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Science Fiction and the Myth of Trajectory or Progressive Evolution

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In “The Ladder and the Cone: Iconographies of Progress,” Stephen Jay Gould argues that Western society has embraced “iconographies of evolution... reinforcing a comfortable view of human inevitability and superiority” (Gould 2007, 363). Under the influence of these iconographies, we have ceased to see evolution as “a copiously branching bush” (Gould 2007, 367). Instead, we have developed a deep, intuitive understanding of evolution as a steady, linear progression towards increasing complexity, equating “more” with “better.”

Gould discusses iconographies like the “great chain of being”<sup>1</sup> and the “march of progress” as influencing our perceptions of evolution. Today “family tree”-style pictures are beginning to replace the traditional image of the “march of progress” in biology textbooks. However, outside academia, there are still countless visual representations of evolution that maintain the fiction that evolution inevitably follows a certain predetermined linear progression and that that trajectory moves towards humanoid bodies and human or superhuman brains. Science fiction movies, TV shows, and comic books are powerful iconographies in today’s society, continuing to perpetuate the myth of trajectory-based evolution. According to the sci-fi genre, evolution follows an internal “blueprint,” a preset trajectory that takes organisms from simplicity to complexity for complexity’s sake.

The first part of this paper will discuss three examples from the genre that perpetuate this myth: “My Three Crichtons” from the *Farscape* television series, “Threshold” from the *Star Trek* franchise, and the *X-Men* series of comic books and movies. The second half will examine

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<sup>1</sup> The great chain of being refers to the medieval conception of the order of the natural world. God and the angels were at the top, then the social hierarchy, from king to gypsies, and then the animals, plants, and rocks.

why evolution is presented this way in sci-fi, why it matters, and if and how we can reconcile evolutionary fact with the overarching mission and themes of the genre.

### **Farscape: “My Three Crichtons”**

*Farscape*, a science fiction television series produced by the Jim Henson Company, first aired on March 19th, 1999 and continued for four seasons on the SciFi (now SyFy) channel in the U.S. The sixty-minute episodes were mostly filmed in Australia and starred Ben Browder as human astronaut John Crichton, Claudia Black as Aeryn Sun, and Wayne Pygram as Scorpius. The series chronicles the adventures of Crichton who gets lost through a wormhole and ends up on Moya, a living ship housing prisoners who have escaped from the totalitarian Peacekeeper regime. The show ended with a cliffhanger in 2002 after the planned fifth season was cancelled.

In the episode “My Three Crichtons,” a huge ball of energy invades Moya. The energy ball engulfs Crichton and then spits him out, along with a “primitive” Crichton and an “advanced” Crichton. Communication is established with the energy ball, which states that it is conducting research, presumably of a biological nature. It agrees to leave Moya’s crew in peace, on the condition that one of the Crichtons be sacrificed for its research. The crew must make hard decisions regarding the value of each Crichton in order to decide who will be sacrificed (*My Three Crichtons* 2000).

This episode of *Farscape* perpetuates the myth of progressive evolution by presenting evolution not only as linear and following a preset trajectory, but also by presenting that trajectory as one that moves towards increasing complexity. The three Crichtons are meant to represent different stages of human evolution. “Primitive” Crichton is an early hominid, the

original Crichton is a modern-day human, and “advanced” Crichton is supposed to be the future of human evolution, what modern-day humans will eventually evolve to.

“Primitive” Crichton is commonly understood to be a Neanderthal, due to his strong brow ridge and projecting midface. For now, we can set aside the issues with this episode’s depiction of Neanderthals as unintelligent knuckle-walkers-- Neanderthals not only had incredibly impressive tool traditions but also walked upright-- and focus instead on the implication that Neanderthal Crichton was “devolved” based on original Crichton’s DNA. This is hugely problematic because it suggests that Neanderthal Crichton is a direct ancestor of original Crichton. In fact, humans, while related *to* Neanderthals, did not evolve *from* Neanderthals. They are two separate branches of the same tree, sharing a common ancestor, but not directly descended, one from the other. By representing Neanderthal Crichton as the only logical previous step in modern human evolution, this episode reinforces the understanding of evolution as linear, rather than branching.

