

**Science, Evolution, and Cinematic Representation**  
**Stephen S. Daggett, Avila University**

*The Problem*

The bitter debates in several states concerning the teaching of evolution in science classrooms of public schools raise several questions concerning the sources of these ideological conflicts. In this article I will explore the role of popular entertainment, especially movies, in the public debate over evolution in the United States. C.P. Snow noted the existence of a sometimes tense, if not outright hostile, dynamic between art and science in his work *Two Cultures* of the late-1950's. But, according to Snow, this fissure dates from much earlier—the ever-increasing sub-specialization of the sciences and arts that began already in the nineteenth century.

Although useful, Snow's interpretation did not consider films in his discussion. (Snow, 1956) Yet, recent films such as *Outbreak* (1995) and *Jurassic Park* (1993) have not only been influenced by science, but have generated discussions and research in the scientific community. (De Salle and Lindley, 1997) If these films can have such an impact on scientific inquiry, it seems logical to assume they affect the public's perception of science, including evolutionary theory. Thus, Snow's fissure still exists, perhaps now a chasm between science and art has developed. This article explores this issue with the examination of Hollywood's portrayal of evolution positing that film representations of evolution are ambivalent at best and often misleading. In particular, my analysis will focus on seven American mainstream films with plot elements drawn from the science of evolutionary biology. Three of the films are depression-era classics that well-illustrate the historic origins of this problem. These films are *Dracula* (1931), *The Island of Lost Souls* (1932), and *King Kong* (1933). Three somewhat more recent productions, *2001: a Space Odyssey* (1969), *Alien* (1979), its sequel *Aliens* (1986) and *Mimic*

(1997) demonstrate how these misperceptions continue to be reinforced. The structure of the paper is as follows. First, I will offer a brief overview of evolutionary theory in modern biology, describe the critical underpinnings of my approach in terms of film theory, and then apply these ideas to the analysis of the films mentioned above. My goal is to recommend a new interdisciplinary approach that offers a bridge between art and science.

### *Evolutionary Theory and Modern Biology*

A brief explanation of how biologists define evolution is in order. The simplest definition is that evolution is heritable change in a population of organisms over time (Mayr, 1982, 400) The change is not an instant one but instead occurs over the course of several generations and is subject to several forces. The change is typically due to a random mutational event in an individual. If the change is heritable and results in greater reproductive success, biologists say it has conferred a selective advantage for the organism. It must be noted here, that this does not mean that a “better” organism has been created.

Instead, these organisms have features that allow them to generate more offspring in their environment at that place in time. The horse is a perfect example of this process. Over the course of millions of years, skeletal remains of horses indicate that there have been smaller, swifter species of horse. There also have been larger, stronger species. However, the current species of horse is best adapted to the current environments in which we find wild horses (Campbell, 2002, 481) In several thousand years, another species of horse may be more reproductively successful than the one in which we are familiar.

Many non-biologists view the evolutionary process as being goal-oriented. That is, continued changes such as the one described here result in superior organisms. The other

popular misconception is that the change in the population is instantaneous and that with each generation, improvement in these characteristics that have facilitated reproductive success continues. Evolution with instantaneous change taking place is non-Darwinian and, therefore, not evolution in terms of modern biology. (Mayr, 1982, 345-346) Biologists refer to it as Lamarckian, because it echoes the pre-Darwinian theorizing of the French naturalist Jean Baptiste de Lamarck. Moreover, the notion of a goal-oriented process fits comfortably into an Aristotelian great chain of being (*scala naturae*), where some organisms are superior to others in a never-changing hierarchy (Lovejoy, 1970, 58) This concept and its inherently reactionary premise is the foundation of Social Darwinism, the nineteenth-century ideology that espoused racial and social superiority to justify elite bourgeois and aristocratic society. The heart of this conflict and misuse of evolutionary theory lies in the use of expressions, such as “fitness,” which biologists define as reproductive success, and “competitive struggle for existence, which biologists define as the successful utilization of limited resources in order to facilitate propagation of the species.

