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Allie Faden

**Science and Myth**

Science and mythology are generally considered to be at odds with one another. However, science and myth serve a relatively similar purpose – to explain to human beings events in the natural world that may otherwise remain mysteries to us. Science explains how things happen, and by what mechanism, whereas myth attempts to tell us why these things have occurred, and by whose influence. When examining the creation story myths and those of extreme destruction brought about through geological[1] events, one may realize that these myths serve to explain to people how important historical occurrences have come about, in the absence of any formal scientific understanding. Despite the lack of formal scientific insight, myths generally give the same explanations, albeit in metaphor, as scientific understandings of natural phenomena. Barthes explains, in *Mythologies*, this ability to derive meaning through non-scientific narrative by saying, "[t]he writer's language is not expected to *represent* reality, but to signify it" (136). In other words, myths do not provide an explanation for what has happened, but rather express that these events have relevance to human populations and attempt to derive meaning regarding these occurrences for individual societies.

Cross-culturally, humans tell stories of primordial nothingness preceding life on our planet, explanations of the development of (human) life, as well as telling of instances where extreme flooding has occurred. These stories are the personalized history of the people who tell them, explaining to future generations why their collective histories recall periods of destruction in the places they live(d). While it is outside the purview of science to substantiate claims of divine influence in the world of man, science *can and does* support claims[2] of massive global change, destruction and rebirth. By examining these myths with a mind toward available scientific evidence, one may see that these myths pass down a collective history not only of the evolution of man, but of radical changes in the planet itself and how man may have coped with these changes to ensure his survival. Mythologies are "a pure ideographic system, where the

1 The term “geological” tends to give people an immediate impression of things relegated to the study of rocks. However, the word actually refers to the study of the history of the Earth and its life. While this generally includes some study of rocks, the study of rocks is not necessary for the study of geology to occur (“Geology”).

2 It is a common misconception that science may prove or disprove different concepts. This, however, is not an accurate understanding of the function of scientific inquiry. Science may entirely disprove a concept, but it can never prove one. The best science may accomplish is to state definitively that the currently held evidence supports a particular claim with reasonable certainty.

forms are still motivated by the concept which they represent while not yet, by a long way, covering the sum of its possibilities for representation," and this allows myth and science to work in tandem to (re)present identical natural truths in different formats that appeal more or less to varied audiences while still saying the exact same things (126).

The most widely accepted[3] theory on the conception, evolution and expansion of the universe is the big bang model. Edwin Hubble observed in 1929 that our universe is continuously expanding and that it expands in all directions. Through mathematical analysis of the velocities[4] of travel of various galaxies, scientists have extrapolated that a single origin point must have existed from which all these celestial objects traveled. This point of origin is infinitesimally small and theories surrounding it are modeled on the idea of Zeno's Paradox[5], ultimately leading scientists to believe that the universe is approximately fourteen billion years old, and follows the laws of Euclidian geometry[6]. This point of origin, and its associated explosion, is considered by science to be the "beginning" of the universe, as there is no objective means for discovering what may have occurred before it, or what physical laws may have governed any space that existed before the inception of our universe. As the particles stemming from the big bang continue(d) to accelerate through space, they cool(ed), ultimately resulting in the formation of atoms, gasses and solid objects. This caused the formation of galaxies, stars and other planetary bodies (Ratra and Vogeley 235-265). Over time, we see the formation of Earth, leading to the eventual evolution of life on our planet.

The idea of something coming from nothing is common in myth. Many creation stories begin with the notion that there was nothing, and then an event occurs, from which the god(s) and the world are formed. In India, creation myths state "[t]here was neither non-existence nor existence… One arose through the power of heat" (Bierlein 37). In Iran, "Ormazd began his work of creation by casting some of his pure light into the vast abyss of the cosmos…" (41), and in the Nordic creation myth, the Elder Edda states that "[l]ong ago there was no heaven above

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3 There are many dissenters of the big bang model and other proposed theories to explain the formation of the universe. However, to maintain continuity with what is most widely accepted by science currently, I have chosen to look exclusively at the big bang model in this paper.

4 Speed and velocity are different measurements, although they are related and use the same units of measurement. Speed, a scalar quantity (a numerical value), relates exclusively to the rate of travel, calculating that speed = distance/time traveled. This calculation is made without regard to direction of travel. Velocity, a vector quantity (a vector is a ray or line in 3D space that contains a scalar quantity and a specified direction), references speed with the additional directional component.

