not understand the technical prose, continues Lubenow, “evolutionists often appeal to the authority of the scientific community regarding the fact of evolution”

(Lubenow, 2004, p.32). The person who conducted that research and wrote the scientific article is someone who earned a doctorate, so what he asserts must be true.

However, Whitcomb and Morris insist that the established authority of secular scientists does not expunge the fact that evolution is only a theory constructed upon a “foundation of sand,” (Whitcomb & Morris, 1961, p.212). Darwinism is the product of a secular worldview sustained and reproduced by an educational system endorsed by a discriminatory group who always thinks in terms of evolution and geological uniformity. As Kuhn (2012 [1962]) argued, as textbooks and articles are the major pedagogic vehicles for the formation of scientists as well as the means for the perpetuation of scientific facts, it is very hard to escape from a vicious cycle that passively replicates what has already been said.

For Morris and Whitcomb (1961), due to its lack of evidence, evolution requires more faith in its premises than does Creationism. Among secular and mainstream scientists, evolutionary theory became a religion that cannot be contradicted. Any other view that goes against its established framework is seen as a contamination of doctrinal purity – a heresy. Creation scientists are perceived as deviants, who, despite having “all the accrediting insignia of science, audaciously violate its conventions and become, in effect, a heretical threat to the scientific establishment” (Lessl, 1988, p.19). Conversely, Creationists counter attack: it is not fossils that prove the correctness of evolutionary theory. In fact, naturalized presuppositions turn evolution and uniformitarian theories into a more reasonable model than the idea of a supernatural

creation. As claimed by Latour (1987), when a mere supposition becomes an orthodox fact, the brutal facts of nature are engaged as material evidence to support the mainstream worldview, revealing, however, what they are *made* to reveal.

For more than one hundred years, evolution has been regarded as the only adequate explanation for the origin of plants and animals (humans included). Throughout that time, evolutionary thought has regarded fossils as one of its most important forms of material evidence. According to the Creationist critique, the evolutionary account depends heavily on what fossils can reveal. The battle against evolution is the battle against the secular interpretation of fossils. Take for example the famous fossil AL-288-1. It is composed of several fragments of bones, all of which together are identified as representing 40% of a skeleton of a primitive female. After being assembled as a puzzle, the bones were categorized as belonging to an *Australopithecus afarensis* - a *hominin*, the chimpanzee-human last common ancestor. "Lucy," as she is commonly called, was found in 1974 in Awash Valley, Ethiopia, and classified as part of a group of 13 hominid individuals known as the 'First Family' (Walter, 1994). As time is a key element in the construction of evolution, immediately following her discovery, there were attempts to establish a period framework for Lucy's bones. Nonetheless, the employment of potassium-argon radiometric dating technology to determine her age failed owing to the limitation of this technique. Primary crystals and/or detrital contaminants were insufficient in most of the volcanic ashes deposited around her fossil. A newer and more sensitive technology for measurement was crucial

to determine Lucy's age and, subsequently, to insert her into the existing paleontological record of the evolutionary tree. Only when Derek York from the University of Toronto improved the available technique, could Lucy's fossil be argon-argon dated by Robert C. Walter in 1992. By applying this new technology to the volcanic ashes, Lucy was finally estimated to have lived 3.2 million years ago. The results of Walter's achievement were published in the prestigious scientific journal *Geology* in an article entitled "Age of Lucy and The First Family: Single-crystal  $^{40}\text{Ar}/^{39}\text{Ar}$  dating of the Denen Dora and lower Kada Hadar members of the Hadar Formation, Ethiopia." In the scientific community, Lucy's dating was praised as a "step toward refining temporal biostratigraphic and paleoenvironmental zones within the Hadar Formation" (Walter, 1994, p.9). With this discovery, the time span of hominid evolution was finally understood. Lucy was consecrated as the youngest specimen of *A. afarensis* in the Hadar sequence.

For the science writer Misia Landau (1991), cited by Lubenow (2004), what is most curious about Lucy is neither her discovery nor the development of a more accurate dating technology. Landau does not even mention the role that a new technology played in Lucy's dating. According to him, as a matter of fact, far from presenting anything new to be celebrated, the discovery of Lucy did not challenge any important scientific premise. Once described, measured, dated, and categorized, she was turned into a museum piece and properly placed in a larger assemblage of fossils to affirm what was already told about human evolution. As she became an iconic actor in

the evolution schema, replicas and models built from her original skeleton were reproduced and displayed in the most important natural science museums around the world in order to confirm a pre-existing theory: humans evolved from apes. In these places, such as National Museum of Natural History in Washington, D.C., her fixed role is to represent one of the longest-lived and best-known stories about early apelike humans in the evolutionary line (Fig.3.1).



Figure 3.1: Representation of Lucy at the Natural History Museum, Washington, DC, USA.

In the Creation Museum in Kentucky, there is also a section dedicated to Lucy. In her window, not different from other natural science museums, we see a sculpted model and replicas of her original bones (Fig.3.2). The similarities end there, however, because in this museum Lucy is not displayed to confirm what is already known about

human evolution. In the Creation Museum, she is used to tell a different story. On all fours, her model steps on pictures of what to Creationists are monstrous hybrids of human and simian. A label explains to visitors that Lucy has been “widely portrayed in the media and museums all over the world as the supreme example of the ‘missing link’ between apes and humans.” Secular scientists have praised her as the “mother of humankind.” “Biblical Creationists, on the other hand, consider Lucy to be nothing more than an extinct ape with similarities to both chimpanzees and gorillas.” They believe that Lucy, like “many modern apes,” could have walked upright as implied by the model on exhibition in the Natural History Museum in Washington (Fig.3.1), but only for short distances. After all, the label continues, based on the length of her arms and legs, she would probably feel more comfortable walking on all fours as the animal she surely was.



Figure 3.2: Representation of Lucy at the Creation Museum, Kentucky, USA.

For Creationists, the famous “Lucy” is nothing more than the product of an invented evolutionary schema. Her dating process does not reveal an actual primordial age but rather the blind faith in an untrustworthy, controversial, and secular geochronological technology for measuring time.

Geochronology is a field of scientific investigation concerned with determining the age of rocks, fossils, and sediments. Nowadays, there are many techniques and technologies for dating artifacts in support of the view that fossils and the crustal formation of the earth are much older than the time of creation narrated in the Bible. Among them, radiometric dating is used to measure the constant amount of radioactive decay of radioactive isotope using pre-determined decay rates. The radiocarbon technique, for example, measures the decay of carbon-14 in organic material and is

recommended for samples no more than 60,000 years old. Potassium-argon dating and argon-argon dating are techniques used to measure metamorphic rocks and igneous minerals (formed through the cooling and solidification of magma or lava) that can be applied to samples more than 60 million years old. As a matter of fact, secular scientists sustain that geochronological technologies are able to measure the nuclear decay that has been part of the world since primordial times, more than 4.54 billion years ago.

Creationists, however, have a different view: radioisotope dating is not realistic for many reasons. First, such natural conditions and properties cannot be replicated in laboratories. For Creationists, the supposition that scientists can reproduce what happened millions of years ago is a secular version of believing in the existence of supernatural forces and miracles, only, in this case, performed by humans (Price, 1927). Similar to the principles defended by Latour (1987) in chapter 1, in fact, what happens in laboratories - highly controlled places with highly controlled technologies and techniques - has never happened before in nature. Second, no natural system can remain unaffected by its environment over million of years. "Rocks are not clocks," affirms nuclear physicist and Creationist Vernon R. Cupps (Cupps, 2015a, p.10). For Morris and Whitcomb (1961), the claim that these decay rates are constant could only find legitimation in a computer age, when everything is thought to be measurable and calculable. Therefore, the pretense, accuracy, and significance of these techniques for measurement are based entirely on the disposition to believe in the technological mediation, which, in fact, will only generate results that the machine was previously

programmed to produce (Whitcomb & Morris, 1961; Cupps, 2014, 2015b). Creationist conclude: geochronological technologies, one of the most important pillars of evolution and uniformitarianism, are based on bias, artificial reproduction, erroneous interpretations, and, consequently, subject to large error. What is displayed in natural science museums around the world is only a symbolic action, in which rhetorical selections are made according to particular worldviews that direct attention toward some meaning while, at the same time, deflecting others.

Evolutionists and Creationists both come to the same evidence with different preconceived ideas and beliefs about human origins. When evolutionists reconstruct Lucy, their choices for posture, skin color, and the thickness of hair over her body, surface are largely determined by their beliefs about her location on the evolutionary timeline (label in Lucy's window at the Creation Museum).

For Creationists, the secular version of Lucy is no more than a product of rhetorical construction. The technological mediation used to analyze her serves the purpose of fitting her bones as material evidence into an invented narrative. But, as defended by Creationists, if the same fossil is scrutinized under different lens, different laboratory techniques, different schemas, and different worldviews, Lucy will probably tell a different story. In fact, the wide margin of possible interpretations is suggested by another window in the Creation Museum, which displays different models that have been proposed to explain Lucy's existence. Accordingly, Creationists argue that Lucy's role in evolutionary theory is assembled according to the secular belief that is not

drawn directly from evidence but it is only a singular interpretation determined by an authorizing worldview.

But Lucy is not an isolated case that illustrates how evolutionists artificially build their theory. To identify all the strategies used to construct what Creationists call “secular science” is essential for the Christian enterprise. Echoing the rhetoric of the founders of modern science discussed in chapter 2, it is a Christian duty to combat the illusions, the fetishes that compose evolution’s argumentation (Cupps, 2014a). In order to unveil the social and rhetorical construction of evolution, Creationists have been systematically challenging the methodological procedures conducted in secular science laboratories, the technologies used to date fossils (radiometric dating, powerful microscopes), and the presuppositions that support the idea that humans developed from apes in a long million-year-process (Price, 1927; Whitcomb & Morris, 1961; Lubenow, 2004; Jeanson, 2014a). According to Christian scientists, who come to the debate with arguments drawn from areas like geology, paleontology, anatomy, and lately, advanced genetic research, uniformitarians and evolutionists have made a “persuasive-sounding case for [humankind’s] universal common ancestry hypothesis” and the idea of a 4.5 billion-year-old earth (Jeanson, 2014, p.13). Since the publication of the formative *The Origin of Species*, secular science has “mustered arguments from disciplines beyond anything that Darwin could have imagined” (Jeanson, 2014a, p.13). According to Nathaniel T. Jeanson, who holds a Ph.D in cell and developmental biology from Harvard University, all these strategies compose the arsenal of evolutionary

persuasion. The Creationist’s ultimate mission is to identify the flaws (the anomalies) in the evolutionary scheme in order to provide an alternative.

One of the most significant identified flaws is the *geologic time-scale*, a system of chronological measurements accepted worldwide that relates stratigraphy – the study of rock layers or strata and processes of sedimentation - to time (Fig.3.3). Modern geologists and paleontologists have steadily used this index to determine the chronology of the events that occurred in earth’s long history.

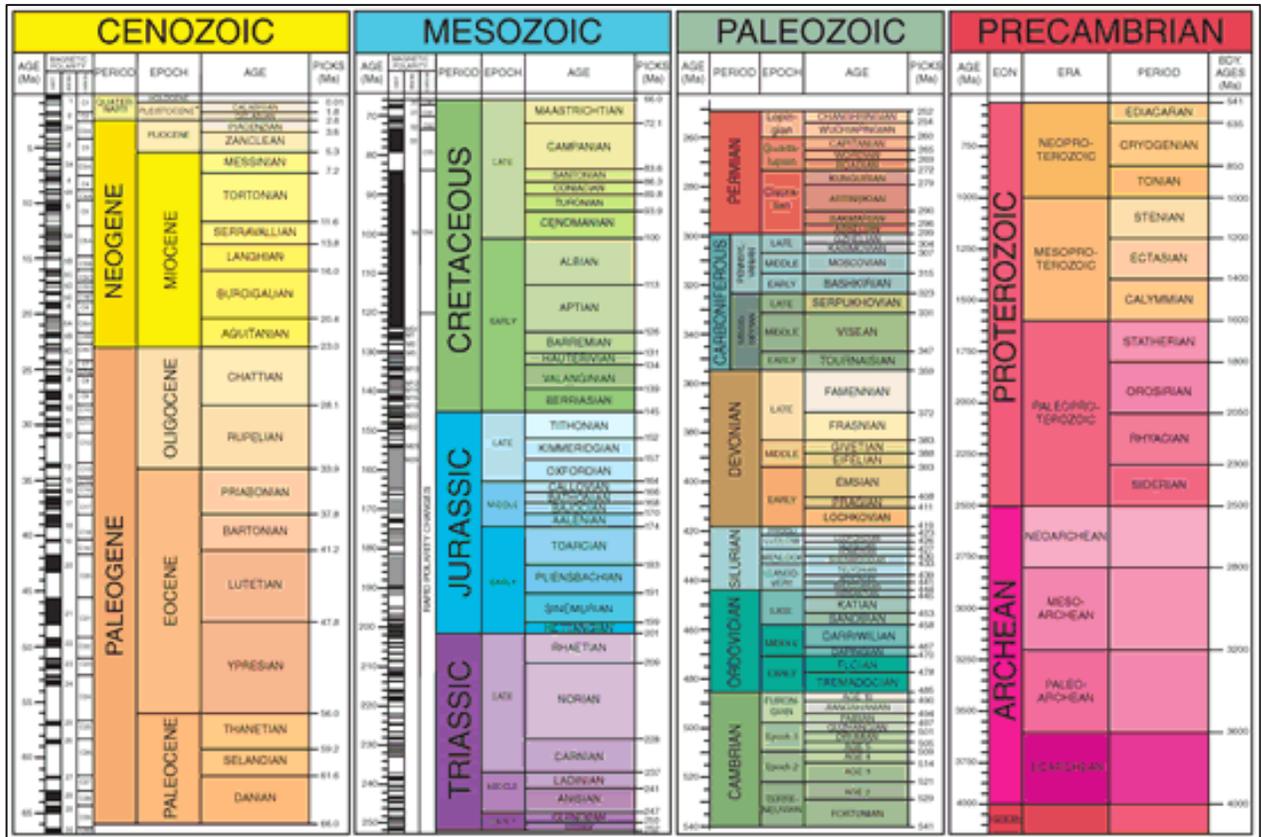


Figure 3.3: GSA Geologic Time Scale, The Geological Society of America.

Already in the early twentieth century, in *Evolutionary Geology and the New Catastrophism* (1927), George McCready Price argued that the whole theory of a

progressive evolution of animal and vegetable lives was intrinsically dependent on the sequence of fossils in the geological strata.

The world has been told that certain forms of life lived long before others came into existence only long ages after these second ones had all disappeared; in short, we have been told that this *orderly sequence* among the various kinds of life is absolutely reliable, not as a mere theory, but as a historical *fact*" (Price, 1927, p.12 – italics in the original).

Based on the geologic time scale, the determination of geological ages depends on finding the types of lives that have flourished during different periods. When one of these forms is found, the age of a certain rock is determined according to the kind of fossils that is associated with it. Since different strata are regarded as having been made at different times, usually, the stratum on the top of a formation is considered younger than layers formed below. Accordingly, the lowest is considered the oldest because logically it was deposited first; the highest is considered the newest since it follows that it was deposited later. In geology, this principle of sedimentation is called 'superposition.' When one stratum is technically and methodologically analyzed and, eventually, its fossil contents determined, it is classified based on the categories established by the geologic time scale. For instance, if a stratum presents a dominance of trilobites (an extinct marine arthropod), it will be assigned as "Cambrian;" if fossils of dinosaurs are found, the stratum will be probably classified as Mesozoic, the era in which these animals were supposed to have existed and disappeared; if fossils of a *Paranthropus* specie (a primitive *hominid*) are present, the material evidence will indicate that the stratum belongs to the Pleistocene. If, by chance, these fossils turn out

to be different in some aspects from any collection hitherto known, they will possibly be categorized as “intermediate,” or another sub-category will be created. In this case, instead of being properly tested in the manner recommended by Popper, these anomalies will not be questioned but absorbed into the uniformitarian account, expanding the material evidence that will strengthen this paradigm. Therefore, for Creationists, the data does not falsify the theory but instead the theory is actually expanded to accommodate the data.<sup>21</sup> Eventually, this stratum will be correlated to another formation known elsewhere and will be assigned to a definite place in this scheme for geological succession. As Landau (1991) suggested regarding the line of human evolution, once described, measured, dated, and categorized, a stratum will be properly inserted in a pre-determined schema to confirm what was already known about geological formation.

Nevertheless, Creationists contend that this geological index that denotes an exact and orderly successive forms of life and sedimentation does not have a single fact to ratify it in the realm of nature (Price, 1927; Whitcomb & Morris, 1961). In nature, fossils of trilobites can be found in strata above (therefore, newer stratum) and fossil of more recent forms of life can be found in beds below the trilobites (therefore, older stratum). Of course, secular geologists also have an explanation for this phenomenon that directly confronts the schema they invented. They explain this occurrence as

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<sup>21</sup> In fact, that is not true for Karl Popper’s idea of ‘falsifiability.’ Creationists rhetorically appropriate Popper on their own benefit. In *Conjectures and Refutations*, Popper says that “the criterion of the scientific status of a theory is its falsifiability or refutability, or testability.” Further, he completes: “Every ‘good’ scientific theory is a prohibition: it forbids certain things to happen. The more a theory forbids, the better it is” and “A theory which is not refutable by any conceivable event is nonscientific.” See Popper, 1962, p.34-37.

'geological fold,' a phenomenon that happens when one sedimentary stratum bends over or curves as a result of the action of forces of nature and time such as the cataclysmic upheaval of earthquakes or plate tectonics. If for normal science, rock formations all around the world are material evidence that support geological fold, for Creationists, constrained by the biblical framework, the simple and objective observation of nature actually reveals that geological classifications do not represent successive ages but serve merely as taxonomic classifications. All these geological series, these old-time taxonomies and classifications were artificially and rhetorically arranged. They are scientific "inventions," asserts Whitcomb & Morris (1961, p.133) and when recalcitrants contradict, and therefore challenge, a scientific statement, the brutal facts of nature are forced to bend over to the accepted schema.

Fleck (1979) proposed an appropriate explanation for this uncritical acceptance: the tenacity of the system. Once a scientific system of opinions is structurally completed and closed as a fact, it has the ability to offer enduring resistance to anything that might contradict it. Since scientists tend to explain phenomena based on the most accepted current view (in this case, the 'geologic time scale'), 1) any contradiction to this system will appear to be inconceivable, 2) when something does not fit into the system it is either rejected, ignored, kept in secret or 3) efforts are made to explain the exception in other terms in order to avoid contradicting the established system (Fleck, 1979). Creationists maintain that secular scientists only accept their tortuous, unclear, and circular arguments as scientific facts simply because the majority of people in the

academic community uncritically embrace them. What makes them to endorse such premises is only the authority that is given to it by themselves - the mainstream scientific community (Lubenow, 2004). Nevertheless,

The geological classification really represents taxonomic values; they are merely a card catalogue of the buried floras and faunas of the ancient world. The 'phylogenic series' is nothing more than an old-time taxonomic series, and there is absolutely nothing at all to prove that it represents succession in time (Price, 1927, p.54-55).

Moreover, fossils of dinosaurs only determine a stratum because they are assumed to have first appeared during the Triassic and to have become extinct at the close of the Mesozoic era. But who said that? Is it possible to go back in time and determine when dinosaurs actually lived? According to the Creationist counter-rhetoric, secular scientists have the habit of making unsupported assumptions that will be engaged to support further studies. Secular new researchers will depart from this *pre-existing index* in order to process his/her own categorization. They will not create anything new; only reiterate what was already said. The index will tell them the "exact age" of that rock that will corroborate important premises that ground evolutionary theory: the earth is 4.5 billion years old and different types of creatures – such as dinosaurs and humans - could not have lived contemporaneously. However, the fact that material artifacts can be arranged in a schema does not mean that this schema is based on reality. If the assumptions that sustain the geologic scale are challenged, if the black box of evolution and uniformitarianism is opened, the entire index will collapse because it will make no sense. Because of its endurance as a scientific fact, for Creationists, the geologic time

index establishes constraints for other, different interpretations, some that would, for example, accept the validity of the Genesis account. Therefore, the geologic time index must be confronted because it is a 'technology of fact' that perpetuates the misunderstanding about the origin of the universe and humankind.

Creationists are also aware of the crucial role that visual and material rhetoric plays in the construction and maintenance of secular evolution. One of the most important rhetorical tools for the construction of the idea of an early ape-like man can be found in natural science museums. Traditionally, science museums belong to the very established rhetorical genre of display. This rhetoric implies that "truth" is behind whatever it visually discloses. In particular, science museums create a rhetorical space that intends to prove, make manifest (showing valued artifacts), and enact a concept of truth. They are places to host science and to tell the audience how the past 'truly' happened, how the whole universe was created, and how humans came to be as they are at present. However, as mentioned before, the idea that science is the objective mirror of nature is deceitful. In science, truth is not immune to the social, political, and cultural context in which it is erected. The material rhetoric of the natural science museum is another instance for adducing proof for a certain kind of truth constructed according to a particular worldview.

Places for exhibition can be considered rhetorical for at least two major reasons. First, the meanings they perform result from carefully selective processes that "constitute partial perspectives with political, social, or cultural implications" (Prelli,

2006, p.11). The selection and organization of all sorts of artifacts for the purpose of display are not neutral. Rather, the product that was created for communication is the outcome of a certain moral framework. In other words – to use Burke’s concept again -- what is “brought forth” is formulated according to the “terministic screen” of a certain cultural and social setting. Second, museums are places of very established conventions for visual representations (charts, storylines, graphs). Usually, these conventions are historically established in order to provide a more popular, simplified version of a more complex and technical discourse. The rhetorician Jeanne Fahnestock (1999), for example, investigates the development and establishment of “figures of speech” (illustrations such as charts, graphics, diagrams, tables) in scientific discourse. According to her, despite the assumption that ladder-type, line-type or tree-diagrams are created to facilitate communication both in science museums and scientific books, these common figures are not rhetorically neutral. They simplify complex relationships in nature by suggestively affirming the way the natural phenomenon happens.

In the early decades of the twentieth century, natural science museums in the United States already had a reputation for their fossil collections and exhibitions. To make all these artifacts meaningful and understandable, museum designers had to develop visual forms that could clearly narrate the intended scientific narrative. For instance, among these established conventions, *cladistics* was considered to be a good way to represent the vertebrate evolution (Dyehouse, 2011). This method of classification, and also exhibition, tends to regard fossils as primary evidence for

determining the evolutionary lineage of distinctive groups. As an approach for reconstructing evolutionary relationships, in cladistics organisms are grouped together based on shared characteristics that would point to their common ancestry. Most commonly, the evolution of a specimen is shown in a classic, linear progression with the early specimens coming first and then being gradually followed by their successors. Once again, Lucy is a very good example. In the National Natural History Museum in Washington, Lucy is exhibited under an established and accepted taxonomy. Her fossil, grouped together with other fossils of her kind, tells us that she is one of the earliest known human ancestors. Lucy is there to tell us a visual and material story in which it is clear that we descend from apes. For Lubenow (2004), no tool has been as successful in promoting evolution and the presumption of simian ancestry as pictures and reconstructed models displayed in natural science museums. "Since no one has ever seen these ancient ancestors, the abilities of the artists who constructed them have been nothing short of miraculous. It gives the term 'science fiction' a new meaning" (Lubenow, 2004, p.38). From the Creationist scientific point of view, these drawings and reconstructions are despicable.

The museum in Washington is a special case. Funded by public money (which outrages Creationists), it features a dedicated exhibition called the "Hall of Humans Origins." The Hall offers to visitors "an immersive, interactive journey through 6 million years of scientific evidence for human origins.... Connect with your distant ancestor at the Hall's life-size, forensically reconstructed faces of early human species and learn

about major milestones in the origin of human beings.”<sup>22</sup> In the exhibition, pictures illustrating how the early humans lived are assembled with replicas of fossils, reconstructed models, and sculptures in order to illustrate how human evolution truly happened (Fig. 3.4).



Figure 3.4: *David H. Koch Hall of Human Origins*, Smithsonian National Museum of Natural History, Washington, D.C., USA.

According to the museum website, the paleo-artist John Gurche was involved in the project of visually and materially revealing the past by using the “latest forensic techniques, fossil discoveries, and 20 years of experience to create the lifelike head constructions of the fossil nicknamed ‘Lucy’.”<sup>23</sup> In a two and a half-year-project, Gurche also created for the museum five other bronze statues of different early human species. Lubenow (2004) resents that Gurche’s work of inventing early humans from “chimpanzees” models has been sponsored by the most respected natural history

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<sup>22</sup> Smithsonian National Museum of Natural History website. “What does it mean to be human?” Available at < <http://humanorigins.si.edu/exhibit> > Retrieved from Internet on April 20, 2015.

<sup>23</sup> Smithsonian National Museum of Natural History website. “What does it mean to be human?” Available at < <http://humanorigins.si.edu/exhibit/early-human-reconstructions> > Retrieved from Internet on April 18, 2015.

museums in the nation. He also complains that Gurche was invited to travel all around the world to discuss his reproductions with the most authoritative anthropologists. The Creationist author confesses that he has only seen a picture of one of Gurche's works, which depicted a *Homo erectus* head. However, for Lubenow, even in a picture this head is controversial. "I have a number of artists' drawings of what *Homo erectus* might have looked like" and almost all of them appear to be humans. As a matter of fact, they should look like one since "*Homo erectus* was truly human and should not be called *Homo erectus* but *Homo sapiens*" Lubenow, 2004, p.40). However, in the picture, Gurche's head appears to be much more apelike than any of the others pictures found by the author. This is because in order to create his models, Gurche used the features present in both *existing* apes and humans. He merged both into a hybrid, an aberration. However, asserts Lubenow (2004), even if it is assumed that the major premise of evolution is true – humans actually descend from a common ancestor of apes – there is no evolutionist in this planet who would dare to affirm that modern humans evolved from modern chimpanzees. However, the evolutionary *status quo* endorses this kind of work that, far from based even on secular facts, is a rhetorical and creative construction about the origin of humans. And what is the danger posed by this rhetorical construction? "Millions of people will see these heads each year and will be impressed as to how much we know about our ancestors" (Lubenow, 2004, p.41).

But constructed models are not the only visual and material rhetorical tool employed by evolutionists to normalize their perspective. Creationists assert that the

invention of evolution has relied on rhetorical (and false) visual argumentations since its very beginning, when Darwin drew his ‘phylogenetic tree,’ better known as the ‘tree of life.’ The tree argumentatively displays how different branches (labeled A-D), both living and extinct, evolved from the same ancestor (Fig. 3.5). According to Campbell (1990), with this simple drawing, Darwin could solve all his “biogeographic, taxonomic, and hereditary problems” at the same time (Campbell, 1990, p.74). Through the perspective of sexual-generation, he could integrate evolution (species development) with the gradual and long geological process proposed by uniformitarianism. “Gradualism was triumphant on both the macro and the micro levels: one double hierarchy explained sexual generation as the biological corollary of uniformitarian geology, and another explained the development of species as a corollary of the development of individuals” (Campbell, 1990, p.74).

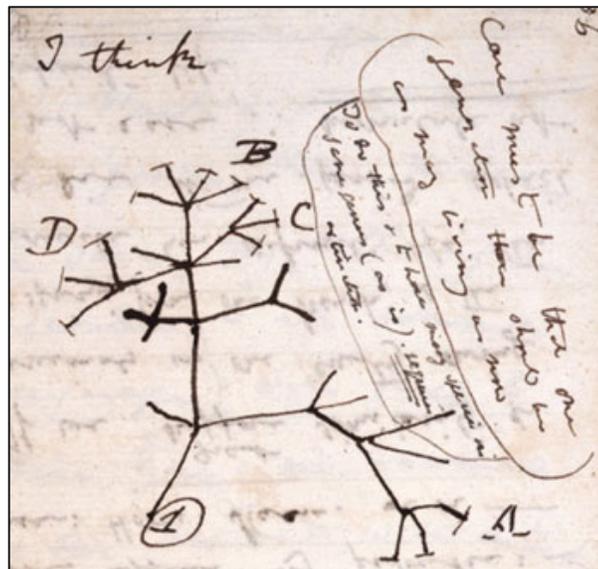


Figure 3.5: Darwin’s first sketch of the ‘tree of life,’ found in one of his notebooks from 1837.

Another relevant example of visual rhetorical tool at the service of evolution is the scientific illustration known as the *March of Progress* (Fig. 3.6). This parade representing 25 million years of human evolution is, beside the life tree, one of the most successful rhetorical tools to promote Darwinism. In this picture, fifteen ancestors line up as if marching towards progress from left to right. Lubenow (2004) argues that this figure of speech is so well conceived that even a child can understand its rhetorical message: in the beginning, there were bipedal and erect apes that over time evolved to be modern humans. *March of Progress* has been widely reproduced and distributed in schoolbooks, charts, and museums all around the world. It even appears on T-shirts, having successfully made the transition to popular culture. It is actually hard to find someone who does not know it. "There were few social studies classrooms and school library bulletin board where this parade was not prominently displayed. Because of its graphic power, it is still indelibly etched into the minds of billions of people worldwide," laments Lubenow (2004, p.39).

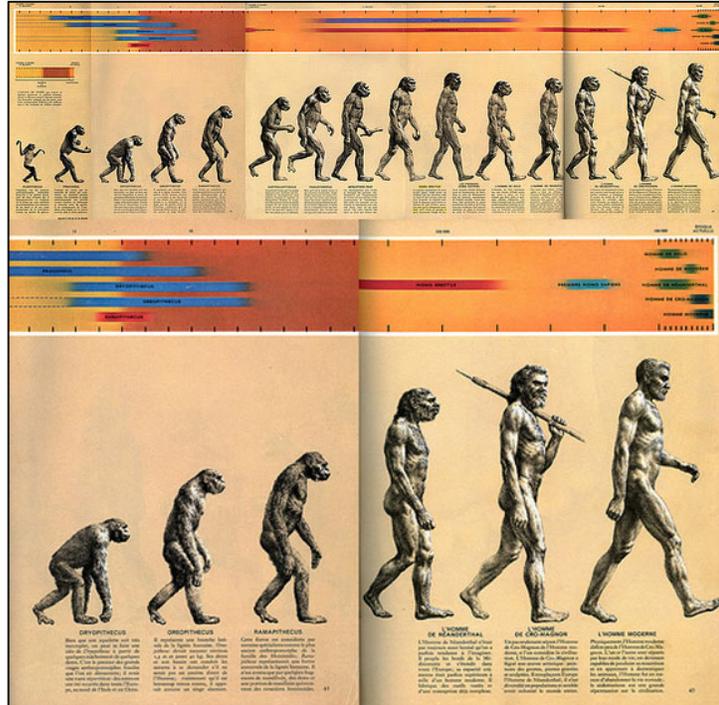


Figure 3.6: The original “March of Progress” illustration from *Early Man* (1965).

This iconic image was first published in *Early Man*, a book authored by anthropologist F. Clark Howell (1925-2007). According to the American paleontologist Stephen Jay Gould (1989), *March of Progress* became the canonical representation of evolution. However, Gould, a secular scientist, points out that this famous march is not accurate. The image suggests that evolution can be described as a steady, linear progress. The march-image transformed a much more complex branching perspective into a simple graduated advance. Even Darwin’s famous tree of life (refuted by Creationists) represents evolution as a much more complex process. The tree develops in a branching diagram, in which common ancestors produce many different descendants across successive

generations. “We then view this twig as the acme of upward achievement, rather than the probable last gasp of a richer ancestry” (Gould, 1989, p.35).

Consider, for example, the way the Museum of Natural History in New York has recently chosen to represent the evolution of horses. Since the early 1990’s, the museum had displayed a classic, linear progression of horse evolution. However, after recent renovations, the museum offers a more contemporary view of evolution with a more complex, branching history (Fig.3.7).



Figure 3.7: Evolution of horses, American Museum of Natural History, New York, USA.

This new representation is an attempt to be more loyal to a current understanding that the progressive journey would be better represented by a meandering pathway composed of different species evolving simultaneously. Regarding human evolution, following the same tendency, scientists have agreed that human evolution cannot be fashioned in a linear, sequential way. They have acknowledged that the *March of*

*Progress* skewed the understanding of evolution by implying - and simplifying - that human evolution happened on a straight road according to a progressive formation.

For Creationists, however, the *March of Progress* is not rhetorically wrong simply because evolution cannot be represented in a linear way. They claim that the chart commits even more serious errors. First, the parade starts with erect-walking apes when evolutionists already recognized that, at the beginning, these animals were not bipedal. Second, and even worse, these fifteen forms were not only standing. "They were walking across the pages from left to right. Some of them have one foot in the air as they walk" (Lubenow, 2004, p.40). This is raw evolutionist propaganda, contends Lubenow (2004). Similar to Darwin's iconic tree of life, this scientific figuration embodies the sum of evolutionary rhetoric about the two species' common ancestry. Finally, this image outrages Creationists because it brazenly depicts the basic assumption that humans descend from apes. As a matter of fact, despite the fact that evolutionists argue for a long process of evolution, the first ape-figure is not positioned far enough from modern humans (Clark, 2001).

Creationists fiercely oppose the use of diagrams and charts in the evolutionary account. They have a point. Like many diagrams in scientific articles, they can be easily misinterpreted by people with no scientific expertise (Fahnestock, 1999; Clark, 2001). Based on Creationist narrative, evolution is nothing more than a set of presuppositions assembled and reinforced by rhetorical visual artifacts. First evolutionists assumed that humans and chimpanzees had evolved from the same ancestor, who originated in

Africa; then they established the major similarities between them in order to prove their assumption. Consequently, Creationists aver, the legitimation of these studies relied on the first (and invalid) assumption, otherwise it would not make any sense. Then, they created a visual and textual apparatus to promote these assumptions to the status of scientific facts.

In the Creationist movement, the word 'evolution' has rhetorically stood for more than a scientific theory. Evolution became a metonymy for many different things. The decay of the American family and society, and the decline of Christian values were considered to be consequences of the theory of evolution. If men and women believed they came from apes, no one would be surprised if they acted like animals. Women would feel free to pursue promiscuity and men licensed to perform sexual violence. Divorce, abortion, alcoholism, drugs, and homosexuality were the products of evolutionary ideas born in a world in which God had been steadily crossed out. Moreover, since evolution suggested that people of different ethnicities belonged to the same line of descent, it brought the dangerous encouragement of racial equality and – even worse - the inevitable mixing of races.

Fundamentalists also perceive evolution as one the biggest menaces that Christianity had ever faced (Liesnech, 2007). According to the fundamentalist point of view, the pillars that sustain Christianity depend directly on the preservation of the biblical narrative. If there was not an Adam, there was not Eve, temptation, apple, or serpent. The Fall would not have ever happened. If there were no Fall, no atonement

was necessary to redeem humans from their state of original sin. Finally, if there was no atonement, Christ, the Savior, need not have existed. Additionally, if there is no Fall, no Flood, no punishment, then the second coming of Jesus is also unnecessary. This argument, defended by Price (1916), considered the vindication of the creation narrative as described in the Book of Genesis as fundamental for the point of the entire Christian project: the salvation of humanity. Accordingly, for fundamentalists, these two concepts – Christianity and evolution – could not be more exclusive of one another. In order to save Christianity, evolution must be destroyed.

Thus, it is a Christian duty to trace (and scientifically prove) human ancestry back to a single couple – Adam and Eve – and “not a group of ape-like creatures” (Jeanson, 2014, p.9). In tandem, the concept of a gradual uniformitarianism should be displaced to prove that the legendary Flood really occurred and that humankind had a second chance to re-start civilization from four couples: Noah and his wife, his three sons, and their wives about only 4,350 years ago. In order to perform their duty of saving fundamentalist Christianity, Creationists must first act as sociologists and rhetoricians of science to reveal the social and rhetorical process of the construction of evolution and uniformitarianism. They have to discredit secular science. They must demonstrate that evolution has never been grounded in scientific fact but in the nefarious philosophical belief of humanism, which placed humans at the center of the universe. Only then, are they able to begin the process of constructing their own science, in which, though using the same data and similar scientific rhetorical strategies,

they produce an assemblage that conveys a totally different message.

### **3.3 Flood Geology: In the beginning was the Word**

“Every man has some sort of philosophy, adequate or inadequate,” stated Price realizing that science is deeply connected with values and worldviews. “The philosophy of the man,” he continued, “who is convinced of the catastrophic interpretation of the geological phenomena will be vastly different from the philosophy of the one who believes in an absolute uniformity of nature; -- yes, very different, -- as different as creation is different from evolution” (Price, 1927, p.339). The philosophy of George McCready Price, the father of Flood Geology, implied that the Bible was a factual book that accurately described all the major geological and biological events that occurred during the period of Creation and afterwards. His philosophy despised the science that had increasingly eliminated the vestiges of supernaturalism from the creation of the universe and humankind. If an infallible God wrote the Bible, there was no way that the Scriptures could possibly be wrong, asserted Price (1927). If, by any chance, some phenomena could not be fully explained by science, belief in God’s miraculous power would fill in the gaps, because “he made the earth by his power, [the one] who established the world by his wisdom and by his understandings stretched out the heavens” (Jeremiah 10:12).

