Reflections of Science and Medicine in Two Frankenstein Adaptations: *Frankenstein* (Whale 1931) and *Mary Shelley's Frankenstein* (Branagh 1994)

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Mary Shelley's *Frankenstein*, a novel that centers on a scientist who collects organs and limbs from dead bodies to construct a new being, illustrates the complex, interwoven history of science and science fiction. The novel's attention to the animation of assembled body parts reflects contemporaneous scientific interest in the reanimation of corpses by galvanism. In this article, I extend the science/science-fiction relationship developed in the novel by analyzing the visual differences between two of its subsequent film adaptations. Although scholars have extensively scrutinized and speculated about Shelley's influences, limited consideration of contemporary scientific influences on later film versions exists. The first production considered here, directed by James Whale in 1931, presents Shelley's Creature[1] as a monstrous robotic figure, suggesting automation as an influencing theme and electricity as a source of life. Its mechanical movement echoes developments in mechanization typical of the time, as well as the related theme of automatism associated with the Futurist art movement. In stark contrast, the Creature of Kenneth Branagh's 1994 adaptation is corporeal and abject, with more emphasis placed on bodily fluids than electricity. While neither version takes into account obvious medical implausibilities, such as incompatible tissue types, brain death, and irreversible tissue damage, they do reveal how discourses of science and medical history have shifted since Shelley wrote her novel. If Whale's adaptation reflects interest in and experimentation with the effects of technology and electricity as well as co-existent issues of eugenics and criminal atavism, then Branagh's film typifies concurrent scientific

preoccupations with assisted reproduction and cloning. For instance, while it too draws on the concept of galvanism, Branagh's version of the Creature's animation takes place in a vat of amniotic fluid. Rather than behaving robotically, this creation is infant-like in its random, uncontrolled bodily movements, its inability to stand, and its lack of clothing. Indeed, the somatic sensibilities of Branagh's film correspond with visual culture's renewed attention to the abject body in the latter decades of the twentieth century. The abject in this context refers to images of bodily disgust and horror that threaten one's physical and psychological integrity (and therefore sense of self), although, as one of its key exponents, Julia Kristeva explains, there are numerous triggers for this.[2] For example, the maternal body, mental disorder, the decaying corpse and bodily fluids are all sources of abjection. While classical artworks have long dealt with abject imagery (as a means of purification), it has become an increasingly distinctive feature of film and television but also of culture more generally since the 1970s. Specifically, the interior body and the revelation of horrifying and repulsive aspects of embodiment usually considered taboo in Western culture have become pivotal to a broad range of genres. Even as such images first appeared in science fiction and horror films of the 1970s, (and persist to the present day), they have gradually emerged in other productions. For example, postmodern artworks of this period, as well as medical drama, neo-noir, Nordic noir, and more recently, reality programming (such as *Bodyshock*[3] and *Embarrassing Bodies*[4]), have focused on the anomalous, corporeal, bleeding and aberrant body, with detailed attention to bodily fluids, orifices, and somatic borders and their transgression.

Such physical opening up of the body parallels socio-cultural and political trends and the increasing transparency of associated institutions - particularly those of medicine, religion and policing - during the past fifty years.The abject body found in Branagh's *Frankenstein*, and across the visual arts more broadly, is simultaneously a product of the biological

revolution more generally, and the 1990s medical and scientific zeitgeist specifically.

The two *Frankenstein* films, as well as mediating concomitant medical discourses and developments, also illustrate the cinematic advances of their respective eras. Whale's version is monochromatic and its cinematography tends to be slower-paced (perhaps intentionally, but also because it was limited by larger cameras), while Branagh's color version has a distinctly kinetic aesthetic enabled by smaller, more mobile equipment and zoom lenses. Branagh's more graphic imagery is promoted by enhanced make-up, prosthetics, and special/digital effects available at the time of its production. Engaging theoretically with medical discourse and histories of science and medicine, this article textually analyzes the two films with reference to the original novel, locating them within their respective medical and scientific milieus. In sum, I argue that the visual differences between the two film adaptations and from the source text disclose both a visual chronicle of medicine and science and a history of technological progress.