5 Zeno's Paradox is a parable version of the theory of limits in calculus. Zeno hypothesized that if Achilles raced a tortoise, that despite the fact that Achilles ran much more quickly than the tortoise, he could never overcome it, because "[i]n the time it takes Achilles to cover half the distance from the starting block to the tortoise, the tortoise has moved on. When Achilles covers half the remaining distance, the tortoise has moved on further, though by a smaller amount. This goes on *ad infinitum*, so that Achilles is never able to come level with the tortoise" (Rooney). This is expressed mathematically as $e = \lim(1 + 1/n)^n$.

6 There are many forms of geometry, but Euclidean geometry is the type most commonly thought of by laypeople as "geometry."

nor an earth beneath, only a vast bottomless deep shrouded in an atmosphere of mist," along with another world "of light[,]" where "warm [air] began to melt the ice[,]" eventually allowing for the formation of the first gods and eventually of the worlds (44). The Greeks believed that "[i]n the beginning was Chaos and darkness[, where] all elements were mixed together without form[,]" ultimately resulting in the formation of the Earth and all living things (46). Likewise, the world creation stories of Africa, Asia, the Americas and Polynesia parallel this notion of our world, the cosmos, and living things coming from a vast, formless nothing. Without the existence of formal scientific thought, it is quite natural that the people would use their gods in place of cosmic expansion and subatomic particles as the means through which these events and developments occurred. Although the signifiers between scientific and mythological explanations vary in their descriptive forms, the signified remains the same in the signs used to describe the birth of the universe and heavenly bodies.

The theory of evolution remains among the most hotly contested scientific theories ever set forth. Of primary dispute is whether this theory discounts the notion of god(s) and contradicts the teachings of certain religions. I do not believe any religious teachings are contradicted by the theory of evolution; rather, many myths detailing the coming of man allude to the same general notions the theory of evolution more plainly states. Although many people wish to engage in debate regarding intelligent design or creationism versus evolution, I see no valid reason to examine these concepts as an "either or" situation, when the myths that form the basis of ideas surrounding creationism and intelligent design function in a capacity that utilizes different signifiers from that of scientific discourse to demonstrate the same signified concept all three discuss.

Charles Darwin's[7] theory of evolution built upon the works of those before him, such as Anaximander of Miletus, coupled with more than twenty years of study in the diversity and similarities of biological systems. The basis of the theory of evolution is that life originated from a "primordial soup" of proteins, amino acids and other building blocks of life, first developing bacteria and slowly, through the means of natural selection, developing life of greater and greater complexity. Spontaneous mutations in creatures that allow for increased chances of survival in their environment pass these mutated genes onto their offspring. This process of natural selection continues over millennia, promoting intra-species diversity and ultimately resulting in the development of entirely new species. All species, extinct and current, are thought to have originated through this process of natural selection (Darwin). Over the course of the last 150 years, scientists have performed experiments and collected data in an attempt to falsify the theory of evolution, and as of yet, no data disproving this theory has come to light.

Many of the creation narratives also support the notion that life follows the ideas set forth in the theory of evolution. The Norse creation myth, for example, states that after the worlds were created, portions of the god Ymir gave birth to the mountains and the earth, as well as all the plants. From the elm and the ash, man and woman were created. Although this myth skips the development of other life with complexities between that of plants and man, the general idea follows that life originated in the form of flora before developing the increasingly complex forms

7 Note: Alfred Wallace developed the theory of evolution, with some notable differences, separately from Darwin, though during the same time period. Darwin is credited exclusively with its creation because he published his findings before Wallace was able to. The primary difference between Darwin and Wallace's theories is that Wallace believed in a concept more similar to that of Intelligent Design, wherein evolution as we know it occurred, but with the help of a spiritual helper.

of fauna. The Algonquin Indians believe in a creation story strikingly similar to that of the Nordic people (Bierlein 44). In the Algonquin myth, the Earth has two sons, one who, like Baldur, can be killed only by an owl feather, named Glooskap. He creates all the plants and animals of the world from the body of his mother. His brother, Malsum, is jealous and kills Glooskap. Glooskap is able to come back to life, and in turn kills Malsum with a fern (the only thing that he can be killed by). Malsum ultimately becomes the spirit leader of the wolves and serves to torment humans and animals through them, in the same manner as Loki (ibid.).