The “new geology” proposed by Price – and endorsed by many other Creationists after him - was committed to deconstructing evolution and constructing upon the

wreckage a “true science of earth history,” one that was based on the framework provided by the Bible. Scripture should be allowed to “speak for itself,” guiding the analysis of geological, biological, and paleontological data that should not be investigated beyond the limits posed by the biblical narrative (Price, 1927; Whitcomb & Morris, 1961). For creation scientists, only the Bible – as a record of divine revelation, an epistemological, and an historical document – could provide “genuine knowledge” about the creation of the universe and humanity (Whitcomb & Morris, 1961, p.331).

For Creationists, the more science progresses and technology develops, the more evidence becomes available to prove the idea of a divine and perfect Creation (with a capital C). One that was sadly followed by the Adamic Fall and the increasing deterioration of human morality, which required God’s supernatural intervention in order to offer another chance to humankind: the Flood. For Morris and Whitcomb (1961), the major obstacle to accepting the evidence of Flood Geology is that the “Modern” does not want to accept that the physical world is material evidence of a divine judgment on humankind’s sin. For the Moderns, who believe that religion and science are mutually exclusive accounts, the assertion that religion and science are intermingled with each other is profoundly offensive to their intellectual and moral pride.

Therefore, drawn from the first eleven chapters of the book of Genesis, Flood Geology (or Creation Science) claims that men were *created* and not *evolved*. There is no chance that a universal evolution could have ever happened. The transmutation of

species is a myth: the cell of man created another man; the cell of a monkey created another monkey. The development of the world was not caused by a steady process of millions and millions of years, but by an enormous cataclysm of universal proportion that deeply affected the entire crust of the earth and its biosphere. Before that, the entire universe was created in literal six days. Following the act of Creation itself, for creation scientists, Noah's Deluge is understood to be the major cause for changes in the environment, during which gravitational, hydraulic, thermodynamic, and magnetic forces acted together. These forces disturbed the air and the waters from the firmament and below the surface, causing a violent (and deadly) transformation in the whole planet. Creationists also maintain that the famous Ark constructed by Noah is not a legend, but a fact, and that during the forty-day-Flood the vessel carried one pair of *all* the animals that lived on the surface of earth, including dinosaurs.

In Creation Science, time is another crucial - and conflicted - feature that differentiates Christian from secular science. While uniformitarians and evolutionists work within a scope of billions of year, Creationist geochronological technology is derived from the Christian calendar (see Chapter 5 on Creationist technologies). Instead of using radiometric-dating technologies, they apply the Ussher chronology, a seventeenth-century method for measuring time formulated by the Protestant Irish archbishop James Ussher. Through a systematic, complex, and theological analysis of the Bible, Ussher identified three different historical periods (early times, early age of kings, and late age of kings) and mathematically computed that the creation of the

world took place in the year 4004 B.C. (Barr, 1984). With this religious technology, the Deluge is computed to have happened around 2350 B.C, or some 4,400 years ago. Flood Geology, therefore, promotes the modern idea that by scrutinizing the biblical account it was possible to reckon the exact time and date of the act of Creation, which, as Ussher concluded, happened not so long ago: the earth is young, around 6,000 years old.

At this moment, it is important to clarify what I have so far called 'Flood Geology' and 'Creation Science.' Creationism, it should be pointed out, is far from a monolithic theory. Diverse theories are associated with the idea of divine creation instead of a progressive and slow evolution. As a matter of fact, as Ronald Numbers (2006) has observed, over the last century Creationism has changed more than its counterpart, evolutionary theory. The word "creationism" has worked as an umbrella for hosting different approaches and debates about how the book of Genesis should be interpreted. Therefore, the scientists who advocate Flood Geology do not fight only against secular scientists, but also debate theological interpretation that might threaten the premises of Flood Geology.

For instance, six-day-Flood geologists disproved both theologically and logically the 'Day-Age-Theory,' in which the days described in Genesis (chapter 1) are thought to represent not a 24-hour-day, but vast ages in the history of earth. For Price, to defend the six-day theory was a matter of preserving the theological fundamentals of his own faith. As an Adventist, he could not admit a biblical interpretation that would put in danger the belief in the literal existence of the seventh day that followed Creation,

because the sanctity of Sabbath is one of the core principles of Adventist faith. Later, Whitcomb and Morris also defended that this idea of days-age was also logically inconceivable due the order in which God created all things. As stated in the Bible, on the third day, when “tremendous amount of geological work [was] accomplished,” God created the flora (Whitcomb & Morris, 1961, p.214). Then, only on the next day, God created the sunlight.

God said: let there be lights in the firmament of heaven to divide the day from the night; and let them be for signs, and for seasons, and for days, and years: and let them be for lights in the firmament of the heaven to give light upon the earth: and it was so. And God made two great lights in the firmament of heaven to give light upon the earth, and to rule over the day and over the night, and to divide the light from the darkness: and God saw that it was good (Genesis 1:14-18).

Consequently, as God created plants before the sunlight, according to six-literal-day Creationists, if an entire age had passed between these two ‘days,’ the absence of light would have killed all vegetation.

Neither rhetorically nor theologically could Flood geologists accept another theory. The “Local Flood Theory” suggests the possibility that the Flood would have happened locally, as a minor and local inundation in part of Mesopotamia.

Theologically, Creationists challenge this idea because it contradicts the biblical statement that the Flood wiped out the entire human population. For Flood geologists, the Bible does not work in metaphors. Also, this theory implies that Noah was a fool. Why to spend more than hundred years constructing an Ark of immense proportions and complexity, if he and his family could just have moved to another region? No, the

Flood was not local, but universal to an extent that could transform the earth's surface, the sedimentary strata, and its biosphere.

Rhetorically, the “universal” nature of the Flood has deeper implications. The Christian deluge cannot be ‘local’ because the power of the Christian God extends around the globe. This all-encompassing scope emerged from Evangelicalism’s history of universal missionary aims and the Millennialist conception of the nation (Britain and later the US) as God’s latter-day Israel. As God’s chosen vehicle of eschatological purpose, the “Christian nations” of Britain and the United States (where, as described in the second chapter, fundamentalist Protestantism originated) each understood their place in the world as unique and divinely ordained. They believed that by testifying to everyone on earth, the Second Coming of Jesus would be hastened. The scope of the ancient flood endorsed the scope of the modern day ambitions of Evangelicalism and British and American nationalism. For British and American Christians of a Fundamentalist bent, the universal Flood is proof that the Christian God has the power to judge and punish any person from any region on this planet, no matter their faith because the world can only have one true religion.

Other theories also exist. ‘Progressive Creationism’ or ‘Pictorial-Day Theory’ argues that creation was revealed pictorially in six days, but not performed in six days (Numbers, 2006). ‘Multi-catastrophism’ or ‘diluvium theory’ suggests the idea of many successive cataclysms that, across a much longer time than 6,000 years, provoked transformations in the environment (Whitcomb & Morris, 1961). In the 1990s, a new

form of Creationism arose: Intelligent Design (ID), which claims to have found evidence of God's work in the universe, in nature, and even in the investigation of human genes. Despite the fact that some proponents of ID denies that this branch of Creationism originates from religious ideas, ID scientists challenge the strictly materialistic view of evolution and suggest that creation could be a process lead by a divine (or a form of) Creator (Numbers, 2006). For Flood geologists, attempts to harmonize the Scriptures and science are reflections of the spirit of our time, marked by free and irresponsible interpretations of the events described in the Bible. Like the theory of evolution, they are all illusions forged by the pride of the human mind. For them, the only true account of Creation is Flood Geology or Creation Science.

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The next three chapters will be dedicated to demonstrating the material and rhetorical processes that construct Creationism as a scientific field. In order to fight secularism, particularly the theory of evolution, Creationism makes use of rhetorical, scientific, and technological strategies that 'bring forth,' make visible and, consequently, prove logically and materially the act of creation described in the pages of the book of Genesis. Erected on modern scientific topoi, the strategies involve the use of geological and paleontological data, laboratories, experiments, empirical observations, inductive methods, and the production of scientific articles and books that convert the collected data into scientific prose with textual and visual arguments such as graphics, figures, and photographs. Despite the fact that Creationists reject theoretical speculation and

defend the idea that they practice a pure, objective science, across these chapters I will demonstrate that in fact this is not true. Constrained by the strict limits imposed by the biblical records, within a different guiding paradigm, Creationists speculate repeatedly in order to fit the recalcitrance of nature into the biblical narrative. However, they do so with a paramount difference: while in secular science recurrent unexpected results (anomalies) can generate new hypothesis or even cause a paradigmatic revolution (Kuhn, 2012), in Creation Science, the biblical records are the irrefutable “fact” that must command all the results and submit the action of recalcitrants to its logic, which, for many detractors, is the ultimate proof that Creationism is not science at all.

In chapter 4, by using Actor-Network Theory combined with the concepts of “recalcitrants” and “terministic screen” developed by Kenneth Burke (1954), I compare and critically analyze the networks of Creationism and evolution. I examine how Creationism mobilizes the brutal facts of nature as agents (actants) in order to turn the Book of Genesis into an account of scientific truth. Chapters 5 and 6 investigate the technological strategies employed by Creationists to make factual what is contained in the book of Genesis. Chapter 5 scrutinizes the role that “technologies of precision” (geochronology technologies and technology of visualization) play in the technological and rhetorical construction of Creation Science. Finally, chapter 6 examines “technologies of imagination:” museum settings that display what happened in a distant past. Science museums work as privileged places to speak on behalf of the facts of Nature, closing any further controversy about how things were believed to have

happened. In the Creationist cause, natural history museums serve as technologies that seal up the black boxes of Creationism by displaying a definitive picture of what Creationists understand as biblical reality.

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### The Question of Agency in evolution and Creationism: What Recalcitrants Have to Say

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In the Creation Museum, there is a full-size replica of a digging site (fig. 4.1). Two archeologists, one secular with Asian features and the other a white Christian male, are excavating the same fossil: the skeleton of a big dinosaur. Regardless of the fact that they are working on the same material evidence, the two scientists will reach diametrically opposed conclusions. On the one hand, supported by radiometric dating, the secular archeologist will conclude that dinosaurs belong to a diverse group of animals that first appeared during the Triassic period, around 230 million years ago. By employing the evolutionary framework, he will find that dinosaurs became the dominant animals on earth until they almost completely disappeared at the end of the Cretaceous period, long before the human species began to evolve.<sup>24</sup> On the other hand, the Christian archeologist, supported by the Scriptures, will affirm that dinosaurs were not very old, coexisted with *all species* that God created, including human beings, who were there since the beginning to testify to their existence.

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<sup>24</sup> According to a recent theory, dinosaurs are not absolutely extinct, as commonly stated. The paleontologists Lowell W. Dingus and Timothy B. Rowe (1997) actually make a case for the continuity and evolution of dinosaurs by defending that birds evolved from dinosaurs.



Figure 4.1: “Digging site” at the Creation Museum in Kentucky.

The two rhetorical purposes of this setting are: 1) to illustrate the importance that recalcitrants –the brutal facts of nature – play in the construction of scientific narratives and 2) to teach the audience that, despite their working with the same data, it is not ludicrous to admit that archeologists can get very different results. This site makes its point. When questioned, recalcitrants do not tell the same story. They are “flexible,” as stated by sociologists of science K. Amman and K. Knorr-Cetina (1981).<sup>25</sup> How recalcitrants respond to queries will depend on a set of variables and resources, such as different starting points, employed technologies, selected technical procedures, and most important, different worldviews. In science, things are only capable of representing something when they are socially and rhetorically organized by

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<sup>25</sup> Knorr-Cetina does not use the term *recalcitrants*. Instead, she names what is obtained and used in laboratories to test a theory, *sense data*. I understand these two concepts to be, in great extend, interchangeable.

procedures conducted by a community that shares the same principles (Amman & Knorr-Cetina, 1981; Burke, 1954; Gross, 2006). “Dinosaurs don’t come with a tag with them telling us how old they are, where they lived, and how they died,” explains a banner displayed in the Creation Museum’s simulacrum of a digging site. “We have to figure that out from a few clues we find,” and from these few hints, construct an entire narrative.

According to Lawrence Prelli (1989), in order to understand the rhetorical force that recalcitrants have in the construction of science, it is necessary, first, to recognize the importance of the human capacity to create and believe in symbolic forms. Referring to “symbolic forms” in a broader sense (which includes the use of various forms of language), Prelli reminds us that we cannot even think without symbolic forms. Remove the symbolic constructions from history, religion, law, philosophy, arts, and science, and what would be left in our cultural tradition, asks Prelli.

Strip away the symbols that mediate what one remembers about the past, what we have learned through personal relationships, through books, magazines, newspapers, and through various electronic media, and what is left as a remainder of what we commonly refer to as the self? The central point is that because the human being is a symbol-using animal, it names its experiences, and through this symbolic act it creates, to a great extent, what it takes to be its world (Prelli, 2006, p.15).

However, Prelli goes on to argue that despite their symbol-making intrinsic feature, humans cannot escape from the power of the material world and its boundaries. We have to insert into the scientific account the agency of “non-human masses” with its “push backs,” as stated by Latour (Latour, 1992a, p.225). Beginning with the limits of

human biology, the recalcitrance of the world poses limits to our experience. Humans cannot go back in time to watch how the universe was created. Neither they can live forever to witness the future and tell what is going to happen to humankind. But it is when humans use their capacity to symbolize, mediate, create, and name things that they enable recalcitrants to transcend their own silent materiality.

It is not only in the scientific realm that humans believe that artifacts can ‘talk.’ Both in science and religion, scientists and clairvoyants will defend the agency of objects to reveal facts about the past and future of the universe, this planet, and humankind. Bones, shells, animals, and all kind of objects are used in religious practices to see the future, to know the past, and to uncover the hidden and invisible causes of illness (Turner, 1975). In this sense, science is not very different from religion; facts are not different from fetishes (Latour, 2010). In the nineteenth century, when Louis Pasteur became famous for defeating the mysterious forces that caused the lethal diseases that beset sheep and cows, the scientist was described by a friend as a “man who was not afraid to deliver oracles” (Latour, 1988). As a matter of fact, in *Scientists as Prophets: A Rhetorical Genealogy*, Linda Walsh (2013) argues that the prophetic ethos that pervaded the ancient world was adapted and adopted by natural philosophers and, later, by secular scientists. As in traditional forms of religious divination, which inspect the behavior of things to get answers about the past, present, and future, in science the brutal facts of nature became major elements to provide insights about a situation that otherwise would remain occult to our naked eyes. For instance, by revealing the

material existence of 'invisible' anthrax, Pasteur was able to warn and prevent possible eruption of epidemics and suggest how to avoid this terrible plague. Science can appear similar to the prophetic style found in the book of Revelation. Through the analysis of natural signs, scientists today foresee that the rise of temperature in the planet will raise the oceans, shrink the food supply, lead to the extinction of species, and increase the number of plagues and violent cataclysms that may have the power to wipe out humankind. Like mystics and shamans, archeologists, paleontologists, and geologists develop techniques to unveil the past based on the analysis of artifacts. In so doing, they "animate" the recalcitrants of the natural world. As suggested by Latour (2010), by attributing animistic (or fetishist) characteristics to nature, scientists take the ability of natural artifacts to reveal the past even more seriously than their religious predecessors (Hornborg, 2006).

But the similarities between religion and science do not end there. Practices defined as either scientific or religious are perceived as efficacious techniques in achieving the ends envisioned by practitioners. Regarding divination, Omar Khayyam Moore (1957) describes the technical and ritualistic procedures employed by the Montagnais-Naskapi, a tribe that lives in the north of eastern India. They consider the shoulder blade of the caribou to be particularly "truthful." Before being used for divination, the bone must be boiled and wiped clean. "It is hung up to dry, and finally a small piece of wood is split and attached to the bone to form a handle. In the divinatory ritual the shoulder blade, thus prepared, is held over hot coals for a short time. The heat

causes cracks and spots, and this way they find answers to important questions” (Moore, 1957, p.70). Victor Turner differentiates divination from revelation precisely by defining the first as an organized “mode of analysis and a taxonomic system” (Turner, 1975, p.15). Therefore, methodological and laboratorial scientific procedures are not dissimilar to the highly structured practice of religious rituals. As a matter of fact, Moore erases the distinction by suggesting that some divinatory practices classified as magic may work well as techniques for attaining desired ends. In other words, divination has scientific values.

Moreover, both of them rely on the power of technologies (in a broader sense) to obtain accurate results. In divinatory practices, texts (bibliomancy), shells, beans, and bones, among many other things, are believed to reveal the future, tell about the past, and mediate contact with a supernatural agency. In laboratories, more and more sophisticated machines are supposed to extract, isolate, and bring forth the essence of phenomena, telling us, among other things, to which time they belong. Additionally, there is a rhetorical analogy between the scientific investigations of bones and fossils to the religious practice of divination. By the analysis of fossils, science is supposed to respond to the deeply existential (and religious) question about where we come from and how things came to be the way they are.

In science, a single fragment of bone can unfold many questions. When did that animal live? Why did it die? What was the world in which it flourished? How did it walk? What kind of creature stepped on that once soft earth? What did it eat? How did it

behave? What was its size and biological structure? And the most existential question: how far back can we go back in time based on the analysis of a single fragment of fossil? By analyzing pieces of rocks, bones, and dust, what big science really wants to answer is the ultimate question that corresponds to many religious anxieties: how humankind and the whole universe actually began and where we are going.

However, things do not have an immanent value that resides within them. As Price reminds his readers, “in all scientific inquiry we generally find what we are looking for; in other words, nature will answer us only when we put to her leading questions, or when we shape our questions so they can be answered by yes or no” (Price, 1927, p.105). Working as a network of actants framed by different terministic screens, nature does not reply with a single answer to general questions. As ‘fetishes,’ actants are indeed “talk-makers,” but when they ‘talk,’ they do not ‘talk’ only one thing. The role they play, the things they communicate are the result of an assemblage of communal frameworks, contexts, and materials that produce symbolic meanings while in interaction (Latour, 1985; Foss, 2004; Gallagher et al, 2012; Morgan, 2014b). Therefore, what recalcitrants reveal is not factually fixed, but fluid. Facts are not absolute and indisputable, but *factishes*, hand-made assertions of truth, as described by Latour (2010), in which their process of construction is rhetorically concealed to become a synonym of truth. As Morgan suggested regarding religious imagery, in science, recalcitrants work as masks, offering access to what looks like a fact, but instead hides the assemblage of actants employed in the construction (Morgan, 2014b).

Anticipating a post-modern sensibility that framed the work of Ludwig Fleck (1979), Thomas Kuhn (1962), and Bruno Latour (1985), Price (1927) challenged the principles of science by affirming that evolutionary and uniformitarian theories require that we read nature in a single way, in which time matters, things have agency, and chance plays a decisive role.

In this chapter, I explore precisely how Creationists mobilize the brutal facts of nature as witnesses engaged to testify to the factuality of the Book of Genesis. I show how this is done by comparing two different networks, in which recalcitrants are made to 'talk' differently according to two different worldviews. One network is oriented by the secular principles of modern geology and evolution, while the other is framed by the Christian principles of Creation Science. In the former, the interpretation of natural artifacts is constrained by the facts established by the current and hegemonic scientific paradigm. In the latter, recalcitrants are only allowed to communicate what is prescribed by the boundaries defined by conservative interpretation of the Scriptures.

My analysis draws on Actor-Network Theory combined with the concepts of 'recalcitrance' and 'terministic screen' (worldviews) developed by Kenneth Burke (1954). By comparing the Creationist and secular accounts, I suggest that what actually changes fundamentally between the two narratives concerns the agency attributed to recalcitrants. On the one hand, Creationism, inspired by Scottish Realism, conceives that all matter is dead and inert, which subjugates the role of recalcitrants to divine intervention. Natural artifacts do not have agency, but function as witnesses of God's

work. On the other hand, according to Creationists, by attributing evolutionary skills – self-determination - to the brute facts of nature, uniformitarians and evolutionists are irrefutably denying the power of the Christian God over nature, the globe, and the universe. Evolution is nothing more than a modern and secular version of primitive and superstitious animism that attributes to things an inner agency that makes them evolve without divine intervention.

#### **4.1 The actants at work in the evolutionary account**

‘Agency’ is an important word for Creationists when trying to explain - and debunk - the premises of evolutionary and uniformitarian accounts. Back in 1927, the Creationist George McCready Price stated that according to the secular perspective, in our “modern world, we have six sets of *agents* which are now *at work*, or have been *at work*.” The agents, to which Price was referring, were the brutal facts of nature - rivers, major breaks or faults, the strand lines of continents, mountains and the evenness of their skylines, and fossils - used as “time-checks,” clocks to reveal the age of the world in the secular account (Price, 1927, p.147-8 – italics added). John W. Whitcomb and Henry Morris also drew attention to the notion of agency when they wrote that evolution and uniformitarianism relied on “the major geological agencies – erosion, deposition, volcanism, glaciation, diastrophism, etc” – to explain the rock formation on the crust of the earth (Whitcomb & Harris, 1961, p.169).

In one of the word's many definitions, the Merriam-Webster dictionary defines "agency" as an "the capacity, condition, or state of acting or exerting power."<sup>26</sup> In sociology, *agency* is the capacity of agents to act – intentionally or unintentionally - in any situation or setting. In Price's sentence, the word "agents" is used to suggest that, in evolution and modern geology, the brutal facts of nature are endowed with agency. They are thought to have power to act of or exert some form of influence upon the environment. In turn, "at work" implies that something or someone is not stationary, but in a flow of action, operating, causing effect, and engaged in a work process. The same idea of "at work" is also found in Whitcomb and Harris' sentence. For instance, volcanism is the phenomena associated with the sporadic but *recurrent* action of discharging liquefied rock on the surface of the earth.<sup>27</sup> Erosion is the *gradual* and *continuous* process in which earth is worn away, often by the action of other agents: water, wind, or ice.<sup>28</sup> Sedimentation or deposition refers to the *progressive* process of the settling of solid particles from fluids.<sup>29</sup> In the uniformitarian account, natural phenomena *are* constantly happening.

Interestingly, Price's "agents at work" and the notion of "agencies" proposed by Whitcomb and Morris convey what Latour and Madeleine Akrich (1992) defined as

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<sup>26</sup> Merriam-Webster dictionary. Agency. Available at < <http://www.merriam-webster.com/dictionary/agency> >. Retrieved from Internet on July 20, 2015.

<sup>27</sup> Encyclopedia Britannica website. Volcanism. Available at < <http://www.britannica.com/EBchecked/topic/632078/volcanism> >. Retrieved from Internet on May 29, 2015.

<sup>28</sup> National Geographic website. Erosion. Available at < [http://education.nationalgeographic.com/education/encyclopedia/erosion/?ar\\_a=1](http://education.nationalgeographic.com/education/encyclopedia/erosion/?ar_a=1) >. Retrieved from Internet on May 29, 2015.

<sup>29</sup> Encyclopedia Britannica website. Sedimentation. Available at < <http://www.britannica.com/EBchecked/topic/532291/sedimentation> >. Retrieved from Internet on May 29, 2015.

“actant.” In the glossary of ANT, an actant is “whatever acts or shifts actions, action itself being defined by a list of performances through trials; from these performances are deduced a set of competences with which the actant is endowed” (Akrich & Latour, 1992, p.259). Taking seriously the agency of non-humans, ANT comprehends actants not only as humans, but also animals, machines, artifacts, and the brutal facts of nature. Moreover, according to the ANT account, actants are considered undetermined unless “at work” in a network of associations and connections that will define the role they contingently play.

By stating that in our modern world, six *agents* are *at work*, Price was referring to the way in which secular scientists have engaged recalcitrants to prove that the world and humankind were both the result of a long, progressive, and random evolutionary process instead of the product of God’s sudden creation. Throughout his book, he underlines three major errors committed by evolution and uniformitarianism theories: the idea that things have agency, the notion of time, and the role of chance plays in the universe and human existence. First, in evolution, recalcitrants are endowed with a kind of free will that enables them to evolve by themselves. Second, in evolutionary and uniformitarian accounts, time (or ‘times,’ as prescribed by Albert Einstein’s theory of relativity) is understood as a primary structure of the universe.<sup>30</sup> For big science, time matters. It is a key actant in the secular network. It is the notion of an immeasurable time that frames a narrative that goes back billions of years. The

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<sup>30</sup> For Albert Einstein, there was not a single and constant flow of time. In contrast to the Newtonian perspective of time, Einstein defended that time flew in different rates. The notion of “times” replaced the traditional “time.” See Peter Galison in *Einstein’s Clocks, Poincaré’s Maps: Empire of Time* (2003).

expression “at work” implies that humans and nonhumans have lived amidst a web of continuous events and connections that affected how living forms currently are and shaped the milieu in which they live. In order to exercise their ability to evolve, “things” need an extensive time span. For instance, since the Big Bang, the prevailing cosmological model for the beginning of the universe, that is estimated to have occurred between 12 and 14 billion years ago, the universe is still evolving. For instance, as suggested by a study led by Susan Kassin, an astronomer at NASA’s Goddard Space Flight Center, galaxies are not yet finished. “Over this period of time, galaxies spin faster, their amount of disorder motions that they harbor had decreased, and their total energy increased.”<sup>31</sup> Derived from the study of meteorites, the solar system is thought to have started its growth around 5 billion years ago and, inside it, the Earth has evolved since its formation, around 4.6 billion years ago. On this planet that spins around its own axis while orbiting the sun, humans have been evolved at least more than thirty times the six thousand of years prescribed by Creationism.<sup>32</sup>

Moreover, both in evolutionary and uniformitarian accounts, the present time is the key to understanding the past. In the essay *A New Refutation of Time* (2007 [1962]), Jorge Luis Borges wonders if time is really real or if a mere fairy tale invented by philosophers and scientists. At first, it seems that the author’s enterprise is to deconstruct the notion that time actually exists or can be grasped and measured. Even

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<sup>31</sup> NASA Goddard (2013). *Astronomers Uncover a Surprising Trend in Galaxy Evolution*. Available at < <https://www.youtube.com/watch?v=voq3Wfr5cho> >. Retrieved from Internet on July 20, 2015.

<sup>32</sup> NASA – National Aeronautics and Space Administration. “Universe 101: Our Universe.” Retrieved from Internet from < [http://map.gsfc.nasa.gov/universe/uni\\_age.html](http://map.gsfc.nasa.gov/universe/uni_age.html) >. Accessed on May 26, 2015.

chronologies, ages, and geological periods are social constructions, mere fictions.

However, in the last part of his essay, in a radical plot twist, Borges abandons the idea that time is a human invention. He poetically concludes that it is through material forms - flesh, water, and flames – that we can physically apprehend the passage of time in our very being: “Time is the substance I am made of. Time is a river which sweeps me along, but I am the river; it is a tiger which destroys me, but I am the tiger; it is a fire which consumes me, but I am the fire. The world, unfortunately, is real, and I, unfortunately, am Borges” (Borges, 1964, p. 234). Time is evident in the materiality of the world. It is realized through the material integration and disintegration of our daily lives and the ordinary existence of all things, including ourselves. It is precisely by the investigation of this integration and disintegration of geological processes that geologists and paleontologists infer about what happened millions or even billions of years ago. In the scientific world, fossils, rivers, mountains, canyons, and continents become media for revealing what happened in a distant past.

The nature of time and its relationship with the matter of the universe is also the main issue posed by the atheistic cosmologist Stephen Hawking in his *A Brief History of Time* (1998 [1996]). Throughout his book, Hawking asks what do we actually know about time. “What is the nature of time? Will it ever come to an end? Can we go back in time?” How and when was the universe formed? “Where did the universe come from and where is it going? Did the universe have a beginning, and if so, what happened before then?” For Hawking, the most recent findings in science and “fantastic new

technologies” can actually offer some reasonable answers to these questions (Hawking, 1998, p.1). Indeed, the author believes, it *is* possible to go back in time. From Aristotle, Ptolemy, Copernicus, Galileo, Newton, to Albert Einstein and Hawking himself, defining time goes together with understanding the materiality and the motions of the universe. The more technologies for visualization are developed, such as the telescope, the more it is possible to picture the action of invisible matter and along with it, the more time is believed to be measured in otherwise unimaginable past times. Together with the nature of time, one of the major ambitions that has propelled scientific enterprise is to know what happened in a time when no known form of intelligence was present to witness the creation of the planet and the universe.

Later, in the next chapter, I will come back to the role that geochronological technologies play in both secular and Christian sciences. For now, what is important is acknowledging that, according to secular science, through the analysis of the materiality of the world and the universe, we can go far back to immemorial times. Relying on the work achieved in a vast amount of time, secular science tells us that the universe expanded, more than one hundred million galaxies were progressively made of uncountable stars, planets, gas, dust, and dark matter. One of them, named ‘our solar system,’ comprises the sun and objects that orbit it. And among these objects is a planet designated ‘Earth’ that was formed 4.5 billion of years ago. There, life forms began to arise 3.5 billion of years ago. Its biodiversity continually expanded except for some events of mass extinctions that changed the biosphere. But these ‘catastrophes’ allowed

other species to evolve in a different environment with different actants and, therefore, different forms of competition (Sahney et al., 2010). And finally, but no less importantly, in this secular and hegemonic account, one of these new species, homo sapiens, evolved on the African continent from a branch of great apes. This new species was characterized by erect posture, bipedal locomotion, manual dexterity, and an increased capacity to develop tools that boosted their ability to survive. Based on biological and paleontological data, secular science proposes that tool-making began to produce significant social benefits around 50,000 years ago when homo sapiens started to migrate to other parts of the globe, eventually populating and dominating the entire world.

By now, it is clear that secular science denies the existence of a pre-inscribed or divine plan to explain the origin of the universe and humankind. In contrast, the mechanism of evolution happens as a long-term process in which random variations take place. The morphology and ecological array of organisms is not the product of a deterministic pattern, but the result of a long process, in which chance has played a big role. The world is the result of a slow, random, and constant action of natural agents and time that has produced mountains, carved meandering riverbeds and canyons, heaped and moved continents, propelled biodiversity, and fueled human development. It was the action of time allied with the brutal facts of nature that allowed the constitution of the universe, the planet Earth, and human beings to evolve. According to this worldview, time does not only matter. As suggested by Borges, time *is* matter.

So, how do we know that happened in immemorial times? How can we affirm that the universe is a dynamic and living entity, constantly moving, transforming, and expanding by the actions of its own laws? How can we distinguish its age and the age of the Earth and humankind? How can we determine the moment of the beginning of all things, including ourselves? How can we actually believe that once upon a time modern humans were apelike and lived in trees? We can only know these answers because scientists transformed the brutal facts of nature into material evidence. They believed and persuaded us to believe that recalcitrants could actually tell their own stories, if submitted to the appropriate technical procedure and technological mediation. The universe and our prehistory would be mute, they say, if scientists did not have the proper knowledge and instruments to decipher the brutal facts of nature. With the advent of modern science, probably more than in any other moment of the history of religion, the secular prophets began to read the brutal facts of nature and make them talk (Hornborg, 2006; Marshack, 2010).

For instance, let's take the example of light. Regarding the electric light, media theorist Marshall McLuhan materialized the ephemeral phenomenon by transforming it into a medium. He argued that in spite of being ignored as such, since it does not have "content," electric light bulbs and lighting systems were indeed powerful media that shaped "the scale and form of human association" (McLuhan, 1964, p.24). The light, McLuhan asserted, enabled people to reorganize their lives around brightened spaces that otherwise would be immersed in darkness. Modern capitalism, factories, and even

new forms of domestic leisure owed their characteristic features to this technological advance from the nineteenth century. However, McLuhan was neither alone nor the first one to advance the idea of light as matter.

Long before him, scientists had materialized the fleeting nature of light, turning it into a recalcitrant. This operation was not simple and was definitely not the achievement of a single scientist. Many had to take place first in order to treat light as material evidence. First, scientists defined visible light by its wavelength. Since some light is visible to the human eye, researchers calculated that the human eye is capable of perceiving wavelengths from 400-700 nm (Pal & Pal, 2001, p.26).<sup>33</sup> Magnified by technologies for enhancing vision, light could be seen that was invisible to the naked eye. Because of the physical properties, light was said to travel in wave-like form. But unlike sound waves or water waves, scientists concluded that light did not need any matter to carry its energy. This made possible the assertion that light could travel in a vacuum, a completely airless environment.<sup>34</sup> Then, when scientists technologically visualized indistinct spots in the cosmos, which were invisible to the naked eye, they turned them into a 'thing' that could be controlled, measured, and investigated in laboratories. With the mediation of microwave telescopes, they examined these spots. By calculating the projection of light's wavelengths in outer space, they concluded that

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<sup>33</sup> *International Electrotechnical Commission* website. Available at < <http://www.cie.co.at/publ/abst/17-4-89.html> >. Retrieved from Internet on September 14, 2015.

<sup>34</sup> *Fact Monster* website. "Light." Available at < <http://www.factmonster.com/dk/encyclopedia/light.html> >. Retrieved from Internet on September 30, 2015.

some of luminous transmissions travelled so far that they were as old as the beginning of the universe.

As we can see, in order to achieve their conclusion, scientists needed to enumerate a series of premises, calculations, and technological mediations. In order to measure time, the next step was to determine the speed of light. Next, the speed of light was established to be a constant of 300,000,000 meters per second, no matter if in a vacuum or, theoretically, in a medium such water or gas. By treating it as a constant, light could be understood as a recalcitrant – a natural phenomenon that had a constant behavior, materiality, and was therefore susceptible to prediction and measurement. Based on these established scientific facts, scientists announced that objects were at such a colossal distance from earth, millions of light-years away, that their transmission of light took a long time to reach us. But since the speed of light could be measured (light is the fastest thing we know), it could be used to calculate these enormous distances. Researchers established the parameter that in one year light travels about 6 trillion miles. To have an idea how far this is, light from the moon requires only one and one-half seconds to reach earth. Based on the facts they determined, scientists taught us that many of the distant objects that appear in the night sky were actually no longer there. What I want to demonstrate with such a long explanation is that the construction of light as a recalcitrant is grounded on a deep stack of scientific facts, inferences, and measurements that, as in a feedback loop, reinforce the network of secular science. Every time light is measured and used to support the idea that the universe is billions of

years old, secular scientists are reinforcing their perception of this reality and at the same time asserting the accuracy of their scientific enterprises. Thus, according to this elaborated account of modern science, to look to outer space and measure its light turns out to be the supernatural ability to peer back into time.

In the evolutionary and uniformitarian account, recalcitrants basically tell the same story: 1) the universe, the planet Earth, and humankind are old - the latter is old only when compared to the Creationist account but very new in view of the scientifically estimated age of the universe; 2) they were not created, but progressively and slowly evolved; 3) their primordial appearance was not the same as their contemporary appearance: the universe has changed, the planet has changed, and, at the dawn of the species, humans were more akin to apes; 4) across many different ages, living forms arose and disappeared, providing room for other species to evolve in a different environment; and finally 5) the planet and humans are less than a grain of sand in the universe; their existence is not in the hands of a benevolent God, but is part of a bigger network in which nothing can be taken for granted.

## **4.2 The actants at work in the Creationist account**

In 1981, *McLean vs Arkansas* began when concerned parents, liberal religious groups, and biology teachers filed a legal suit contesting Act 590, which mandated the “balanced treatment” of Creationism and Darwinism in Arkansas public schools. For the plaintiffs, the Act violated the First Amendment of the United States Constitution. Judge

William Overton handed down the final decision in favor of the plaintiffs, finding that Creation Science indeed conflicted with the First Amendment because it “was simply not science,” but a religious belief. His conclusion was based on the four features that Robert K. Merton (1973 [1942]) described as the normative structure of science: communism (the assumption that scientific knowledge belongs to everyone), universalism (the independence of scientific truth from the cultural context in which it was created), disinterestedness (the freedom of scientific knowledge from personal bias), and skepticism (the submission of scientific claims to rigorous testing). For Overton, Creationism did not exhibit any of these features. First, it was not based on communal knowledge, since only Fundamentalist Christians accepted its premise. Accordingly, Creationism did not participate in the *sensus communis* that characterized the scientific community. For instance, no recognized scientific journals had ever published any article endorsing the claims of Creation Science. Therefore, Creationism was not part of the communal nature of scientific inquiry. Furthermore, Creation Science did not meet the “universalism” requirement. The theory did not have any universally accepted concept. Indeed, it denied universally accepted knowledge, such as the premise that the Earth is more than 4.5 billion years old or that humans share ancestry with apes. Finally, Creationism did not display the features of “disinterestedness” or “skepticism.” It was entirely supported by personal beliefs in the inerrancy of Genesis. And none of its assertions was ever subjected to revision or serious scientific testing.

However, we have seen that, scholars in the field of rhetoric and sociology of science have challenged Merton's normative principles of science. As a matter of fact, regarding this debated demarcation of science from non-science, Thomas S. Gieryn reminds us that Merton's four norms of scientific behavior are merely vocabularies for ideological descriptions of science (Gieryn, 1983). Rhetoricians and sociologists of science have also agreed that scientific theories are not universal, but contingent. They are not shared by everyone or independent from the cultural context in which they were created. Actually, as mentioned before, both Kenneth Burke (1954) and Ludwik Fleck (1979) argued that science is an activity that only fits a certain claim, a certain community of thought, a worldview compatible with values and a period of time. Consequently, the freedom of scientific knowledge cannot be considered free from personal bias. And, according to Burke, no matter the rhetorical efforts to legitimate scientific facts, scientific theories do not explain "reality," but are devoted to fit nature and reality into a theory. As James Kelso (1980) pointed out, "contrary to popular belief, science reflects not the meaning of the universe, but man's efforts to make this universe meaningful" (Kelso, 1980, p.18).