### *Historical Origins of the Problem*

Darwin’s theory was published in the mid-nineteenth century. The religious community was divided into those who cherished a literal interpretation of the biblical work Genesis and those who integrated the creation story with Darwinian thought. The secular world was more receptive to Darwin’s work. David Skal in *Screams of Reason* notes:

*Darwinism offered seductive metaphors-all of them completely unsupported by the substance of Darwin's science-to justify existing social, political, and economic trends. Social Darwinism neatly rationalized nearly everything excessive, unbalanced, or cruel in nineteenth-century life. According to the ascendant doctrine of the survival of the fittest, the weak and disenfranchised deserved their lot, just as the rich and the powerful had earned theirs, ipso facto. It was nature, after all, that selected the winners. (Skal, 1998, 63)*

The effect of this was evident in literary works, essays, and laws passed in Darwin's Britain. It would take somewhat longer to gain a foothold in the United States. Some of the social problems faced by Britain, such as race and class structure, were also present in post-Civil War America. While the scientific community in America by and large embraced Darwinism, Lamarkism and Aristotelian ideas remained influential. (Hawkins, 1997, 104) Culturally, Darwinism and Lamarkism often merged or interchanged in popular or influential writings such as Herbert Spencer, Brookes Adams, and Theodore Roosevelt. (Hofstadter, 1955, 186-188)

Despite science's acceptance of Darwin, religion still remained central to American culture. Nowhere was this influence more dramatically felt than in the young art form of movies. Religious leaders, politicians, political reformers, and civic leaders quickly realized the power of cinema in the socialization of American citizens. (Black, 1994, 9) Censorship began locally, but soon engulfed a Hollywood studio system, which was eager to accommodate all constituencies in order to maximize the new industry's profits. Production codes became institutionalized nationally. Within this production code, however, the popular social Darwinist/Lamarkian ideals were also ingrained as part of the traditional Victorian values of the period.

This synergism is evident in 1931's *Dracula*. The film was based on Bram Stoker's novel, which appeared in 1897. The book reflected Stoker's concern over the loss of Victorian values with the growing omnibus of scientific knowledge. Stoker's vampire, with his bloodlust and ability to transmutate into animal forms, epitomizes the materialism of naturalists. The vampire's description and behavior represent an inferior being; one who lacks a soul and the moral values of a well-bred Victorian. Renfield, Dracula's disciple in the novel ends up in a padded cell after feasting on a hierarchy of nature buffet, moving from insects to "higher animals" such as mice. Stoker intended Renfield's experience to be metaphorical for readers who flirt with Darwinian and other improper notions (Skal, 1998, 82-83)

In the realization of this novel into film, filmmakers Todd Browning and Karl Freund maintained the spirit of the book, if not the letter of its plot and its hostility to modern science, specifically evolution. (Gifford, 82) The presence of the inferior, "eastern" count among the staid "western" Victorians creates disorder, chaos, and regression. The only individual capable of restoring order and, thereby, progress is the paranormal specialist, Abraham Van Helsing. Van Helsing is unperturbed and knowing about the vampire's abilities, including the ability to transmutate into a wolf or a bat. Concerns about atavism were not new with the coming of *Dracula*. Legends of half-human, half-bestial characters populate mythology and literature. (Skal, 1998, 61-62) The notion of an individual having the ability to change into different organisms and then revert back was clearly non-Darwinian. These anti-Darwinian themes were not pronounced enough for some critics. The vampire's skill at becoming a "lower" animal was a reminder to many that the barrier between humans and these life forms was thin. Inferior beings and their behaviors were just one small link in the Aristotelian chain of being.

*Dracula* the film received many scathing reviews, such as that from the outraged *PTA Report* chairman Marjorie Ross Davis: “This picture should be protested by every previewing organization. Its insane horrible details shown to millions of impressionable children, to adults already bowed down by human misery, will do infinite amount of harm.” (Skal, 1993, 125) Davis clearly feared the degenerative effects of *Dracula*, a potential catalyst for the sinking of humanity into “misery” and as a showcase of the animal tendencies and indeed roots of humanity. Despite the efforts of Davis and others, the film was a success and avoided such censorship. Bela Lugosi’s portrayal became an ambiguous icon of allegedly Darwinian dangers in western consciousness. (Gifford, 1973, 82) And with it was attached weak science that distorted the theory of evolution.