In the Polynesian cultural region, mythology indicates that Kane fathered plants and reptiles before fashioning mankind. Likewise, the Arikara tribe of North America believed that lesser forms of animals, ducks and spiders, came first. The spiders then produced the plants and animals, including humans. In both of these myths, humans are a natural evolution following the creation of lesser forms (61).

Perhaps as a nod to the process of developing from more primitive human-like species into modern man, the Yuma people tell a story of the creation of man that goes through several attempts before achieving the perfection that is mankind. Bakotahl, the blind god, attempted to create human beings from clay and water. His creations lacked fingers and toes, which makes them incomplete persons. Kokomaht then created perfect humans, who had fingers that "enabled them to make things and create works of art," also alluding to the cognitive superiority humans demonstrate over those of other creatures as well as that of the importance of the opposable thumb (64). The Mayans also believed that man went through more than one incarnation before his development was complete, requiring a total of four attempts before man was perfect (69).

The Zuni myth corresponds more directly to the theory of evolution, stating "Awonawilona fertilized the sea and green algae grew over it. The green algae produced the earth and sky. The marriage of earth and sky and the action of the sun on the green algae produced all living things" (67). The creation story of the Playanos also speaks of creatures coming from the sea and attempting to adapt to land, stating, "…some of the fish tried to colonize the land…With the sea and land completed, Nocuma took some soil and sea-water and made a man…" (68). Likewise, the Abanaki people believe that "…human beings came forth from the union of sea and land," another possible allusion to the evolution of some aquatic life to that of land-dwelling species (109).

The Bible details the evolution of Earthly life in Genesis, where it states that on the third day of the creation, "…God said, 'Let the earth sprout vegetation: seed-bearing plants, fruit trees of every kind on earth that bear fruit with the seed in it,'" demonstrating that plant life was the first type of life to occur ("Genesis 1:1-2:4" 3-4). Then, on the fifth day, God said to "'Let the waters bring forth swarms of living creatures, and birds that fly…' [and then he] created the great sea monsters…living creatures… that creep, which the waters brought forth in swarms, and all the winged birds of every kind" (ibid.). On the sixth day of creation, God then "made wild beasts of every kind and cattle of every kind, and all kinds of creeping things of the earth," also prior to his decision to create man (ibid.). Once all living things exclusive of man have been created, God then "created man in his image, in the image of God created him; male and female He created

them[8]" before taking a day of rest for himself (ibid.). This telling of the creation of life on Earth almost directly corresponds to scientific thought on the origins of life, albeit in a mythic form.

A large part of our collective global mythos is based on the destruction of large portions of mankind due to flooding. These myths exist everywhere, from Asia to the Americas and even in Australia, a place where this type of geological concern is inconsistent with the prevailing climate. However, during the Last Glacial Maximum (LGM)[9], as well as during the early Holocene period[10], a surprisingly large portion of the Earth's surface was covered by glaciers, and the ocean levels were as much as 300 feet lower than they are today in some areas (Fielding et al. 129-140). Given the scope of glaciation during the LGM, it is reasonable to presume extensive flooding occurred during the glacial retreats of the Holocene period[11].

In the Americas, the site of the most extensive flooding during the glacial retreat of the Holocene period, the mythologies of the various tribes are rife with mentions of flooding. The Aztecs describe the periods of the five suns, each sun representing a different period in human history. The fourth sun of their cosmology is the "Sun of Water, Tlaloc, the rain god, who destroyed all the people in a flood," and is followed by the fifth sun, our modern period (Bierlein 104). Tlaloc chooses to drown the world because the people were acting impiously and ignoring the needs of the gods. He does, however, save two devout people, Tata and Nena, by tasking them with making a large canoe and instructions to eat only one ear of corn each. This couple eventually disobeyed Tlaloc, catching and eating fish, which resulted in their destruction as well (128). The Incas also tell of a large, destructive flood in the highlands of Peru. Two well-mannered shepherds were warned by the llamas that this flood would arrive and sought refuge within caves of the highest mountain. Fortunately for the refugees, the mountain they hid within continued to grow so as to save them from the rain. Although the people repopulated the earth, including lower lands, the llamas are said to have not forgotten the flood, which explains their love of highlands (134).