In this section, I argue that if Creationism challenges the orthodox boundaries of secular science, it is not because it fails to follow the four features that Merton described as the normative structure of science. Rather, it is because of its concepts of agency and materiality. If we move from the secular framework to a fundamentalist Christian worldview and ask rocks, rivers, mountains, canyons, and fossils what they

have to tell us about the origin of the universe and humankind, what kind of answers would we get? First, according to the Creationist account, recalcitrants would tell us that they do not have agency to evolve by themselves, as a cell for example; they cannot directly act or cause any change in the environment by themselves, as erosion, sedimentation, or volcanic eruptions would. They are not the kind of agents as suggested by secular science able to cause transformations or animistic entities that can evolve by its own internal laws. Nevertheless, this does not mean that in Creation Science the concept of 'agency' is absent or that recalcitrants are less important. They are present and relevant, but in a different way.

First of all, Creationists assert that, in nature, there is only one true and powerful agent in the creation of the universe and humankind: the Christian God who plays the major role in universal and terrestrial events. However, Creation Science also advocates the Flood as the major actant in environmental changes, after God himself created the whole universe. In the Creationist account, the agency of water explains the processes of sedimentation and erosion and, consequently, the formation of mountains and continents, canyons, rivers and oceans, and also the existence of fossils. During the mythic deluge, "great quantities of water were poured down on the earth from the skies, not in the form of a gentle drizzle, but as a torrential downpour continuing without ceasing for forty days and nights, all over the world" (Whitcomb & Morris, 1961, p.120). The global cataclysm was of unprecedented violence. Immediately, the impact of the water began to work on the soil and caused erosion. As the water ran, it

began to form rivulets. It also caused raindrop impact, sheet erosion, and transported immense amounts of earth and rocks. These waters that poured over the earth formed the oceans that we have today (Whitcomb & Morris, 1961, p.121). The massive movement of water shaped the geological formations that exist today. However, according to the Creationist interpretation, if the waters of the Flood acted as the major agent for geological transformation since the act of Creation, they did not act independently. They were the instruments of divine will and punishment for men's disobedience to God's laws (Fig. 4.2).

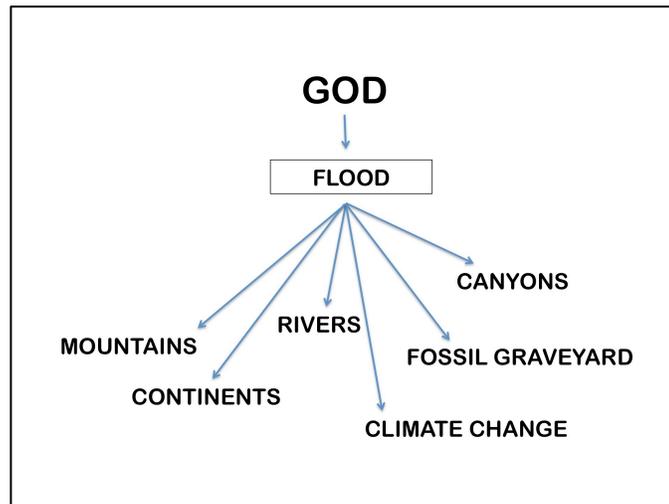


Figure 4.2. Network representation of Creationism.

However, it is important to highlight that if, for Creationists, the waters did all the geological work, it was God who fiercely released the waters from both the firmament and the ground. As soon as they were released, they acted according the laws of hydraulics, achieving the work pre-established by God's plans. Here, it is important to remember that based on the principles defended by the founders of modern science (chapter 2) and endorsed by Creationists, to investigate the Book of Nature, the laws of

physics, is the equivalent of verifying the factuality of the Bible. Supported by the creed of the Baconian principles of objective science, Creationists do not deny science as a whole. The only acceptable and true science is the one that investigates, carefully describes, and, by the inductive method, establishes the laws of physics, as once was done by Calvinists Francis Bacon, Robert Boyle and Isaac Newton. Natural phenomena such as gravity, hydraulics, and inertia are the inherent mechanics of the world designed by God. By designing His own creation to be “good” (as described in the Book of Genesis), God knew exactly how the waters would act when unleashed from above and from beneath the ground. “Is believing in evolution the same thing as believing in gravity,” asks John D. Morris in an article posted on the Institute for Creation Research website (2004). No, he answers, because science should always rely on human observation.

The study of gravity involves science, for the effects of gravity can be observed today. In fact, each and every time someone observes anything, gravity operates. Gravity is more than a theory, it is a law, and has never been known to fail. It seems nonsensical to ask, "Do you believe in gravity?" because we know for a certainty that gravity works (Morris, 2004).

In Creation Science, it is a mistake “to assume that the concept of a universal Flood involves an endless supplying of miracles” (Whitcomb & Morris, 1962, p.77). The planet works by natural laws and understanding and describing such laws, their actions and effects is to understand God’s work and, most important, intentions.<sup>35</sup> In Creationism,

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<sup>35</sup> John Whitcomb and Henry Morris (1962, p.77-78) give two other biblical examples to illustrate the agency of God’s hands in the action of water: the biblical crossing of the Red Sea and the walls of Jericho. According to

chance does not exist. Everything is tightly linked by a divine plot. What happens to humans, to this planet, and to the universe can only be explained in the scope of God's activities. In spite of the fact that both secular and Creation sciences are concerned with the same kind of primordial question (the origin of all things), mainstream science organizes its network based on the forces of nature while Creationists lengthen their network to show that all causes derive from one special force – God. As a result, in the Creationist network the brutal facts of nature do not independently act but are instruments and witnesses of God's benevolence and wrath against humankind. And since fundamentalist Christians believe that the Bible is the infallible Word of God, "verbally inspired in the original autographs," they find in the Book of Genesis the framework that will determine what recalcitrants are allowed to say (Whitcomb & Morris, 1961, p.1).

"Allowed" is a good verb to describe the actual role that recalcitrants play in Creation Science. In comparison to the evolutionary and uniformitarian network, what changes in both narratives is basically the function that recalcitrants play in these different worldviews. Creationism, inspired by Scottish Realism, conceives that all matter is dead and inert, which subjugates its role to divine intervention. Recalcitrants don't have 'animistic' characteristics as in the secular account but are engaged in a way that confirms the Fundamentalist interpretation of the Scriptures. According to

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the Exodus, God parted the waters of the Red Sea in order to allow Moses and the Israelites to cross it. However, as soon they were safe on the other side, God released the water, which, by the laws of hydraulics, drowned Pharaoh and his army. Likewise, the stones in the wall of Jericho fell to the ground by gravitational force, but it was the invisible hand of God that first shook its foundation.

Creationists, by attributing evolutionary skills – self-determination - to recalcitrants, evolutionists are in fact denying the supreme and absolute agency of God over nature. In order to counter this heresy, Creationists rearrange the mass of geologic and paleontological data with the intention of demonstrating the accuracy of the biblical record, in which God is the major actant for the creation of the universe. He is the ‘Great Designer’ and, therefore, the ultimate commander of natural forces. Once this is done, a whole different narrative emerges; a different ‘truth’ is created. Thus, I go back to the same questions posed to secular science in the previous section: how can Creationists affirm that the universe is not a dynamic and living entity, but governed by divine law? How can they tell the planet’s age and details about the origin of the universe and humankind? First, because the Bible tells them so. Second, they transform the Scriptures into a book of facts and engage recalcitrants to support their claims.

Creationists have a basic question to begin their fight against secular science: why believe in mere theoretical speculations when humankind was gifted with a historical record written by the Hebrews in biblical times? Creationists insist that Noah’s Deluge really happened and that evidence can be found in many oral and literary sources. For instance, the existence of many ancient accounts describing a flood that extinguished everyone except one family stretches the network that supports the veracity of the mythical deluge. Creationists consider the Gilgamesh epic (the Akkadian poem about of the Babylonian ‘Great Deluge’) as another record – an “immutable mobile” - that proves the Flood actually happened. Latour calls “immutable mobiles” all

sorts of devices dedicated to producing texts (in a broader sense) that are able to materialize and, therefore, stabilize disorderly natural phenomena in the form of data and other representations (Latour, 1986; Barany & MacKenzie, 2014, p.118). According to this reasoning, the fact that two (or more) major narratives corroborate the same story is a strong sign that a phenomenon occurred, and in this case, in such vast proportion that it is not a surprise that people would write about it.<sup>36</sup>

Whitcomb and Morris argued that the differences between the Jewish and the Mesopotamian narratives rely on the fact that “the Biblical [account] being far more *rational* and consistent than the Babylonian.... The gross polytheism and confusion of details in the Babylonian account seem to indicate a long period of oral transmission” (Whitcomb & Morris, 1961, p. 39-40 – italics added). In contrast, the organized structure of the Scriptures implies that humans could write and read before the Flood. Accordingly, for Creationists, Noah and his sons were able to provide a very descriptive and logical account of the Flood – the first scientific chapter about all the geological transformations that affected the world.

Therefore, in their scientific enterprise, first, inspired by the fathers of modern science (chapter 2), Creationists transformed the Bible into a ‘factish,’ a hand-made object supposed to contain historical and scientific facts about the creation of this world, humankind, and a flood of global proportions that changed entirely the environment and biosphere. Thenceforth, they employed the brutal facts of nature to

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<sup>36</sup> If, on the one hand, historians and anthropologists have argued that the Hebrew account was clearly inspired by the Mesopotamian folktale, on the other hand, for Creationists, the recurrent theme across different narratives is a historical evidence that the mythical Flood is a fact.

demonstrate the accuracy of the biblical records. They faithfully believe that, if questioned by the correct methodology and technological procedures, recalcitrants will witness what is described in the Book of Genesis: God is the supreme agent of all creation.

Hence, in the Creationist account, what rivers, rocks, mountains, canyons, and fossils have to say about the creation of the universe and humankind? For instance, what kind of information is imprinted in the surrounding formations of the Green River, which runs across Wyoming, Utah, and Colorado (Fig. 4.3)?



Figure 4.3: The Green River near Canyonlands National Park, USA.

What kind of phenomenon formed this river composed of “steep rocky gorges...that cut through mountains ranges,” large faults and flexures (Price, 1927, p. 149)? How were all its mountains ranges (Uinta, Wind River, Wyoming, and others) lifted above the ground? We already know how recalcitrants would answer in a secular investigation.

The past two centuries have been prolific on secular theories about the formation of mountains, most of them based on the agents described by Whitcomb and Morris, such as erosion, orogeny, and sedimentation. Erosion of plateaus (an extensive plain that was raised by regional uplift) is supposed to create rugged topography – “in fact it makes mountains.” Structures such as in the Appalachian Mountains are commonly related to orogeny that folded the Paleozoic rocks. In Scandinavia, “the Caledonian structures were eroded to a plain, the planation surface was warped up much later to form a plateau, and later erosion made the mountains of Norway” (Ollier & Pain, 2000, p.1-2). Secular science would say that, based on extensive geological fieldwork, those ranges arose more than 65 million years ago under Tertiary sediments. “Downwarping [sic] of the floors of the basins which began early in the Tertiary, apparently continued more or less intermittently all through the Eocene and was primarily responsible for the continuous sedimentation of the Wasatch, Green River, Bridger, Uinta Formations” (Bradley, 1964, p. A1). Additionally, modern geologists would write academic papers in which the Green River, the Colorado River, and the Columbia River were called ‘antecedents,’ which would imply that these rivers existed before the mountains or plateaus “having been elevated across their courses since the rivers get started” (Price, 1927, p.149). Following this narrative, the canyons, with their meandering paths, are associated with non-resistant banks, in which the river terraces are supposed to be formed gradually, across millions and millions of years, by the erosion of the valley sides and “smoothing the valley floor” (Whitcomb & Morris, 1961, p.320).

Fossils would also be engaged as geochronometers in order to support evolutionary and uniformitarian theories. They would be used to identify and categorize different geological ages: Mesozoic, Paleozoic, and Cenozoic (Tertiary) (Fig. 4.4). As we saw in chapter 3, in the uniformitarian account, the age of a certain geological formation is determined according to the fossils found in those strata. "It is assumed that, at any given period in the past history of the earth there was only one assemblage of organisms on the earth and that, therefore, when these organisms are found as fossils in the rock stratum, the latter is thereby identified as belonging to that age" (Whitcomb & Morris, 1961, p.131-32). And this, of course, is based on an established premise that different forms of life lived in different ages. Therefore, fossils of trilobites or primitive fishes are considered much older than a fossil of dinosaur, which, in turn, precedes human fossils by millions of years.

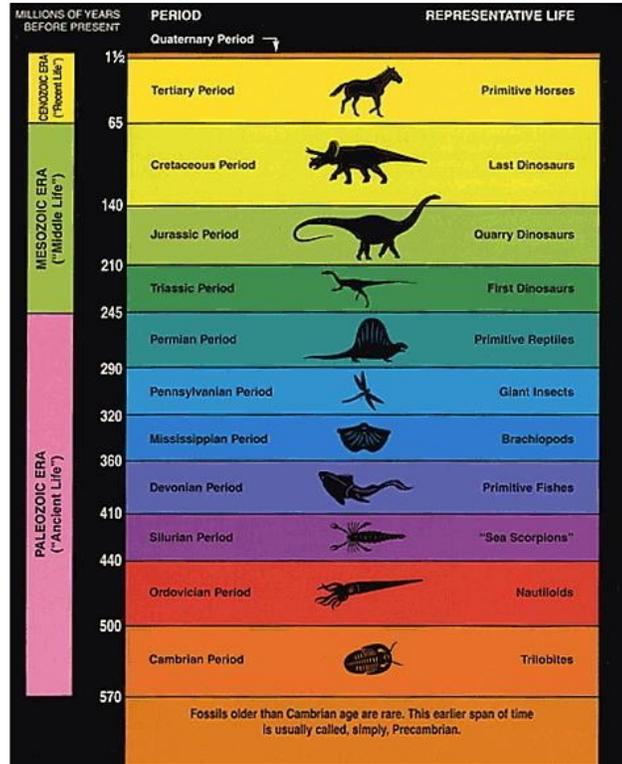


Figure 4.4: Early life chart.

But, no matter what secular scientists say, for Creationists, the natural conditions of evolution or uniformitarianism cannot be “duplicated in the laboratory... leaving only theoretical guessing to determine the behavior of the material under consideration” (Whitcomb & Morris, 1961, p.193). As soon as the Book of Genesis is accepted as a factual book of records, it is possible to interpret the recalcitrance of nature by the Christian terministic screen. In this assembled network, rivers, mountains, canyons, and fossils will tell a different story: 1) the universe is young, around 6,000 years old; 2) all the living species were created contemporaneously—the mammoth is identical to the elephant, humans co-existed with dinosaurs, and, most important, the pair of a man and a woman witnessed the dawn of creation; and 3) and

instead of a progressive and slow development, everything was suddenly created and, afterwards, an abrupt and awful catastrophe transformed the environment of the planet into a wholly different world, with which we are now familiar. As Price considered at the end of his book, if a real Christian believes in the miracle of reincarnation, in the resurrection of Christ, and in the Millennialist view of human history, why not to believe in an event such as a world-deluge, “when the very stones are now crying out that the Bible record must be true” (Price, 1927, p.341)? For Creationists, it seems quite reasonable that the Creator would – in some way – reveal to humankind the essentials of His work. Indeed, they affirm He did so. His work is communicated by rocks, which are “crying out” that the Green River formation, for example, is the outcome of a cataclysm brought to cleanse the world of human degeneration.

### **Big fossils, the canopy, and the ante-diluvium period**

In the late nineteenth century, an excavation led by the Dutch paleoanthropologist Eugène Dubois on the island of Java, Indonesia, uncovered a tooth, a skullcap, and a thighbone (Fig. 4.5). The discovery occurred amidst an academic feeling marked by a profound skepticism towards Lyell and Darwin’s theories that challenged the predominant paradigm that the Earth had geologically been transformed by catastrophes such as the Flood. Therefore, it is possible to have an idea of the impact caused by the discovery. Excited about his finding, Dubois quickly declared he had

discovered the ‘missing link’ between apes and humans, which would validate the new paradigms: evolution and uniformitarianism (Curtis et al., 2000). After all, what other explanation could exist for such big pieces of bones? The “Java Man,” scientifically named *Homo erectus*, bore a resemblance to humans. His size was comparable to human size. Therefore, based on the analysis of its bones, this early human was declared to have been about 5 feet, 7 inches (1,70m) tall. In the evolutionary line, the skull of this human ancestor “was thick-walled, its face was massive, it had prominent brow ridges, and its teeth were slightly larger than those of present-day humans.



Figure 4.5: Original fossils of *Pithecanthropus erectus* (now *Homo erectus*) found in Java in 1891-2.

The finding was so relevant to stabilizing the evolutionary paradigm that these bones never stopped to attract academic attention and new studies. In 1990, more than one century after this milestone discovery, the paleontologist Carl C. Swisher and the geochronologist Garniss Curtis dated the small collection of bones at 1.7 millions years

by using the argon/argon radiometric technique, which, according to the authors, provided results “with very little margin of error” (Curtis et al., 2000).

However, no matter how many “immutable mobiles” were created, how many articles and books were written about this finding, the “Java Man” never achieved consensus among scientists. Some critics did not even accept the idea that those bones, despite their human size and characteristics, belonged to a primitive man. They also criticized the accuracy of the applied geochronological technology. Creationists, for instance, assert that the fossils do not belong to a human ancestor but to an upright ape that was in fact much bigger than its modern counterpart. Moreover, it is unreasonable to affirm they are 1.7 million years old since the planet itself was not created more than 10 thousand years ago (see chapter 5 on “geochronological technologies”).

Regarding geological time, Creationists created another taxonomy. Based on the fundamentalist and systematic interpretation of the Bible, they fit the brutal facts of nature into another geologic time scale that represents a different succession of events in earth’s history. Instead of Pre-Cambrian, Paleozoic, Mesozoic, and Cenozoic, in Creationism, time is divided into four distinct eras: the moment of creation itself (which lasted six literal days), anti-diluvium (after the Adamic Fall), diluvium, and post-diluvium (also known as ‘the modern world’) periods (fig. 4.6). Big fossils that bear a physical resemblance with contemporary animals - such as the mammoth and the elephant or primitive humans and apes – do not prove long successive ages or that different living forms lived in different periods. Instead, for Creationists, they are

material evidence that all plants and animals were created “altogether in an older state of the world as we know it” (Price, 1927, p.222) and the large size of the bones only confirms that animals were bigger in the past due the existence of a canopy of vapor around the planet that produced a much healthier climate.

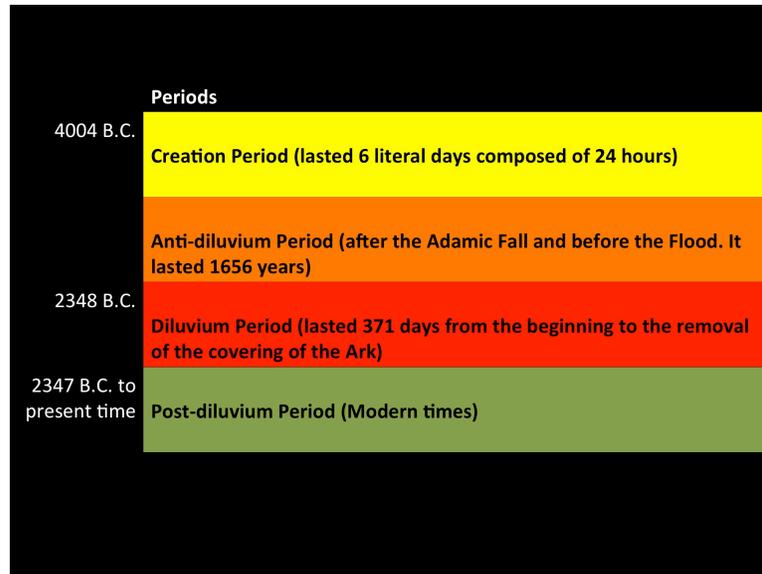


Figure 4.6: Creationist geological time scale.

In spite of the Creationist criticism that accuses evolution and uniformitarianism of being mere theoretical speculations, Creationism is not free of suppositions. As Kuhn (2012 [1962]) suggested in his criticism to the structure of “normal science,” Creationists likewise try to insert the data into their theoretical framework. In fact, in order to harmonize the biblical narrative as endorsed by Flood Geology with the brutal facts of nature, Creationists must creatively fit the scientific interpretation to the religious account. Quite often, Creationists do not seek scientific evidence for their

explanations about the creation of the universe and humankind. They refute evolution and uniformitarianism by applying sophistical techniques, through which they try to demonstrate the logic of their reasoning by reinterpreting secular data by the light of the Scriptures. As I will discuss later (Chapter 6), Creationists invest little money or effort in experimentation, laboratories, or technologies of visualization and measurement. They rely instead on textual and visual rhetorical strategies to make visible and imaginable what is only minimally suggested by the Book of Genesis.

Both secular and Christian sciences also have their unopened “black boxes” (Latour, 1987), which makes invisible the premises and technical work that hold a scientific framework together. Some of them will be discussed in this and in following chapters. Assumptions about both frameworks would collapse if those black boxes were finally deciphered. So I would like at this point to introduce one of the major black boxes of the Creationist account. It is a cognitive artifice that presumes that the Bible is a book of fact: the canopy of vapor. As described in the first chapter of the Book of Genesis, on the second day of creation God “made the firmament, and divided the waters which were under the firmament from the waters which were above the firmament” (Genesis 1:7). For Creationists, what marks the anti-diluvium period is the existence of a ‘canopy’ (the “waters above the firmament”) made of vapor that surrounded and protected the planet against the action of harmful rays and kept the temperature uniform. According to Whitcomb and Morris, “as vapor, it was quite invisible but, nevertheless, would have a profound effect on terrestrial climate and

meteorological processes” (Whitcomb & Morris, 1961, p.240). Around the globe, at the north and south poles, owing to the action of this canopy, the climate was temperate. The Arctic, Antarctic, and desert zones did not exist during the geological period that preceded the Flood. The constant battle of cold or warm fronts that we watch almost every day on the Weather Channel was mostly absent. Therefore, for Christian scientists, the antediluvian climate was not only warm, but also deprived of violent storms, hurricanes, tornadoes, or other devastating cataclysms. Since there were not natural disasters before the deluge, Creationists assume that, during this geological period, not much geological work was done. “The waters both above and below the firmament were in large measure restrained, temperatures were equably warm, there were no heavy rains or winds and probably no earthquakes nor volcanic emissions” (Whitcomb & Morris, 1961, p.243). As the illustration of the biblical conception of the universe shows (Fig. 4.7), this vaporous canopy was located “in the upper troposphere, below the stratosphere” and surrounded the globe (Whitcomb & Morris, 1961, p.257).

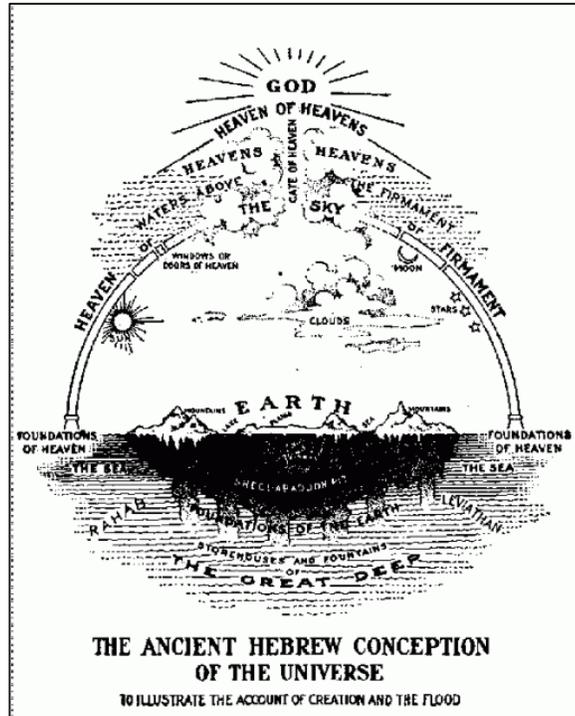


Figure 4.7: An early-twentieth-century conceptualization of ancient cosmology. Illustration from Robinson, 1913.

Creationists assert that this vapor cover nurtured life. It worked as a protective shield against radiation from the sun. Consequently, the canopy is the Creationist explanation for the large size of fossils. In such warm, pleasant, and healthful environment, animals and plants grew larger due the benevolent tropical climate. That is why fossils of ancient animals (mammoths and dinosaurs), and the misinterpreted outsized apes “Java Man” or Neanderthals, do not stand for evolutionary claims, but only for the fact that these animals, once big, suffered a profound transformation in the environment caused by an enormous cataclysm. Price was happy to point out that “The *Java skull* has been pronounced by various persons as that of an idiot, that of a sub-man or ape-man, or that of a large *Hylobates*, or gibbon” (Price, 1927, p.296), when, in fact,

“our modern plants and animals whether in the sea or on the land are degenerate dwarfs,” explained Whitcomb and Morris (1961, p.277). What changed from these larger ancient forms found in fossilized samples to the smaller modern versions was an “*abrupt and complete*” transformation over the whole globe, which also created rivers, carved canyons, uplifted mountains, and produced the fossils that explorers find in the modern period (Price, 1927, p.286 – italics in the original). As “God writes correctly in crooked lines,” for Creationists, in a twisted and indirect way, big fossils are part of the material evidence for the reality of the Flood.

Creationists understand the canopy as the most important actant for the geological and biological conditions in the ante-diluvium period. Among its beneficial effects, it also explains the long longevity of the patriarchs recited in the Book of Genesis (fig. 4.8).

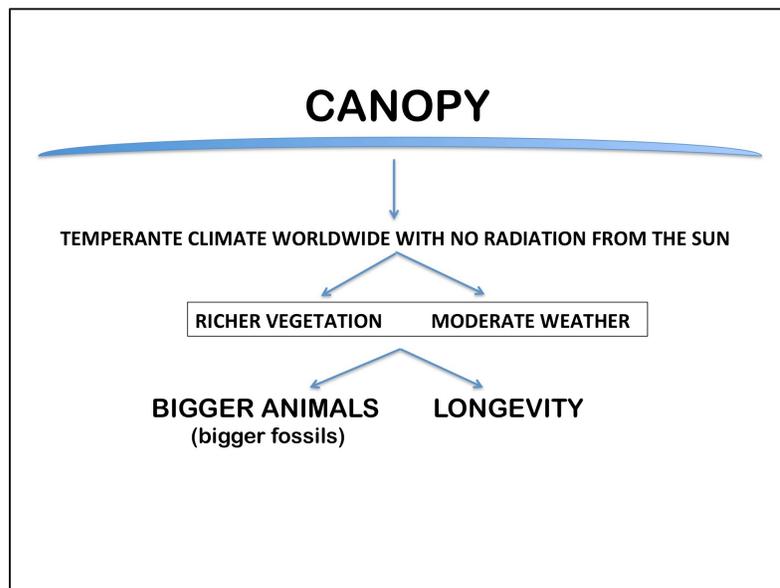


Figure 4.8: The action of the biblical canopy.

Back then, before the protective canopy collapsed, people lived a longer life. In Genesis, we read that Adam lived 930 years, Seth 912, Methuselah 969, and Noah 950. However, Isaac died when he was 180 years old and Jacob at 147. In a chart prepared by William R. Vis and published in *The Genesis Flood* (1961, p.24), a graph indicates the different ages of the patriarchs and an abrupt decrease of their life spans (Fig. 4.9). According to Creationists, this visual representation is rhetorically clear. It scientifically shows “in a striking way that something extremely significant happened to the earth and to man at the time of the flood” (Whitcomb & Morris, 1961, p.24-5). If the spiritual message of the Bible is clear, “the length of life decreased because the entrance of sin into human family,” the scientific explanation for such important phenomenon should also be evident. The canopy, characteristic of the anti-diluvium period, produced an environment that was favorable for a longer life. Consequently, the decreasing life span in the biblical narrative is another proof that something really transformative happened in the environment (p.25).

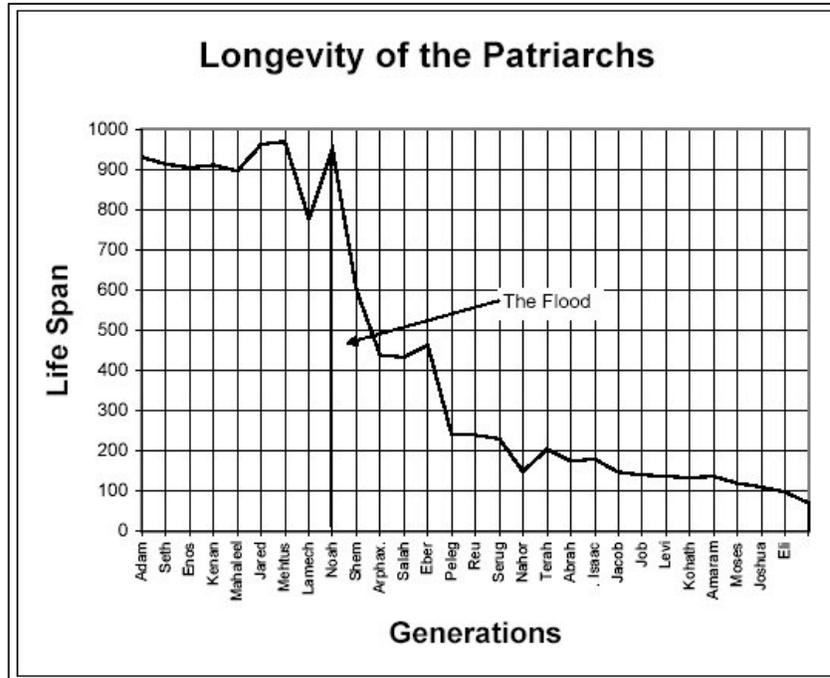


Figure 4.9: Graph showing the sudden decrease in the age of patriarchs after the biblical Deluge.

But since the Fall, the world had grown in moral and physical degeneration. So God sent his punishment. Accordingly, that almost Edenic environment was disturbed by a divine, sudden, and awful catastrophe that transformed the planet into a wholly different world. The cataclysm was so enormous that “the sea and the land have practically shifted places over all the globe” (Price, 1927, p.333). Whitcomb and Morris argue that the number of superlatives used in the Bible to describe the magnitude of the Flood only confirms the scale of the event. Because of its vast proportions, Creationists believe that this deluge must have been a much vaster and much more important event than it has usually been considered by secular scientists.

## **Mountains, rivers, canyons, and fossils formation in the diluvium period**

During the deluge, the protective canopy collapsed in the form of heavy rain causing a profound discontinuity in the anti-diluvium process of nature. Any deposits formed before the Noah's deluge were deeply altered by the great "complex of hydrodynamic and tectonic forces" unleashed by God's will during the Diluvium period (Whitcomb & Morris, 1961, p.123-4). Therefore, if, for Creationists, humans (at least the original couple) witnessed the dawn of the universe, selected members of the human race (Noah's family) watched "the entire elevation or at least the completion of practically all the great mountains in the world" (p.318). In the Creationist account, mountains do not reveal that they were formed progressively in a billion-year-process. As a matter of fact, according to Creation Science, recalcitrants will prove that geological formations are extremely young. If recalcitrants - mountains, rivers, canyons, and sedimentary strata - *look* old, it does not mean they really are old. For Creationists, the Bible is textually clear. God created the basic forms of matter – the firmament, the skies, the dry land, the seas, and the biosphere - and declared they were "good" (Genesis 1-31). If God announced they were "good," it means that all things were created the way they should be, with their final appearance, which can look ancient when in fact they are not.

In Flood Geology, Noah's deluge is a landmark that inaugurates another geological period. During the forty days of intense rain (when the waters were released

from the firmament), tectonic and volcanic activities, an enormous adjustment of sediments took place.

This must mean the great quantities of liquids, perhaps liquid rocks or magmas, as well as water (probably steam), had been confined under great pressure below the surface rock structure of the earth since the time of its formation and this mass now burst forth through great fountains, probably both on the lands and under the seas (Whitcomb & Morris, 1961, p.122).

Associated with volcanic activities, the authors also ponder that during the Flood it must also have been great earthquakes and – along with them – tsunamis. “These eruptions and waves would have augmented the Flood waters as well as accomplished great amounts of geological work directly” (p.122). Based on this scenario, it is plausible to imagine the amount of earth and rock that must be excavated by the waters of the Flood and its other consequential activities. The violence of the waters and cataclysms were in such extent that the Flood moved rocks, sand, and all kind of sediments in a global and enormous scale. In this way, entire ranges of mountains, such as the Rocky Mountains, suddenly arose. Islands of deposited sediments were left behind by the receding Flood, which created elevations such as the Red Butte and Cedar Mountain (Fig. 4.10).



Figure 4.10: Cedar Mountain Trail, Grand Canyon National Park.

The moving and lethal waters carved their way over the ground, creating, canyons. “The current Colorado River does not cut downward, suggesting that modern erosion cannot explain Grand Canyon,” explains a banner in the Creation Museum. For Creationists, the Grand Canyon with its amazing formations works as a witness for the truth of Noah’s deluge. It meanders and cliffs were caused by the violence of water. Its multiple thin layers of different sediments do not confirm a long process of sedimentation, but a thick and rapid deposition. For instance, the geologic formation known as “Coconino sandstone,” present in the Grand Canyon, Arizona, is said to be composed of sand grains that came from the Appalachians Mountains, situated on the east side of the continent. How do they end up in Arizona, 1,970 miles away? “The Flood required only a few months to deposit about 10,000,000 cubic miles of gravel, sand, and mud,” concludes a banner in the Creation Museum.

A fossil also cannot be categorized as older because it was found in a stratum erroneously classified as Cambrian, Creationists counterattack. Nor it is younger because it occurred in more recent strata. Most of fossils have in fact the same age. They were produced by the same phenomenon that did not take millions of years to be accomplished, but lasted only forty days. The Flood carried and chaotically jumbled the bodies of all dead animals. For the Creationist scientific framework, it is bad science to attempt to guess how long ago fossilized specimens lived or how and when they were buried. As a matter of fact, the six agents described by Price (1927) do not work as a geochronometer for different periods, but “appear to treat the fossiliferous strata as if they were all of about the same age” (p.157-8). So, “if we are now asked, what do the rocks have to tell us, in view of the fact they refuse to testify to a life-succession?” (Price, 1927, p.164). They would answer that all stratified deposits happened because of one single event, that they are certainly not older than the human race and not even older than the living species of plants and animals.

Let’s now take a look at the standard processes of formation of fossils, which, according to Creationists, reveal that in order to come to exist, fossils require some sort of catastrophic event. Accordingly, fossils can be preserved: 1) by freezing, 2) the preservation of hard parts of the organism (the most common – bones and shells), 3) the conservation of the carbon only (carbonization – coal), 4) the imprint of the original form in cast or molds, such as the preservation of the tracks of animals, and 6) petrification (footprints).

According to the principles of Creation Science, the conservation of a body by freezing proves that these animals were frozen in a very fast way. For instance, the well preserved mummified body of a woolly mammoth found in Siberia in August 2010, with the most intact brain found so far (its folds and blood vessels were actually visible), is material evidence that the natural conditions under which it froze were not the result of a long-term reduction of the global temperature, as suggested by secular scientists who endorse the Ice Age theory. Creationists claim that the well-preserved condition of the body materially demonstrates that, suddenly, the cold became so extreme, that the animal was frozen while in action (fig. 4.11). Therefore, this fossil – as do many others – reveals the existence of an abrupt change in the climate situation.



Figure 4.11: The mummified carcass of the 39,000-year-old woolly mammoth nicknamed Yuka found in August 2010 on the Laptev Sea coast, Russia.

Again, the explanation for such sudden change relies on the collapse of the ante-diluvium and biblical canopy. With the post-canopy cycle of evaporation, “atmospheric

turbulence and vapor transportation, and condensation and precipitation became established, snow began to fall, quite possibly for the first time in earth's history" (Price, 1927, p.292). Price uses the example of the mammoth to demonstrate that only a catastrophic event can explain the formation of fossils. After all, he reasons, when an animal dies a natural death, the carcass is soon devoured whole or a bit by other creatures nearby or slowly decompose. Logically, the amount of preserved mammoth carcasses in Siberian regions can be elucidated by the sudden frost that followed the collapse of the mild atmospheric environment characteristic of the anti-diluvium period.

Price, Whitcomb, and Morris also call attention for the fact that very few preserved fossils are found nowadays. "Never does one find, in the present area, great graveyards of organisms buried together and waiting fossilization" (Whitcomb & Morris, 1961, p.156). Fish, for instance, "do not naturally become entombed like this but are usually quickly devoured by other fish after dying" (p.157). However, thousands of remains of vertebrate animals and great number of insects, mollusks, and plants were found in big graveyards of fossils. Therefore, "it is inconceivable that deposits of this sort could be really due to normal, slow, autochthonous processes. Unusual transportation and rapid burial mechanisms are plainly indicated" (p.160).

The case of cast and molded fossils, for Creationists, is a mode of preservation that also provides evidence for a sudden or catastrophic burial, "followed by rather rapid cementation of the surrounding sediments, in order or the mold to be preserved"

(p.165). The same can be said about petrification or the preservation of tracks: some sort of cataclysmic occurrence is necessary for the burial of the materials before they are petrified and “the only way in which such prints could be preserved as fossils is by means of some chemical action permitting rapid lithification and some aqueous action permitting rapid burial” (p.168).