Yet another depression-era film explored a similar fear of “evolution.” *The Island of Lost Souls* (1932), directed by Earle Kenton and starring Charles Laughton, concerned a vivisectionist named Moreau whose experiments involved turning animals into humans. The film was based on the nineteenth-century novel *The Island of Dr. Moreau* by H.G. Wells. Wells was an ardent Social Darwinist and a disciple of the scientist T.H. Huxley, Darwin’s chief apologist in Victorian England. Wells’ interpretation of Darwin centered on the belief that social hierarchy had a biological basis. (Skal, 1998, 76) The inferior hybrids of Wells’ work have their own culture and laws, and Moreau continually promises social elevation if they adhere to the established order, the reactionary dream of many social Darwinists of the period. (Skal, 1993, 169) They also tend toward reversion back to their “natural” animal forms. Thus, a fine evolutionary line separates humans from the beasts. Social class hierarchy helps maintain that barrier.

Both the book and the film received critical condemnation. Wells believed he had written a Swiftian satire and could not understand the outcry. (Skal, 1998, 80) Despite the critical response, however, the film managed to reach a significant audience in Depression era America. As David Skal notes:

*America apparently was going to hell in a handbasket, and just as in the mid-1990s controversy over *The Bell Curve*, the fantasy of genetic backsliding provided an easy scapegoat for a cultural morass essentially economic and political in origin. It was comforting to believe that socially and (supposedly) biologically inferior people were somehow-magically!- to blame for the excesses of privileged capitalists of the 1920s who had brought about an international monetary collapse and thereby the economically debased, “animalized” millions thrown out of work in the 1930s. (Skal, 1998, 143-144)*

The story's popularity has since resulted in two remakes of the tale in 1977 and 1996—a tribute to the power of this story within western culture. *The Island of Lost Souls* was an overt paean to Social Darwinism, thus a source once again of misinformation concerning modern evolutionary biology.

One last depression-era film encapsulates film and, thereby societal, ambivalence concerning evolution. The classic *King Kong* integrated similar themes with a spectacular adventure story, making it the most influential fantasy film of all time to many critics. (Marrero, 37) Producer Merriam C. Cooper, who was an adventurer/naturalist as well as filmmaker, developed the screenplay about a group of documentary filmmakers who journey to an island where dinosaurs, people, and a fifty-foot ape live together. The ape falls so hopelessly in love with the only female member of the troop that he endures capture and risks his life to be with her on the concrete island of Manhattan. Film theorist Noel Carroll astutely noticed Social

Darwinian icons in the film. (Carroll, 126) In the context of depression-era America, *King Kong* becomes a conservative economic parable. An early sequence with the destitute heroine (Fay Wray) helped by the wealthy Cooper-like producer (Robert Armstrong) leading to the climax where the individualist Kong brings destruction upon civilized Manhattan, warns moviegoers that social order is to be maintained during trying times. As Carroll writes, “The prehistoric imagery (especially the clashing dinosaurs) and the condensation of the jungle and the city, draft the Darwinian metaphor of the struggle for existence as a sign of modern, competitive, urban (read “economic”) life. (Carroll, 1998, 142)

Huge audiences viewed these three films at the time of their release. Fears of the Depression and residual Victorianism left audiences receptive to the Aristotelian/Lamarkian evolutionary themes presented in each. There would be other films, including the atomic age giant mutant creature films of the 1950’s, that would echo the thinking presented in these works (Crane, 118-119) However, improved special effects and the counter culture movement beginning in the late 1960’s would widen Darwinist misinformation into the 1990’s.