Mary Shelley's *Frankenstein* (1818): Anatomy and Galvanism

Although Shelley's novel had a modest print run when first published in 1818, it was brought into mainstream cultural consciousness by the numerous theatrical and film adaptations that followed.[5] Thereafter, its narrative of man as creator of life has continued to find new resonances. As Rick Worland notes, "The impact of a story about a scientist who creates an artificial being that then runs amok was bound to increase through the nineteenth and twentieth centuries, as it contemplates the responsibilities, limits and potential costs of advancing scientific and industrial technology."[6] Indeed, Shelley wrote her novel during a period of scientific and philosophical preoccupation with human anatomy, vitalism, and

galvanism and amid actual reports of the reanimation of animal and human corpses. An extract from a paper presented by Andrew Ure at the Glasgow Literary Society in 1818 provides insight into contemporaneous thinking concerning reanimation and applications of voltaic electricity to dead animals. Ure refers to several key scientists in the field of electricity including Galvani, Volta, Aldini, Vassili, Julio, and Rossi before recounting how in November 1818 he himself conducted voltaic experiments in Glasgow on a murderer ten minutes after his execution. Describing how he induced respiration by activating the phrenic nerve, he comments that, "No pulsation could be perceived meanwhile at heart or wrists; but it may be supposed, that for the evacuation of the blood—the essential stimulus of that organ—this phenomenon might also have occurred."[7] Ure goes on to state that, "In deliberating on the above galvanic phenomena, we are almost willing to imagine that if, without cutting into and wounding the spinal marrow and blood vessels in the neck, the pulmonary organs had been set a playing at first . . . by electrifying the phrenic nerve . . . , there is a probability that life might have been restored."[8] Clearly, then, the scientific climate at the time Shelley was writing her novel helped to inform its concepts.

Richard Holmes details the more direct influences on Shelley and claims that her ideas for the novel originated in 1812, when her father took her to a public lecture by Humphry Davy, who was known, among other aspects of chemistry, for his work on the voltaic pile.[9] Her future husband, Percy Shelley, also befriended William Lawrence, a professor of anatomy who had studied anthropology under Johann Blumenbach, a scientist who had a particular interest in craniology and the study of skull dimensions, brain size, and intelligence and who proposed racial divisions between various types.[10] Tim Fulford, Debbie Lee, and Peter Kitson report that Blumenbach "acquired the world's largest collection of heads, to ensure that his science could be based, and be seen to be based, on the real objects that it represented"; "it contained 70 or 80 skulls, a number which later rose to 120."[11]

Lawrence's other well-documented relationship, with his contemporary, John Abernethy, is further relevant to Shelley's novel, since the two men held highly polarized views. Abernethy was a proponent of vitalism, and Lawrence maintained that the mind was "based on the notion of the strictly physical evolution of the brain."[12] As Holmes explains, vitalism was "the first great scientific issue that widely seized the public's imagination in Britain, a premonition of the debate over Darwin's theory of evolution by natural selection, exactly forty years later."[13] As a result of his connections, Holmes contends that it was "Lawrence, with his unusual knowledge of French and German experimental medicine, who helped turn the Shelleys' joint scientific speculations along a more controversial path."[14] He goes on to state that "Mary Shelley's idea of the mind was, like Lawrence's, based on the notion of the strictly physical evolution of the brain."[15] According to Anne Mellor, the Shelleys met Lawrence in 1812 after which he became their personal physician. She also infers from the novel that Mary Shelley was familiar with the racist agenda of Blumenbach.[16] For instance, Mellor identifies a racial element in Shelley's characterization of the Creature, and draws attention to the fact that, "his skin is yellow, his hair is 'black and flowing,' both the irises of his eyes and the sockets in which they are set are 'dun-white' or light grey-brown. This Creature is not white-skinned, not blonde haired, not blue-eyed. He is not Caucasian. He is not of the same race as his maker, Victor Frankenstein."[17] Like Holmes, Mellor further observes that "most of Mary Shelley's nineteenth-century readers would immediately have recognized the Creature as a member of the Mongolian race, one of the five races of man first classified in 1795 by Johann Friedrich Blumenbach."[18]