Nonetheless these fossils do not only testify to the existence of a sudden catastrophe, but also for a cataclysm of universal proportions, and for the contemporaneity of all species. For instance, Creationists point out that fossils are not only found in the Mesopotamian Valley, but all over the world, which indicates that Noah’s Flood was worldwide. Human fossils spread all around the globe also prove that humans had migrated to distant regions before the Flood (Whitcomb & Morris, 1961, p.32). Moreover, for Creationists, fossils indeed support the fact that all the species were created together. Humans and dinosaur species did not flourish in different geological periods, as determined by the secular geologic time scale. If the extant material proofs for this coexistence are not accepted, it is because a hideous secular conspiracy works in favor of evolution by hiding or reinterpreting evidence that testifies to this concurrence. “Geologists refuse to accept the evidence at face value, because it would mean either that modern man lived in the earliest years of the postulated evolutionary history” (Price, 1927, p.173).

But how could man have evolved in the late Tertiary if what appear to be human footprints have been found in rocks from as early as the Carboniferous period?

Furthermore, how can dinosaurs be considered much older than humans if material evidence shows they existed at the same time? Take for example the famous (and controversial) site at Paluxy River, near Glen Rose, in Texas (fig. 4.12). Ignored by secular geo-paleontologists, this evidence is interpreted by Creationists such as Whitcomb & Morris (1961, p.166) to show that dinosaur tracks and human footprints in the same limestone bed shared a contemporary origin.



Figure 4.12: Taylor Site, Paluxy Riverbed, Glen Rose, Texas, USA.

In the ICR website, John D. Morris asserts that *if* this evidence were allowed to be confirmed, the entire secular interpretation of biological and geological data that sustains the evolutionary network would disrupt. However, Morris (1986) and Price (1927) also insisted that secular scientists would never consent this to happen.

“Uniformitarians can negate even the most plain and powerful evidence in opposition to their philosophy” (Price, 1927, p.173). They do not pay much attention to this proof. As

a matter of fact, they often ridicule it by arguing that these apparent human footprints have been wrongly interpreted or are the mere result of a hoax. But fossils, counter the authors, are not the only “talk-makers” that indicate that humans and dinosaurs lived once together. Creationists argue that the drawings on the walls of Havasupai Canon, Arizona (fig. 4.13), are an actual depiction of a dinosaur, which proves that all species were contemporary and humans were there to testify to their creation and existence.

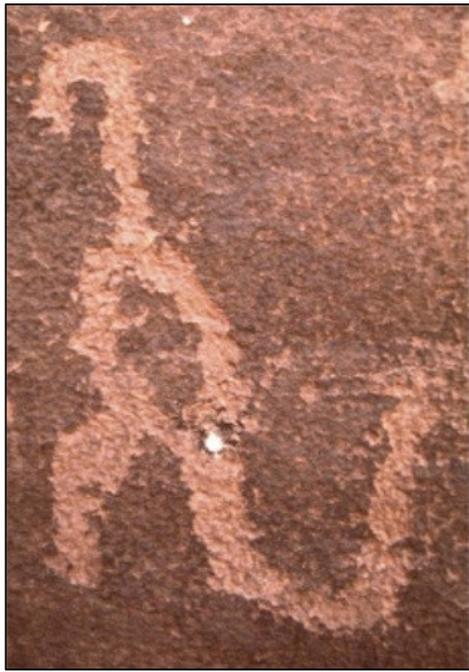


Figure 4.13: Supposed *Edmontosaurus* petroglyph, Havasupai Canyon, Arizona, USA.

## **The post-diluvium period and global warming**

After one year the waters of the Flood had subsided enough so that Noah, his family, and all the animals could disembark from the Ark. But Creationists argued that “the profoundly disturbed and altered hydrological and isostatic balances of the earth undoubtedly continued to manifest themselves in what might be called residual catastrophism for many centuries later” (Whitcomb & Morris, 1961, p.313). The post-deluge period – or the “modern world,” as Creationists call it – underwent further geological transformations and new climate conditions. The glaciation of the poles (which secular scientists know as the “Ice Age”) was only one of the effects that followed the Deluge. In fact, for Creationists the aftermath of the Flood has significant importance. As the vapor canopy had precipitated over the planet, important climatic reactions ensued.

According to Whitcomb and Morris, while the poles knew freezing temperatures for the first time, the rest of the planet experienced a sudden warming of climate (we have to remember that the loss of the canopy allowed solar radiation to penetrate the earth). The authors state that this abrupt post-deluge global warming was caused by the combination of three agents present in the new earthly atmosphere: water, ozone, and carbon dioxide. The carbon dioxide in the air supported only limited forms of animal and vegetal life compared with the luxuriant vegetation and fauna in the antediluvian period. As a consequence of this new agent in the atmosphere, animals decreased in size. The ‘mammoth,’ for example, is said to have acquired its current size,

which converted it into the modern elephant. The size of chimpanzees also diminished and were, therefore, smaller than human dimensions now. For Creationists, the post-deluge climate change and radiation also explain why some species that co-existed with humans went extinct - or supposedly extinct.<sup>37</sup>

Whitcomb and Morris (1961) speculate some possible causes for the increase of carbon dioxide in the atmosphere. One of them was probably growth of volcanic activity during the Flood and the aftermath. However, volcanic activity was not the main agent for climate change. Since the dry lands started to be repopulated again, the burning of coal and oil immediately grew. “The problem of atmospheric contamination by fossil fuels has also come in for some reconsideration, since the burning of coal and oil during the past century and more has added measurably to the amount of carbon dioxide in the carbon cycle” (Whitcomb, & Morris, 1961, p.373). In other words, climate change was produced by human activity and the escalation of burning fossil fuels. This caused a gradual warming of the temperature of the earth. In order to endorse this hypothesis, Whitcomb and Morris cite the work of E. S. Dewey Jr., then director of the Geochronometric Laboratory at Yale, who demonstrated in a study his concern “about the possibility of our present climate becoming warmer due to the addition of carbon dioxide to the atmosphere” (Whitcomb and Morris, 1961, p.310), a process presently known as ‘global warming.’

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<sup>37</sup> As suggested by the Creation Museum, Creationists consider the hypothesis that dinosaurs are not actually extinct, but could be found in some remote region in the planet.

So, why, after more than 50 years since the publication of *The Genesis Flood*, did Dr. Larry Vardiman, chairman of the Astro-Geophysics Department at the Institute for Creation Research (ICR), question if the global warming was “caused by man,” if this question contradicts the theory proposed by Whitcomb and Morris in their seminal book? In an article published in 2007, Vardiman stressed that, for him, it is very unclear that the increase of temperature in the planet is caused by the industrial and massive burning of fossil fuels. In the same direction, confirming that there is current tendency in Creation Science, Ken Ham, president and founder of *Answers in Genesis* during the debate with Bill Nye, also challenged the assumption that humans’ activity could be the main agent of climate change.

In *Redeeming America: Piety and Politics in the New Christian Right* (1993), Lienesch highlights the capacity of Christian fundamentalists to adjust their discourse in order to challenge the predominant system of politics that threatens their own political, religious, and moral agenda. The last two centuries were prolific in issues that confronted fundamentalist beliefs. It has not been easy for Christian scientists to defend their principles without adapting their own rhetorical discourse to contemporary problems. However, they must do it if they want to be seen by their audience as equivalent in scope and approach to secular science. As I said before, modern Creationism would not exist without its counterparts, evolution and uniformitarianism. Historically, mainstream science has established the agenda while Creationists have reacted by providing their own interpretation of natural phenomena. Already in the

1920's, they had to begin their crusade against the teaching of evolution in American academy and public schools. In a world perceived as doomed by abortion, drugs, divorce, pornography, and homosexuality, Creationists have held as crucial to fight the plague of secular science, which regards humans as simply another kind of evolved animal and this planet as only another astronomical object in the still evolving universe. According to the Creationist perspective, as illustrated by the 3-D projection "Created Cosmos" in the Creation Museum, no matter the size of the universe, it was in this one that God chose to create humankind in His own image and to which to send His son to die for the sins of humanity. Therefore, one of the ways of fighting secular science and the perceived growth of atheism in the United States is to emphasize the role that recalcitrants play in the Christian scientific account: they are nothing more than the servants of the Christian God, instruments of and witnesses to His power.

On June 29, 2015, in an ICR newsletter sent out three days after same-sex marriage was endorsed by a Supreme Court decision, Henry Morris III, the son of Henry Morris, warned his audience that people have paid "great attention to weather forecasting and other mundane matters, while ignoring or rejecting the evidence that God Himself, in Christ, was in their midst." He continued:

Today we are more occupied with daily weather even than they were, with all sorts of forecasting devices in operation. There is also a growing army of doomsday forecasters, loudly concerned about a predicted nuclear winter, overpopulation, pollution, alien invasions from outer space, and a host of other foreboding secular "signs of the times." Yet they ignore the overwhelming evidences, both in science and Scripture, that our great Creator/Savior, the Lord Jesus Christ, is still in control and is coming again soon to fulfill His great purposes in creation and

redemption. A mere listing of the many real signs of God's times would take many pages (Morris, 2015).

People should be reminded that the "Creator/Savior is still in control." That is the role that recalcitrants play in the Creationist account. God is the one who has agency and, therefore, determines the action that the brutal facts of nature would take according to His own will. Therefore, as recalcitrants are subordinated to God's determination, by observing nature's behavior – such as climate change – is not only possible to look at the past and tell how things happened in biblical times, but also to predict the future, in which the natural signs only reveal that God will again respond rapidly and violently to the present moral decay of humankind.

In the sixteenth century, amidst the birth of modern science, John Calvin acknowledged that the human intellect extended "both to things terrestrial and celestial." However, if "the sons of Adam are endued with some light," this is not enough to enable them to comprehend God's work (Calvin, 1995 [15,36] Book II, chapter 2:13-19). "Man" can have some success in the enterprise of understanding the inferior objects that are part of our mundane and natural life. But it is one thing to have license to study the earthly things that maintain a connection with present life and quite another thing to grasp the mysteries posed by heavenly things. Secular scientists claim that they have mastered the art of reading the essence of the brutal facts of nature and, along with it, the ability to tell what happened billions and billions of years ago. However, for Creationists, scientists remain blind to what recalcitrants are really

saying. The brutal facts of nature do not have agency but are witnesses to the power of the Scriptures to reveal the salvation that comes from God.

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### Technologies of Precision: What They Show and What We See

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In the last chapter, we saw that when recalcitrants ‘talk,’ they do not ‘say’ the same thing. What they reveal is not immanent in the object but changes according to different interpretations, different worldviews. In this chapter, I focus in on the role that technology plays in making the natural world speak on behalf of the work of God and, therefore, for the Creationist account.

Technologies are powerful actants in the construction of science. They are credited with grasping the essence of natural phenomena and revealing what they are, what they mean, and where they come from. Telescopes can generate images of remote objects. Microscopes are used to visualize objects that are too small for naked eyes. Technologies and techniques of precision can also identify and isolate invisible particles. Like the iconic spaceship in Star Trek, technological instruments can go “where no man has gone before.” In laboratories, no matter if situated on this planet or orbiting in outer space, machines are employed to produce scientific results. They are the best and most reliable friends of scientists. Sometimes they are regarded as even more important than the human actor in revealing the unexpected, changing the route

of research, and therefore serving as the most important agent for a new scientific revolution. More important, what technologies reveal is believed to be free from human bias and untouched by prejudice. Bruno Latour and Steve Woolgar suggest that technological results “should not be so obviously linked to the rhetorical operation of convincing others,” however scientists usually make connections between what is produced by instruments and reliability (Latour & Woolgar, 1979, p.200). Consequently, in the production of scientific objectivity, technologies are one of the most powerful instruments for rhetorical persuasion.

However, in this chapter it is not my goal to discuss the extent to which technologies are (or are not) able to produce objectivity. By describing how Creationism embraces (or dismisses) technology in its scientific enterprise, I challenge the very idea of technological objectivity arguing that, no matter what is technologically produced, Creationists will interpret the data according to their own terministic screen. As a matter of fact, I suggest that technologies *are* terministic screens, designed and employed to reproduce an already organized and bounded representation of the world. In order to do that, in the first part of this chapter, I discuss what scholarly literature has said about the relationship between technology and scientific representation. My goal is to demonstrate why Creationism is a good case to complicate even more the relationship between science and technology, already complex and without a general consensus. Then, I describe four ways in which Creationists engage technologies in their process for transforming the Book of Genesis into a scientific record: the employment of

geochronological technologies, technologies for visualization, display, and, finally, what I call natural technology. Finally, I focus on two out of these four – geochronological technologies and technologies of visualization - which I classify as technologies used for precision. Following this chapter, Chapter 6 will be dedicated to discussing the other technologies – technologies of imagination – that I categorize as divine technologies.

## **5.1 Technologies of scientific presentation, (re)presentation, and (mis)representation**

The role of imagination in science is a good way to open a chapter that will discuss the technological production of images. Try to envision science without any form of technology. What would Robert Boyle have done without the assistance of his air pump? It was by means of this instrument that Boyle could examine the elasticity and weight of the air, a finding that immortalized him as one of the fathers of modern science. Try to envisage the work of the technophile Robert Hooke (who also helped Boyle to improve the air-pump) without his microscopic observations of fossils, flowers, and insects. In 16<sup>th</sup>-century in Italy, would Galileo Galilei have instigated a scientific revolution without his telescope? With this instrument, Galileo was able to observe what had not been seen before. It is reasonable to wonder if he would have become the “father of modern observational astronomy” without his achievements in optical technology (Singer, 1941, p.256).

Most landmarks in the history of science are directly linked to technological developments and the use of all sorts of devices. Instruments for manipulating reagents, for measuring temperature and distances, for magnetic observations, to magnify or extend vision, to see through, or for producing electric current are intrinsic parts of the scientific enterprise. But if we subtracted all these different forms of technology from science, what would be left? How could science exist or experiments be done without machines, asked John Law (2014)? How to “see” and manipulate scientific results without the assistance of technologies for representation that not only produces images, but generates tables, graphics, charts, and all kinds of coded inscriptions? How can we even conceive of scientific inquiry without technological representations that intend to objectify reality (Daston & Galison, 1992)? Therefore, we must ask if it is even possible to study science without taking into account the technological production of results and the technological visibility of what would be otherwise invisible (Kelso, 1980)? As Bruno Latour put it in *Science in Action*, science *is* the relationship between facts and machines while they are in the process of fabricating knowledge (Latour, 1987 – italics added).

Over the past hundred years, the intersection of science and technology has become an established topic in the fields of philosophy of technology, rhetoric of science, and sociology of science (Actor-Network Theory, Social Construction of Technology, Empirical Programme of Relativism, among others). Many different questions and premises have guided this conversation about the ways in which

technology is associated with science. Is there an essential difference between these two concepts such that it is a mistake to mix the study of science and technology? Or, by contrast, are technologies for measurement, calculation, and visualization the very essence of modern science (Heidegger, 1977)? After all, as Martin Heidegger pointed out, if modern science is all about exactitude, what better way of accomplishing the illusion of certainty could there be than by employing technologies?

But the controversial relationship does not end here. Other questions arise from scholarship on science. Can technological artifacts reveal reality or do they only produce mediated representations? Are representations the result of technological manipulation, and, therefore, is science inherently misled and grounded upon false premises (Coppmans et al, 2014)? Or, maybe, as suggested by Law, technology constructs neither reality nor falseness, but “collateral realities” that are both material and metaphysical (Law, 2014, p.339-340). Does technology affect our perception of reality? Scholars have incessantly pointed out that there is an enormous difference between how the universe was mentally pictured before and after the advent of the telescope (White, 1962; Ihde, 1990). Does technology have agency (Latour, 1985; Galison, 1997)? Can it produce scientific results independently of the intentions of scientists? In science, what motivates technological activity? Is the desire of achieving pure observation and the objective description of the world or is it to evoke ‘collateral realities?’ Because, as long as we understand science as an activity, it seems impossible to deny that scientists have their own motives. All these questions derive from a

common ground: the awareness that we live in a world embedded in science and technology. But the answers to these questions (and the produced objectivities) are not always the same.

In the field of the philosophy of technology, for example, James K. Feibleman (1972) proposed to draw a definitive line between science and technology by establishing the difference among what he called “pure science,” “applied science,” and “technology.” According to Feibleman, it is a mistake to mix these concepts with one another. On the one hand, pure science (or “basic research”) means methods of investigating nature by laboratorial procedures for the sake of understanding natural phenomena. On the other hand, applied science is the use of pure science for practical reasons, that is, in order to get concrete results. As an example, Feibleman described Louis Pasteur’s discovery of the scientific principle that when attenuated and inoculated in bodies, microorganisms induce the production of antibodies. The subsequent development of vaccines would be what Feibleman defined as an achievement of applied science. Finally, technology would be a “further step in applied science by means of the improvement of instruments” (Feibleman, 1972, pp.33-36).

However, in the studies of technology and science, Feibleman’s argument is outnumbered by the opinions of other scholars. For most of them, the fact is that technologies have always mediated all sort of scientific practice. As Latour (1993) insisted, there is no such thing as “pure science,” as if it arose in an unadulterated state from nature. Pasteur himself would not be able to produce any scientific fact if not

assisted by instruments in his laboratory, as illustrated by fig. 5.1.



Figure 5.1: Louis Pasteur experimenting with a centrifuge in his laboratory.

Another contradiction of Feibleman's argument comes from the philosopher of technology and sociologist of science, Sergio Sismondo (2008), who established points of contact between science and technology. First, they are both social, which means that technology and science do not work outside the context in which they are constructed. Second, neither of them provides "a direct route from nature to ideas about nature; the products of science and technology are *not themselves natural*" (Sismondo, 2008, p.14). The dream of pure science is a chimera. Science is made of an assemblage of actors, in which technology is one of the most important actants in the construction of what we take for scientific reality.

Yet in this discussion, James Kelso (1980) attributes a specific role to technology in the process of constructing scientific facts. He states that this process is marked by the employment of devices that disguise how scientists are actually manufacturing facts rather than extracting them from nature (Kelso, 1980, p.102). Among these devices are technologies of visualization. Modern science has always used technologies for representation. They have always been an essential part of this process either in the form of pencils and papers to produce drawings or, more recently, magnifying lens, photographs, and digitally processed images. Because of the ubiquitous use of images in scientific claims, it is not a surprise that the scholarship on science and technologies for representation is also vast. In *Representation in Scientific Practice Revisited*, (2014), Catelijne Coppmans, Janet Vertesi, Michael Lynch, and Steve Woolgar followed up a project that began more than thirty years ago in Paris, which aimed to reflect on the dissemination of images, maps, graphics, and other pictorial displays produced for and by science. The project began with a workshop organized by Bruno Latour that wanted to scrutinize the relevance of this kind of “immutable mobiles,” “the fixed and transportable” products of scientific work in the history of science (Coppmans et al, 2014, p.vii). “Technoscience practices generate representation,” explained Law in one of the essays written for this project. “They offer literal representations of realities, or they can be read that way” (Law, 2014, p.339). Moreover, in scientific discourse, they work as objects of authority too. “Once the machine works people will be convinced,”

states Latour (Latour, 1987, p.10), which implies that results produced by technological artifacts are rhetorically used to give legitimacy to a certain result.

In rhetoric of science (which could be also be called “rhetoric of technology”), the analysis of the role that technology plays in the construction of science recognizes the relevance of technologies of measurement and visualization for scientific argumentation (Finnegan, 2004; Gross, 2006; Prelli, 1989, 2006). In scientific practice, laboratories are regarded as confined and controlled spaces that contain instruments that do not lie (Latour, 1987). They are thought to provide accurate results. They will see what human sense cannot see and – an interesting plus - offer results free from metaphysical speculation. For example, because they are believed always to tell the truth, technological results can be used in court as material evidence in legal cases. Conservative Christians use images generated by ultrasound pregnancy in anti-abortion campaigns (Winderman, 2015). The rhetorical message of such use is no matter what people may argue or think about the beginning of life, the image objectively demonstrates that there is a real heart pulsing inside the womb.

In “Image of Objectivity,” the purpose of Lorraine Daston and Peter Galison (1992) was to dissect the origin of this trust in technologies for visualization and the roots of the idea of technological objectivity. To some extent (I will come back to this issue later), Daston and Galison’s work can be read as a project in material rhetoric, examining how recalcitrants are ‘objectively’ made to talk through technological mediation. Focusing on nineteenth-century science, the authors asserted that “let

nature speak for itself” became the motto of modern science. The new scientific ethos advised scientists to restrain themselves from their personal desires, “hopes, expectations, generalization, aesthetics, even ordinary language on the image of nature” (Daston & Galison, 1992, p.81). The machine was the antidote to human weakness. Technologies for visualization and mechanical reproduction, especially the photograph, were advertised as capable of seeing and capturing what flawed human senses could not grasp without bias. The authors even suggest that technologies for visualization “became the Bible for observational science.” They were able to make fossils, particles, sediments, human bodies, and forms of lives to talk without the contamination of human interference. “Images were thought least vulnerable to such subjective intrusions – protective charms against ambiguity, bad faith, and system building” (p.82). Not without irony, in the history of science, technologies for producing images begin to work as the remedy against the tendency of the human mind to forge idols, as condemned by Calvin (see Chapter 2). In this regard, machines were rhetorically constructed as allies for the preservation of human virtues and for revealing the truth. They did not only produce better observations. They were neutral. In fact, instead of offering “freedom of will,” they offered “freedom from will” (Daston & Galison, 1982, p.83).

Accordingly, in the ontology of science, what does a scientific instrument for visualization mean? Is it an untrustworthy device that only produces mechanical representation that does not have anything to do with reality or is it the only way to

overcome the biological and ideological limits of human weakness and value? Does it cheat us by making us believe in the mystical power of technologies or does the instrument produce images that are not compromised by human interpretation? The answer is neither and both. As a matter of fact, the attempt to answer this question is not quite a fruitful one. In the end, this question is irrelevant because there is no way of conceiving science without the employment of technologies (Daston, 2014; Lynch, 1991). Machines designed to generate inscriptions, to measure, to magnify the spectrum of vision, and to perform complex calculation are not simply *employed* by scientists. They are indeed part of the apparatus that constitutes what we call “science.” In this regard, technology is co-extensive with scientific investigation and argumentation. Science and technology are not distinct entities, as suggested by Feibleman (1972). Science *is* technology.

However, there is another question that is appropriate for both sociology of science and rhetoric of science that seems to be missing in these approaches towards the relationship between science and technology. To what extent do technologies have agency, as asserted by Peter Galison in *Image and Logic* (1997)? Or, to what extent are technologies designed with motives of generating certain results that will justify a scientific activity? How far can the material culture of laboratories produce ‘truth’ and ‘objectivity’ independent of the theory or worldview that guides the experiment? Directly contradicting Thomas Kuhn (and indirectly Ludwik Fleck and Kenneth Burke), who claimed that scientists started their observation with a theory in mind that would

submit experiments under its theoretical premises, Galison argues that the “momentum and motivation to experimentation” is not only driven by theory; it is a matter of trying to fit material evidence into some paradigm. In laboratories results happen, affirms Gallison. They reveal new things, no matter the intention, the worldview, the terministic screen of scientists with their revealing machines. Experiments and technologies have a life of their own, concludes Galison. Of course, it is hard to deny that Galison makes a very important point. Technologies have *some* agency. For instance, because they have an internal logic of operation, technologies demand that scientists acquire different skills to manage them. Scientists also have to learn how to interpret their codified signs and traces, and understand the complex world of representations they produce. Technologies contribute even more for what we call specialization. As pointed out by Galison, as experiments have become more and more technologically sophisticated, they also have become more expensive. Scientists are compelled to compete for public grants or private initiative. But to what extent are these machines that generate images, pictures, photographs, and inscriptions ‘naturally’ producing scientific objectivity? Because regardless the myth of objectivity and neutrality, it is also possible to consider that technologies themselves are submitted to another layer of mediation: human interpretation.

If, on the one hand, we accept that technologies are a part of what we call science, on the other hand, the relationship between scientists and machines is not without daily struggles. The search for objectivity, the manipulation of evidence, the

mediation of the machine, the control of procedures, the accuracy of the technical functioning, and also the demystification of the efficacy of these instruments permeate the discussion about the role that technology plays in the construction of scientific facts. Therefore, the examination of how technologies enter into a scientific account can bring some light to the complex ways scientists interpret the brutal facts of nature. In this study of Creation Science, the objective is not to find out if technologies are trustworthy, the best friends of scientific objectivity, or if they are mere objects for representation, misleading scientists to apprehend the real world out there.

Creationism is one of the most interesting cases in which to investigate the relationship between science and technology. It poses a unique case to demonstrate how technologies can be coerced to reveal a selective version of reality, one that is bounded by religion. In the search for scientific authority, Creationists need technologies to validate their scientific claims. However, by employing technologies to demonstrate that the Book of Genesis is in fact a book of scientific record, they maintain a relationship with technology that is not free of conflicts, nurturing all the contradictions that I have already discussed in this chapter. Of course, anyone can argue that in this regard Creationism is not very different from secular science in which researchers also need laboratorial procedures and instruments to produce (and legitimize) their hypotheses. However, Creationism resides in a more hostile and controversial environment. First, It does not hold a scientific status within mainstream science or even beyond its own community of Fundamentalist Christians. Second, in the

end, what Creationists really want is to prove the factual truth of the Gospels and, consequently, to promote their version of Protestant Christianity as the only true religion. Therefore, in order to translate the Bible into scientific facts, Creationists engage secular science in basically two different ways. First, they re-interpret the data produced by secular technology and secular experimentation. Second, they selectively choose or dismiss 'big science' technology. The selection is determined by the support that certain technologies can give to Creationist arguments. However, they also quickly (sometimes carelessly) dismiss instruments and techniques that endorsed evolution and the idea of an old and godless universe.

Therefore, Creationism does not only intersect with technology as an important actant for scientific investigation. Creationists also engage technology in a religious way. Technologies can be either an instrument for God's revelation, a way of witnessing the work He has done or, in other cases, devices for fraudulent persuasion at the service of secular and evil ideas. For example, in an article published on the Institute for Creation Research (ICR) website, Brian Thomas (2010) speculates that contemporary tracking devices, such as the UPC code, are not instruments of the devil used to track not only products, but people. For Creationists, this concern makes perfect sense since the device is interpreted in light of the Book of Revelation. According to Thomas, Revelation describes an evil ruler who pretends to be the Lord reigning on earth, but instead, his business is buying and selling goods and souls: "And he causeth all, both small and great, rich and poor, free and bond, to receive a mark in their right hand, or in

their foreheads: And that no man might buy or sell, save he that had the mark, or the name of the beast, or the number of his name” (Revelation 13:16-17).

Creationism also has a broad definition of technology. It is not only understood as machines and instruments for measurement, inscriptions, and visualization. The natural world is also comprehended as the direct product of God’s creation. Creationists broaden the definition of technology beyond its classic definition: machinery and equipment developed from scientific knowledge and technical progress for achieving specific results and mass communication. Technologies are more than machines. Insects, animals, and plants, the oceans, wind, and sun, the solar system and the universe are all seen by Creationists as examples of perfect technologies designed by God Himself. God is the great technician, the ultimate designer who created the perfect technology (the brutal facts of nature), which, once mastered and mimicked by humans, can support humankind’s rightful domination of the world.

Throughout this chapter, I demonstrate how creationists employ two kinds of technologies, and as I illustrate this scenario, I also discuss their concerns towards what they consider the dangerous use of ‘deceitful’ technologies for secular scientific enterprise. In order to do that, and only for the sake of clarity, I divide technology into four different kinds under two different categories: *technologies of precision*, which encompass “geochronological technologies,” and “technologies for visualization,” and *divine technologies*, which include “technologies for display,” and “natural technology” (Chapter 6). *Technologies of precision* are technologies used for scientific measurement

and calculation and what I call *divine technologies* are both the natural world (the perfect technology designed by God) and forms of display to make visible the mythical events described in the Book of Genesis. This chapter focuses on the first category, technologies of precision. *Geochronologies* are techniques employed to determine the age of rocks, fossils, and sediments. Since 1907, secular science has used many different geochronological technologies to determine the age of the crustal formation of the earth and fragments of bones, and in so doing to establish the geological time scale (Fig. 3.3). Among the most known are Carbon 14 (radiocarbon) and Argon-Argon (potassium-argon) dating. All of them have the affordance to reveal that this planet is much older than the time of creation established by Fundamentalist readings of the Bible, which makes this particular technology one of the most important targets for Creationist research. What I call *technologies for visualization* are machines developed to magnify vision, allowing scientists to see better, closer, and farther. I also include in this category technologies that transform samples (blood, chromosomes) into visible inscriptions, such as structure graphs produced by computer software for statistical analysis.

By highlighting the importance of technology in the Creationist account, this chapter also aims to bring together, on the one hand, the role that technology plays in the social and rhetorical construction of science and, on the other hand, the humanistic and phenomenological perspective towards technology. First, technologies (material culture in a broader sense) have agency and affect the way science comes to be.

However, we should not forget that they are intentionally used by people as powerful instruments for rhetorical persuasion.

## **5.2 Geochronological technologies and the time-construction of “collateral realities”**

In the previous chapter, I argued that *time* was one the most important actants in the secular network. In this narrative, nature and humankind did not spring up overnight. Both evolution and uniformitarianism rely on a colossal amount of time to explain how the universe and this planet developed and how humans evolved. The reason, for example, that the “Earth’s surface is heavily cratered is because it is a dynamic planet that has continuously changed during its 4.6 billion-year existence” (Wicander & Monroe, 2004, p.8). The size, shape, and the geographic distribution of continents and ocean basins have slowly but consistently changed over time. The composition of the atmosphere has changed. Life forms that exist today are different from those that lived in the distant past. Mountains, canyons, and rivers have been steadily carved by erosion. The planet is moving, changing, adapting, and evolving in a long process that began 4.5 billion years ago.

However, the secular emphasis on the action of time as a powerful agent for a long progression does not mean that Creationists dismiss the question of time. On the contrary, it is precisely because secular scientists stress so much the role of time in the constitution of the universe and humankind that the clear quantification of time

becomes an important issue and a motivation for Creationist enterprises. How can secular scientists determine the age of the universe, the solar system, this planet, and humankind? How can they believe that the universe is 13.82 billion years old when, according to the secular narrative, no human witnessed the dawn of creation? They are able to do so because they produced geochronological technologies with the function of revealing 1) that even one of the youngest creatures (humans) is much older than the time established by the biblical account and, most important, 2) that all things arose over billions of years, rather than having been created in six literal days, as Creationists interpret the Book of Genesis. Therefore, one of the most important projects of Creationists is to disclose the black box of secular technologies to measure time and promote instead a proper Christian technology: one that was developed in the seventeenth century by James Ussher, a devout Calvinist, who created a computational method with a very clear motive: to calculate the exact date and time of the act of creation, which he determined to have taken place in the year 4004 B.C., beginning around noon on October 23.

By applying a different geochronological technology to claim authority for the Christian timeline, Creationists produce not only another form of representation or interpretation. In fact, through technological mediation, they create another concept of reality, one in which God created and controls everything. In Creationism, technologies help to create the “collateral reality” described by John Law. In this case, one in which

“the monotheistic version of God is alive,” controlling everything including the fate of individuals (Law, 2014, p.338).

### **Radiometric technologies for time expansion**

Richard Overman is not a conventional scientist. Or, to put it another way, he does not have the required credentials to be called a scientist. Overman does not hold a Ph.D in any of the areas traditionally researched by big science, such as geology, biology, physics, astronomy, or geology. It is true that he holds a M.S. in science, but Overman can be considered an amateur devoted to his faith and to the investigation of the relationship between secular geochronological technologies and the age of artifacts. Overman has zealously dedicated part of his life to becoming an expert in radiometric dating technology, opening its black box, revealing its inconsistencies, and arguing that such technology is nothing but a rhetorical tool for evolutionist argumentation. Overman himself has his own motives to do that: first, the desire to promote the major principles of Creation Science and, second, to denounce that the secular geochronological technology has been used with the clear purpose of promoting the idea that the universe and mankind are older than 6,000 years.

In the previous chapter, I argued that under technological mediation, recalcitrants can tell about the distant past of this planet and humankind. Under technical scientific procedures, a single fragment of bone can answer many questions about when that animal lived, when it died, and how old was the world in which it

flourished. If, for more than one hundred years, evolution has been regarded as the only adequate explanation for the origin of plants and animals (humans included), the evolutionary and the geological accounts depend heavily on what recalcitrants can reveal. Yet, as I noted at the outset, if recalcitrants talk, they do not always say the same thing. How they respond to queries will depend on a set of variables and resources, and one of the most important of these is the difference that technology makes. The selection of one technological device over another one is already a rhetorical move. As suggested by Lawrence Prelli (1989), by choosing one procedure among other options, scientists are indeed emphasizing particular meanings and values that seem more appropriate according to their understanding of the world. Therefore, the choice of a certain technical procedure is itself a terministic orientation, a framework of logical valuing and moral evaluation.

But in this chapter, I want to investigate to what extent machines are themselves imbued with rhetorical motives. In rhetorical studies, based on Kenneth Burke's use of the term (1969), motives are usually understood as "why people do what they do," a statement that implies that motives are internal factors that prompt or cause a symbolic action (Benoit, 2006). However, if we take another of Burke's ideas – the concept of "agent" - and apply it to machines, we can say that by analyzing the agent's action (in this case, technological results), we can infer the "agency" (how the action was done) and the "motive" that prompted such action (Benoit, 2006; Foss, 2009, p.357). Moreover, we can also suggest that technologies are programmed to generate and

reproduce a certain representation of the world (what Burke calls “terministic orientation”). The philosopher Vilém Flusser claimed when he opened the black box of the camera that from the beginning, all cameras already contained all the photographs they might produce. The technology’s design disposes them to produce images within in a certain limit (Flusser, 2000). Machines are designed with an internal motive that cannot be understood as totally exempt from human intentions (Flusser, 2000). They are not neutral. They are themselves terministic screens that constrain what they can reveal. In their conceptualization, there is a motive that exists prior to action, causing results and inducing conclusions. In short, the results obtained from the use of a technology are conditioned by the way in which it is rhetorically programmed to function.

For Overman, radiometric dating is one of these rhetorically designed machines. It is a technology that has been constantly programmed and re-programmed to reveal that the universe is very old. Even when it fails to do its job, mistakes are systematically ignored in order to fulfill its reigning rhetorical purpose. And, according to Overman, this technical procedure fails more often than it achieves success. In the International Conference on Creationism 2013 (ICC) in Pittsburgh, he presented the “The Temporal Geographical and Geological Ubiquity of Excess Argon with a Young Earth Analysis,” in which he offered a literature review of more than 500 articles, published in thirty different secular academic journals that dealt with the subject of potassium-argon (K-Ar) and argon-argon (Ar-Ar) radiometric dating. His task in favor of Creationism was

Herculean. As stated by secular scientist Simon Kelley, professor of isotope geochemistry, “the ease of measurement and ideal half-life (1250 million years), for dating geological events has made this [K-Ar] the most popular of isotope dating technique” (Kelley, 2002a, p.785). K-Ar and Ar-Ar are supposedly the most accurate technology for the rhetorical argumentation in favor of evolution and uniformitarianism. In his analysis of this vast scholarship, Overman denounced a consistent anomaly presented in these techniques that, according to him, has also intrigued secular scientists (Damon et al, 1967; Kelly, 2002b): the prevalence of excessive argon in experimental results, which, for Overman, put the technique in jeopardy.

In order to understand what Overman is talking about, it is necessary first to check the historical, rhetorical, and physical premises involved in radiometric dating technology. In the second half of the nineteenth century, among geologists, the rise of uniformitarianism and evolutionary theories spawned an energetic debate regarding the age of Earth and how to calculate it. Therefore, in Burke’s concepts, in that new secular context there was an *act*, the urge to prove that the world and humankind had evolved instead of being the result of a divine Creation performed in six literal days. There was a secular academic *scene*. There were also *agents*: scientists eager to prove that evolution and uniformitarianism were not crazy speculations but verifiable and measurable scientific facts. And, no less important, there was a *purpose*: to develop technological means that could measure and, therefore, prove the old age of

recalcitrants. The discovery of the radioactivity by Henri Becquerel in 1896, and the subsequent finding of constant release of energy (radioactive decay) involved the release of provided the *agency*: how the *act* (to prove that humankind and the universe had evolved) could be accomplished. The concept of radioactive decay was believed to provide the means for comparing the natural occurrence of radioactive isotopes and their decay products by using pre-established decay rates (McDougall & Harrison, 1999, p.3). Since 1907, when Bertram Boltwood published the first work on the disintegration products of uranium, the dating of rocks became undeniably the main rhetorical technical tool for the doctrine of a very old earth and the establishment of the secular geologic time scale. Among all these developed technologies, the K-Ar and Ar-Ar dating methods became the most accurate radiometric techniques to date rocks (inorganic material) from the Cenozoic or even earlier geological strata. Finally, secular scientists could affirm that a technology of undeniable precision was able to make credible the whole idea that humans evolved from apes.