### *The Sophistication of Misinformation*

Against the backdrop of technological innovation that enabled us to explore space, Stanley Kubrik’s *2001: A Space Odyssey* (1969) is not simply a space odyssey. It is an evolutionary odyssey. It is, perhaps, the first film that most closely attempts to portray evolution accurately. Its limitations were the existing evidence of human evolution and behavior, and the director’s fascination with humans and their developing technologies. Following the opening view of space with the tones of Richard Strauss’ *Thus Spoke Zarathustra* (borrowed from Friedrich Wilhelm Nietzsche) [Nietzsche is very difficult to categorize—I would suggest

avoiding categorization of him] thundering on the soundtrack, ape-people begin their daily routine of seeking out food. The story continues with the ape-people developing territorial behavior and technology that aids them in the competitive struggle for existence. In this case, the technology is a bone used as a lethal weapon. The victor in the struggle tosses the tool in the air and as it spins, the shot dissolves into a slowly rotating space station. Kubrik's fascination with technology results in a story where there is a competitive "struggle for existence" between humans and the thinking machines they are creating. At the film's conclusion humans must evolve into a much more highly sophisticated being, namely the "starchild" seen in the final sequence. Each step along the evolutionary passage is prefaced by the appearance of a mysterious monolith, which signals the imminent change. Most evolutionary biologists would deplore the goal-oriented nature of Kubrik's evolutionary vision. However, one cannot help but admire the research and attention to detail that went into developing this film. Kubrik and Arthur C. Clarke wrote the opening sequence based upon landmark scientific work done in the mid-twentieth century. (Lobrutto, 266) The filmmakers also drew upon the writings of paleoanthropologist Raymond Dart, animal behaviorist Konrad Lorenz, and the popular science writer Robert Ardrey to realize their vision. (Milner, 442) Thus, Kubrik's film reflected the context of the then-current scientific debate about human evolution. Once again, however, the thrust of the plot was very much Social Darwinian and often still distorted the true contours of evolutionary biology.

*Alien* (1978) and its first sequel *Aliens* (1986) provide excellent examples of humans having an environmental impact (ultimately an evolutionary impact) on other worldly life forms. In both films, the alien organism needs a human-like host in order to complete part of its life cycle. The organism gestates at first in an egg and then inside a body. When it reaches a

developmental stage where it can exist on its own, it destroys the human host. Once humans begin to colonize the planet where the alien eggs have been laid, the alien population grows rapidly. An actual evolutionary event does not take place in either film. However, some of the dialogue in each indicates that there is a naturally occurring goal-oriented evolutionary process that is taking place. In the first film, the scientist character Ash (Ian Holm) refers to the alien as a “perfect organism,” with little elaboration about why this is so. It is strong and difficult to destroy. Yet, it seems to have a fairly significant limitation: the need for humans to complete its life cycle, particularly when few humans are present. This work reinforces the notion that size and strength are indicators of organismic perfection. In the second film, the villainous “corporation” that sponsors the colonies wishes to selectively breed these extra-terrestrials. In the end, only military hardware (read “physical strength”) can eliminate these “perfect” icons. It must be noted that the films do make allowances for the value of traits other than strength and size. The heroine Ripley’s (Sigourney Weaver) victories in both films, display how intelligence is as valuable a trait as physical size and strength. But the alien’s ability at manipulating people for its reproductive strategy, as well as its ability to avoid destruction, reinforce the idea of superior beings and competitive struggle for existence (i.e, social Darwinism).

Biocontrol, the use of genetically modified microorganisms to correct environmental problems, caught the news media’s attention in the late 1980’s. The concept was used as a plot device for 1997’s *Mimic*. Here, the environmental problem is a virus that is lethal for children. Its carrier is the common cockroach. A young, cutting-edge entomologist, creates a genetically modified cockroach that can successfully resist the virus and multiply at a much faster rate than the other cockroach carriers. Once the virus problem is solved, people forget about the modified cockroach. However, its modification (i.e., a mutation) continues to allow the insects to become

more and more like humans with each generation. The notion that there is a rapid, directional evolutionary change toward mimicking a “superior” organism is both Lamarckian and goal-oriented. F. Murray Abraham portrays the mentor of Mira Sorvino’s entomologist and preaches that, “This is not just some random mutation...” and “Evolution has a way of keeping things alive...” with a portrait of Darwin sternly looking on at the proceedings. His autopsy of a larva in development reveals “...a perfect set of internal organs...,” which almost echoes Ash in *Alien*. Humanity triumphs, as it does in all of these films, but the portrayals of pure science and evolutionary biology are sacrificed.