In an oft-quoted revised preface to the 1831 edition, Mary Shelley, as part of a small circle of key literary figures, provides additional insight into her inspirations:

> Many and long were the conversations between Lord Byron and [Percy] Shelley to which

> I was a devout but nearly silent listener. During one of these, various philosophical doctrines were discussed, and among others the nature of the principle of life. . . . They talked of the experiments of Dr. Darwin . . . who preserved a piece of vermicelli in a glass case till by some extraordinary means it began to move with voluntary motion. Not thus, after all, would life be given. Perhaps a corpse would be reanimated; galvanism had given token of such things: perhaps, the component parts of a Creature might be manufactured, brought together, and endued with vital warmth.[19]

One of the less well-documented of Shelley's influences is her husband's association with a Scottish doctor, James Lind, while he was at Eton.[20] Christopher Goulding recounts that Lind was an accomplished astronomer and geologist with "a keen interest in the latest developments in every emerging field of science."[21] He also notes that Lind was acquainted with significant figures of eighteenth-century science and that Mary Shelley's posthumous biography of Percy Shelley revealed Lind's significant impact on her husband.[22] Goulding further highlights Lind's medical education under William Cullen in Edinburgh, "who was instrumental in the early codification of procedures for the revival of drowned or otherwise asphyxiated persons."[23] Goulding suggests that two scenes in *Frankenstein*—the revival of Victor Frankenstein when dragged from an ice floe in the Arctic Ocean and the Creature's attempted revival of a young girl whose body he drags from a river—imply a link to Lind.[24] Other details reinforcing Goulding's claim that he was an important influence on *Frankenstein* include Lind's connections with Tiberio Cavallo, who was familiar with Galvani's experiments, and Sir Joseph Banks, who supplied Lind and Cavallo with frogs in order to conduct experiments concerning "animal electricity."[25]

Regardless of these possible scientific influences on Shelley, and the mention of galvanism in the 1831 preface, the novel yields few unequivocal signs. Naomi Hetherington,

who identifies differences between the various editions of the novel, remarks on an apparent shift in Shelley's attitudes towards science. She observes that despite allusions to galvanism in the text (as cited below), the first mention of the process as Victor Frankenstein's method of animating the Creature only occurs in the preface to the 1831 edition.[26] Unlike the later film adaptations, the animation of Shelley's Creature does not explicitly involve electricity or lightning, though there is mention of both prior to the creation of the Creature. For example, Shelley writes that "on a sudden, I beheld a stream of fire issue from an old and beautiful oak. . . . Before this I was not unacquainted with the more obvious laws of electricity. On this occasion, a man of great research . . . entered on the explanation of a theory which he had formed on the subject of electricity and galvanism" (39). Frankenstein also discusses "bestowing animation upon lifeless matter" (50). His use of electricity as a source of life is suggested by "I collected the instruments of life around me, that I might infuse a spark of being into the lifeless thing that lay at my feet. It was already one in the morning . . . when, by the glimmer of the half-extinguished light, I saw the dull yellow eye of the Creature open; it breathed hard, and a convulsive motion agitated its limbs" (55). The novel, therefore, suggests a much less dramatic event than do the films and merely implies galvanism as an animating force in its reference to "spark," "glimmer," and "convulsive motion." Whale's version emphasizes the electrical characteristics of the animation far more, but ultimately shifts attention to the scientific preoccupations of its time, namely the industrialization of electricity, automation, and eugenics. Also, contrasting with the Creature's stilted mechanical gait in Whale's film, and its initial bodily amorphousness in Branagh's version, Shelley's creation is described as agile and physically superior. For example, she writes that Frankenstein "suddenly beheld the figure of a man, at some distance, advancing towards me with superhuman speed. He bounded over" (94). The Creature subsequently comments to Frankenstein that "thou hast made me more powerful than thyself; my height is superior to

thine, my joints more supple" (95).