However, according to Overman (2010), these methods were never pristine. The phenomenon of excess argon started to appear in the secular literature already in the 1960s. The Creationist author cites the work of P.E. Damon, A.W. Laughlin, and J.K. Percious (1967), which reported that “some level of excess of  $^{40}\text{Ar}$  in minerals is a ubiquitous phenomenon (Damon et al, 1967, p.463). For Overman, this continuous and pervasive problem could not be categorized as an incidental anomaly anymore. The fact that the excess argon was reported in research conducted across the entire world could

only prove one thing: these methods to date rocks and fossils were not valid. In a more recent Creationist conference (2015), based on the same literature review, Overman even demonstrated on a graph that if the secular chronological system were based on the real results produced by radiometric technologies, the geologic time scale would have a different look than the one that is currently presented (fig.5). In spite of the fact that Overman does not use rhetorical concepts, based on his arguments, what he really wants to demonstrate is that radiometric dating does not produce scientific objectivity, but is used for secular rhetorical persuasion.

Overman is not alone in his zealous enterprise. Discrediting secular geochronological technology is one of the most important projects in Creation Science. Creationists regard radiometric dating is one of the most dangerous technologies for rhetorical argumentation against the Bible's records and the idea of a recent creation. By demonstrating that "evolutionists have insisted that the earth is billions of years old, as have arrogantly dismissed any views contrary to this belief," Creationists believe that, once radiometric dating is disgraced, they will be able to provide an alternative and "physical evidence that supports what the Bible says about the young age of the earth."<sup>38</sup> Therefore, for eight years, scientists associated with ICR were involved in a project called "Radioisotopes and the Age of the Earth" (RATE), whose major outcome was to produce evidence against the secular technology and promote instead their own technology of precision that supports the view of the biblical truth. As one of the

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<sup>38</sup> ICR website. Radioisotopes and the age of the earth. Available at < <http://www.icr.org/rate/> >. Retrieved from Internet on July 8, 2015.

members of this project, Andrew A. Snelling (1999), who holds a PhD in geology from the University of Sidney, also writes about the excess of argon, challenging the premises upon which this method is built and describing how results can change according to different parameters.

When muscovite (a common mineral in crustal rocks) is heated to 740°-860°C under high Ar pressures for periods of 3 to 10.5 hours it absorbs significant quantities of Ar, producing K-Ar "ages" of up to 5 billion years, and the absorbed Ar is indistinguishable from radiogenic argon ( $^{40}\text{Ar}^*$ ). In other experiments muscovite was synthesized from a colloidal gel under similar temperatures and Ar pressures, the resultant muscovite retaining up to 0.5 wt% Ar at 640°C and a vapor pressure of 4,000 atmospheres. This is approximately 2,500 times as much Ar as is found in natural muscovite. Thus under certain conditions Ar can be incorporated into minerals which are supposed to exclude Ar when they crystallize (Snelling, 1999).

Therefore, following the same objective of opening the black box of such technology in order to reveal its rhetorical motives hidden behind deceitful inputs and outputs, the Creationist Russell Humphreys, with a Ph.D in physics from the University of Louisiana, also reports that one of his experiments commissioned by the RATE project indicated that "1.5 billion years worth of nuclear decay took place in one or more short episodes between 4,000 and 14,000 years ago" (Humphreys, 2002).

According to Humphreys, the result strongly supports the Creationist *accelerated decay* hypothesis, which holds

that episodes with billion-fold speed-ups of nuclear decay occurred in the recent past, such as during the Genesis flood, the Fall of Adam, or early Creation week. Such accelerations would shrink the alleged 4.5 billion year radioisotope age of the earth down to the 6,000 years that a straightforward reading of the Bible gives (Humphreys, 2002).

Creationists aim to demonstrate that, if tested by such programmed techniques, rocks of a known age will show inflated 'radioisotope age.' In other words, by applying radiometric dating, secular scientists will achieve their goal or purpose. A young artifact will falsely reveal an excess of isotope decay: it will be considered older than in fact it is. Moreover, if scientists change the pre-established inputs (rate of decay), they will find discordant results.

“So maybe there are flaws in the way [secular] science has calculated the age of things,” teaches a video on the ICR website.<sup>39</sup> Maybe the machine does not produce objectivity. “If you go to practically any museum of natural history, they will tell you that dinosaur fossils are tens of millions of years old. But how can they be sure?” It is more accurate to say that secular scientists found what they designed to be found. For Creationists, another very renowned radiometric technique – Carbon 14 – is also questionable. Dr. Jake Hebert, a member of ICR with a PhD from the University of Texas, wonders how “coal, wood, even dinosaur bones, that are supposed to be ten or even hundreds of millions of years old,” can still contain “detectable Carbon 14 in them,” when, according to Hebert, this should not be the case. Creationist interpretation insists there is an inherent contradiction in this technology. If decay rates have been constant throughout history, as held by secular science, and these fossils are really thousand of millions old, then they should have no Carbon 14 in them. Organic materials that

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<sup>39</sup> *Institute for Creation Research* website. How do we determine age? Available at < <http://www.icr.org/creation-radiometric> > Retrieved from Internet on July 9, 2015.

supposedly are millions of years old should not contain any radiocarbon (Snelling, 2008, p.10). “But there is and that is why we think there is a problem with this method,” concludes Herbert.

But the ‘accurate’ measurement of time is not only a rhetorical question for secular science. Creationists are not disinterested in precision. As a matter of fact, in order to transform the Bible rhetorically and technologically into a book of scientific facts, Creationists need technologies of precision as much as secular scientists do to make their claims credible. After all, at the end of the day, science is in the business of measurement and precision. However, Creationists operationalize ‘precision’ in a different way. Where secular technologies of precision take facts like the decay of isotopes as a measuring point for precision, Creationists adopt another technique. Based on their own motives, Creationists maintain that the Bible contains the answer to this question. It is the ultimate technology, the trustworthy source for revealing the age of everything that was ever created. And the Bible “clearly” teaches a recent creation of both the heavens and the earth, says Henry M. Morris (1997), son of Henry Morris and current president of the ICR, on behalf of the entire Creationist enterprise. Biblical revelation must be the framework, the “constraining guide” (Morris, 1997), in seeking the final answer for the age of the earth.

Whether or not we creationists can ever come to a firm consensus on the significance of the radiometric data, we must never forget that the evidence for the inspiration, integrity, and clarity of God's word is far greater than the illusory and self-serving arguments offered by evolutionists and compromising creationists for an ancient earth (Morris, 1997).

Biblical scholars cannot accept any technology that demonstrates that the world is older than 6,000 years. According to Creationist geochronologies (Chapter 4), Creation Science scientists have found dates for the Flood ranging from 3398 B.C. to 2348 B.C. and creation between 3760 B.C. and 5555 B.C. (Lorey, 1994). One of these endorsed geochronological technologies is the method known as dendrochronology or “tree-ring dating,” the scientific technique of dating based on the patterns of “growth rings.” This method is accepted for measuring almost the exact date when a tree ring was formed. In spite of the fact that secular literature on dendrochronology has suggested that the tree-ring chronology has already covered a period of 11,000 years ago (McGovern, 1995, p.100), for Creationists, based on researches on Bristlecone pines in the White Mountains of eastern California, this technology endorses the concept of a young earth: no tree older than 4,600 years has been already found in that region of California (Lorey, 1994).

However, among Creationists, the most recognized geochronological technology is the one derived from the studies of Archbishop James Ussher, whose seventeenth-century biblical chronology creationists still accept as authoritative.

### **Ussher’s chronology for time compression**

Stephen J. Gould wrote an essay entitled “Fall in the House of Ussher,” in which he actually praises the work of the man who “had the audacity” to establish the date and time of creation at midday on October 23, 4004 B.C (Gould, 1993, p.181). At the

beginning of his text, Gould acknowledges that Archbishop Ussher “is known today to us [scientists] almost entirely from ridicule. Nevertheless, Gould proposes that in fact Ussher’s chronology must be regarded as one of the most important and an “honorable effort for its time.” Mocking him is to incur in the common mistake of using present criteria to judge a distant and different past (Gould, 1993, p.182). Of course, in his text, Gould makes clear that he does not endorse the idea of a 6,000-year-old earth, since that would make the entire scientific geological project impossible. Squeezing all “the empirical records of miles of strata and life’s elaborate fossil history” into such short span of time would require a belief in miracles as agents of transformation (p.185-86). However, “his current infamy as a symbol of fundamentalism” did not, in Gould’s view, justify the accusation that the pious Ussher was responsible for delaying the real progress in geological studies. “To accuse Ussher of delaying the establishment of an empirical geology is much like blaming a dinosaur for holding back the later success of mammals” (p.186).

In spite of his positive approach towards the work of Ussher, Gould’s arguments do not make any sense for Creationists, who continue to praise Ussher as one of the most brilliant scholars of all time (Bergman, 2014). In addition to sanctioning Ussher’s chronology, they do not support the idea that scientists have to be secular in order to get the right answers and make real science, as suggested by Gould. And, of course, dinosaurs did not delay the success of mammals, since Creationist assert that all creatures were created in those six miraculous days. Ussher is critical for the

Creationist project because, first, he is considered one of the most important scholars of his time to embrace the Calvinist idea that the Bible should be investigated in a systematic and rational way (see more in Chapter 2); second, because Creationists believe that the question of measuring time is a product of the Reformation, and finally, and most importantly, Ussher's chronology fits Creationists' main motive: to re-establish the Bible's authority on scientific matters.

In contrast to the Creationist claim, measuring time is not originally a Protestant enterprise. The concern to measure time had enjoyed a long tradition in the Catholic Church, centuries before the Reformation. Lynn White (1962) points out that, as early as the thirteenth century, "the contemporaries of St. Thomas Aquinas" were already very deliberate in their attempt to develop a mechanical timekeeper to measure time (White, 1962, p.103). Media theorists John Durham Peters (2013) and Wolfgang Ernst (2013) and the philosopher of technology Don Ihde (1999) do not hesitate in avowing that clocks and calendars were born inside the walls of Catholic monasteries to synchronize the cycles of religious life with the motions of celestial spheres. Even the project of establishing an 'exact' timeline for the most important biblical events was already part of a long medieval tradition. Long before Ussher, the scholar and English monk known as the Venerable Bede (672/673-735 A.C.) estimated the act of Creation to have happened in 3952 B.C. (Barr, 1984; Gould, 1993).

What was absolutely distinctive and unique about Ussher was his active participation in the Calvinist enterprise of transforming the Bible into a book of

scientific facts, which Gould described as a mix of religion and scientific procedures and Latour would call as a good example of a 'factish' (Latour, 1993, 2010). Ussher embraced the old Catholic tradition and modernized it. As a Calvinist believer in the total inerrancy of the Bible, Ussher was the first to attempt matching the iconic biblical events (Creation, Flood, Solomon's temple, and the birth of Jesus) to historical events. In doing so, Ussher joined the fathers of modern science for whom the Bible was not only a religious book, but also a truthful account since the day of Creation until the life of Jesus (Barr, 1984; Gould, 1993). In other words, Ussher combined biblical texts with extra-biblical sources. In this way Ussher was actually rhetorically stating that Jesus was a historical figure and the Gospels contained not only teachings, but a collection of facts. By merging biblical and historical events into one single narrative, Ussher's chronology, the technology of precision for Creation Science, rhetorically conveys the ultimate purpose of Creationism: endorsing the belief that Jesus Christ really died to save all of humankind and that Christianity is the only true religion.

In order to underline the rhetorical motivation behind the employment of such technology, I rely on the work of Oxford University biblical scholar James Barr. In his essay "Why the World Was Created in 4004, B.C.," Barr (1984) opens the black box of Ussher's chronology. While "the published biographies of the man [were] concerned mainly with his ecclesiastical and political career," Barr scrutinizes the method and premises for his chronological calculations. "Modern works on biblical chronology may mention him but they make no attempt to understand him" (Barr, 1984, p.575). In

order to fill this gap and to understand this complex piece of machinery, Barr dove into a massive, bound volume of 2,000 pages of Ussher's Latin. The tome had remained ignored by readers in Oxford's Bodleian Library, its pages even uncut since issuing from the publisher's press until Barr undertook to make visible how Ussher's technology worked (with all its contradictions).

Whereas secular technologies of precision take isotope decay rates as a measuring point of precision, Creationists adopted a technology that offered different entries of measurement and precision. The means of measurement endorsed by Creationists were selected to accommodate the major Creationist motive: to validate the historicity of biblical events. According to Barr (1984), Ussher developed a complex computational method to craft his biblical/historical timeline. First, he established his inputs: historical parameters that could help him to determine important dates in the Bible and information contained in the Bible that could assist him to parallel the biblical events with historical records. Traditional Christian calculations had supposed that Jesus was born 753 after the founding of Rome. Before him, another Calvinist, the French religious scholar Joseph Justus Scaliger (1540-1606), had placed Creation in 3950 B.C. He adopted Scaliger's finding that Herod the Great had died in 4 B.C. Therefore, since according to the Gospel of Matthew Herod was still alive when Jesus was born, the birth of Jesus should go back to 5-4 B.C. "Hence, the date of 4004 B.C. for creation gave a more or less exact period of four thousand years from creation to Christ" (Barr, 1984, p.578).

Another important biblical input was the construction of Solomon's Temple. According to the Book of Kings, "in the four hundred and eightieth year after the children of Israel were come out of the land of Egypt, in the fourth year of Solomon's reign over Israel, in the month of Zif, which is the second month, he began to build the house of the Lord" (1 Kings 6:1). But the Bible posed some problems to determine this exact date. The Bible, as a measurement point, began to show serious problems in its inputs and outputs. Some parts of this black box do not work very well. For example, it does not provide any information about the span of time between the Old and the New Testaments. Moreover, the time in the Old Testament only moves forward and the New Testament moves in both directions (backward and forward). Ussher needed to fill this gap by combining both testaments in order to establish one linear and continuous timeline. To facilitate his work, he created another abbreviation to describe this linear time since the Creation that only moved forward (A.M. = *Anno Mundi*) in opposition to the Catholic Christian calendar that moved backwards (B.C. = Before Christ) and forwards (A.C. = After Christ). By Ussher's calculation, the temple had commenced in 2993 A.M., or 2993 years after the creation of the world, and was completed in 3000 A.M., therefore, 1,000 years before the first coming of Jesus.

By then, Ussher was aware that the Bible was presenting some technical problems. It could not provide an exact chronology by itself. But Ussher sought scientific and historical precision. He needed to synchronize the biblical events (such as the Exodus and the construction of Solomon's temple) with extra-biblical data. Ussher

made clear which profane event was a temporal landmark for him: the death of the King of Babylon Nebuchadnezzar II and his succession by his son, Amel-Marduk. In order to determine these dates, Ussher used as historical source the texts written by Titus Flavius Josephus (37-c.100 CE). According to this classical tradition, the death of Nebuchadnezzar II had occurred in 563 BCE. The event was relevant to Ussher because it could actually be matched with the Bible. II Kings 25:27 states that in the year that Evilmerodach of Babylon became king, it was also the “thirty-seventh year of the exile of Jehoiachin king of Judah, in the twelfth month, on the twenty-seventh day of the month.” This synchronism provided an entry for Ussher to relate other biblical events to the non-biblical record. Accordingly, he established that Nebuchadnezzar had died in the year 562 B.C.

But Ussher found another obstacle in his enterprise: the Jewish calendar, which is not the same than the Christian calendar. For instance, the current year 2015 in the Christian calendar is counted by Jews as 5775, which would place the creation in 3761 B.C. Ussher could not fit all the historical events into an even smaller span of time. When Ussher conducted his synchronized calculations (the construction of the temple, the Persian Empire, Alexander the Great, and Julius Cesar), there was not enough room for the Persian Empire, for example. In spite of his commitment to the inerrancy of the Bible, he concluded that the Jewish scriptures contained many errors. For example, it assigned either 52 or 32 years to the Persian Empire, which Ussher knew by classical studies had lasted just over two centuries. As an educated and modern scholar, Ussher

found that following scripture by itself was not possible if he was to establish a consistent dating of events. The day of creation had to be set before the Jewish date of 3761 B.C. Moreover, if based on Jewish information, the Flood would have happened in 1652 A.M. while according to the Septuigint (the Greek translation of the Hebrew Bible produced by Jewish scholars during the third century BCE), the deluge took place in 2242 A.M. In the Hebrew text Adam was 130 years old when Seth was born, but in the Greek text he was 230 (Barr, 1984, p.582). Therefore, Ussher decided to ignore the Jewish account (which, in fact, could be understood as the original text) and focus only on the Christian translation.

Barr expounds that Ussher had also to do another important concession in order to create his 'exact' and definitive Christian chronology. Scaliger had already identified a problem in the biblical chronology in his *De emendatione temporum* (1583), considered the foundation of the Christian scientific chronology. Regarding the Flood, the Bible contained contradictory dates. Genesis 11:10 stated, "two years after the Flood, Shem [Noah's son] was 100 years old, he became the father of Arphaxad." Based on the biblical account, Ussher knew very well that Noah was 500 years old when "he fathered Shem, Ham and Japhet" (Genesis 5:32). He was 600 years old when the Flood began (Genesis 7:6). And Ussher also knew that Noah entered the Ark with his entire family at the same time. Barr points out that Ussher and Scaliger's troubles reside precisely from different translations of Genesis 11:10 and Genesis 11:11 ("Shem was an hundred years old, and begat Arphaxad two years after the Flood"). For many theologians, Shem was

one hundred years old when the Flood *began* and not when his son was born, two years after the Flood. Ussher decided to end this theological debate. He came up with a solution: Japhet was born when Noah was 500 years old and Shem was born two years later, which means that Shem was 98 years old when the Flood began and 100 years old when he became father.

Barr points out that the resolution of this two-year-discrepancy is not only important to demonstrate that Ussher's chronology is different from any previous biblical timelines. It shows how Ussher dealt with contradictions in a book he regarded as an accurate book of facts. Barr contends that these many concessions, personal interpretations, and adaptations to fit historical events into the biblical account suggest that the Bible could never be used as a precise source to calculate when historical events had actually happened. As Barr demonstrated elsewhere, the Bible cannot be understood as one single book but is rather a library, a collection of books that were written, translated, modified, and subtracted throughout the complex and dynamic histories of Judaism and Christianity (Barr, 2002). However, regardless of all the contradictions, Ussher believed that the Bible was a fully infallible chronological guide. He did not want to know only the exact year of Creation. Ussher wanted to know the exact day and hour. After years of exhausting intellectual work, he determined that the act of Creation had happened in 4004 B.C., on a Sunday noon, on the day of October 23, which became Day One on the Creationist timeline. In the same way Creationists understand recalcitrants as passive matter that only obeys God's will (chapter 4),

Ussher bent historical and biblical events to produce the appearance of chronological precision.

In spite of so many historical and biblical contortions, for Creationists, there is no reason to deny scientific authority to Ussher's work and not to use its chronology as a framework for scientific research, which only emphasizes that their rhetorical motive (to confirm the Bible as a historical and scientific book) is more important than objective accuracy. For instance, John D. Morris (2003) and Jerry Bergman (2014) lament that Ussher's chronology lost its place as the primary investigative tool to determine the age of the universe and recalcitrants. Bergman reminds us that until recently, nearly all printings of the King James Bible included Ussher's dates in the marginal notes, which helped Christians to place biblical events in their chronological and historical context. Now, even Protestant bibles seem to be part of the secular conspiracy to eliminate confidence in the biblical record. Belief in the assumptions behind Ussher's chronology has been confined only to Creationist circles. Bergman (2014), a human biologist by Columbia Pacific University, does not see any reason to ridicule the work of James Ussher and insists that it is high time to restore conviction in his chronology.

Ussher was a first-class scholar very involved in scholarly research. He regularly interacted with the most learned men of the day to intellectually savor their ideas. He was also a real connoisseur of books, and there was scarcely a book in any British library that he was unfamiliar with (Bergman, 2014).

To defend the authority of Ussher's achievement, Bergman even distorts what Gould said about the archbishop by selecting sentences out of context, in order to transform rhetorically the latter into an advocate for Ussher's chronology. Bergman states that "Gould determined that Ussher's chronology was an 'honorable effort for its time' and argued that the common ridicule only reflects a 'lamentable small-mindedness based on mistaken use of present criteria to judge a distant and different past'" (Bergman, 2014).

Among Creationists, Ussher's geochronology is not only still used to determine a timeline in which all the geological and biological events must fit. Creationist researchers such as Anne Habermehl, who holds a BS in chemistry from the University of Waterloo, continue Ussher's practice of matching historical facts with biblical events, but now not only to create a geochronological tool, but to prove scientifically that biblical events and historical facts are indeed the same thing. At the Creation Research Society Conference (2015), Habermehl emphatically asserted that the best way to terminate evolution for once and for all is not through geological and paleontological works but through history. In her presentation, "Dating the Ipuwer Papyrus on the Biblical Versus Secular Timelines," Habermehl came with an object and an argument that is very common in Creationist circles (websites, articles, and blogs): the famous Ipuwer Papyrus contains an ancient Egyptian poem, which describes an Egypt afflicted by a series of natural disasters followed by a state of chaos.<sup>40</sup> Habermehl (and many of her Creationist fellows) insist that this poem is a historical document that describes the

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<sup>40</sup> A similar argument on the same object was published by Alan Montgomery on *Lambert Dolphin's Library* website on April 5, 2001. Available at < <http://www.ldolphin.org/montgochron.html> >

biblical Exodus, which happened after the ten plagues that the God of Israel miraculously inflicted upon Egyptians.

In mainstream science, the precise date of the papyrus is still debated. It is believed that the papyrus could not be earlier than the nineteenth dynasty (c. 1292 – 1187 B.C.), “although there are sufficiently strong indications that the scribe used a manuscript of which the history of transmission may go back to the beginning of the eighteenth dynasty” (c. 1543 – 1292 B.C.) (Seters, 1964, p.13). However, John Van Seters, a secular scholar in Hebrew Bible and the Ancient Near East at the University of North Carolina, offers another interpretation. He points out that first conclusions were only because the manuscript shares literary style with another text – *Prophecy of Neferty* – from the same period. Seters proposed another possible date based on more than only style and rhetorical genre: the chaotic social and political period of the thirteenth dynasty (c. 1803-1649 B.C.) (Seters, 1964, p. 1964). Habermehl suggests another method for dating the document (Ussher chronology) and proposes an alternative interpretation. She claims that once the secular timeline is synchronized with the biblical timeline, the date of the Ipuwer manuscript will match exactly the date of the mythical Exodus and, as a consequence, will also provide a powerful testimony to the biblical account of the divine plagues and the chaotic aftermath.

By using Ussher’s method, Habermehl came up with her own version about when the papyrus was produced. In order to match both timelines and fit the biblical and the papyrus’ events into Ussher’s chronology, she suggests that the 6<sup>th</sup> and 12<sup>th</sup>

Egyptian dynasties must have ruled concurrently (respectively in Upper Egypt and Lower Egypt) and also ended at the same time for the same reason: the chaos that followed the plagues and the Jewish exodus. “This means that the Exodus pharaoh [whom she demonstrates was Amenehat IV] reigned near the end of the 12<sup>th</sup> Dynasty, ruling the northern (Lower) Egypt; while at the same time Pepi II near the end of the 6<sup>th</sup> Dynasty was ruling in southern (Upper) Egypt” (Habermehl, 2015). She continues her hypothesis by affirming that, on the one hand, “we know that Exodus pharaoh (in the north) drowned in the Red Sea.” On the other hand, historians ignore the fate of Pepi II. Habermehl suggests that he was a firstborn and therefore died in the night of the tenth plague. “It is probable that Pepi II probably was a lesser pharaoh who ruled under the auspices of the 12<sup>th</sup>-Dynasty in the north.... Egypt may have been ruled by two pharaohs for the most of its history” (Habermehl, 2015).

It is not because Creation Science does not accept the idea of a billion-year-universe that time is not relevant or plays no role in Creationism. In fact, to prove scientifically that the age of the universe and humankind must be only 6,000 years is a very important matter for biblical apologetics. However, instead of being expanded, as in secular science, in Creationism, time is compressed, forcing historical events to fit into a very small space of time. And as in any science, it is unconceivable to measure time without the assistance of technologies--in this case, a technology that, on the one hand, works rhetorically by condensing time in a very short scale and, on the other hand, has the power to constrain what any other technology can reveal.

### 5.3 Technologies of visualization: “chart and compass came from thee”

What do we see when we look at the sky? Does the sky reveal itself to us by its own merits or isn't the sky necessarily mediated by technologies of visualization? Did the mythical Adam envision the same firmament that we contemplate in the dawn of the twenty-first century, an age marked by telescopes and interplanetary space probes? Is it even possible to consider the existence of a sky absolutely 'natural'? After all, hasn't the sky always been the seen through layers of mediation such as religious ideas and expectations? A meteor is an omen rather than merely a vaporizing bit of nickel. In medieval and Ptolemaic cosmology, the earth was seen as an immobile object at the center of the universe. All the heavenly bodies (the sun, moon, planets, and stars) travelled in uniform, circular, and perfect orbits around the earth.<sup>41</sup> In 1493, thanks to the affordances of the new printing press, the scholar Hartmann Schedel published his most famous work, the Nuremberg Chronicle, which was adorned with 1,089 woodcuts, in which he described and pictured the ages of the world since Creation. In one of the illustrations, we can see the map of the universe (Fig. 5.2). Having accomplished his tasks, God rests in His glory above all, in Heaven, contemplating His work. It is the seventh day. The picture of the universe is complete. Under God's feet rotates the cosmos that He put in motion on the fourth day of Creation. From both sides of His throne, and protecting this finite and cosmic bubble, we can see the nine orders of

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<sup>41</sup> *Encyclopedia Britannica* website. “Ptolemaic System.” Retrieved from Internet < <http://www.britannica.com/topic/Ptolemaic-system> >

angels, listed on the left. From all around the world, the cardinal winds blow establishing the orderly location of this divinely restrained universe.



Figure 5.2: Creation of the World, Chronicle of Nuremberg. Illustration by Anton Koburger, 1493.

Around one hundred years after Schedel published his book, Galileo sparked a revolution with the assistance of the telescope and prepared the path for the picture of another sky, the one in which the sun was the center of the universe as formulated by Nicolaus Copernicus (1543). Technology transforms and shapes our experience, states Don Ihde (Ihde, 1999, p.49). It affects the way we see. No matter if the technology is a religious book believed to contain the word of God or a lens for magnifying visions,

what we envisage is affected by technological artifacts. Technologies change our perception of natural phenomena and how we conceive the appearance of the world. Right now, if we close our eyes and try to form a picture of the universe, very likely we will not see a dark and enclosed mantle scattered with bright dots or fourteen rings surrounded by a horde of angels. We will see nebulae, galaxies, supernovas, the rings of Saturn, the red and dusty surface of Mars, the mountain ranges of Pluto, or the infinitude of a universe that is much bigger and much older than our solar system. Moreover, we will presume that neither the earth nor the sun is the center of the universe. In 1929, Edwin Hubble mathematically demonstrated that the universe was created billions of years ago and has been expanding ever since. Either there is no center for this expansion or we can say that the center will change according to our standpoint. In the rhetoric of secular science, we live amidst an uncertain time and in an indeterminate position in an unfinished universe. There is no fixed point from which we can explain everything and assume that things will remain the same.

Therefore, if we need to establish a center, a point of departure, I agree with Ihde (1999) when he suggests that the best way of approaching the investigation of technologies is to adopt the metaphor of a sailor, which suggests that each starting point implies a different perspective. Or, in other words: it implies a different rhetorical motive. "The navigator, in the very midst of the sea where both boat and sea are in motion, must take bearings, find a direction, and locate both himself and his destination" (Ihde, 1999, p.10). The navigational perspective implies that no matter if in

constant movement, in order to find a direction it is necessary first to establish a reference point. Only then will it be possible to trace a trajectory.

So, what is this reference point, this orientation screen? Why, in science, as in some sort of religious revelation, is it so important to see what cannot be seen by the naked eye? And regarding motives and purposes, what do both secular and Creationist sciences need to visualize in order to make visible, to prove their respective claims?

Like everyone else, Creationists live in a world surrounded by increasingly sophisticated technologies of visualization that demonstrate rhetorically in new ways every day that the universe is immense and the planet earth is not the center of it. In the mainstream scientific environment, Creationists encounter information produced by technologies of higher precision whose motives are to support evolution and the idea that we live in very old universe, in which we are only a tiny and insignificant part. Quite often, media outlets announce new projects and discoveries that enhance the strength of the network of the recognized secular paradigm. But no matter what technologies demonstrate and what kind of calculations they perform, Creation Science provides another interpretation for the visible data. Creationists have their own point of departure, their own direction, trajectory, and their own motives to interpret what they see. Their reference point is their interpretation of the Bible. In the very midst of the sea where both boat and water are in endless motion, Jesus is their pilot. The boat, like the Ark, is a good metaphor for such rhetorical purpose. As the nineteenth-century hymn says: "Jesus, savior, pilot me. Over life's tempestuous sea; unknown waves before

me roll, hiding rock and treacherous shoal. Chart and compass came from thee: Jesus, Savior, pilot me.”

**Telescopes, microscopes, and inscriptions: “search me, O God, and know my heart”**

On March 21, 2013, the European Space Agency (ESA) published a new image of anisotropies of the cosmic microwave background (CMB) produced by the Planck space telescope (Fig. 5.3).

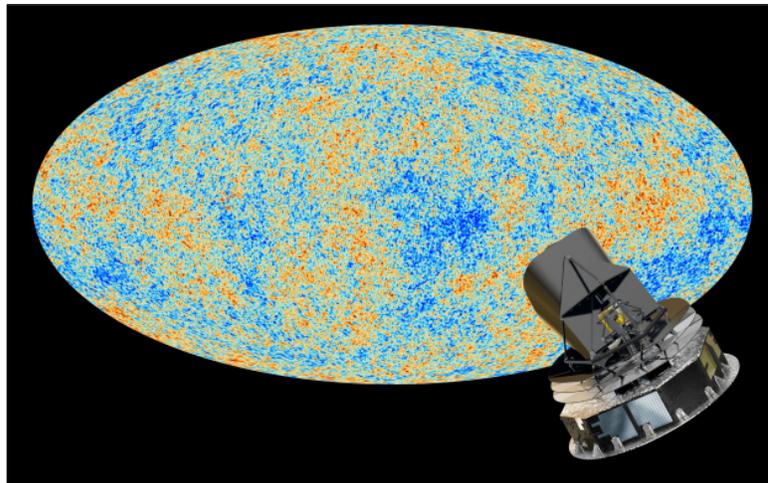


Figure 5.3: Anisotropies of the Cosmic Microwave Background. Telescope: Planck.

Anisotropy of the CMC consists of small temperature fluctuations in the blackbody radiation left over from the Big Bang. I will not go in details about the parameters and technical procedures (the “blackboxing”) for this kind of measurement but, according to the ESA website, the Planck telescope was able to capture a “snapshot of the oldest light

in our Universe, imprinted on the sky when the Universe was just 380,000 years old.”<sup>42</sup> It is a glimpse of the early universe in the process of formation. The tiny temperature fluctuations correspond to regions of slightly different densities. In this image, the colorful pixels represent the “seeds of all future structure: the stars and galaxies today.” The Planck probe, almost miraculously, took a picture of a very distant past. But not for Creationists. In an article posted April 3, 2013 on the ICR website, Jake Hebert praised the technology but fiercely criticized the secular interpretation of this. The image “is the highest resolution images of the CMB to date,” he said. The Planck probe’s ability to detect tiny temperature fluctuations (around a millionth of a degree Celsius) in the CMB “is certainly technologically impressive.” In order to measure these puny fluctuations, “the satellite’s detectors were cooled to the incredibly low temperature of just a tenth of a degree above absolute zero (about -273 °C),” explained Hebert. This picture, with its unprecedented richness in details, caused such impact that it led the “Big Bang cosmologists” to revise numbers that are important for their claims. After this experiment, they in fact increased the estimated age of the universe to 13.8 billion years old (Hebert, 2013).

In his article, Hebert echoed the repercussion of this groundbreaking experiment on media outlets. Newspapers praised a technology that could capture the unexpected. The secular technology had agency, after all, and, as suggested by Galison (1997), it had produced ‘truth’ and ‘objectivity’ independent of the theory, motives, or worldview that

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<sup>42</sup> *European Space Agency* website. “Planck and the Cosmic Microwave Background.” Available at < <http://sci.esa.int/planck/53108-planck-and-the-cosmic-microwave-background/> > Retrieved from Internet on July 13, 2015.

had guided the experiment. *The Telegraph*, for example, first stated that the image was an evidence for the Big Bang event. Therefore, the idea of an old universe was safe. Then, the newspaper pointed out that the mediated image “also contains subtle differences which contradict elements of the Standard Model of cosmology, meaning theories will have to be tweaked” (Collins, 2013). The *Time* also reported that the ESA noted that some of the unexplained features in the CMB may “well require new physics to be understood” (Paramaguru, 2013). In spite of rhetorically reinforcing the truth of the secular theory about the origin of the universe, “the extraordinary quality of the Planck data reveals the presence of subtle anomalies in the CMB that might challenge the very foundations of cosmology,” affirms another report published by the ESA.<sup>43</sup> For Hebert, it was no surprise that, to be fully understood, such advanced technology would require the “new physics” to “challenge the very foundations of cosmology.” However, for him, there is a more important point that apparently secular journalists and secular scientists are missing. Among so many admitted anomalies and so many necessary revisions, this new data cannot be said to confirm the Big Bang. Instead of revising the very premise of their major hypothesis (a very old universe), “Big Bang cosmologists” insist on fitting the contradictory data into an old theory, as described by Kuhn (2012 [1962]). Instead of agency, it is better to say the technology has some sort of delegated agency to make visible what is already prescribed by the terministic orientation of secular scientists.

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<sup>43</sup> *ESA Science & Technology* website. “Simple but Challenging: The Universe According to Planck.” Available at <http://sci.esa.int/planck/51551-simple-but-challenging-the-universe-according-to-planck/> Retrieved from Internet on July 13, 2015.

For Hebert, Bible-believers should not fear new and more sophisticated technologies of visualization. To the contrary, they should welcome the technologies developed by unbelievers and use them to Creationists favor. High tech devices will reveal the anomalies present in secular theory about the creation of the universe and humankind. They will provide access to what godless people cannot see. For Creationists, the problem is not with the essence of the technology per se, but with the social and secular construction of science and technology. “Higher-resolution data can only spell ‘bad news’ for those seeking to explain our existence apart from our Creator” (Hebert, 2013).

The same can be said about the microscope. Some years ago, when looking through her microscope at the bone of a *Tyrannosaurus rex*, Mary Schweitzer, a paleontologist from North Carolina State University, found what was not supposed to be there: soft tissue. At first, Schweitzer could not believe in her eyes. “I looked at the scope, and backed up, and I looked at the scope again. And I said, ‘Jen [Wittmeyer, a lab technician], this is not possible. That is not a microbe, that is an osteocyte [a type of cell found in bone].”<sup>44</sup> Schweitzer had discovered for the first time a star-shaped cell found in an ancient bone that supposedly could not live longer than the organism itself (fig. 5.4). In other words, she had found what was supposed to be absent in the bone of an extinct animal that evolutionary theory insisted lived millions of years ago. But

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<sup>44</sup> *NC State News*. Dr. Mary Schweitzer. Interview available at < <https://news.ncsu.edu/2011/11/dr-mary-schweitzer/> > Retrieved from Internet on August 14, 2015.

contradicting all scientific logic, what the paleontologist was seeing under the lens of her microscope was

Soft tissues and cell-like microstructure derived from skeletal elements of a well-preserved *Tyrannosaurus rex* (MOR 1125) were represented by four components in fragments of demineralized cortical and/or medullary bone: flexible and fibrous bone matrix; transparent, hollow and blood vessels, intravascular material, including in some cases structures morphologically reminiscent of vertebrate red blood cells; and osteocytes with intracellular contents and flexible filopodia (Schweitzer et al, 2007, p.183).

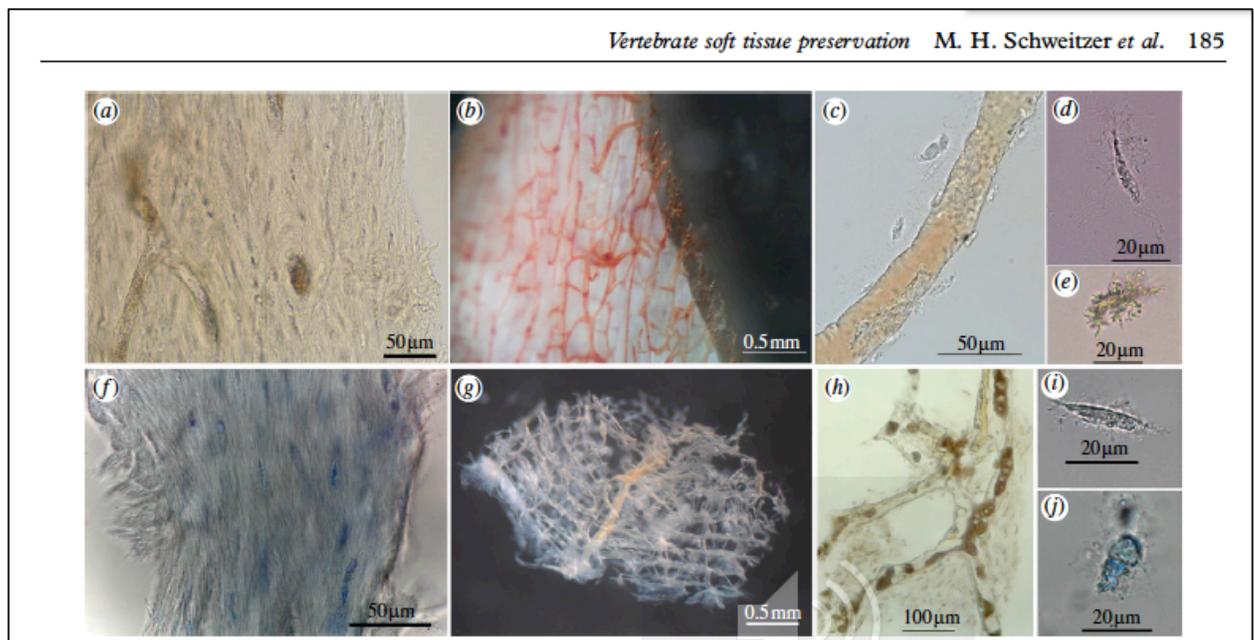


Figure 5.4: Illustration of tissues and cells in Mary Schweitzer’s article (2007).