#### *Evolutionary Biology, Film, and Bridging the Chasm between Art and Science*

Evolutionary biology, in fact biology as a whole, often is viewed negatively by filmmakers as demonstrated by these films and even the recent *Gattaca* (1997) and *Minority Report* (2002), both paeans against genetic engineering. These films reach wide audiences and imperfectly reflect academic discourse, and, consciously or not, distort the science they claim to represent. Academic discourse, in turn, is affected as the public turns to academe to learn more about the issues, whether historical, scientific, or literary, it has witnessed on the silver screen. The scientific community must shoulder this burden as well, since it has become increasingly less communicative with the general public, as specialization has become the absolute norm. Thus, the chasm identified by C.P. Snow’s *Two Cultures* in 1956 continues to widen. As Snow reveals, “This polarisation is sheer loss to us all. To us as people, and to our society. It is at the same time practical and intellectual and creative loss.” (Snow, 1956, 12) Realist film theoretician Siegfried Kracauer went so far as to pronounce that science has distanced itself from people and cinema must fill the void. But if that void is filled with misinformation, the distance

between science and the public will grow. (Dudley, 1976, 125) Once again, the academic community, however, must also play a role in narrowing this gap between popular culture and scholarship. It must embrace popular culture as a means to propagate its message to a broader audience. In the end, imperfect science in movies does expose the general public to issues that it might not otherwise consider.

What is the solution? Major film releases, such as those described here, are products of an industry, where financial returns often outweigh consideration of service to society. Hence, the solution must lie in how films are discussed and critiqued in both the academic and popular media. E.O. Wilson, in his work *Consilience*, recommends that artistic interpretations bring together science, history, biography, and personal confession for a well-rounded analysis. “Scholars in the humanities should lift the anathema placed on reductionism,” Wilson writes, linking interpretation as a type of art, in and of itself. (Wilson, 1998, 211) He continues:

*The key to the exchange between them is not hybridization, not some unpleasantly self-conscious form of scientific art or artistic science, but reinvigoration of interpretation with the knowledge of science and its proprietary sense of the future. Interpretation is the logical channel of consilient explanation between science and the arts.* (Wilson, 1998, 211)

This is the type of analysis used in this document and helps provide a more balanced perspective on the films discussed. It does not solely rely on scientific thinking to analyze films. (Turvey, 2002) It does make use of what science has revealed about the material world. In contrast, Noel Carroll in his analysis of *King Kong*, frequently refers to the film’s Darwinism, rather than Social Darwinism; two distinct concepts that are linked solely by the incorporation of the name of modern biology’s founder. (Carroll, 1998, 142)

Film theorists and critics must accurately incorporate the findings of modern science in their analyses, or Hollywood will continue to propagate misinformation as fact. Realists, such as Kracauer, assert that film gives audiences a vision of nature. The wonders of nature are exciting and comprehensible to a general public adequately informed of scientific thinking. Accurate representations of Darwinian evolution should not be restricted to the confines of documentaries and art house films, such as *Angels and Insects* (1995)--which honestly contrasted Darwinian theory with the Victorian Social Darwinist "traditional values" of the time period. Evolutionist Steven Jay Gould wrote, "Artists can be most useful to scientists in showing us the prejudices of our categorizations by creatively expanding the range of natural forms, and by fracturing boundaries in an overt manner." (Gould, 1995, 29) This type of dialogue, or consilience to use Wilson's terminology, would bridge C.P. Snow's cultural chasm. And such a change would be a welcome one.

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