Not only is human evolution linear in the Farscape universe, but it also follows a pre-set trajectory towards increasing complexity. The next step after original Crichton is “advanced” Crichton, distinguished by the folded indentations in his forehead, evidence of a huge brain that is literally too big for his skull. A separate paper could be written about how extraordinarily disadvantageous such a variation would be, but what is equally interesting is the premise of the episode that states that “advanced” Crichton was “evolved” from original Crichton’s DNA. The implicit argument here is that humanity’s evolutionary trajectory is preset. Human beings will evolve in a particular way, regardless of anything else around them. This totally contradicts the main tenet of Darwin’s theory of natural selection, which is that successful species evolve through advantageous adaptations to their environment: “any variation, however slight... if it be

in any degree profitable to an individual... will tend to the preservation of that individual, and will generally be inherited by its offspring” (Darwin 2006, 40). The idea that Crichton’s evolutionary future can be determined from his genes takes the environment out of the equation, and thus discounts natural selection as the mechanism by which evolution occurs.

Finally, it is interesting that the defining characteristic of this future Crichton is his extraordinary intelligence and reasoning capabilities. This furthers the idea that evolution follows a trajectory towards more complex organisms and towards more intelligent organisms. This is consistent with the episode’s premise that evolution occurs irrespective of environment, but it is inconsistent with mechanism of evolution in actuality. The only trajectory evolution follows is one towards fitness for an organism’s environment. Human beings are very well adapted for our environment, but jellyfish are equally as well adapted to their environment, as are Moya’s many inhabitants to their environments.

### **Star Trek *Voyager*: Threshold**

Star Trek: *Voyager* is the fourth installment in the Star Trek franchise. It follows the crew of the USS Voyager, captained by Kathryn Janeway (Kate Mulgrew), as they must find a way back to federation space after being blasted 75,000 light years away from home. The show ran for seven seasons from 1995-2001.

In the episode “Threshold,” the Voyager’s crew discovers a more stable form of dilithium crystal that they postulate would allow them to break the “Warp 10 barrier.” This would allow them to travel many times faster through space than previously thought possible. Despite what are deemed to be small risks, Lieutenant Paris petitions to take the new crystals on a test run using a shuttle. He returns to the ship almost instantaneously, having travelled through the entire quadrant. His body then starts to change into “a new form of life” leading him to kidnap Captain

Janeway and escape in the shuttle. Voyager pursues them, eventually tracing the shuttle to a swamp-like planet, where they discover amphibian/reptilian-like creatures with traces of Paris' and Janeway's DNA. Luckily, the ship's doctor is able to restore them to their human form at the last minute (De Luca 1996).

Star Trek has played with evolution and genetics since its inception, with varying levels of believability. This episode, however, is universally panned as the worst "DNA episode" of the entire franchise. Even the writer called it "a royal, steaming stinker" (Voyager DVD Commentary 2004). Why is this episode in particular so awful? While previous evolution- and genetics-based episodes either took the idea of mutations caused by the environment to ridiculous heights<sup>2</sup> or pushed evolutionary coincidences beyond the boundaries of probability,<sup>3</sup> "Threshold" disregards the most basic and fundamental characteristics of Darwinian evolution.

As in "My Three Crichtons," we have an episode from a science fiction show that is presenting evolution as something for which an organism's genes have a solid, unchanging blueprint: an organism's evolutionary path is preset, and by speeding up the passage of time relative to the individual, processes that would ordinarily take centuries or even millennia, like evolution, can now happen in a matter of days. Based on the incredible speed achieved by breaking the Warp 10 barrier, coupled with the fact that Star Trek had previously established that time travel is possible given the right speed (in the Star Trek universe), it is implied that Paris and Janeway are not mutating, but rather are evolving into the next species along their evolutionary line. This concept is partnered with the very Lamarckian view that individuals can

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<sup>2</sup> I.e., certain kinds of radiation causing people to mutate into fish-like creatures.