By “flexible,” Schweitzer meant that once stretched, the tissue could return to its original shape. “It just does not seem possible,” she said in another interview.<sup>45</sup> “I can’t explain it, to be honest.” With her discovery, Schweitzer buried many years of secular

<sup>45</sup> *NBC television*. Interview with Mary Schweitzer. Video uploaded on August 25, 2011 on YouTube. Retrieved from <https://www.youtube.com/watch?v=6hhsx80P1PQ>

scholarship. Her findings challenged everything scientists thought they knew about the resilience and survival of cells.

Schweitzer is not only a prominent scholar among paleontologists. The implications of her research also make her a star in Creation Science circles. Many articles have been written about her research in Creationist journals and websites. In the Creationist Research Society Conference (2015), an entire plenary session entitled “The Real Jurassic World” was dedicated to present her work. Carl Wieland (2005), founding editor of *Creation* magazine, compelled readers to “step back and contemplate the obvious” presented in her amazing discovery: “It is inconceivable that such things can be preserved for (in this case) 70 million years.” Being a fossil, there should have nothing left. However, if the secular terministic screen with its interpretative framework of millions of years was set aside, another explanation for the presence of soft tissues could emerge: dinosaurs are not million of years old, but “were buried during a recent and major watery catastrophe,” that took place no more than 5,000 years ago (Thomas, 2009).

Precisely for this association between soft tissues and the idea of a very young earth, journalist Barry Yeoman (2006) called Schweitzer’s findings “a dangerous discovery.” “Rhetoric like this has put Schweitzer at the center of a ranging cultural controversy, because she is not just a pioneering paleontologist but also an evangelical Christian,” wrote a very suspicious Yeoman. But that does not surprise Creationists. Carl

Wieland framed the disbelief of secular scientists reevaluating their motives as the myopia of their theoretical presupposition:

Unfortunately, the long-age paradigm [evolution] is *so* dominant that facts alone will not readily overturn it. As philosopher of science Thomas Kuhn pointed out, what generally happens when a discovery contradicts a paradigm is that the paradigm is not discarded but modified, usually by making secondary assumptions, to accommodate the new evidence (Wieland, 2005 – *italics* in the original).

For example, in spite of Yeoman’s suspicion of her alleged faith, Schweitzer did not even consider the idea that dinosaurs could have lived in a more recent past or co-existed with human beings. Having reported that she could not understand how the preservation could have happened, after her findings, her next research project was dedicated to finding out what chemical and/or physical factors could have contributed for the conservation of soft tissues. In other words, she presumed the accuracy of evolutionary theory’s dating of dinosaurs. And as predicted by Wieland (2005), Schweitzer found a theoretical explanation that could suit the secular paradigm of the scientific community of thought. She concluded that, contradicting common knowledge, proteins (and maybe DNA) can survive for millions of years if under very specific conditions: “oxygen interactions investigated...explain the association of iron with many exceptionally preserved fossils and the enhanced preservation of tissues, cells and molecules over deep time” (Schweitzer et al, 2014, p.7).

Kevin Anderson, director of CRS Van Andel Creation Research Center, did not agree with Schweitzer’s final explanation. In his keynote lecture at the CRSC 2015,

Anderson pointed out that Schweitzer conducted her experiments under very specific conditions, in a highly ordered laboratory environment with controlled temperature and procedures. In order to preserve secular rhetorical motives and, consequently, to deny the most visible evidence for a young earth, he contended, the paleontologist only conducted a virtual and hypothetical inspection of the preservation of the dinosaur's tissue. Anderson, who is also the Principal Investigator for the CRS's iDino Project, proposes to create a Creationist model to interpret the same material and visual evidence revealed by Schweitzer. The aim of the iDino Project is to provide a Creationist answer for Schweitzer's question: "how were such fragile biomolecules preserved in these so-called ancient fossils?"<sup>46</sup> For Creationists, the answer is obvious for those who already accepted the Bible as God's words and Jesus as the Savior. However, for those who still do not believe, the biblical framework must be proven by scientific procedures. Anderson believes that continued technological examination will provide even stronger material evidence for the fact that dinosaurs did not live million of years ago, co-existed with humans, and their fossils were buried due a global and violent cataclysm: the Flood.

Creationists know that – at least rhetorically - science is made of measurement, precision, and technologies of visualization. In order to produce factuality, it is necessary to go beyond words and ideas. It is crucial to generate inscription and

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<sup>46</sup> *Creation Research Society* website. iDino – Investigation of Dinosaur Intact Natural Osteo-Tissue. Available at < <https://www.creationresearch.org/index.php/current-projects/item/87-idino-investigation-of-dinosaur-intact-natural-osteo-tissue/87-idino-investigation-of-dinosaur-intact-natural-osteo-tissue> > Retrieved from Internet on August 14, 2015.

images, and also to offer a technical interpretation of them. Creationists insist that secular scientists are very good at developing technologies for visualization but they outwardly ignore how to interpret what they see and the data they get. Take another hi-tech example: the Human Genome Project (HGP), proposed and funded by the government of the United States, and still one of the biggest international scientific enterprises in the history of modern science. In 2003, the HGP could finally determine the DNA sequence of the entire reference human genome. But the project did not end in 2003. With the engagement of prestigious universities, such as Harvard, Stanford, Yale, and University of Southern California, the HGP exceeded its primary goal. With the generated data, “clinical researchers at the National Human Genome Research Institute (NHGRI) are leading a new era in medicine - one where a more profound understanding of the biological basis of disease will pave the way for more effective ways to diagnose, treat and prevent illness.”<sup>47</sup> And, of course, “These accomplishments required the development and improvement of novel technologies and an active program to support technology development.”<sup>48</sup>

One of the outcomes of such technological enterprise did not please Creationists: the research project that conducted a comparison between human and chimpanzee chromosomes, whose conclusions were published in the article “Genomic Structure and Evolution of the Ancestral Chromosome Fusion Site in 2q13-2q14.1 and Paralogous

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<sup>47</sup> *National Human Genome Research Institute* website. Clinical Research. Available at < <http://www.genome.gov/10000331> > Retrieved from Internet on August 15, 2015.

<sup>48</sup> *National Human Genome Research Institute* website. Overview of the Extramural Research Program. Available at < <http://www.genome.gov/12010633> > Retrieved from Internet on August 15, 2015.

Regions on Other Human Chromosomes” (Fan, Y. et al, 2002). According to this study conducted by a team of scientists from the Division of Human Biology at the Fred Hutchinson Cancer Research Center, “human chromosome 2 was formed by the head-to-head fusion of two ancestral chromosomes that remained separate in other primates,” as demonstrated in this graph below (Fan, Y. et al, 2002, p.1651) (Fig. 5.5).

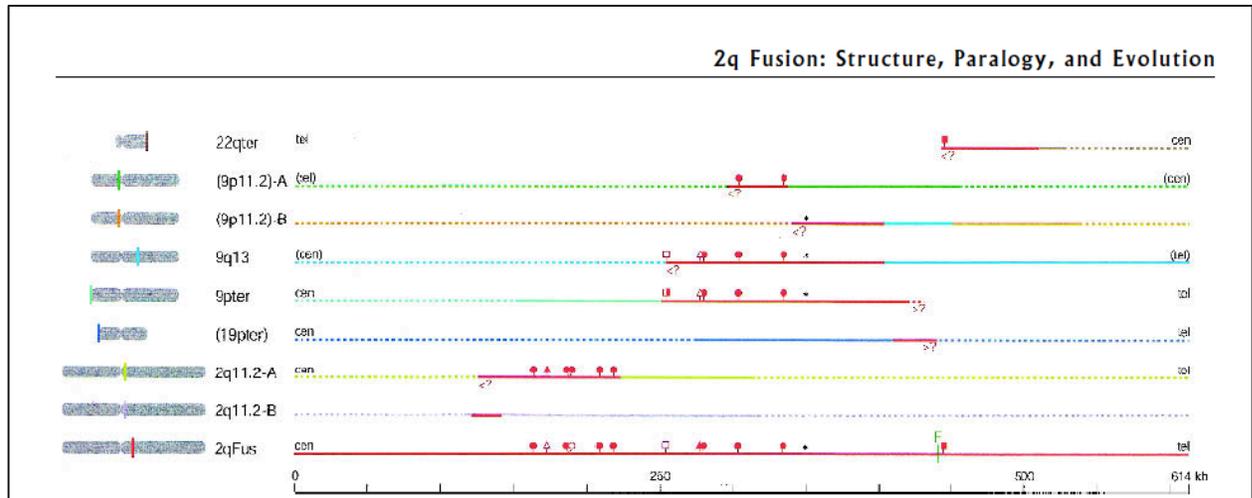


Figure 5.5: Graphic that represents the summary of regions of homology with portions of the 614-kb sequence surrounding the fusion site on 2q13-2q14.1, published in Yuxin Fan et al.’s article.

In this rhetorical figure of science, “for simplicity, only one of the sequences with homology with only the 68-kb region immediately surrounding the site fusion is shown.” Red solid lines indicate the regions with more than 95% average identity to the 2qFus sequence. Red dotted lines designate adjoining regions with no available sequence. Different colors are used to show divergent sequences, with solid lines “indicating the extent of contiguous sequence coverage, and dotted lines indicating either unavailable sequence or neighboring sequence that lacks homology with any other segments shown” (Fan, Y. et al, 2002, p.1655). According to the authors, what we

graphically see led the research team to conclude that “this fusion must have occurred after the human-chimpanzee split, but before modern humans spread around the world,” that is, between one and six million years ago (Fan, Y. et al, 2002, p.1657). In short, they conclude what secular scientists have been saying: once upon a time, humans and chimpanzees shared the same DNA sequence, but chance, natural selection, and evolution in action made human chromosomes to fuse producing a structure different from theirs. The research added further powerful evidence for the evolutionary network.

Jeffrey Tompkins, who holds a Ph.D. in Genetics from Clemson University, has challenged this conclusion. In a paper presented in the ICC (2013) in Pittsburgh, Tompkins countered that in “a preliminary study,” in which he compared “40,000 chimpanzee genomic sequences against the human genome,” he found that “levels of human-chimp DNA similarity were significantly lower than commonly reported” (Tompkins, 2013). In an article published in *Answers Creation Journal*, he presented another interpretation for the same data and graphics published by Yuxin Fan and his colleagues, one in which the “chromosome fusion model” theory is only a matter of incorrect interpretation (Fig. 5.6).

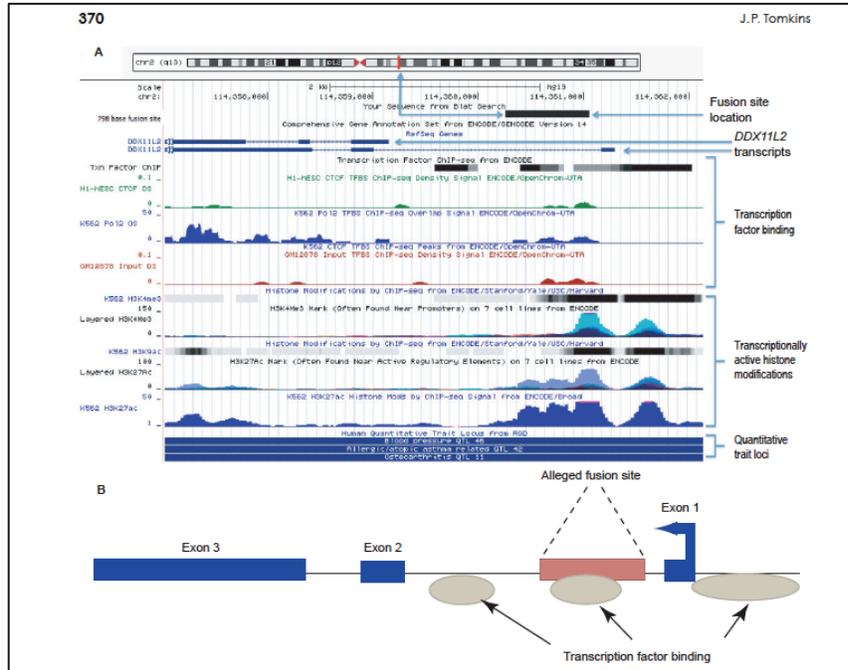


Figure 5.6: ‘A’ represents “UCSC genome browser data showing selected gene connotation and ENCODE-related tracks for the DDX11L2 gene locus with the 798 base fusion site positioned within the locus using BLAT.” ‘B’ represents a simplified version of graph ‘A.’ (Tomkins, 2013).

As Latour (1987) argued, when controversies “flare up” in science, the conversation becomes more and more technical and graphics more indecipherable. It is when the power of rhetorical figures and technical terms becomes even more important. As controversies go on, “the more we are led to into what are called ‘technicalities.’” In order to be persuasive, scientists “start using texts, files, documents, articles to force others to transform what was first an opinion into a fact.” The more scientists dissent with one another, the more the scientific literature becomes technical, and therefore absolutely inaccessible to lay people (Latour, 1987, p.30). Creation scientists are not exempt from this rhetorical strategy. By presenting technical research and conclusions

for an audience composed largely of amateurs and people with different expertise, it is hard to find anyone able to refute the black box produced by technological inscriptions. Without peers who share the expertise, obscure interpretations are even more impenetrable. For an audience untrained in the expert language of a highly specialized scientific field, number, lines, dots, colors, and all forms of technological inscriptions mean nothing, working instead as magical tools for constructing scientific authority.

When presenting his article for an untrained audience at CRSC 2015, Tompkins did not spare the technical terminology to demonstrate that humans and chimpanzees could not be related. He claimed that the idea that “ape chromosomes 2A and 2B purportedly fused end-to-end, forming human chromosome 2” as argued by Fan et al. (2002) is a colossal mistake and the result of a misinterpretation. The claim is postulated “despite the fact that all known fusions in extant mammals involve satellite DNA and breaks at or near centromeres” (Tomkins, 2013, p.367). In addition,

researchers have noted that the hypothetical telomeric end-to-end signature of the fusion is very small (~800 bases) and highly degenerate (ambiguous) given the supposed 3 to 6 million years of divergence from a common ancestor. In this report, it is also shown that the purported fusion site (read in the minus strand orientation) is a functional DNA binding domain inside the first intron of the DDX11L2 regulatory RNA helicase gene, which encodes several transcript variants expressed in at least 255 different cell and/or tissue types.... Chromosome fusions would not be expected to form complex multi-exon, alternatively spliced functional genes. This clear genetic evidence, combined with the fact that a previously documented 614 Kb genomic region surrounding the purported fusion site lacks synteny (gene correspondence) with chimpanzee on chromosomes 2A and 2B (supposed fusion sites of origin), thoroughly refutes the claim that human chromosome 2 is the result of an ancestral telomeric end-to-end fusion (Tomkins, 2013, p.367).

Perhaps Tomkins has a point. A secular scientist trained as a geneticist would be able to answer his claims or even advise him to publish his arguments in a secular peer-reviewed journal, which might bestow on his claims the rhetorical power of scientific legitimacy (Latour, 1987, p.15). Yet owing to the complexity of technical inscriptions, it is difficult for non-experts to know what is valid or not in Tomkins assertions. Unless, of course, in reality, all the rhetorical scientific strategies to demonstrate the truth of the biblical records are only used to embellish what is supposed to be faithfully and blindly accepted. In that case, Tomkin's performance was little more than a ruse to provide comfort and certainty for those who want nothing more than to secure what they already believe—their own worldview, beliefs, and values – their terministic screen.

It is true that by employing scientific rhetorical visual strategies and data interpretations, the ultimate purpose of Creation Science is not only to offer another paradigm for the creation of the universe and humankind, but also to demonstrate the universal validity of the Christian Gospels. Secular scientists are subject to a blindness that Creationists find aptly described by Saint Paul: “the god of this world hath blinded the minds of them which believe not, lest the light of the glorious gospel of Christ, who is the image of God, should shine unto them” (2 Corinthians 4:4). In an article published in *Acts & Facts*, Ken Ham, founder of *Answers in Genesis*, draws attention to what he considers illogical and inconsistent about secular science. Secular scientists have the most powerful and sophisticated technologies to reveal the mysteries of the universe and they still they cannot see. They can contemplate the complexities of the human DNA

and the cells of every living creature through the lens of their atomic force microscopes. They can visualize the universe and observe the galaxies, planets, and stars orbiting in harmony without collision. But whether they are gazing outward at the universe through telescopes or peering into tiny cells through microscopes, they remain blind to the Christian truth. “They will look at this and say ‘chance,’ [refusing] to accept the possibility that the God of creation has spoken of in the Holy Scriptures is that Intelligence—the infinitely intelligent God of creation.” Why? To accept the Creationist paradigm “would mean that this Creator, the Lord Jesus Christ is Lord over them. They would have to kneel and worship Him and accept responsibility for their sinfulness and their need for salvation” (Ham, 1992). But Creationists believe that regardless of what scientists see through their technological apparatuses, one day all evidence will lead people back to the Book of Genesis and Christianity. God and the Book that *is* His word are the only trustworthy technology for revealing the truth. Ham concludes: “these scientists can use their telescopes and electronic equipment but the Scripture remains true” (Ham, 1992).

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In the next chapter, I will scrutinize the role that *divine technologies*, which includes “technologies for imagination and display,” play to turn into material forms what existed only in the pages of the Book of Genesis, such as museum settings that display pre-historical times or computer simulations of outer space. It is important to emphasize that the distinction between *technologies of visualization* and *technologies of*

*imagination and display* is much more for helping me to develop my arguments than a strict separation of two different kinds of technologies for “seeing.” Very often, it is hard to draw a definitive line between what is visualization from what is a technology of pure imagination, such as computer simulations of the universe produced by NASA. On the one hand, technologies for visualization, such as the spacecraft New Horizons that took pictures of Pluto, boost our ability to imagine (make an image of) the universe out there. On the other hand, video simulations derive from what was previously produced by technologies of visualization. For example, based on actual data captured and sent back from the Kepler space observatory, NASA could create an artist’s concept video that depicts one possible appearance of the planet called Kepler-452b, the “first near-Earth-size planet in the ‘habitable zone’ around a sun-like star.”<sup>49</sup>

Finally, I call technologies of imagination “divine” because they make visible, concretizing the mythical and miraculous events described in the Bible. They materialize with richness of detail what is only scantily suggested in the pages of the Book of Genesis.

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<sup>49</sup> *NASA website*. Gallery of videos. Available at < <https://www.nasa.gov/multimedia/videogallery/index.html> >. Retrieved from Internet on July 5, 2015.

### Divine Technology: How God Created Dinosaurs and People

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The first chapter of the Book of Genesis describes how God created all things. In the beginning, we read, God created heaven and earth. But the earth was still shapeless and dark, so God created light. God saw the light was good, so He divided light from darkness. And God also decided that there would be a firmament between the waters, so He divided the waters that would be under and above the sky. And God saw it was good. God also gathered the waters under the firmament and made the dried land to appear. He called the water ‘seas’ and the dried land, ‘earth.’ On the third day, He created seed-bearing vegetation and trees. And God found that this was really good. Next, God created the whales, fishes, and all the living creatures that moved and could fly. And God blessed them by saying “be fruitful, and multiply, and fill the waters in the seas, and let fowl multiply in the earth” (Genesis 1:22). So God populated the earth with all kind of species from the cow to the “creeping thing, and beast of the earth” (Genesis 1:24). And God made the first human couple in His own image. God ordered that they should have dominion over “the fish of the sea, and over the fowl of the air, and to every creepeth upon the earth, wherein there is life, I have given every green herb for meat” (Genesis 1:29-30). And, finally, God contemplated His entire Creation, “and behold,” it was very good (Genesis 1:31). This was the sixth day and God had created everything is

its final and perfect form. He thought He could finally rest. But humankind did not behave according to God's plans.

The consequence of the original couple's transgression became clear later, in chapters 7 and 8 of the Book of Genesis, where God commanded Noah to "come into the Ark, you and all your household, because I have seen that you are righteous before Me in this generation" (Genesis 7:1). God also ordered that Noah should take seven of every clean animal, a male and his female, and two (a male and a female) of animals that were unclean. Noah was responsible for gathering all the birds in order to keep them alive in the face of the destruction of the entire earth. The Bible indicates that Noah followed all the directions established by the Lord. And then the catastrophe came. The waters increased and raised Noah's ark very high above the earth. The depth of the water of the divine Flood was "fifteen cubits upward." All "the mountains were covered." But the ark kept moving safely over the surface of the water, carrying its precious cargo (Genesis 7:20-21). As a result, all the creatures, all men and women who were not inside the vessel, died. God destroyed all the living things that He had created: the cattle, the creeping things, the beasts, and the birds in the air. "Only Noah and those who were with him in the ark remained alive" (Genesis 7:21-23). The Flood prevailed on the earth for 150 days. At the end of this period, the waters decreased. Humankind had another chance and the earth was repopulated.

I belabor this long summary of the two major geological events (the Creation and the Flood) described in the Scriptures for two reasons. First, chapters 1, 7, and 8

of the Book of Genesis directly inspire the way Creationists engage what I call “technologies of imagination” to represent Nature (with capital N) and their notion of reality. Second, based on their interpretation of the narrative of the six-day creation, Creationists explain how they understand “Nature.” After creating each element of the universe, God pronounced that nature “was good.” For Creationists, repeating the assertion has a clear rhetorical purpose. The recurrence of this short sentence implies that when God created all the living forms, He did not expect that they would have to evolve to be eventually perfect. *They were created in their perfect and final form.* Therefore, since nature was created in its final form, evolution has no place in the Creationist understanding of Genesis. Moreover, as discussed throughout this investigation, Creationists insist that all major geological transformations, ‘modern’ animal distribution, and the survival of humankind were decided in one single big cataclysm.

However, in spite of all the efforts to prove scientifically that God created the world from scratch in six literal days and that one single man could have alone saved humanity and all living things from divine wrath, controversies in this account remain and need to be rhetorically solved. If the first chapters of the Bible provide an incomplete and, not rarely, contradictory record of how the universe was created, “Nature” is invoked in order to settle what is supposed to be the correct narrative.

Throughout my investigation, I have described rhetorical and technological strategies employed by Creationists to transform the messy, chaotic, and random world

into an ordered one, a world in which chance plays no role. But their tactics are not over yet. In the end, it is necessary to give “Nature” (the direct manifestation of God) a voice to show what is real by ironing out the inconsistencies in the Creationist representation of the world.

Bruno Latour calls “Nature,” with a capital N, the last precinct for scientific claims. Nature, he says, is the final appeal.

It is Nature who always arrives late, too late to explain the rhetoric of scientific texts and the building of laboratories. This belated, sometimes faithful and sometimes fickle ally has complicated the study of technoscience until now so much that we need to understand it if we wish to continue our travel through the construction of facts and artefacts (Latour, 1987, p.94).

And Nature, the ultimate plea, is brought to scientific argumentation through the rhetorical and technological strategies adopted by natural science museums (Latour, 1987). Regardless of how many Creationist books and articles have been written, how many papers have been presented in conferences, and how many institutes for Creation Science research have already been founded, as with any science the task of defining reality is not yet finished. Science museums work as privileged places to speak on behalf of Nature, closing any further controversy about how things were believed to have happened (Latour, 1987; MacDonald, 1998; Prelli, 2006). That is their rhetorical motive. In the Creationist cause, natural history museums, such as the Creation Museum, are constructed to state the voice of God/Nature, which can be found in the Bible. Natural history museums serve as technologies that seal up the black boxes of

Creationism by displaying a definitive picture of what Creationists understand as biblical reality.

Genesis chapters 7 and 8 ground my discussion in what I call “technologies of imagination.” In this chapter, I analyze the material, technological, and rhetorical enterprise of the Creation Museum and the Ark Encounter Project in Kentucky. Both places aim not only to make real, but also to materialize what is actually only barely suggested in the Book of Genesis. For example, the Creation Museum has an entire section dedicated to the representation of the mythical Garden. Visitors can learn visually the Creationist interpretation about Creation and how they envision the Eden. This section shows how all the animals lived together in perfect harmony in a tropical climate before Adam and Eve disobeyed God’s commandment and were expelled from Paradise. But materializing the pages of the Bible is not the only Creationist rhetorical motive of “technologies of imagination.” In fact, they employ them to re-write the Scriptures by displaying scenes that do not exist in the biblical narrative. Or, put in Latourian terms, the Creation Museum and the Ark Encounter work as milieu for resolving ambiguities, gaps, and anomalies presented in the biblical account. They provide details to explain logically what is tersely described in the Book of Genesis. For instance, the Ark Encounter creates a full-scale representation of “the actual ark” to show what kind of material, tools, and skills were employed by Noah and his family to construct the vessel. It meticulously describes rooms and artifacts. The project also represents the lifestyle and the appearance of the inhabitants inside the ark.

Therefore, the use of the word “imagination” seems right to me. To imagine is to “see” what is beyond what is immediately present to our senses. But the work of imagination is not only an internal faculty (Morgan, 2015, p.5). It happens in visual and material form in movies, theaters, and entertainment parks, but also in places such as natural science museums. Hence, imagination is not only the realm of fantasy or fake idols, as scorned by the Reformation theologian John Calvin (1995 [1536]), but also the way people experience a sense of reality. When we go to a natural history museum and visit the section on human origins, the ape-like creatures are not perceived as the product of an imaginary past. They *are* humans’ ancestors. That is the way Nature talks, and “whoever has Nature in their camp wins, no matter what the odds against them are” (Latour, 1987, p. 94). The slogan of the *Creation Museum* - “prepare to believe ” – refers precisely to this feature of technologies of imagination. Because we see it, it must be true. However, in both secular and Christian projects, seeing is more than simply to believe. It is to prove scientifically that that we share our genetic code with that ape we see represented inside a window or that the ark was actually constructed. Making them visible is to make them possible.

Nonetheless, there is a problem in reproducing materially what is described in the Scriptures. This problem resides precisely in the Book of Genesis. Even the most careful readers will not find details about the materials and tools that Noah and his family used to construct the Ark. Neither they will find any clue to how Noah fed the animals during the long period of the Flood – 371 days according to John Whitcomb and

Henry Morris (Whitcomb & Morris, 1962, p.3). The Genesis also does not specify how Noah could conceive and develop such a complex project. Neither does it tell how he could bring a pair of all animals to the Ark (remember that huge carnivorous dinosaurs were also there). Therefore, in order to explain materially what is not in the Scriptures, Fundamentalist scientists have to produce all kind of theoretical speculation about the Book of Genesis. Contradicting their supposed commitment to “biblical inerrancy,” they have to cross the boundaries of the Bible’s literal content. In order to engage the religious book in a scientific enterprise, Creationists have in fact to re-write the Book of Genesis in order to prove that the construction of the Ark was feasible in biblical times. Providing what the Bible does not say relies on what I call “technologies of imagination:” full-size and small replicas, sketches, animatronics, 3-D projection, videos, dioramas, and even theater to bring to life, to make real what was previously ignored or simply assumed. Of course, I am not suggesting that only Creationist natural history museums do such a thing as “imagine” reality. As I show in this chapter, secular scientific enterprises for imagining the distant past do the same thing. They also have their ways of smoothing over controversies and filling in gaps by employing algorithmic or imagistic simulations of reality. However, Creationists have a different goal. They must prove that the Bible – the ultimate source of authority – is indeed a book of facts. Therefore, it is fundamental to demonstrate that Noah and his Ark are not only the products of a mythical narrative. It really happened. He constructed a vessel that carried all the animals and gave humankind a new chance to prosper and multiply. In

order to prove that the Ark could have been built, Creationists need to prove its feasibility. They have to make it plausible. They have to come up with hypotheses of how the Ark was constructed, which materials were available at that time and employed for its construction, and what kind of technological skills and devices were used to keep that massive vessel, carrying all kind of animals that must be fed, functionally operating for more than one year. Only after developing such theories, is it possible to come up with a design to support the construction of a trustworthy and credible replica. Creationists believe that if a replica can be built based on scientific and technological principles, they will demonstrate that the Ark was not imaginary at all, but a conceivable idea. In order to be real, it is not enough to have faith. Nor is it enough to consider the contents of the Holy Book as scientific records. If it is science, it must be capable of being materialized.

However, in order to materialize what is not totally described in the first chapters of the Bible, Fundamentalist Christians have to re-write the Scriptures, filling in all the gaps that exist in the mythical narrative. They have to rely on reasonable and creative solutions that be translated into the material display of the Creation and the Flood. If, as I said before, Creationists do not invest considerable financial resources in actual research, they certainly invest substantial funds and effort to demonstrate materially what is only minimally depicted in the Book of Genesis. "Because you have seen me, you have believed," said Jesus to a skeptical Thomas (John 20:29). With that in mind, I move to the last technology discussed in this project, which I call technologies of

imagination: technologies that are in the business of revealing what, in fact, no one was present to witness.

## 6.1 “Technologies of Imagination:” filling the gaps in scientific accounts

Between November 9, 2012 and December 31, 2015, *The Field Museum* in Chicago, one of the most important natural science museums in the world, hosted a special exhibition on the Ice Age. On the museum’s website, the exhibition is described as an “exciting 3D adventure” that by means of three-dimension technology will allow visitors to take a detailed look at what happened 2.6 million years ago. *The Titans of the Ice Age 3D*, as it was called, promised to reveal that “icy world on the brink of extinction, where humans share the frozen tundra with majestic beasts.” With the assistance of a motion picture that enhances the illusion of depth perception, visitors will “*encounter* some of the Earth’s most awe-inspiring mammals, such as “the saber toothed cats and dire wolves” that went extinct 10,000 years before modern civilization (*italics added*). The announcement also assured that guests would have the chance to “*meet*” their “ancient ancestors who were, at that time, developing art, language, and hunting skills as they sought to understand and survive in the harsh world around them” (*italics added*). “Titans of the Ice Age 3D is an unforgettable journey back in time that you won’t want to miss.”<sup>50</sup>

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<sup>50</sup> *The Field Museum* website. Titans of the Ice Age 3D. Available at <http://www.fieldmuseum.org/at-the-field/exhibitions/titans-ice-age-3d>. Retrieved from Internet on September 18, 2015.

In another 3D attraction, “The Waking T. rex 3D: The Story of Sue,” the museum promised an “exciting 3D film experience” about the story of the world famous *T. Rex* named “Sue” that “stands guard over the halls of The Field Museum” (fig. 6.1). So far, much of the story of Sue, who lived 67 million of years ago, was unknown. But this was about to change. “Its life has been a mystery to us...until now.” “Sue” was the world’s greatest predator, and finally, with this 3D experience, the viewers would know more about her story.



Figure 6.1: “Sue” at the entrance of The Field Museum, Chicago, USA.

Visitors were able see Sue in full action, hunting its prey and swallowing “100-pounds of flesh and bone in one bite.” The announcement for this magical (virtual) window on a scary past continued: “dare to come *face-to-face* with this roaring, earthshaking, and breathtaking *T. rex* like never before” (italics added).<sup>51</sup>

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<sup>51</sup> *The Field Museum* website. “Waking the T. rex 3D: The Story of Sue.” Available at <http://www.fieldmuseum.org/at-the-field/exhibitions/waking-t-rex-3d-story-sue>. Retrieved from Internet on September 18, 2015.

3D technology is not the only technology of imagination employed by the Field Museum in order to en flesh the spotty evolutionary record and to seal the black boxes of secular science. The same “Sue,” the most complete and best preserved *T. rex* fossil ever unearthed, was also brought to life through lifelike animatronics in celebration of her 10<sup>th</sup> anniversary. But Sue is not the only fossil used to create material representations of a certain notion of scientific reality. In order to materialize the distant past of this “evolving planet,” when no humans were present to testify, the museum also offers interactive displays, animatronics of other kinds of dinosaurs, dioramas with full-size replica of animals, and videos.<sup>52</sup>

*The Field Museum* is not an exception in the adoption of such visual strategy for validating scientific worldviews. The *American Museum of Natural History* in New York possesses the most important collection of dinosaurs and vertebrate fossils in the entire world. But it is not only for his collection of fossils that the museum attracts an audience of 5,000,000 people every year.<sup>53</sup> The museum is also in the business of providing cutting edge technologies of imagination. Total, it contains six halls to represent visually the story of vertebrate evolution. According to information on its website, the museum public’s favorite hall is the one that contains the *T. rex* and the *Apatosaurus*. There, the “tallest free-standing” dinosaur in the world is displayed in a

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<sup>52</sup> *The Field Museum* website. “Evolving Planet.” Available at <http://www.fieldmuseum.org/about/press/evolving-planet>. Retrieved from Internet on September 18, 2015.

<sup>53</sup> *American Museum of Natural History* website. 2014 Annual Report. Available at <http://www.amnh.org/about-us/annual-report>. Retrieved from Internet on September 19, 2015.

way “to reflect current scientific theory about dinosaur behavior.”<sup>54</sup> In this hall, it is also possible to see a tableau vivant in which an enormous mother *Barosaurus* tries to protect her calf from an attack of an *Allosaurus*. In another hall, the Hall of Human Origins, four life-sized tableaux materially represent the behavior and capabilities of *Homo ergaster*, *Homo erectus*, Neanderthals, and Cro-Magnons (fig. 6.2). Or, at least, the behaviors and capabilities that secular scientists suppose they had. The “Mural of Primate Evolution” shows vignettes from 50 million years of primates “with detailed depictions of early primates and habitats.” Moreover, “a panorama in five parts features major events in primate evolution.”<sup>55</sup>

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<sup>54</sup> *American Museum of Natural History* website. “Organizations”. Available at <http://www.nyc-arts.org/organizations/54/american-museum-of-natural-history>. Retrieved from Internet on September 18, 2015.

<sup>55</sup> *American Museum of Natural History* website. “Mural of Primate Evolution.” Available at <http://www.amnh.org/exhibitions/permanent-exhibitions/human-origins-and-cultural-halls/anne-and-bernard-spitzer-hall-of-human-origins/mural-of-primate-evolution>. Retrieved from Internet on September 18, 2015.



Figure 6.2: Anne and Bernard Spitzer Hall of Human Origins. American Museum of Natural History, New York, USA.

The employment of visual strategies to materialize and render sensory the distant past, which is in a large sense unknown, is a common feature in natural science museums across the world. As a matter of fact, the more technologies for display develop, the more museums use all sort of devices to represent visually what otherwise would be only suggested in textbooks, scientific, and technical articles. Dioramas, animatronics, full-size tableaux, videos, 3-D technology, and replicas are among the technological devices used to display what is accepted as scientific fact and what is legitimized by 'Nature.' Steven W. Allison-Burnell (1998) has noted that in science museums representations only rely on technical research for the sake of scientific authority. "The actual process of creating public exhibitions bears no resemblance to the process of generating the knowledge they portray" (Allison-Burnell, 1998, p.77). It is more a creative and artistic process than a scientific one.

The scholarship in the field of museum studies (including science museums) is vast (Bennett, 1995; Crane, 2000; Dickinson et al., 2010; MacDonald, 1998; Pearce, 1992; Roberts, 1997). Its scope not only encompasses the history of this sort of institution, but also forms of display (Anderson, 1998; Crimm et al, 2009), the fundamentals of collection management and preservation of artifacts (Rose et al., 1995), educational purposes (Chadwick & Stannertt, 1995; Falk & Dierking, 1995), and the important role that places for displaying public memory or scientific facts play in our society. It is precisely because natural science museums are regarded as legitimate institutions to present scientific facts that they cannot be exempt from political, social, and cultural consequences. Displays, such as those found in *The Field Museum* and the *American Museum of Natural History*, unveil worldviews represented as “truths” behind, in, and through what is visually and materially revealed. As Victoria Gallagher (2006) has pointed out, the rhetorical examination of such places and their artifacts can explain not what “is,” but, in fact, what “comes to be” through networks of materiality.

For the museologist Sharon Macdonald (1998), there is an intrinsic relation between what is exhibited and notions of scientific authority. The investigation of the act of representation can disclose the motives behind these symbolic dramas. As Kenneth Burke (1969) stated, the selection of a certain form of display is already a deed, a motive, an “act of faith, with the definition or interpretation of the act taking shape accordingly” (Burke, 1969, p.84). Therefore, even if broadly conceived as places for the pure and objective display of scientific truth, museums of science in fact create

powerful rhetorical spaces that intend to prove, make manifest (showing valued artifacts), and enact *their* concepts of truth.