Shelley, however, does specifically introduce the science of anatomy, and there is reference, albeit limited, to decaying bodies and dissection (49). For instance, Frankenstein states, "I collected bones from charnel-houses and disturbed, with profane fingers, the tremendous secrets of the human frame. In a solitary chamber . . . at the top of the house . . . I kept my workshop of filthy creation. . . . The dissecting room and slaughter-house furnished many of my materials" (52). The novel is thus concerned with anatomy and associated grave-robbing, reflecting the practices of the time whereby newly interred bodies of criminals were sold to anatomists for dissection. Tim Marshall explains that "the law since the mid-eighteenth century had permitted the bodies of murderers to go to the surgeons for dissection" but that a "shortage of bodies from this source which led the surgeons reluctantly into league with the grave-robbers," a situation that changed with the 1832 Anatomy Act that allowed surgeons unconditional access to the bodies of paupers.[27] In fact, the 1931 film, which omits much of the back-story of Shelley's novel, opens with a grave-robbing scene.

James Whale's *Frankenstein* (1931): Eugenics, Automation, and Electricity

The two film versions of the novel considered here follow the same central narrative as Shelley's original but there are significant differences in characterization, plotline, and scientific emphasis. Holmes suggests that the changes of almost all subsequent stage and film productions were affected by an early theatrical adaptation of the novel at the English Opera House in 1823 and claims that "the changes altered the scientific and moral themes of the book and shifted it permanently towards a mixture of gothic melodrama and black farce."[28] These included, for example, the fact that the 1823 play "deprived the Creature of speech;

introduced the comic character of Fritz, Frankenstein's assistant; and perhaps most importantly, made Dr Frankenstein confess his religious remorse to the audience."[29] One might equally argue, however, that Whale's adaptation of Shelley's novel is indicative of its own time of production, not only in its visual style and technical manipulation, but also in its reflection of the scientific milieu of the 1930s. As Lester Friedman and Allison Kavey note, "The overwhelming majority of the movie Frankensteins bestow life upon their creatures purely by scientific methods, thereby making the basic narrative as germane to the rapid technological transformations of twenty-first century life as it was to the shifting scientific paradigms of the nineteenth century."[30] Certainly, Whale's film mediates the ways in which allegedly "scientific" discourse affected concurrent socio-cultural and political attitudes, both in relation to eugenics and degeneracy, and also as a result of a technological revolution that was marked by the advent of electrical power, the use of machinery in manufacturing, and the beginnings of mass production.

Whale's film is a black and white production typical of the era and, as Worland (and almost every other critic) points out, exploits German Expressionist design in its cinematography and *mise-en-scène*.[31] The film begins with a sequence absent from the novel whereby a slow pan captures a number of grief-stricken characters sequentially in medium shot. The sound of a tolling bell and recital of prayers suggest a funeral scene before a panning long shot confirms the setting to be a cemetery. Typically for expressionist horror film, the crosses marking the graves are positioned at odd angles and framed from a low angle perspective. In particular, the slow and deliberate camera movements and canted angles directed towards the darkened sky amplify the horror iconography. Worland explains that the cemetery scene was "constructed on a sound stage, allowing complete technical manipulation of the environment."[32] After the funeral, two men, Henry Frankenstein (Colin Clive) and his assistant, Fritz (Dwight Frye), who have been illicitly watching the burial from a distance,

disinter the body. They subsequently cut down another body found hanging from a gallows at the roadside, the cinematography this time comprising a number of fades, high-angle, and overhead shots, not only indicating the editing technology of the time but also contributing to an expressionist aesthetic. Upon examining the body, Frankenstein comments that "the neck is broken and the brain is useless—we must find another brain" [33]