The Navajo people, likewise, attribute extensive flooding to the angering of the gods. When Coyote, and other beings climbed up to the third world, they were advised not to disturb Tieholtsodi, the water serpent, if they wished to live in peace in this world. However, Coyote, being Coyote, was unable to follow the rules laid forth for him and as such, kidnapped the children of Tieholtsodi. This angered him so greatly that he opted to flood the world so as to find

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8 "Adam," the human being, is tied with "adamah," the soil, in the Hebrew language and accordingly denotes a non-gendered human until later in the Book of Genesis, when Adam and Eve are segmented into different physical beings with different natural sexes. Likewise, the Hebrew "Elohim" is a masculine plural word that indicates the feminine and masculine natures of the divine (Berkowitz).

9 The LGM is the last period of extensive glacial covering, which began its retreat at approximately 18,000 BCE. Although it is generally considered that the most recent "ice age" (correctly called glacial maximum) has already ended, there is some dispute as to whether it may truly be considered completed at this time (Tudge).

10 The Holocene period began around 12,000 BCE and continues today.

11 This continues to be an issue in some localities, such as Iceland. Modern day glacial retreat periodically results in extreme flooding, although this flooding would be considered minor when related to the floods of the primary glacial retreat.

the party responsible for stealing his children. Massive flooding occurred, and the people had to use magic to escape into a higher world. This saved the people for a short time, but ultimately the flooding continued into this world, too, and the people were forced to escape to yet another world through the same magical means. Eventually, the people forced Coyote to return the water serpent's children, and the floods subsided at this time (105-107).

The Mandan, Kniseneaux, Choctaw, Creek-Natchez, Mojave-Apache, Cree and Algonquin people also tell of great world floods. The Chinook Indians also tell of massive, destructive flooding as a punishment for wickedness. This may be a reference to either glacial retreat or to the formation of the Ghost Forest[12] in the Pacific Northwest (Peet 316).

Genesis tells of the most commonly known flood myth, where God instructs Noah to build an arc and fill it with his family, as well as sets of all the animals of the world. God was so angry with the people for their evil doings and violence that he decides to wipe out all of his creatures, save those aboard Noah's arc. The world experienced extreme flooding caused by forty days and nights of continuous rain, which resulted in the death of the entirety of the world's creatures not protected by the arc. At the conclusion of the floods, the seas had risen fifteen cubits[13] and no land mass was visible. After nearly a year in his arc, Noah finally discovers dry land and is able to live on land again and take part in the re-population of the world ("Genesis 6:5-9:17" 8-11). The Babylonians, in a myth that likely preceded that of Genesis, also tell of a flood where the gods instruct a pious man to build a ship, and to fill it with pairs of the animals of the world as well as his family. This saves him and allows the entirety of the world to be repopulated with humans and other animals (Bierlein 126). A similar story is told in Greece, although in place of a ship, the human survivors instead occupied a wooden trunk until it floated to the remaining uncovered mountaintop (129).

In India, the tale of Manu and the fish is told. Manu, a kindly man, is advised by a fish to care for him in return for protection from the floods that would destroy all the people of the Earth. By keeping his deal with the fish, Manu is able to survive the floods (125). Likewise in Hawaii, two human beings were believed to have hidden on Mauna Kea until the floods subsided, after which they offered thanks to the gods for saving them (127).

Upon examination of different global creation and disaster myths, it is startling to see the degree of correlation between these stories and what science commonly holds as universal truths. In the absence of such continuity from one culture to the next, one might presuppose that these legends may be randomly attributed to creativity on the part of those with whom they originate. However, there is no discernible logical reason for cultures across the globe to believe in myths that correspond to one another if they are not mythological explanations for prehistoric events that occurred throughout the globe. Through the use of different signs, science and mythology actually work in tandem to explain identical historical events using the language that best represents the understandings and cultures of the people who serve as each respective audience.

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12 The Ghost Forest is a portion of the Pacific Northwest where the remnants of forests of dead trees still stands. It is believed that a large Alaskan or Cascadian earthquake caused a downward shift in the land, resulting in extreme flooding. When the waters receded, the trees, all drowned, were left standing.

13 Fifteen cubits is equivalent to twenty-two feet. However, one may extrapolate that the Bible is expressing the idea that the highest points of land on Earth were covered by fifteen cubits of water, rather than a generalized increase in sea level of fifteen cubits, the minimum depth required for Noah to have been capable of sailing his arc over every land mass on Earth.

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