However, in this section, it is not my intention to go through a long literature review on the role of power and authority that museums play in contemporary society. Other scholars have already done so with competence (Bennet, 1995; Crane, 2000; Dickinson, Blair, & Ott, 2010; MacDonald, 1998; MacDonald & Fyfe, 1996; Prelli, 2006). I am more interested in the way material and technological artifacts are employed rhetorically to bring forth an imagined world. I call these material and technological artifacts “technologies of imagination:” technologies designed to provide the experience of “encountering face-to-face” extinct animals or “meeting” remote ancestors, whose rhetorical motives make vivid and tangible a certain version of reality. Technologies of imagination are technologies used to create the illusion that we are looking at the past, witnessing how things really happened, when, in fact, we are looking at only a technological projection based on one (among many) possible interpretations of the past. For Bruno Latour (1987), natural science museums are in reality in the business of creating visual and material constructions of what is understood as scientific fact. They rhetorically and technologically display a certain concept about the origin of the universe, the humankind, and geological transformations, as these concepts were unquestionable and the definitive truth. Regarding all these technological tools employed by the most prestigious science museums in the world to make visitors to see and, therefore, to believe in their version of the past, Latour has an opinion: there is

nothing more ridiculous than imagining a real dinosaur invading a natural history museum to be compared with its plastic model (or animatronics or 3D film projections).

In this regard, it is not fair to consider the *Creation Museum* and the *Ark Encounter* project as ridiculous aberrations while secular science museums are the sacred vessels of scientific truth. In the way they are materially organized, the Christian enterprises do not differ much from their secular counterparts. One can easily argue that the latter is actually based on material evidence and the former is only based on what is allegorically and vaguely described in the first chapters of the Christian Scriptures. However, I argue that in essence both secular and Christian enterprises parallel one another in this regard. On the one hand, secular natural science museums construct complex, three-dimensional narratives based on bits of material evidence and many scientific inferences. Through the analysis of fossils and artifacts, secular scientists have to come up with plausible scientific hypotheses to describe what extinct animals looked like, how they moved, what they ate, how they hunted, and even the sounds they produced. By the investigation of scattered pieces of bone, secular scientists also elaborate stories of how humans evolved. They propose a specific time in which these hominids took their first steps as bipedal beings. They form theories about the primitive production of artifacts and how these primitive humans used them. Scientists also propose hypotheses about ancient social interactions and notions of collective order. By scrutinizing primitive paintings in caves, secular scientists conjure entire stories about what beliefs, religions, and values might have been held by the

people who created the drawings. Put together, these hypotheses are materialized in secular science museums.

On the other hand, biblical institutions, such as the *Creation Museum* and the *Ark Encounter*, build their narratives based on bits of biblical literature, fossils and artifacts, and, like secular scientists, much creativity and theoretical speculation. Creationists have to come up with plausible theories about the pre-Flood world that was (according to their worldview) totally destroyed by the deluge, leaving no vestige behind. What did this world look like? What kind of people inhabited that world? What kind of religion did they have? What sort of music did they listen to? What kind of clothing did they wear? In what kind of social structure did they live? Moreover, how could Noah construct the Ark, a wooden vessel able to survive the violent waters of the Flood and safely carry all those animals? What kind of lumber and tools did he use to construct the craft? How could Noah possibly fit all those animals into the ark? And even more basic questions about the daily routine inside the vessel: how did Noah and his family feed the animals and deal with all their waste?

Consequently, the rhetorical motive of Creationist enterprises is not very different from reputable secular natural science museums: they want to provide explanations for the story that is not completely told. While secular scientists have to come up with theories about a world that no longer exists, Creationists have to fill all the gaps in the biblical account. In order to provide plausible explanations about the Christian idea of the past, they actually re-write the Scriptures, adding more

information than is to be found in the text. But re-writing the sacred text is not enough. Like secular institutions, for the sake of scientific authority, it is crucial for Christian museums to make visible their version of history. Creationists also want to promote a face-to-face encounter with extinct animals and make the viewer “meet” what they consider our remote ancestors, in this case, Adam and Eve and Noah and his family. Creationists employ sophisticated technologies to create the illusion that we are looking at the real past, when in fact, we are looking only at their own interpretation of it. Similar to secular museums, the purpose of Creationists is to translate their theoretical framework into material and demonstrable facts. By employing technologies of imagination, Creationists want us to see, and by seeing, to believe that humans did not evolve from ape-like forms, but are direct descendants of Adam and Eve. By constructing a massive, full-scale ‘replica’ of Noah’s Ark, they want to prove that all geological transformations occurred during and after a horrendous cataclysm that erased from the surface of the earth all but what was carried aboard the ancient ship.

Therefore, in this section, I argue that Christian Fundamentalists are not only scientifically reinterpreting the Bible. The more they transform the Bible into a record of facts, the more they have to expand the biblical narrative. The more they invest in projects of imagination, the more they force the boundaries of the inerrancy of the Bible. Ironically, Creationists are in fact re-writing the Scriptures, using creativity and technologies of imagination to craft what is an increasingly non-orthodox version of Sacred Writ.

## 6.2 Re-writing the biblical narrative with technologies of imagination

In 2007, Beth Mull, a senior editor of the Institute for Creation Research, wrote on the ICR's website: "True science has a new ally. *Answers in Genesis* CEO Ken Ham's vision of a science museum that supports biblical truth became reality." Mull was referring to the opening of the "high-tech" *Creation Museum* in Petersburg, Kentucky, a 75,000 square-foot complex that cost U\$ 30 million. At its opening, "over 4,000 people experienced the... family-friendly exhibits that include startlingly lifelike animatronic figures, dioramas, and presentations that contrast Creationists' and evolutionists' markedly different interpretations of the scientific data concerning life and the universe." The museum's goal, continued Mull, is to provide evidence of the Bible's inerrancy. In spite of all the negative criticism and dismissive approach towards the idea of a young earth creation, when visiting the museum, people were "surprisingly evenhanded," especially with the "high quality and advanced-technology displays" that earned positive reviews from news organizations (Mull, 2007). By "advanced-technology displays," Mull was referring to different technologies of imagination in the *Creation Museum*. For instance, at the entrance of the museum, visitors will be amazed by an impressive big dinosaur. Surrounding this replica, along the walls, animatronic dinosaurs move beside children in a paradisiac place composed of artificial waterfalls and lush vegetation (fig. 6.3). The setting tells visitors that dinosaurs were part of the pre-Flood world where they co-existed peacefully with human beings.



Figure 6.3: Main Hall at the Creation Museum in Petersburg, Kentucky, USA.

In another hall, “Garden of Eden,” people go back in time to learn how the mythical paradise looked – or at least, how it is imagined by the designers of the *Creation Museum*. Amidst luxuriant vegetation with fresh flowing water, flowers, and fruit trees, Adam is surrounded by all creatures created by God (fig. 6.4).



Figure 6.4: "Garden of Eden" at the Creation Museum, Petersburg, USA.

Adam tenderly holds a sweet, white lamb that apparently has no reason to fear its natural predators present in the same scene. Felines, kangaroos, big horn sheep, foxes, chimpanzees, and a penguin materially convey the Creationist worldview: God created all "kinds" of animals (not species) in the first days of creation. In the mythical Garden, animals and the first couple lived together, in peace, inhabiting a temperate, constant climate, whose ideal physical conditions produced an environment of abundance where no competition for food was necessary (seemingly, all the animals were vegetarian). The chimpanzee is there, under Adam's control and domination, to demonstrate that the idea that humans evolved from apes is unconceivable. The penguin rhetorically validates the idea that different kind of animals are not the result of a long process of

adaptation to different environmental conditions (such as cold or extremely hot weather), but they were created simultaneously by God in their final and perfect form.

In the same hall, visitors learn that God gave Adam a companionship: Eve (fig. 6.5).



Figure 6.5: Adam and Eve in the “Garden of Eden” at the Creation Museum.

The idyllic scene between a naked man and woman in a pond has a rhetorical function. In order not to miss the intended message, a banner explains that “the special creation of Adam and Eve is the foundation of marriage: one man and one woman.” As the Fundamentalist Christian movement is characterized by moral crusades against what is nowadays understood as the evil forces of liberalism, this setting is rhetorically constructed to oppose to the idea that same-sex marriage should have the same legal status as heterosexual matrimony.

This section also displays the tree of life, Adam and Eve’s temptation by the serpent, and the consequent Fall. Visitors follow the journey of the outcast couple, now having to earn their food by the sweat of their brow (Genesis 3:19). Adam must plant

and harvest the fruit with the toilsome work. Eve, pregnant, will suffer the pain of childbirth, as described in Genesis (Genesis 3:16). Murder will be a reality in this new world, as demonstrated by the body of Abel at the feet of his brother, Cain.

In the Creation Museum, as demonstrated in previous chapters, technologies of imagination are everywhere. In chapter 3, I described how Lucy and the replicas of her bones are displayed to confirm the Creationist story in contrast to what everyone knows about evolution. Chapter 4 demonstrated how in the Creationist account dinosaurs are used to tell a very different story: when they went extinct (if indeed they are extinct), they were not very old, coexisting with *all species* that God created, including human beings, who were there since the beginning to testify to their existence. In Creationism, Nature is and acts differently from the secular account (see Chapter 4). Yet, in spite of all the technologies of imagination present in the Creation Museum to settle what Nature is supposed to be, I want to focus particularly on the section entitled “Ark’s construction site.” I do so for two reasons. First, because Creation Science (or Flood Geology) is totally grounded in the existence of a global, divinely executed deluge, as described in the Book of Genesis. Strange as it may seem, it is important to understand that young-earth Creationism would not exist without the conviction that Noah literally constructed a colossal ark as his Lord had commanded (Genesis 7:5). Believing in a universal Flood, in a gigantic vessel that carried animals of all kinds, and that one man and his family were responsible for this herculean enterprise constitute the very foundations of Creation Science. Second, it is the design,

construction, and operation of the Ark that requires more free interpretation, more scientific speculation, and consequently, generates more controversies about its plausibility. Therefore, it is necessary to re-write and proffer the 'inerrant' contents of the Bible. Genesis only provides a few clues about the Ark. For instance, it is said that God ordained Noah to make himself a vessel of gopher wood. God also specified that the Ark should have sealed rooms. "Rooms shalt thou make in the ark, and shalt pitch it with and without with pitch" (Genesis 6:14). Additionally, God stipulated the vessel's size. "The length of the ark shall be three hundred cubits, the breadth of it fifty cubits, and the height of it thirty cubits" (Genesis 6:15). The size sounds impressive, though the proportions fail to describe a seaworthy craft. Yet the biblical author added further details to complete the reader's mental image. God told Noah that the Ark should have a window finished to a cubit from the top and a door was to be set in the side. The vessel should contain three floors (Genesis 6:16). At the end of this narrative, it is said that Noah did exactly what God instructed (Genesis 6:22).

But how did he? How could this man, who lived in a desert region 4,000 years ago, construct a massive vessel? If, according to the Book of Genesis, God told Noah specifications about the materials (Genesis 6:14), size (Genesis 6:15), and the cargo (Genesis 6:18-21), the Scriptures do not provide any information about the process for constructing the ark or how Noah made it work. Therefore, it is at the Creation Museum and the Ark Encounter that we have the opportunity to look closely at the task of providing the missing pages of the Scriptures, sealing the controversies about the Flood.

However, in order to do that, it is first necessary to prove that Noah could undertake such task.

### **Noah, the technician of the pre-Flood world**

When visiting the site where a “life-size ark” is being built, visitors can have an idea of how difficult was for Noah to build a vessel of such proportions.<sup>56</sup> In the construction site of the Ark Encounter in Kentucky, an immense structure of concrete pillars supports the wooden ark. Big trucks come and go to pour concrete for the ark’s foundation. Gigantic cranes lift all kinds of heavy material to the top floor of the ark and help workers to lay heavy concrete slabs on the structure. Three immense towers with elevators, stairs, and restrooms complement the facilities offered by the future touristic attraction. On each of them, there will be a 14,500-pound HVAC unit to keep the air controlled and circulating inside the ark (Ark Encounter, 2015). All around the place, different materials (sand, wood, mortar, hardware) lay on the ground, imported from many different places in the United States, from Colorado to Alabama. Tractors carry heavy loads of lumber from trucks to the construction site. Warehouses store all the supplies necessary to assemble the ark. An extensive crew composed of engineers, designers, masons, and artisans work together to finish this project.

Four thousand of years ago, Noah did not have any of this infrastructure and technology to build the ark as commanded by God. Or at least, based on classical studies and secular history books, that is what we suppose. “Many think Noah was a very

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<sup>56</sup> According to *The Ark Encounter* website, the attraction will be opened by Summer 2016.

primitive person with no technology,” asserts a post on the Ark Encounter blog (Ark Encounter, 2015). However, for Creationists, there is not enough material evidence for us to conclude what the pre-Flood world was really like. Consequently, we can neither affirm what kind of culture the people who inhabited that ancient world had nor the kind of technology that was then available. The Scriptures offer insufficient information about that world that was completely destroyed by the divine cataclysm, leaving, therefore, only a few traces of its nature. However, Creationists consider that based on the literal content of the Book of Genesis, we can read that prior to the Flood, people already manufactured musical instruments of bronze and iron (Genesis 4:21-22). Hence, “by the time of Noah, who knows what advanced technology they had” (Ark Encounter, 2015).

The Creation Museum and especially the Ark Encounter have the mission to create “a background to explain how Noah was capable of building the Ark and performing the many duties required of him.” What sort of career did he have in order to be chosen to perform such a complex task? “Did he have multiple occupations prior to building the Ark, after all, he lived five centuries before his work on the Ark” (Ark Encounter, 2014c)? How did Noah acquire so many different skills necessary for building the Ark and to be able to care for a few thousand animals?<sup>57</sup> Did he have agricultural experience? Did he have technologies? Did he know about shipping and civil engineering? Did he hire people to help him? After all, the Bible does not explicitly

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<sup>57</sup> Creationists calculate that the number of animals was fewer than 5,000. See <http://www.icr.org/article/how-could-noah-have-built-ark-all-by-himself/>

state that Noah and his family labored alone in constructing the ark.

As stated in the website of *Answers in Genesis*, the apologetic ministry responsible for the construction of both attractions, “using a bit of imagination,” we can think of Noah as a very educated and skilled man (Answers in Genesis, 2014). The *Creation Museum* visually supports this idea. There, an animatronic of Noah depicts him as a very knowledgeable man (fig. 6.6).



Figure 6.6: Animatronics of Noah working in his studio inside the ark. The Creation Museum, Kentucky, USA.

Sitting in his studio, Noah, an old man, works at his desk. Immersed in his own thoughts, he writes on a paper what seems to be a day-by-day log of his journey. Was Noah describing how dark clouds had obscured the sun and how the rain had started to pour violently over the world, as suggested by the post on the website? Was he writing a detailed report about the daily activities in the ark and what would have happened to his family during that year-long ordeal? If this setting in the *Creation Museum* wants to encourage the viewer to imagine a world that for Creationists really existed, its

rhetorical motif goes beyond the attempt to evoke individual exercises of imagination. It intends to represent Noah as a technician, an architect, and an engineer of the pre-Flood time. As a matter of fact, Noah is represented as the ideal modern man of Enlightenment. First, Noah could write, read, and apparently, he also had access to paper, though its composition from pulp rather than papyrus is noteworthy. Moreover, he was a man trained in mathematics. On the paper before him, we see what appears to be the Babylonian numeric system and the cuneiform alphabet. Beside the paper, we can also see a disc made of clay (fig. 6.7).



Figure 6.7: Detail of the paper containing the Babylonian numeric system and the instrument for navigation. Creation Museum, Kentucky, USA.

This object deserves attention. The circular artifact bears an astonishing resemblance to a Sumerian star chart (a proto-astrolabe) used to record astral events. The historical artifact in Figure 6.8 is believed to have recorded the impact of an asteroid, an event that occurred over 5,000 years ago (Bond & Hemsell, 2008). Therefore, the object on

Noah's desk reveals many aspects of his personality that are not described in the Scriptures. First, it tells us that Noah had nautical skills and could orient himself based on the movement of celestial bodies, which is what astrolabes are for. The artifact also implies that Noah had the most sophisticated knowledge available in his time. It reconfirms the image of Noah as a highly educated man. And no less important, the presence of this artifact also suggests that he could have used a similar disc to record the cataclysmic event of the deluge (which, for Creationists, means that this object could still be found buried in a dusty Mesopotamian library). Noah is shown producing a document that, for Creationists, would be the definitive material evidence for the mythical episode, were it to be found.



Figure 6.8: Sumerian star map from Nineveh, circa 3,000 B.C.

The project for imagining Noah as a 'jack of all trades' does not end in the *Creation Museum*. It will be even enlarged in the *Ark Encounter* project. As we can see in

the sketch below, for the full-size ark, the designer Allen Greene has conceptualized a much more spacious and sophisticated studio for Noah (fig. 6.9).

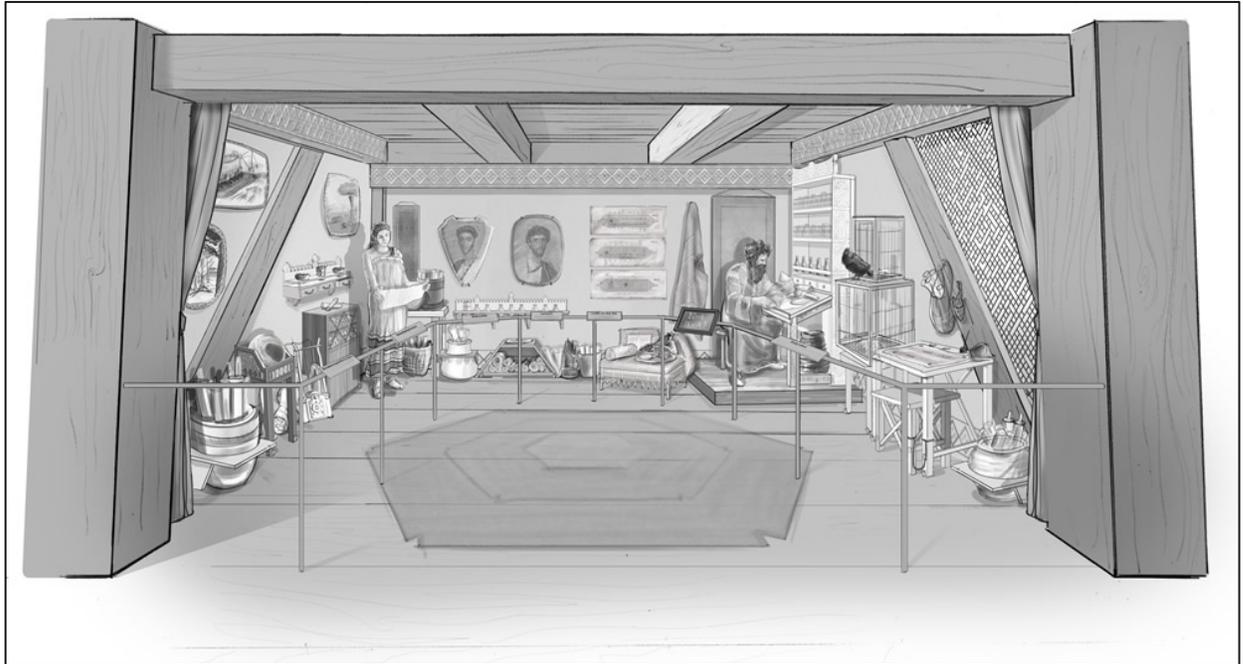


Figure 6.9: Noah's studio in the ark according to Allen Greene, one of the designers working on the Ark Encounter Project.

The crew involved in designing the ark aims at constructing more than the vessel described in the Bible. The Creationist team also seeks to provide answers to prosaic questions that cannot be found in the Book of Genesis. For instance, “after the animals were fed and the cages were cleaned, what did Noah and his family do on the Ark?” asks a post on the *Ark Encounter* blog (May 2015). The answer is in this sketch. Noah would spend his leisure time in intellectual and practical activities in his private office.

We plan to show Noah busy at his desk keeping track of the amount of time that has passed while on the Ark and keeping a log of the food and water that remains on the Ark. Noah's wife is also featured in the study. Perhaps she takes a moment to remember the world that has passed by, reading a letter from her mother. In addition, guests will see items in this

space such as paints and instruments, alluding to what Noah and his family may have done together in the small amount of downtime they shared on the Ark. (Ark Encounter blog, 2015b)

But, again, the rhetorical task of this adorned setting goes beyond representing the pleasant room where Noah and his wife would have spent their downtime.

The studio is organized as a theatrical stage in which the audience will see the action through a ‘fourth wall’ – the imaginary boundary at the front of a stage in the traditional, three-walled box set. In theater, the adoption of the ‘fourth wall’ model is usually associated with the illusionary aspect of a realist theater, characteristic of the nineteenth-century. The invisible wall allows the public to see the action while the characters are immersed in their performance (Mangan, 2013, p.172). In the way this setting is physically organized, the audience will experience the imagined reality created by the designers of the *Ark Encounter*. On the three walls appear papyrus rolls, sheets of vellum, writing utensils, cylinder rolls of cuneiform text, and a writing desk at which Noah is writing his journal. The place is actually conceived as an ancient library that would contain books that possibly described the beginning of the universe. This setting tells the audience that Noah was a literate man who had access to the original sources that were perhaps later converted into what is today the Bible. Therefore, the material representation of Noah’s wisdom and diligence to work is not only to illustrate his capability to construct and conduct the daily routine in the ark, but also to give authenticity to the Christian book. In the study pictured in Figure 6.9, Noah is the author, and therefore *authorizes* the narrative of the Book of Genesis. Like a biblical

Herodotus, Noah is the privileged witness of this unique event and consequently the most trustworthy storyteller of the episode. Both in the Creation Museum and in the Ark Project, Noah is represented in such way to iron out the discrepancies about how a single man could have built a large and complex vessel able to survive an enormous cataclysm in order to ensure the future of humankind and the planet.

But the representation of a wise Noah is not the only result of this technology of fantastic imagination. This space is composed of objects that come from different historical times. Hanging on the back wall, we can see two paintings of different men. Are they two of Noah's three sons? His ancestors? Regardless of who these paintings represent, their style and format unmistakably resemble mummy portraits of Roman Egypt, consisting of a practice and technique that were traditionally used around 100-300 A.D (Walker, 2000). For instance, the two paintings bear a striking resemblance to the portrait of a young man produced around 125-50 A.D. and painted in encaustic on wood (fig. 6.10). The likeness of the two images suggests that this image (produced at least 3,000 years after the date Creationists established for the Flood) worked as a model for designer Allen Greene.

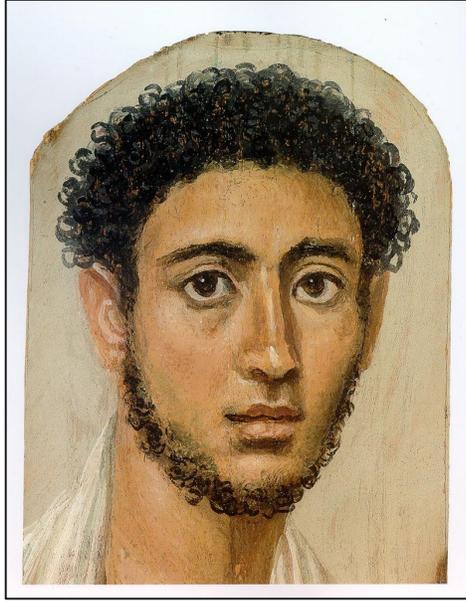


Figure 6.10: *Portrait of a young man*, Antikensammlungen, Munich. Circa 125-50 A.D.

Two other genres of paintings hang on the left wall: two landscapes and a maritime scene. Perhaps the designer imagined that Noah's family would engage in artistic activity during leisure time. They could have painted the world they left behind. The maritime scene looks like an aerial view of a ship, possibly the ark (though one must wonder how an aerial view could be produced 4,000 of years ago (unless of course Noah was able to rely on the geometrical projection of Renaissance style perspective techniques, yet another historical source for the conception of Fig. 39).

On the back wall, visitors will see a vertical configuration of three blueprints used by Noah to conceive the three floors of the ark. Yet again, this detail presents Noah as a very skilled craftsman and engineer, able to engage in complex mathematical calculations and planning to construct such enormous vessel. As a matter of fact, *Ark*

*Encounter* includes a scene in which visitors will see Noah learning the trade of shipbuilding from a master (Fig. 6.11).



Figure 6.11: The production designer John Taylor explains a scene in which Noah learns how to build ships. Source: *The Ark Encounter* website.

However, combined with another artifact present in Noah's studio, these blueprints produce another important rhetorical effect. Amidst these objects that seem to be dislodged from their own time, two artifacts connect the assemblage of disparities to what is literally described in the Scriptures. First, the blueprints: the material reference to God's command that Noah should construct a three-floor ark (Genesis 6:16). Second, the cage on the right side of the room, which contains a raven and a dove: these are the birds that, according to the Scriptures, Noah sent out to determine if the waters had receded upon the earth (Genesis 8:7- 11).

These two representations of actual passages of the Bible are not displayed by chance. This setting has the rhetorical function of materializing what Creationists

believe to be the real past. Both references intend to stabilize the chaotic narrative that the other artifacts, originating in different periods of time, provoke in the viewer's mind. The artifacts insert the biblical events into the facts of the historical world of manuscripts, mummies, landscape, and marine art. For Creationists, inspired by Ussher's chronology (chapter 5), ancient history corresponds to the biblical narrative. In an ironic parallel with evolution, we see in this sketch what Creationists understand as the "missing link" between historical events and biblical narrative. As discussed in chapter 2, in spite of the fact that secular scholars consider the Bible a compilation of many different texts, translations, and insertions across different historical times, here we have a rhetorical attempt to establish the Bible as the major and most trustworthy source for ancient historical events. The Bible has to be turned into the spokesperson for the shape of the world, as we know it. If Noah is real, then the whole Bible is a single historical book, which means not only did the flood really happen, but also that one man died to save all humankind. Therefore, by linking references to the Bible to other historical objects, Noah's imagined studio ultimately aims to legitimize the Scriptures as the book that accurately describes the miraculous (and historical) episodes of the creation and flood, and Christianity as the true religion.

### **The 'kind' of animals from the pre-Flood world**

In order to prove that building the Ark was feasible, representing Noah as a very talented man is not enough. One of the most common questions faced by Creationists is:

how could Noah fit all the animals in the ark? According to information posted on the *Ark Encounter* website, no matter how many times Creationists answer this question, the issue continues to be a problem for many skeptical people. “One cause for the confusion surely is due to the ‘bathtub arks’ commonly depicted in children’s storybooks, wallpapers, and toys.” These misrepresentations can give an entirely wrong impression of how large the ark surely was. “Rather than being a cute toy with giraffes’ heads popping out of the roof that would be toppled by the waves, the biblical Ark was a massive vessel, at least one and a half football fields in length.” According to Creation Science’s worldview, the ‘real’ ark could be fairly compared in scale (if not design) to a transoceanic modern cargo ship. For Creationists, another important source of misunderstanding has to do with the number of animals required to repopulate the planet with the bio-diversity that we know in the modern world. “Secularists often claim that million of animals would have been necessary based on the number of species of animals on earth” (Ark Encounter, 2014). However, according to the Creationist interpretation of the Bible, Noah did not bring to the Ark every species of animals that inhabited the pre-Flood world. Rather, according to the Book of Genesis, he was instructed to bring every “kind” of animal (Genesis 1:25). This selection of words (‘species’ and ‘kind’) conveys an important rhetorical implication for Creationist cosmology. Creation scientists do not accept the secular biological taxonomy for classifying animals and plants. Rather, in their publications, they use the terms “kind,” “type,” “group,” or “*baramin*” to refer to a classificatory system, in which animals are not

genetically related, but were created by God during the six days of Creation (Frair, 2000).<sup>58</sup> Baraminology, a term introduced by Kurt P. Wise (1990), is defined as a taxonomic system based on God's created kinds. Roughly, *baramin* (or kinds) could be compared to the sub-category of "family" in the secular biological taxonomy. For instance, by applying this system of classification, Noah would not have to bring all the species of snakes or salamanders, but all "kinds" [families] of them, which would reduce drastically the number of animals inside the Ark. Instead of *millions* of life forms, Noah would have to board *thousands* of animals.

Lately, creation scientists found an unusual ally in their quest to prove that one single man (and his family) could have gathered all the "kinds" of animals created by God and carried them safely until the Flood's waters receded: secular science. By combining the size of the Ark, the characteristics of the material used in its construction (Genesis 6:14-15), the density of the water, and the Archimedes principal of buoyance, a group of master's students from the Department of Physics and Astronomy at the University of Leicester concluded that Noah's Ark would have floated if carrying up to 70,000 animals. In an interview for *The Telegraph*, one of the students, Thomas Morris (not related to the Morris family from the ICR), declared: "you don't think of the Bible necessarily as a scientifically accurate source of information, so I guess we were quite surprised when we discovered it would work" (Knapton, 2014). In spite of the fact that Creationists appreciated the conclusions of this research, the crew involved in the *Ark*

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<sup>58</sup> *Baramin* was a term first introduced by Frank L. Marsh in 1941. It is derived from the Hebrew words *bara* (create) and *min* (kind). See more in Wayne Frair, 2000.

*Encounter* project affirms that, since “kinds” of animals can interbreed (for instance, a horse and a donkey produce a mule), “the total number of kinds determined by [Creationist] research so far is less than 600” (Ark Encounter, 2014a). Even in the “worst case scenario,” Creationists do not believe that Noah would have to bring to the Ark more than 5,000 animals. Therefore, in this future touristic attraction, visitors will encounter six hundred pairs of animals that supposedly represent all the existing creatures in the pre-Flood world, and enough to repopulate the entire planet.

But the classificatory branch of Creationist science does not explain what “kinds” of animals were miraculously brought to the Ark. Did they look like modern animals or did they change over time due interbreeding? The designers and artists involved in the project have worked imaginatively to create the animals that made the journey with Noah and his family. The Bible does not offer anything about how they looked. However, based on the analysis of fossils and “using a bit of imagination,” as Ken Ham put it, the designers are currently in the process of fabricating the Ark’s animals.

According to the *Ark Encounter* blog (2014, June 5), amidst the work of imagination there is in fact a rational process for figuring out the appearance of the animals.

One of our goals is to identify and eliminate from our animal designs those features that result from post-Flood changes. These ‘new’ features include not only superficial expressions (e.g., certain post-Flood coat colors or patterns in mammals) but also broader expressions of animal anatomy (like longer necks, fewer toes, or changes in body proportions). The latter will first step in this process (Ark Encounter, 2014d).

In order to understand how the designers are creating the animals, let's take the example of the must deer of the family *Moschidae*. In order to design its ancestor, the crew not only uses present day musk deer as a model. They combine contemporary features with fossils of *moschids*, which, according to the Creationist worldview, were buried during the Flood (see chapter 4). "Candidates with the best quality fossil material or the greatest physical similarity to late representatives of the *baramin* are selected as reference" (Ark Encounter, 2014d). Later, this selective model will serve as a guideline for the artists to craft the imagined animal, which includes painting and furring.

But it is not only animals that must be imagined in order to be materialized. The Bible also does not provide any information about what the eight human inhabitants of the Ark looked like. This issue has also important rhetorical implications. According to the Creationist account, these eight people were responsible for regenerating humankind after the Flood. Therefore, it is necessary to represent them with an array of genetic characteristics present in the world's latter-day population. The way the designers found to create these representations was to merge what the Bible says in Genesis 10 about the dispersion of people after Babel with the physical characteristics present in the places where these biblical characters purportedly settled. Take the example of Japheth, whom Creationists believe to be the Noah's oldest son. Since according to the Book of Genesis, many of Japheth's descendants settled in Europe, designers from the Ark Encounter project depict him with lighter skin (fig. 6.12).



Figure 6.12: Concept image of Japheth. Source: *The Ark Encounter* project website.

Furthermore, since his descendants settled in what is now European territory, the museum will also represent him as the tallest among his family, maybe “an inch or so” since “there’s a good possibility that one of Noah’s sons would have surpassed him in stature” (Ark Project, 2014e). Following the same logic, Shem will be darkest one, since his descendants “range from being dark to lighter middle brown” (Ark Project, 2014g) and Ham, the youngest, will have a skin tone between his two brothers. However, since “there are hints [in the Bible] that Ham and some of his close descendants were more powerful or sought to be more powerful than their relatives,” the designers conceptualized him a little more muscular than his siblings (Ark Encounter, 2014f).

It is not easy (or cheap) to bring to life a world that no one recorded in detail. In this regard, the challenges faced by Creationists are not very different from the challenges faced by secular scientists. After all, as mentioned before, secular natural history museums have been pioneers in the business of making the past plausible through materialization. The *National Museum of Natural History* in Washington already spent \$20.7 million to create “The Hall of Human Origins” composed of John Gurches’ “hyperrealistic facial reconstruction of several of our earliest cousins” (see chapter 3) (O’Sullivan, 2010). In 2014, the museum announced a new \$45 million makeover (du Lac, 2014). This time, the construction of the “Deep Time Hall” (to include the former “Dinosaur Hall”) will focus on the representation of a terrestrial ecosystem from the past. “A lot of people will call this the ‘Dinosaur Hall,’ and dinosaurs will be the most visible part of this, but there will be a lot of stories through time,” said Brian Huber, chairman of the museum’s Department of Paleobiology (Parker, 2012 – *italics* added).

The financial investment in technologies of imagination has demonstrated to be worthwhile. In 2014 alone, the *Natural Museum of Natural History* received 7.3 million visitors and most likely this number will increase when the new Hall is opened.<sup>59</sup> The *Ark Encounter* expects over 1,600,000 guests on its first year, coming from all around the world.<sup>60</sup> Therefore, though it may seem ironic, it is not by chance that two big enterprises of imagination – one secular and other fundamentalist Christian – are taking place at the same time. In Kentucky, people and high-tech machines are in the

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<sup>59</sup> National Museum of Natural History (n.d.). In *Wikipedia*. Retrieved on October 1, 2015, from [https://en.wikipedia.org/wiki/National\\_Museum\\_of\\_Natural\\_History](https://en.wikipedia.org/wiki/National_Museum_of_Natural_History)

<sup>60</sup> *Ark Encounter* website. “About.” Retrieved on October 1, 2015, from <https://arkencounter.com/about/>

service of creating the pre-world Flood. Parking lots and roads are being planned to receive the flux of tourists eager to see the biblical past. “Space-age technology” is being employed to survey the progress of the Ark. Bulldozers are “equipped with devices that determine blade positions during the grading process” (Ark Encounter, 2015). Computers are used to generate places, characters, and domestic scenes that supposedly would have happened inside the simulacrum of the ‘original’ ark. Creationist artists are molding and casting all the imagined creatures that once lived inside this imagined vessel. Of course, they are taking liberties, explains one of the posts on the *Ark Encounter* blog, since “the Bible doesn’t give us any details as to the content of the Ark. But this does not actually matter, argues the blog, because “when you come to visit the Ark, you will be amazed by its structure and size.” In fact, as Latour suggested (1987), it really does matter if dinosaurs or other “kinds” actually looked like their plaster models: would real dinosaur’s recognize their plaster counterparts? Both secular and Christian enterprises are in the business of amusement and expanding the network of scientific authority.

## Chapter 7: Conclusion

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### Apostles and Heretics of Science

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Throughout this study, I have investigated the role that the combination of scientific rhetoric and technological progress have played in the construction of Creationism as a scientific field. In chapter 2, I offered a historical and critical analysis of the relationship between modern science and religion in order to demonstrate that Creationism is not an echo from the Dark Ages but is rooted in its own time. I emphasized how, inspired by Scottish Realism, they have transformed the Bible into a modern book of facts. Instead of blindly accepting the biblical content as described in the text, Creationists, immersed in modern and Calvinist sensibility, constantly submit biblical events to scientific scrutiny. In order to be true, the content of the Book of Genesis must be objectively proven.

Chapter 3 argued that Creation Science (or Flood Geology), in order to exist, had first to challenge the authority of scientific discourse, its premises, and inscriptions. Second, it had to rearrange the brute facts of nature to re-construct new inscriptions, but now dedicated to serving the scope of conservative Christianity. I showed that contemporary Creationists make two distinct rhetorical moves. The first one is based on postmodern skepticism, which aims to *deconstruct* the notion of absolute truth; the

second is the *construction* of an alternative scientific schema based on incontestable belief in the Bible. In the first move, Creationists challenged the authority and veracity of the hegemonic scientific discourse, in this case, the premises of evolution and uniformitarianism, to explain both the creation of the universe and the development of humankind. The second move proposes to replace the hegemonic schema with the Creationist one, which interprets the same data through another worldview (terministic screen), one that intends to demonstrate the accuracy of biblical records and the scientific validity of the Genesis.

Then, in Chapter 4, I demonstrated how creationists engage recalcitrants - paleontological, biological, and geological data - to demonstrate that the events described in the Book of Genesis really happened. I showed how this assemblage takes shape by comparing two different networks in which the brute facts of nature (ice, water, rocks, fossils, etc.) are assembled according to two different worldviews and made to produce different “truths.” One network is oriented by the principles of secular geology and evolution; the other by the principles of Creation Science.

In chapters 5 and 6, I investigated the technological strategies employed by Creationists to make factual what is contained in the book of Genesis. Chapter 5 scrutinized the role that “technologies of precision” (geochronology technologies and technology of visualization) plays in the technological and rhetorical construction of Creation Science. More specifically, I discussed the extent in which technologies are designed with rhetorical motives of generating results that justify a certain worldview.