The following scene cuts to an autopsy at Goldstadt Medical College where Professor Waldman (Edward Van Sloan) lectures on two preserved brains, one labeled as "normal" and the other as an "abnormal" brain belonging to a criminal. Each is viewed in close-up. Waldman claims that the abnormal brain demonstrates "distinct degeneration of the middle frontal lobe. All of these degenerate characteristics check with the case history of the dead man before us whose life was one of brutality, of violence and murder." His commentary resonates with the theme of degeneracy that pervaded scientific thinking in the 1930s. At the laboratory and unaware that Fritz has damaged the normal brain and instead has stolen the abnormal brain, Frankenstein transplants this "abnormal" brain into the Creature. While Worland identifies this deviation from the novel as controversial—because "Frankenstein's tragedy is commonly understood to result from a flawed endeavor, not a defective part"—and the film draws on a range of concurrent scientific developments including automation and electricity, it is clearly inflected with trends in criminal anthropology.[34] Particularly prominent at the time of the film were the racist beliefs of physician and criminal anthropologist Cesare Lombroso (1835–1909), who was renowned for formulating an association between criminality and certain physical traits that he based on concepts of atavism. For instance, he alleges that many of the characteristics of primitive man are also commonly found in the "born criminal," these features including: "low sloping foreheads, overdeveloped sinuses, frequent occurrence of the medium occipital fossetta, over-developments of the jaw and cheekbones, prognathism, oblique and large eye sockets, dark

skin, thick and curly head hair, large or protuberant ears, long arms, similarity between the sexes, left-handedness, waywardness among women, low sensitivity to pain, complete absence of moral and affective sensibility, laziness, absence of remorse or foresight, great vanity, and fleeting, violent passions."[35] The original (1876) edition of his book *Criminal Man* not only claimed that certain facial characteristics and cranial sizes were typically found in criminals, but also suggested a correlation between these characteristics and those of certain groups, notably various ethnic groups.

These claims contributed to the prevailing climate of racism promoted earlier by Blumenbach's work on brains, and they ultimately informed eugenic proposals to "breed out characteristics deemed to be deficient or undesirable through marriage, regulation, sequestration of the mentally deficient, sterilization of the unfit, and, in 1930s and 1940s Germany, the murder of Jews, gypsies and the mentally 'unfit.'"[36] Like Blumenbach, Lombroso's definition of traits that he claimed were linked to criminality and deviance centered significantly on the skull and its physical dimensions and qualities. Given that earlier stage plays and films showed no inclination to indicate cranial abnormality in their portrayals of Shelley's Creature, Whale's film undoubtedly draws on such sensibilities in the multiple physical and psychological anomalies of the Creature, specifically, its abnormal forehead and its long, swinging arms (achieved by shortening the actor's coat sleeves).[37] In these respects, Worland states that Whale's film "originated much of the prevalent iconography" of Frankenstein.[38] Moreover, after the vitalization of the assembled body, discussions between Waldman and Frankenstein center on criminality and the brain of the Creature. As Friedman and Kavey note, the addition of the plot component concerning the malformed brain "shifts the reason for the Creature's homicidal actions from a lack of nurture, as in Shelley's novel, to biological causes, a criminal brain that makes his killings inevitable, echoing the nineteenth-century conviction . . . that criminal behavior rested in the

body and could be transmitted through inheritance and transplantation."[39] Whale's depiction of Fritz, while following the 1823 stage adaptation, also builds on Lombroso's associations of physical difference with deviance; in this case, the deformed assistant, when first seen in the cemetery scene, has a wide-eyed stare, giving an impression of madness. He later torments and tortures the Creature, although, as Worland observes, the "semi-conscious equation of physical disability with moral turpitude or madness was a pervasive trope in many cultural forms for centuries."[40]

In particular, the film focuses on the Creature's facial details through the use of close-ups, whereas its unusual, almost robotic gait is visualized through long shots. While its odd physiognomy and figure reflect on anthropological discourses of the time, its stilted way of walking resonates with concurrent progress in mechanization during the technological revolution of the late nineteenth and early twentieth centuries. If electricity had been around since the time of Shelley's *Frankenstein*, it was only following the invention of the voltaic pile and subsequent harnessing of that power that electricity shifted from experimentation to industrialization. As Robert Hughes contends, "what . . . emerge[d] from the growth of scientific and technical discovery, as the age of steam passed into the age of electricity, was the sense of an accelerated rate of change in all areas of human discourse, including art."[41] Certainly, concepts of mechanization and movement pervaded the entire socio-cultural and political spectrum, especially molding the style of Futurism, an art movement that began in the early 1900s and persisted into the 1930s. In this vein, Iwan Morus notes, "[e]arly Victorian Britain was increasingly a machine culture. Fascination with, and speculation about, machinery and its futures was rapidly becoming a staple part of early Victorian life."[42] Morus also highlights critics of the machine age, notably Thomas Carlyle, who saw the life of the machine as being merely galvanic. Morus explains that "[g]alvanic life was artificial, soulless, and contrived" and notes analogies between machines and Frankenstein's Creature

that were made in publications of the time.[43]