<sup>3</sup> I.e., the implication is that there are so many humanoid races because they are all descendants of single-celled organisms spewed all across the universe by one alien species- unlikely, but recent advances in evolutionary developmental biology tell us that it is possible for two very distantly related species to achieve similar structural features through radically different genetic means (Chouard 2008).

radically alter their characteristics, “evolving” within their own lifetime, rather than evolution occurring through the selection of advantageous variations in offspring. What might have made more sense, if Star Trek insists on speeding up time, would be an accelerated birthrate as a result of this accelerated time, meaning that hundreds or even thousands of generations inherited slight genetic variations, were selected for or against, and (relatively) slowly evolved into the legged-catfish-like creatures that the crew of Voyager discovers. In choosing not to take this route, however, “Threshold” is advancing an understanding of evolution that presents it as a linear progression encoded in an individual’s DNA, and thus, through some kind of mystical science, an individual could realize his species evolutionary potential within his lifetime.<sup>4</sup>

In “Threshold’s” defense, Paris and Janeway do not evolve into the more complex organisms of greater intelligence that science fiction tends to expect. Rather, they evolve into creatures eminently suited to the swampy environment they land in. However, the important part, the part that furthers the myth that evolution follows a predetermined trajectory, is that Paris, and presumably Janeway, started to evolve *before* reaching the swamp planet, meaning that their evolution was not constrained by their environment the way Darwinian natural selection is supposed to be.

### **The X-Men**

The X-men are a group of superheroes in the Marvel comics universe. Each mutant has special powers, thanks to their possession of the “x gene,” which is missing from genetic structure of normal humans. Having been ostracized from society, mostly due to the physical

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<sup>4</sup> It should be made clear that the critique here relates to the idea of species evolutionary future being coded into each individual’s DNA. It is not intended to argue against an individual’s ability to respond to environmental pressures. In fact, Lamarck has recently experienced resurgence in popularity with the discovery of epigenetics. Epigenetics is not evolution, but rather a change in physiology, resulting from environmental stress, which is exhibited by an individual and/or that individual’s offspring.



characteristics that accompany their powers (such as blue skin, wings, claws, toad-like physiology, and so forth), they try to prove that mutants are deserving of equal rights and equal respect by using their powers for the good of mankind, saving people from robots, supervillains, and other popular comic book conflicts.

The idea that evolution must naturally proceed from simple creatures to more complex creatures is almost overpowering. The X-men are frequently referred to as the “next step” in human evolution (*X-Men: First Class* 2011; Gresh and Weinberg 2002, 133). According to Darwin, in order for evolution to occur, an individual must exhibit a variation that makes it better suited to its environment and then that variation must be selected for and passed down to future generations. When that variation has accumulated throughout the species, the species is considered to have evolved. Playing by Darwin’s rules, then, in order for the X-men to be the “next step” in human evolution, they must have a variation, that variation must prove useful in their environment, and that variation must be passed down to offspring.

The genetic variation that the X-men have is called the x-gene; presumably the same gene, shared among the X-men but not among normal humans. There are huge problems with this, not the least of which is that an identical gene has appeared simultaneously in individuals who otherwise share very few genes. Furthermore, while Richard Dawkins, celebrated author of *The Selfish Gene* and authority on genetics, talks at length in about genes for various physical traits and sets of genes for various behaviors, he never once in his body of work mentions the possibility of a gene that has the same protein structure in each individual, but manifests itself in each individual in a radically different way. There is a gene for blue eyes and a gene for brown eyes, but the blue-eye gene will never produce brown eyes. Yet the x-gene is capable of producing invisibility, scales, telepathy, and wings, all with the same protein structure. Even

epigenetics, which can account for different physiological manifestations of the same genetic code, cannot produce such a wide variety of traits.

But, be that as it may, is this variation, or variations, beneficial to humanity in their environment? According to Lois Gresh and Robert Weinberg, the X-men do have “helpful mutations... This point is demonstrated numerous times in the adventures of the X-Men, where team members use their mutant powers to help them survive dangerous situations where normal humans would be killed instantly” (Gresh and Weinberg 2002, 135). What Gresh and Weinberg have overlooked, however, is that these “dangerous situations” came *after* the genetic variation, not before. Most of the battles the X-Men fight are either against other mutants-- such as Magneto and the Brotherhood of Evil Mutants, who have a more violent response to human oppression of mutants-- or against anti-mutant hate groups, such as the Sentinels or Friends of Humanity, whose only goal is to wipe out all mutants. All of these “dangerous situations” come up *in response* to the X-Men’s genetic variation, meaning that this variation cannot be an adaptive response to an environment. Of course, under the theory of evolution by natural selection, every mutation need not necessarily be useful. However, the premise of the X-Men franchise is that these mutations are the foundation of the next phase of human evolution, so these mutations must provide some sort of selective advantage in order for that to be true.