Finally, in this chapter, I suggested that although praising the inerrancy of the Bible, Creationists are indeed in the project of rewriting the Scriptures in order to transform the mythical narrative into a book of historical and scientific facts. I argued that by using technologies of imagination, creationists are also in the project of writing the 'missing pages' of the Bible. They are materially crafting the imagined lost documents, which would describe in detail the beginning of time, the life in the pre-Flood world, and the cataclysmic events that led to the creation of the modern one. Nonetheless, the rhetorical implications of the Creationist enterprise go beyond the conversion of the Bible into a scientific book. By making clear that the Bible is still being written, Creationists position themselves as the new authors of the Scriptures, following the previous work of Moses, Paul, Matthew, Mark, Luke, and John. Therefore, the advocates of Creation Science identify themselves as the new apostles of Christianity, whose mission is to keep ongoing the writing project initiated by Adam.

The best way of illustrating how Creationists perceive Creation Science as a mission of biblical proportions is to go back to the individual who helped to create Creationism: Henry M. Morris. In an article entitled "God's Library," Morris (1998) calls attention to a "very intriguing verse" in the Gospel of John: "and there are also many other things which Jesus did, the which, if they should be written every one, I suppose that even the world itself could not contain the books that should be written" (John 21:25). Morris goes on to link this verse with another one from the Book of Acts: "The former treatise have I made, O Theophilus, of all that Jesus began both to do and teach,

until the day in which He was taken up to heaven after giving instructions through the Holy Spirit to the apostles he had chosen” (Acts 1:1-2). In connecting the two verses, Morris suggested not only that Scripture does not claim to be exhaustive in its description of events, it is also actually capable of expansion. He asserted that the first verse implies that since we do not know everything that happened to Jesus during His lifetime, much more could be added to the traditional 27 books of the New Testament. Second, the verse in the Book of Acts indicates that even after His death, Jesus, in the form of the Holy Spirit, continued to teach and speak to His followers inspiring them to witness (and write about) His work. “There could be a special book written for each of his [sic] millions of disciples, describing all that their indwelling Lord accomplished through them as they studied and worked and witnessed in His name” (Morris, 1998). Creationists write books and articles as they were composing what, one day, will be universally accepted as part of the great library of God – the Christian Bible, the only and true Book of Nature.

The warrant for such a bold and unconventional claim is simple and directly linked to the rhetorical construction of the Bible as a book of records. Creationists insist that the Bible is trustworthy as a factual book precisely because it was written by people who actually witnessed the events recorded there. According to their very particular interpretation of the Scriptures, Adam himself was a literate man. He made notes and wrote about the events of Creation. As proposed by the Creation Museum and the Ark Encounter project, Noah and his descendants composed the account of the Ark,

the Flood, and what happened in the aftermath (see chapter 6). Later, Moses “collected and edited” these previous tablets in what became known as the Book of Genesis (Morris, 1998). Succeeding this tradition of recording the ‘true facts,’ Creationists also believe that the disciples of Jesus directly described His life and teachings.

Nevertheless, the work of describing and explaining events is not done yet. When God created the universe, the world, and all living things, He gave Adam the right of dominating the earth and exercising control over it and its creatures (see Chapter 6). In Morris’ words, “this necessarily implied research and technology.... Many books would need to be written describing the processes and systems of Earth and all its inhabitants, finally filling many libraries around the world” (Morris, 1998). But who would be the authors of such a privileged task? Who would be the people able to describe processes and systems and, therefore, *authorize* reality? To be sure, Creationists do not think this task is to be undertaken by secular scientists, who in spite of all their technologies of visualization cannot see the Christian truth. Bible-believers should do it. Grounded in Creationist rhetoric, conducting genuine scientific research is more than simply describing the processes and systems of nature. It is even more than witnessing God’s work. It is to participate in the divine project of writing the Bible under the inspiration of the Holy Spirit.

However, regardless of how Creationists grandiosely perceive their own work, the relevance of their work is not translated to the secular world. As a matter of fact, it does not require extended research on the Internet to verify that secular scientists and

non-believers turn Creationism more into an object of mockery than a scientific paradigm to be taken seriously. The few occasions in which Creationism takes part in the secular scientific conversation are readily dismissed as non-sensical and mindless. If Creationists see themselves as the new apostles, the secular response is to represent them as the heretics of science, those who should be banished from any scientific circle. Bill Nye, for example, does not mince words when talking about Creationism, describing it as a “worldview that is obviously wrong.” He worries about organizations such as *Answers in Genesis*, which deliberately develop projects for proselytizing children and young people with a perception of reality that is indisputably incorrect. For Nye Creationists are particularly odious because they coerce their young people to subvert the truths of American science.

If you want to deny evolution and live in your world that’s completely inconsistent with everything we observe in the universe, that’s fine. But don’t make your kids do it. Because we need them. We need scientifically literate voters and taxpayers for the future. We need engineers that can build stuff, solve problems (Nye in an interview to Bricklin, 2012).

The inanity of Creationism, continues Nye in another interview, “takes my breath away.” Even someone who has a rudimentary understanding of basic astronomy or radioactivity, Nye insists, can easily understand and accept that the earth and the universe must be far more than 6,000 years old. Nye finds it hard to understand how some people can have such a divergent comprehension of the origin of life. Evolution, he states, is a fact, a discovery. “*We discovered evolution*” (Lee, 2015 – italics added to the original). For Nye, there are a “we” and a “they” and, between them, there is a

boundary that must be severely reinforced in order to avoid that “they” contaminate the secular and immaculate doctrine. They, “Mr. Ham and his followers,” Nye stated during his debate with Ham, clearly demarcating who *they are*, “have this remarkable view of a worldwide flood that somehow influenced everything that we observe in nature. I ask *us all*: is that really reasonable” (italics added to the original)?<sup>61</sup> As Thomas M. Lessl points out, the twentieth century brought an immense political power to the scientific institution. “Science is now united with nonscientific institutions, its technological dowry having been accepted by the political, economic, and educational sectors of the modern world” (Lessl, 1988, p.18). The rhetorical demarcation of what is considered normal science from what is discharged as non-science should be seen against this complex background.

Nevertheless, I wonder who the “we” is that Nye refers to as the discoverers of evolution. If Creationists are the heretics who must be evicted, for which group of people does this prominent pronoun stand? There is a robust creed radiating through this innocent pronoun: the belief that a breed of people struggled to overcome the corruption of religion in order to free humankind from the darkness of ignorance and superstition. These are the “Moderns.” Therefore, the use of this pronoun, in fact, returns me to the beginning of this study, where I challenged the idea that Creationism was an anti-modern enterprise by endorsing the famous statement made by Bruno Latour, “we have never been modern” (Latour, 1993). In one of his most famous books,

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<sup>61</sup> “Uncensored Science.” *Bill Nye Debates Ken Ham. Answers in Genesis*, 2014. DVD.

Latour argues that the hegemonic concept of modernity grew from the artificial distinction between individuals, nature, and things, and the deceptive separation between what happens *in this world* and in the other, *above*, the “equally strange beginning of the cross-out God, relegated to [the] sidelines” (Latour, 1993, p.13). The “Moderns” were people who believed in the project of purification of science from religion. They invoked the existence of two different sorts of objects—fairy tale-objects (fetishes) and factual-objects (facts). In their evolutionary scheme, a world freed from religion was superior to the one that still cultivated and fearless used the word “God.” These heroic figures incarnated in the bodies of secular scientists came to show the path of science and reason toward the real Enlightenment. In Nye’s statement, we listen to the echo of the “Moderns” again. “We” are those who know the difference between fetishes and facts. “We” were responsible not only for discovering evolution. “We” found the magical key that gives access to the truth: purification.

In chapter 2, I already argued that such a project of purification never actually took place, even in the apparently shielded scientific world. Now, what I want to highlight is what Nye missed in his “modern” argument. No matter his personal and scientific opinion about ‘truth,’ heresy or orthodoxy, Creationism *is* an enduring perception of reality for many people. Or even more accurately, it is one strong worldview among many other *selections* of reality. It is so powerful that, no less than evolution or secular thought, it organizes and shapes the lives of people who deeply believe in it. Science – regardless whether secular or Christian - is never a pure

reflection of reality. It is more like a deflection, as described by Kenneth Burke (1969 [1945]). It is always a reduction determined by a certain terministic screen.

Men seek for vocabularies that will be faithful *reflections* of reality. To this end, they must develop vocabularies that are *selections* of reality. And any selection of reality must, in certain, circumstances, function as a *deflection* of reality. Insofar as the vocabulary meets the needs of reflection, we can say that it has the necessary scope. In its selectivity, it is a reduction. Its scope and reduction become a deflection when the given terminology, or calculus, is not suited to the subject matter which it is designed to calculate (Burke, 1969, p.59 – italics in the original).

I have no intention of rehearsing everything I have already said. Yet I will return to the issue of Modernity in order to highlight the relevance of this study: not the definition of what science and modernity truly are, but the implications of what science and modernity rhetorically *came to be*. It has not been my aim to determine whether Creation Science is actually science or not. Regardless of any personal, secular, scientific, or ‘expert’ opinion about it, Creationism *is* science for its supporters - and a very modern one. Talking about evolution and “the Creation,” Burke argued that these two frameworks are alike despite their differences: “they are *ontological* statements, statements about *being*, about what *is*” for their respective community of thought (Burke, 1969, p.63). In science – secular or Christian – the way scientists verbally describe reality is the product of their respective worldviews. By looking at the academic production of Creation Science (1983), which contributes to what Morris calls “God’s library,” it is possible to identify the banned vocabularies that Creationists use to convey their sense of reality – a scope, as coined by Kenneth Burke (1969 [1945]). It

also allows us to have an idea about why Creationist claims are not translated into the secular world. The words they carefully select to describe the origin of life and system are not easily converted into the vocabulary employed by normal science. For instance, the word “God” does not have a correspondent in secular science. By exposing what secular science considers the ‘apostate’ texts of Creationism and the issue of translation, I will end my remarks questioning the boundaries imposed by mainstream science and point out future ways of researching the censured intersection among religion, technology, and science.

## **7.1 Purification and the heretical vocabulary of the young-earth paradigm**

Throughout this study, I have argued that modern science has shaped and transformed Creationism. As I showed in chapter 2, Creationism is a modern project, in which even the Bible was not saved from the contagion of the new scientific trend (Heidegger called this overwhelming inclination the “metaphysics” of the modern era). The more that secular science progressed and the more that technological tools were developed by and for its progress, the more Creationists had to expand the vocabulary and the scope of their investigation in order to counter evolutionary claims. For instance, just recently genetics became one of the most important scientific tools for investigating human origins (Jeanson, 2015). Heredity, genes, DNA, chromosome and ‘double helix’ became regular terms employed in the scientific discourse. Creationists

had no choice but to embrace the technical vocabulary of this field. They did not “discover” genetics but they had to adopt and adapt to the secular prose.

In a series of articles published in the Creationist scientific magazine *Acts & Facts*, Nathaniel T. Jeanson (2014b) asserted that the new arena for the rhetorical debate between Creationism and evolution resides in the field of genetic research. “Since the physical traits that define humans and apes are inherited, any attempt to describe human origin must invoke the only direct record of inheritance – genetics” (Jeanson, 2014b, p.9). Therefore, Creationists were compelled one more time to adjust their vocabulary in order to accommodate (and fight) the secular selection of words. One of these recent adjustments appears in ICR’s *BioOrigins* program, “designed to launch this counterattack and to restore creation to its rightful place as king of science” (Jeanson, 2014a, p.13).

Between July 31 and August 1, 2015, ICR and CRC had their first joint meeting: the *Creation Research Society Conference* (CRSC 2015). In two days of research presentations, two keynote lectures and twenty-three sessions offered the most recent Creationist research to an audience composed solely of young-earth Creationists. As one of the keynote speakers, the ICR’s geneticist Jeffrey P. Tomkins opened the second day of the conference presenting the results of the *BioOrigins* program to a largely lay audience. During his lecture, he scientifically refuted the alleged ‘fusion site’ located in the human chromosome 2, which, according to secular scientists, is the evidence that was the synthesis of two ancestral chromosomes that probably differentiated humans

from apes million of years ago (Fan, Y. et al., 2002). In this investigation, by analyzing the data produced by the Division of Human Biology at Fred Hutchinson Cancer Research Center (Fan, Y. et al, 2002), and by employing the same scientific terms coined by secular scientists, Tomkins technically demonstrated to the joy of his audience that the genetic evidence for a human-chimpanzee common ancestry was the result of a scientific misunderstanding, to ignorance, or to a mistake. Performing the rhetorical discourse characteristic of big science research, Tomkins presented his research to an audience consisting mostly of lay people, but also of scientists from different areas of expertise. Even though the content and its meaning were impenetrable to virtually all of the audience, Tomkins was convincing precisely because he used highly complex technical terms. He talked about “functional DNA binding domain inside the first intron of the DDX1112 regulatory RNA helicase gene,” “active DNA transcription,” “complex post-transcriptional regulation,” and “microRNA binding sites.” He affirmed that fusion was not supposed to happen, because “fusions would not be expected to form complex multi-exon, alternatively spliced functional genes.” By pointing to undecipherable graphs, he argued that “this clear genetic evidence” refutes the whole idea that the human chromosome 2 “is the result of an ancestral telomeric end-to-end fusion” (Tomkins, August 2015). The enthusiastic applause after his presentation did not mean that the audience had even slightly followed the line of his technical argumentation. Yet for them, Tompkins had absolutely defeated evolution by using its own sophisticated scientific weaponry.

In Creationist conferences, evolution is omnipresent. Memes with funny monkeys end PowerPoint presentations and jokes about the idea that only secular scientists descend directly from apes are common tropes in Creationist presentations. Each paper in which obscure, technical terms are used to discredit the idea that humans share a common ancestor with chimpanzees are fervently celebrated, no matter if fully understood or not. But if evolution determines the scope or boundaries of Creationism, it is wrong to assume that Creationist academic discourse and vocabulary are reduced to an agenda determined by Darwinism. In spite of the fact that Creationists are more reactive than pro-active, conservative Christian scientists have intense internal debates about different scientific theories on the pre-Flood world or how the Flood could have happened in such enormous proportions. Creationism is not a static body of theological knowledge that does not change over time. As the Bible is still being written, in Creationist circles, the Book of Genesis is under constant investigation and re-interpretation. It is when arguing among themselves that Creationists freely use their own vocabulary. “God,” “six-day-creation,” “Flood,” “Ark,” pre-Flood world,” and “kind” (instead of “species”) permeate articles and academic presentations. Freed from the constraints of secular and imperative jargon, Creationist debates are creative in their use of vocabulary (and imagination), and fiercely passionate.

In order to illustrate this argument, I will describe a particular debate that took place at CRSC 2015 between two Creationist scholars, Timothy Clarey from ICR and Kurt Patrick Wise, director of the *Creation Research Center* at Truett-McConnell College

in Georgia. In a session entitled “A Geological Critique of the Floating Forest Hypothesis,” the ICR’s geologist refuted Wise’s hypothesis on a “floating forest,” which, according to Wise, would be a kind of recurrent pre-Flood biome. Wise is a special character, a ‘star’ in the Creationist world. He holds a celebrated reputation for at least two reasons. First, Wise is a prolific scholar in young-earth Creationism who has published his theories prolifically in Creationist journals. Therefore, he is also productive in creating vocabularies for the Creationist discourse. For instance, he was the one who proposed the concept of *baraminology*, the Creationist system that classifies animals and plants according to their “created kind” or “*baramin*” (see Chapter 6). Second, and maybe the most significant factor, Wise has an astounding academic pedigree: he earned his Ph.D. in Geology at Harvard University where he studied under Stephen Jay Gould (Ashton, 2001). He also had his M.A. from Harvard and got his B.A. from the University of Chicago. As a matter of fact, because of his “impeccable education,” Wise attracts attention beyond the Creationist world. The notorious atheist Richard Dawkins turned Wise into the object of one of his many articles against religion, in which the Creationist is said to display a “modicum of scientific honesty and integrity.” In this article, Dawkins affirms that Wise’s commitment to the teachings of the Bible is so sincere that is almost moving, “in a pathetic way” (Dawkins, 2001). That is because Wise does not restrain himself from adding the word “God” in the text of his academic publications. Contradicting the general misconception that a scientist with such elite credentials and specialized

training would never use vocabularies explicitly and implicitly present in the idea of a six-day creation, the paleontologist Wise remained skeptical about a theory that contradicted the teaching of his cherished Book of Genesis.

At the conference, one of Wise's most important theories challenged by Clarey aimed to challenge the evolutionary foundation (evolution again) on the fossil record as a way to determine the age of strata and the development of species. In order to provide an alternative explanation for the established geological time scale, Wise came with a hypothesis that he was not afraid of recognizing as "bizarre." Before the Flood, one of the pre-diluvium biospheres were continent-sized floating forests that exhibited a different ecosystem, one "filled with combinations of strange plants and animals unlike anything we see today." Why not, since no one knows for sure what kind of "exotic environments" God created "from scratch" during the six-day creation? Nor does anyone know any more about pre-Flood environments that probably disappeared forever during the divine deluge (Wise, 2008, p.41). It was when visiting a large quaking bog in Michigan with a group of students that Wise had an insight about one of these possible "exotic" pre-Flood worlds. The epiphany happened when Wise realized that when everyone jumped together, the ground moved since floating atop of a lake. As waves got to the bottom of the base of trees, "the trees would swing first toward and then away from us" (Wise, 2008, p.41). Wise then created a concept ("floating forests") and formulated a theory in which the order of fossils of both animals and plants could not be used to determine different geological ages, as claimed by evolutionary theory,

since this sequence was the jumbled result of the sinking of such a unique environment. If these gigantic floating forests actually existed in the pre-Flood world, how were these plants buried during the deluge? “I suspect that the destructive waves of the Flood ripped apart the floating forest from the outside in – first burying the weak water plants, then the small bushes, then the tall bushes, and finally the tall trees” (fig. 7.1) (Wise, 2008, p.42).

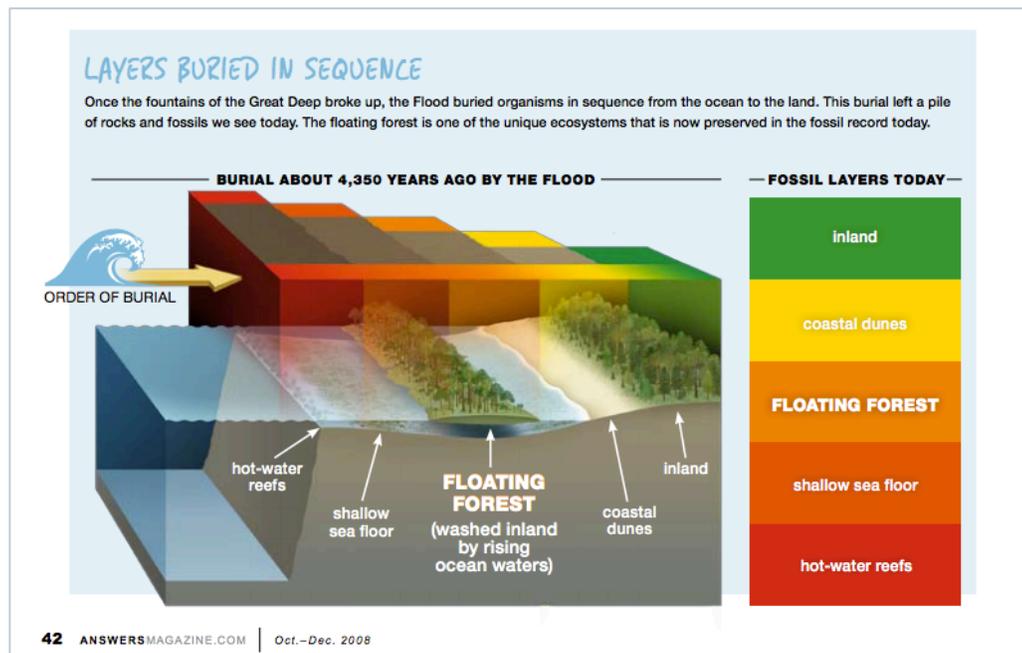


Figure 7.1: Inscription of the sequence of the burial of a floating forest by Kurt P. Wise. *Answers Magazine*, Oct-Dec. 2008.

For Wise, his theory and vocabulary are enough to explain the strange order of fossils of “fish, legged fish, amphibians, and finally reptiles that evolutionists use as evidence of evolution.” The ‘theory could also be applied to explain the existence of coal beds found in late Carboniferous system rocks (Wise, 2008, p.43). He concludes: the ‘floating forest theory’ “not only explains the data that evolution attempts to explain, but by *including*

*the account of God's creation and judgment*, it also reminds us about – and brings glory to – our *great God*” (Wise, 2008, p.43 – italics added).

In spite of Wise’s academic reputation and commitment with the Word of God, Timothy Clarey, his fellow Creationist, did not restrain himself in contesting the validity of the ‘floating forest’ hypothesis. Focusing on the existence of coal beds, during his presentation in CRSC 2015, Clarey not only challenged the validity and accuracy Wise’s hypothesis. He totally dismissed it by affirming that the theory was never properly “tested against other available geological data.” “First, floating forests are found incapable of maintaining a sizeable freshwater lens to supply the plant life, and the pools and springs as suggested by previous authors.” Second, the power of the Flood (tsunami-waves, volcanoes, and earthquakes) would have completely destroyed such a fragile environment. “This activity would have resulted in the formation of multiple coal beds mixed throughout much of the stratigraphic column, contradicting the rock record” (Clarey, August 2015).

Passionate debates about different Creationist theories are not rare in Creationism history, conferences, and literature. Michael Lienesch describes how, while building an institutional infrastructure, Creationists engaged one another in debates about competing theories, such as the ‘day-age’ and ‘young-earth’ theories (Lienesch, 2007, p.203). Ronald Numbers (2006) describes a famous debate that took place between the Baptist preacher William Bell Riley (1861-1947) and the American evangelist Harry Rimmer (1890-1952) over the issue of the first chapter of Genesis.

Riley maintained that the “days” of Creation in fact represented different geological ages (day-age theory). Rimmer was a loyal six-literal-day-creation defender. In defense of his scientific interpretation of the Bible, Rimmer argued that God had created plants before He removed the mist covering the earth to allow sunrays to bathe the earth. Therefore, how could plants have survived for a whole geological age without sunshine (Numbers, 2006, p.82-3)? Creationists created their own vibrant academic life. If science can be defined less as given scientific facts and more as the history of ideas (Fleck, 1979), Creationism should not be so quickly dismissed as a version of a scientific field.

My point is that Creationism is a worldview with its own vocabulary. Based on the analysis of this vocabulary, it is possible to conclude there are two kinds of discourses being produced in the scope of Creationism. One may be described as ‘internal,’ a conversation that circulates only among young-earth Creationists. It consists of what Ludwik Fleck (1979) calls a “community of thought” in science: “a community of persons mutually exchanging ideas or maintaining intellectual interaction” (Fleck, 1979, p.39). Scientific observations, regardless whether secular or religious science, are conditioned by the terministic screen and style of a certain community of thought. In the Creationist case, this internal conversation refers to different interpretations of the Bible, biblical terms, and newer theories that would provide a scientific explanation to the anti-diluvian, diluvian, and post-diluvian periods. The other discourse, however, aims at making an external move toward the secular

world by acting as an answer to mainstream scientific claims. By embracing part of the vocabulary of secular science (technical terms and data), the Creationist discourse might conceivably pursue a dialogue with the 'outside world.' At this first look, it might look like an attempt to surpass the boundaries of an exclusively Fundamentalist Christian domain, translating Creationist claims to a broader scientific audience. Why not, one might ask.

But to what extent does the Creationist vocabulary and counter-attack actually cross to the 'other side?' In fact, Creationist research does not appear in secular journals or conferences, at least not when it is openly Creationist. It is true, for example, that Jeffrey P. Tomkins contributed to chapters and published articles in secular publications, but this happened when he was still a faculty member in the Department of Genetics and Biochemistry at Clemson University (Cuthbertson et al., 2006; Frelichowski et al., Liang et al., 2006; 2007; Tomkins et al., 2005). Back then, in a secular setting and living another scientific life, Tomkins was talking about cotton and flower development and did not invoke the name of God to challenge the premises of evolution.

By rhetorically describing the origin of the universe in such disparate ways, Creationists and secular scientists are indeed constructing different universes for themselves. What I mean is that Creationism and secular science have two distinct worldviews and, therefore, lead separate lives. It is undeniable that sometimes these two worlds collide with one another, but it would be inaccurate to assert that this

encounter actually changes opinions and minds. Two celebrated examples of this collision are the Scopes Trial in 1925 and the debate between Bill Nye and Ken Ham in 2014. However, these confrontations can hardly be considered as examples of successful translations. For instance, in the debate, Ham reinforced his belief in everything that we already know about Creationism: the earth is only 6,000 years old, a Flood of global proportions was responsible for all the geological formations that we see in present days, and a single man with his family could build an Ark able to survive this horrendous cataclysm, giving a second chance to all life forms on the planet. In contrast to Ham, Nye deployed the major rhetorical and technological arguments for secular science and challenged the reasonability of Creation Science.

There are billions of stars more than 6,000 light years from here.... Mr. Ham, how could there be billions of stars more distant than 6,000 years if the world is only 6,000 years old? Is it reasonable that we have ice older by a factor of hundred than you claim the earth is? That we have trees that have more tree rings than the earth is old? ... And potassium-argon dating [[rocks that] are far, far, far older than you claim the earth is? Could anybody have built an Ark that would sustain better than any Ark anybody was able to build on the earth? So, if you are asking me – and I got the impression that you were, (giggling) is Ken Ham’s creation model viable? I say no, absolutely not.<sup>62</sup>

Afterwards, nothing had changed in their own perspectives or in the worldviews of their respective audience. Creationists continued to be Creationists and evolutionists remained followers of Darwin.

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<sup>62</sup> “Uncensored Science.” *Bill Nye Debates Ken Ham*. Answer in Genesis, 2014. DVD.

In my final remarks, I want to address an issue that I mentioned on several occasions in the course of the dissertation: translation. My aim has not been to scrutinize Creationist tactics of translating their arguments to the secular world. Rather, my investigation is better described as a study of how the Bible is translated into a book of facts in order to secure the Creationist worldview and thereby the Creationist community. It is an investigation of the role that rhetoric of science and technology play in the construction and preservation of a much safer world, where chance has no place and everything works according to God's will. However, I want to end this project by raising the question of translation and with that, the issue of scientific boundaries and authority.

In *The Golem*, Harry Collins and Trevor Pinch (1993) affirm that in the competition between different scientific claims the manner of presentation is just as important as the content. The scientific community has its own protocols and rituals, in which rhetoric and the selection of words play an important role. These features distinguish the boundaries of what is considered science as distinct from non-science and pseudo-science. I regard these protocols and rituals, which are part of the process of 'purification' described by Latour (1993), as rhetorical efforts to separate science from religion, the natural world from the supernatural.

In science, one of the most important protocols and rituals is measurement. As Collins and Pinch point out, "science does not really proceed by having clearly stated theoretical predictions which are then verified or falsified. Rather, the validity given to

theoretical derivation is intimately tied up with our ability to make measurements” (Collins & Pinch, 1993, p.44). Apparently, in secular science what cannot be measured and properly explained does not even exist. Take the theory of relativity, for example. In 1887, decades before Albert Einstein, Albert Michelson and Edward Morley had detected the relativity of time and space in their experiments, but they could not prove it because their results did not fit the current context and premises of physics. Only after Einstein was it possible to attribute a meaning to this previous observation (Collins & Pinch, 1993). As discussed in Chapter 5, measuring and seeing is not only a matter of looking through a telescope or a microscope or decoding inscriptions generated by more and more sophisticated digital devices. Both outcomes rest on a complex combination of assumptions, premises, and worldviews. Collins and Pinch argue that instruments yield varying results according to the worldview of who is using the technology and interpreting the data. Scientific progress and technological development cannot do all the work. Cultural settings, cultural transformation, or what Latour called “visual culture” (1986), can change the way scientists interpret results and, consequently, the way they describe the world.

However, no matter how many different “visual cultures” exist out there, since the modern project of purification (Latour, 1993), the constructed boundaries of ‘normal’ science block the word ‘God’ and supernatural explanations from accounts of natural phenomena. Since, according to the “Moderns,” God is immeasurable and ‘writes through crooked lines,’ normal science does not take the divine premise or

supernatural manifestations very seriously. That is what Latour meant when he defined purification as the “strange beginning of the crossed-out God, relegated to [the] sidelines” (Latour, 1993, p.13). Some debates or claims are not accepted inside the secular scientific community simply because they are held to be unscientific on the accepted and established current paradigm. Creationism is one of them.

The pariahs of science conduct research, employ technologies, write papers, and present their findings in Creationist conferences. Following the modern scientific sensibility and mimicking the protocols and rituals of secular science, they even develop techniques and rhetorical strategies to measure what is understood by mainstream science to be immeasurable: God and the mythical events described in the Book of Genesis. In ‘measuring what cannot be measured,’ Creationist academic publications and conferences help to hold Creationism together by creating a common corpus of knowledge that suits a particular worldview. They act as ‘translation operators,’ juxtaposing elements, arguments, revealing relationships between religion, natural phenomena, and reality (Callon et al. 1986). However, if they offer a common ground for their own audience composed of Fundamentalist Christians, it would be to expect too much that this academic production could be (at least in this contemporary context) translated into the secular world. In order to persuade others about Creationist claims it is necessary to do more than simply report findings, rhetorically format these findings in an academic article, or transform the Bible into a book of scientific records. First and most important, it is necessary to choose what to believe. In

the Creationist case, it is imperative *to believe* that the Bible is indeed a book of factual events and that miracles really happen because that is the basis of the Creationist ethos.

In Actor-Network Theory, the success of a scientific text can be measured by its capacity of 'translation:' the extent to which authors are successful in engaging other people to accept their claim. In other words, according to Latour (1985) and Michel Callon (1986), a scientific text is effective only if endorsed by others outside its original milieu. The classic example given by Latour to explain the process of translation is taken from Louis Pasteur's laboratory and microbes (Latour, 1988). For Latour, the success of Pasteur in proposing a vaccine against anthrax did not reside only in the achievement of the vaccine itself, but in Pasteur's ability to convince French authorities that the cure for this cattle disease had to pass through his laboratory. Thus, if the rate of translation to the outside world is the measurement for the success of a scientific enterprise, the relationship between Pasteur and French authorities is not a good analogy to describe the accomplishment of Creationism. Creationism only translates its claim to an audience that already endorses its premise: that God created everything. As a matter of fact, as a scientific (and religious) field, Creationism only provides a safe territory for Fundamentalist Christians, for which it works as a counter-narrative that can be taught to their homeschooled children and to themselves. But, as it happens, Creationists do not translate their claims to the world beyond the scope of Fundamentalist Protestant Christianity. For instance, is it possible to affirm that the *BioOrigins* project is really in the business of promoting a *debate* between secular and

Christian scientists? Does the Creationist project threaten the secular worldview and mainstream science? Can it persuade people who do not believe in the inerrancy of the Protestant Bible? It is hard to believe. Creationism is a statement of belief in the Scriptures and Jesus Christ. One is not simply persuaded by the arguments of Creation Science; it is more like a religious conversion. For instance, when attending the CRSR 2015, people asked me at least three times when Jesus had come into my life. Because if someone does not believe that Jesus is the savior who died to save the whole humankind, Creationism does not even exist. The Creationist self-conception of being remnant of true church matches perfectly over the story of Noah as God's choice to survive a universal cataclysm. Nonetheless, I challenged here the assumption that the success of translation of Creationism can be measured by the extent that its claims are translated to the secular world. Because actually secular reasoning or mockery of Creation Science does not matter. Creationism is an effective accomplishment for its followers. At the second coming of Jesus, the final judgment will prove they were right, since, like modern Noahs, Creationists will survive God's universal destruction of the world, safe aboard the Ark of Creation Science.

In the ongoing process of purification, secular science has constructed its defensive boundaries. The process of purification or, in other words, the demarcation of what is science from what is not science is a daily activity among secular scientists. It relates to the issue of protecting professional authority. For instance, Nye's decision to debate Ham met with harsh criticism from the secular scientific community. While the

Creationist community celebrated the encounter, the secular scientific community reacted as if Nye had slept with the devil.<sup>63</sup> An article posted to the *Christian Science Monitor* wondered if scientists should ever bother debating Creationism (Chowdhury, 2014). Jerry Coyne, a professor of ecology and evolution at the University of Chicago, called the debate “pointless and counterproductive” (Coyne, 2014). Nye defended himself by arguing that he had his reasons, such as protecting society from the danger of Creationism (Lee, 2014). According to Lessl (1988), because they perceive heretical science as dangerous, scientists feel compelled to purge the infecting agent from the realm of pristine science.

In Chapter 4 I argued that because Creationists judge evolution to be a religion (a pre-modern one), Lessl defends the idea that for secular scientists, Creationism is a heresy. By investigating the rhetorical tools employed by scientists to maintain their autonomy and authority, Lessl demonstrates how secular science rhetorically deals with what it considers deviances from the proper standards of science. In religion, heresy is what is recognized by this established *status quo* as a contamination of doctrinal purity – it is pollution that must be treated accordingly. The heretics must be isolated because they bring crisis to the mainstream institution. And here Lessl reveals a rhetorical pun on the boundaries determined by mainstream science: heretics must be secluded precisely because they are insiders. They are technically members of the

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<sup>63</sup> Creationist David DeWitt, director of Liberty University’s Center for Creation Research, echoed the feelings of the Creationist community when he proclaimed, “I am thrilled that people will clearly see the contrast between a Biblical creation view and an atheistic evolutionary one.” Available at <http://www.liberty.edu/news/index.cfm?PID=18495&MID=111079>

group. As I pointed out in chapter 2, Creationism did not begin outside the scientific community, but from within it. Today, Creationists hold academic credentials. But, if they see themselves as the apostles of science writing for God's library (Morris, 1988), in secular science, they are scientific apostasy. And as in any ritual of purification of dissenters, the ritual activity of demarcating scientific boundaries must purge what poses a threat to orthodox authority.

What secular scientists with their anxieties over authority are missing here is that Creationism, likewise secular science, is one out of the many possible perceptions of 'scientific' reality. Or even more accurate, it is one worldview among many *selections* of reality. And for Creationists, likewise secular scientists, it is a true one. The process of non-translation is not only because the incompetence or will of Creationists to engage a different audience about his claims. It is also caused by the myth of purification endorsed by the so-called secular science, which endorses the illusion that science can be totally set apart from religion.

As scholars, we should pay more attention to this kind of heresy and understand how people materially construct different senses of reality. Regardless of what we personally or collectively believe, paraphrasing William Shakespeare, there are more things between heaven and earth than are dreamt of in our vain philosophy. Since there is not a single concept of what is 'real,' it is important to understand what lies within this in-between. Secular scientists such as Nye and Dawkins refuse to engage Creationism in serious conversation. As a matter of fact, they completely dismiss the

Creationist account in the same way that Walter Lippmann once did, as described in Chapter 1. For them, Creationism is only a retrograde reaction against all the promises of modernity. Therefore, it does not – or should not - appeal “to the best brains and the good sense of a modernity community” (Lippmann, 1929, p.31). It is not difficult to understand such revulsion. Creationism does not fit the accepted and prescribed standards of secular, empirical, and measurable science. However, it is erroneous to suppose that Creation Science does not have any appeal in contemporary times because for many Christians it clearly does. Moreover, the conviction is not without significant consequences. For instance, the belief that God created humans and the universe in the exact form they exhibit today affects political decisions and the way people organize their lives. It drives serious controversy such as climate change or the debate over when life begins, and therefore, it influence major national and international issues. Reactions from scientists like Nye and Dawkins are problematic for refusing to look carefully at the appeal of Creationism and failing to recognize that secular science is also built on and maintained by comparable, if distinct appeals. There is a danger in neglecting to understand that Creationism and secular science are similar no less than different. The similarities are at least twofold. First, Creationists mimic scientists by relying on secular rhetorical and technological strategies. Second, both groups exhibit an analogous metaphysical aim: substantiating the ultimate framework of reality made manifest in their investigations of Nature. By disclosing the role that rhetorical and material strategies play in the construction of worldviews, we can look at any sense of

reality – no matter whether religious or secular - and deconstruct it. This makes it possible to understand the rhetorical motivation behind both sides. Therefore, throughout this investigation, while scrutinizing the strategies employed by Creationists to craft their science in order to keep their sense of reality cohesive, I was at the same time revealing the strategies employed by secular scientists to construct their own concept of fact.

Discussing whether Creationism is science or not is academically unproductive. Whatever boundaries mainstream science may erect and police around what it claims is “good science”, people will continue to affirm and tend to their own worldviews. There are questions that are more important for scholars to consider. For example, where does the distinction between natural and supernatural phenomena reside? Scientists produce all kinds of questions about the age or the expansion of the universe and create technologies to capture images of the past, but largely refuse to entertain such matters as UFOs, extra sensory perception (ESP), parapsychology, or divination. The stream of questions only grows: what or who creates the boundaries between science and “pseudo-science?” Whose authoritarian voice determines what “pseudo” really means? Who determined that religion no longer contributes to scientific inquiry? It is also important to keep in mind that different worlds are not only characterized by the scientific regulation of difference. No less critical is to understand how transition and exchange occur between the two, because there are similarities. In spite of so much effort at drawing boundaries, I must end my remarks in agreement with Latour: we

have never actually been modern. Or maybe, I should say: we are, but only when the rhetorical discourse of modernity attends suitably to our needs.

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