During this period, certain groups of artists continued to celebrate the age of the machine and began to look for ways to project movement under the auspices of Futurism. Filippo Marinetti was the initiator of Futurism, with its first manifesto being published in 1909. In order to address the translation of movement into their paintings, the Futurists drew on early cinematography, specifically the sequential photographs of Edward Muybridge and Ètienne-Jules Marey.[44] Futurist art gave the impression of motion by likewise painting the successive positions of a figure on an image, thereby dividing overall motion into its constituent actions. Such fracturing is implicit in Whale's *Frankenstein* in the way that the Creature walks, while its long swinging arms have connotations of the primitiveness suggested by Lombroso. Further, the Creature's square head and bolted neck suggest a part-mechanical, rather than solely corporeal, creation. Related to this, Worland states that "the neck bolts reiterate the Creature's mechanical construction as fasteners that join separate components of skull and torso. The Creature's most distinctive feature, the squared head, suggests the functional but inelegant lines of a cranium altered with the straight cuts of saws."[45] Although James Curtis suggests that Boris Karloff's performance had its basis in a character that Whale himself had played in *A Man with Red Hair* (1928),[46] the mechanical aspects of the Creature are consistent with the contemporaneous zeitgeist whereby the "machine was about to redraw the cultural map of Europe."[47] At the same time, and reflecting Carlyle's reluctance about the machine, Hughes highlights the potential of automation to instill fear and states that "the idea that man's creations could rise against him and eventually destroy him was one of the fundamental myths generated by the Industrial Revolution." Hughes names *Frankenstein*, 1818 as one of the earliest imaginative explorations of this fear.[48]

Aside from its distinctive physical appearance and unusual gait, and unlike Shelley's

articulate Creature, Whale's Creature is also deprived of language, a fact that is crucial to the audience's perception. For as Peter Brooks suggests, in the novel, the "Creature's initiation in language . . . discovers language to be on the side of culture rather than nature. . . . The discovery is a vital one, for the side of 'nature' is irreparably marked by lack, by Creatureism."[49] Moreover, in line with audience sensibilities of the time, as well as imminent censorship, any anatomical dissection of bodies is inferred, first in the criminal brain scene by the wheeling out of a trolley covered in a sheet; and second, when Waldman prepares to vivisect the Creature, a high angle shot framing a range of anatomical instruments on a surgical trolley in medium close-up. There is also a lack of blood and bodily fluids, consistent with the novel but markedly different from Branagh's film. Whale omits much of the novel's framing narrative, and the film shifts quickly to Elizabeth (Mae Clarke) and her concern about Frankenstein's absence of four months. Subsequently, Elizabeth and a friend of Frankenstein, Victor Moritz (John Boles), visit Professor Waldman at the medical school where he informs them of Frankenstein's research into chemical galvanism and electro-biology and his demand for bodies for his research.

Thereafter, the scene moves to Frankenstein's isolated, mountaintop laboratory where the *mise-en-scène* features Gothic edifices and vast, precipitous staircases; typical of expressionist style, shadows dominate the setting and extreme long shots render Frankenstein miniscule within the cavernous building. Here, Frankenstein excitedly comments that "the storm will be magnificent—all the electrical secrets of heaven."[50] As Fritz throws the switches, close-ups of electrical equipment accompanied by technological sounds, a thunderous storm, and electrical crackling, and imagery of sparking and electrical conductance, indicate electricity as a source of life. Holmes describes how earlier adaptations of the novel likewise invested the laboratory with dramatic interest, "with fizzing electrical generators, sinister bubbling vats and violent explosions," aspects that are consolidated as