However, these variations seem much more likely to be selected *against*, since they get the X-Men into so much trouble. Assuming that the X-Men survive long enough to reproduce and care for offspring, very few potential mates are going to be willing to take the genetic risk of mating and producing offspring with them. The comics themselves support this, when the X-Men are ostracized from society as “dangerous.”

Thus, the X-Men cannot possibly be the next stage of human evolution because their adaptations are neither advantageous, nor likely to be passed down to future generations. However, we buy into the notion that the X-Men are the logical progression of our species because they conform to our notions of evolution as something that follows a progression from simple-structured and simple-minded to physical and mental complexity. Because the variations that the X-Men exhibit are flashy, complex, and, very often, associated with some mystical higher functioning of the brain (such as Xavier's telepathy and Magneto's ability to move metal with his mind), they are embraced as the next phase, regardless of environmental pressures or sexual selection. This is where, once again, the idea of a pre-designed evolutionary blueprint for each species comes into play. By discounting factors that influence natural selection, the X-Men comics are presenting a version of "evolution" that is not dependent on natural selection. Rather, evolution will continue creating creatures that are more and more complicated, with more and more interesting brains, because that is the natural trajectory for evolution to follow. Factors such as what is advantageous in their environment or the number of offspring they are able to rear to reproductive capacity are disregarded.

### **The "Cosmic Comfort" of Science Fiction Iconography**

These case studies suggest that science fiction can perpetuate the misunderstanding of evolution as something linear, something that follows a preset trajectory from one type of organism to another, and usually increasing in complexity. But why? And why does it matter?

Ever since Darwin published *On the Origin of Species* fiction writers (and, by extension, screenwriters) have struggled to pin down the essential characteristics that make human beings human beings, distinct beings from the rest of the animal kingdom. Although Darwin only mentions humans explicitly once or twice in *Origin of Species*, the obvious conclusion from his

work was that humans were subjected to the same rules of natural selection as barnacles, pigeons, orchids, and all other living things. This posed a huge challenge for the dominant European worldview that held that humans were divinely placed at the top of a “great chain of being;” humans had been created in God’s own image to have dominion over the earth. With the publication of Darwin’s work, they lost their position at the apex of the natural world. As a result, fiction authors began to wrestle with natural selection, looking for that “something” which set humans apart. This is especially evident in some of the short stories about apes and monkeys published shortly after Darwin published *Origins of Species*. These authors deal with the implications of natural selection theory in a variety of ways, ranging from denial (Clark 1891) to making comparisons with apes an insult (Anonymous 1861) to raising apes to a human level of intelligence (Demerit 1880).

Science fiction has continued in the same vein as these Victorian and turn-of-the century authors. For all that it deals so frequently with aliens, cyborgs, and robots, sci-fi as a genre is primarily concerned with human beings, human nature, and the human condition. James Gunn, a literary scholar with a focus in science fiction, argues that there is a common worldview among sci-fi writers where “Although humanity is as much a product of its environment as the other animals, it possesses a quality that the other animals lack—the intellectual ability to recognize its origins and the processes at work upon it, and even, sometimes, to choose a course other than that instilled by its environment” (2000). Gunn argues that that sci-fi uses aliens, cyborgs, and as yet undiscovered information about the universe not because it has important messages to impart about these ideas, but because these concepts make a unique literary laboratory for measuring how humans will react to new situations, and thus to make statements about the truth of what makes us human.

Sci-fi takes umbrage at the idea that the environment and our natural circumstances is what will ultimately shape our future. Rather, it views humans as capable of rising above the influences of evolution, something which offers deep insight into why the genre is so lax when presenting evolution. Science fiction takes liberties with scientific fact because the thematic focus of the genre is on social and philosophical commentary, rather than an accurate portrayal of physical, chemical, and biological laws. Sci-fi does not ask “what has occurred to make us this particular species of primate?” Sci-fi asks “what makes us human?” Maintaining the myth of trajectory evolution is just one more way to do that. Presenting evolution in terms of consistently increasing complexity orders our world and puts us in the center. We interpret science in a way that places us at the top of a pyramid because we think it puts meaning in our lives and in the order of events in the universe. It gives us “cosmic comfort” (Gould 2007, 374).

After all, though, science fiction is *fiction*; does it really matter whether or not these stories portray evolution accurately? There are a few reasons why it should. First of all, there are plenty of mechanisms in sci-fi for introducing philosophical commentary without breaking into fake evolutionary theory or fake genetics. Alternate universes, alternate dimensions, and virtual worlds, for example, exist in order to facilitate suspension of the scientific laws that govern our plane of existence. In addition, the phrase “truth is stranger than fiction” is not an adage for nothing. Scientists are constantly furthering our knowledge of genetics through systems biology, evolutionary-developmental biology, and epigenetics, pushing the boundaries of what we thought was evolutionarily possible. This means that sci-fi writers and screenwriters can write many of the same stories they always have, but base them in biological fact rather than fiction.

But it is not just about presenting biology accurately. As mentioned previously, the main purpose of sci-fi is to comment on social, cultural, and philosophical ideas. *Farscape* episodes consistently present human beings as special. John Crichton, the human, may be mocked for his physical, cultural, and technological deficiencies, but it is his human wit and human heart (along with a solid dose of American determination and derring-do) that get Moya and the crew out of trouble time and time again. “My Three Crichtons” is no different. It was written to highlight the importance of compassion, arguing that reasoning and analytical power mean nothing unless they are tempered by kindness and that the soul is not an acceptable trade-in for brains.

*Star Trek* too deals with the importance of maintaining our humanity, whatever that may be, in the face of increasing scientific knowledge, an apt metaphor for the self-appointed mission of many fiction writers. The most famous symbol of this in the franchise is probably the relationship between James Kirk and Mr. Spock where Kirk’s human emotions and predilection for taking risks and trusting to luck are presented as a foil to Mr. Spock’s analytical, logical tendencies, and are usually what end up saving the day. In fact, along with other factors, part of the reason “*Threshold*” is so universally despised is because in the course of its scientific ridiculousness, it never once made a philosophical statement about what it means to be human.

Finally, the *X-Men* also makes a statement about the characteristics beyond genetic make-up that make us human. Often interpreted as a metaphor for racism, the *X-Men* seek to prove that being human is not about what’s on the outside-- bipedality, brain structure, or a mammalian integumentary system, but rather it is what is on the inside-- emotions, the knowledge of right and wrong, and the courage to stand up for those convictions-- that really counts.

However, one could argue, and I think Richard Dawkins would agree, that moral judgment calls and the structuring of a kind, generous society are all the more meaningful when they are made in the context of the reality. For Dawkins, this means acknowledging the reality of the selfish gene theory, which states that organisms are nothing more than vessels for fundamentally selfish genetic replicators, and choosing to be generous and self-sacrificing anyway, because we have the foresight to know that it is the right thing to do, not because a holy book says so—according to him, fear of a wrathful deity is hardly a better reason for doing something than is the fundamentally selfish character of genes. Gould agrees, arguing that we should “accept the implications and learn to seek the meaning of human life, including the source of morality, in other, more appropriate, domains” (Gould 2007, 374). In short, the social messages that sci-fi tries to communicate about the value of human emotions, determination, conviction, humor, and knowledge of right and wrong are more meaningful when they are based in, or embraced in spite of, scientific fact.

### **Shaping Our Iconographies, Not the Other Way ‘Round**

Science fiction television shows, movies, and comic books are the new evolutionary iconographies of our day. In their quest to define the uniqueness of humanity, they too often stoop to manipulating evolution, providing a pseudoscientific basis for human superiority. Conceiving of evolution as naturally and inevitably progressing towards something that looks like us, or “better” than us, makes us feel more comfortable about our off-center position in the grand scheme of life. It does not need to be this way, though. Embracing these false iconographies is a manifestation of the negative qualities of being human: pride, arrogance, intolerance; cancelling out all the of the positive qualities of that the science fiction genre advances as the characteristics that make us special in the animal kingdom. Rather, we should

acknowledge our position as “just one bauble on the Christmas tree of evolution” (Gould 2007, 374) and search for the meaning of life in other, more flexible areas.



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