being electrically motivated in the 1931 film.[51] Here, the two men raise the Creature's body up to the roof of the laboratory amidst flashes of lightning, sparks of electricity and crashes of thunder. The successful animation of the assembled corpse leads Frankenstein to exclaim "in the name of God. Now I know what it feels like to be God!" His words are analogous to the initial feelings expressed by Shelley's Frankenstein, though the latter later describes the Creature as "a thing such as even Dante could not have conceived" (56). Whale's adaptation ends with the apparent death of the Creature, and again hints at the mechanization of the era in that Frankenstein and the Creature are trapped together among the large internal mechanisms of a burning windmill. While Shelley's creator perishes, however, Whale's finale differs, for, as Friedman and Kavey note, "Originally, both Frankenstein and the Creature were slated to perish at the end of the movie, but preview audiences objected, and Universal added a short coda—written by Whale—that allowed Henry . . . to recover and join Elizabeth in a conventional happy ending."[52]

Kenneth Branagh's *Mary Shelley's Frankenstein* (1994) and the Abject Body

Branagh's version of *Frankenstein* draws more closely on Shelley's novel than that of Whale, both in its narrative structure and the general unfolding of events, although its ending is markedly different, both from the original text and from Whale's version. Even so, while its title suggests that this version cleaves to the original, analysis here reveals a strong engagement with contemporaneous scientific concerns. Branagh's characterization portrays the Creature (Robert de Niro) as an articulate being and Victor Frankenstein (Kenneth Branagh) as a scientist who is committed to his research, rather than following the mad-scientist stereotype suggested in earlier adaptations. A significant difference from Whale's

version lies in the kinetic cinematography and fast-paced editing, both aspects typified by an opening sequence featuring rapid zooms, extreme camera angles and crosscutting cinematography, to convey the collision of an expeditionary ship, captained by Robert Walton (Aidan Quinn), with an iceberg (a sequence that exaggerates the novel's version, and which is completely absent in Whale's film). Another key divergence from the 1931 film lies in the visual manifestation of the Creature, which is undeniably influenced by the zeitgeist of the 1990s. If its presence on the ice floes is initially indicated by the killing of Walton's dogs (their demise being presented in fast-motion blur), a first glimpse of it occurs via a sudden low-level close-up of a bloodied hand clasping onto the edge of the ice as if its owner is submerged below its surface. The reddened hand foregrounds the frame, which visualizes Walton's ship in long shot, creating a surreal image that is accompanied by a dramatic soundtrack and anticipates the bloodshed to follow. Thereafter, Frankenstein's initial discussion with Walton suggests the fallibility of science. He asks the ambitious and obsessive Walton, "Do you share my madness? You are wrong, I of all men know that." Indeed, Branagh's *Frankenstein* was produced at another pivotal moment in western culture, notably, at the height of a return to the abject body in visual culture that first manifested in 1970s film and television.

The twentieth-century reemergence of corporeal, body-centered imagery that often featured bodily interiors and opened, wounded bodies first became apparent in science fiction and horror films of the 1970s but has since pervaded all genres of film and television as well as conceptual artworks and literature.[53] Even as there were early perceptions of such a trend emerging in the latter decades of the twentieth century, one that was identified as a "graphic sense of physicality" associated with certain horror films, as well as a "mode of *showing* as opposed to *telling*" and an acknowledgment that cinema of the time was informed by images of medicine, these arguments at the time were based on an incomplete picture.[54] One might

now suggest that this early scholarship began to identify an unfolding inclination in film that expressed a broader shift towards socio-cultural and political transparency that was projected through representations of the opening up and transgression of the physical body.[55] As noted elsewhere "Even though it is not possible to correlate unequivocally a genre's aesthetics with either generalised attitudes towards medicine or with broader cultural emotions, there is nonetheless a continuity between the onset of abject aesthetics in post-1970s [...] [visual culture] and the questioning of institutions such as medicine. This correlation is rooted in what Raymond Williams describes as society's 'felt sense of the quality of life at a particular place and time.'"[56] Primarily, it involved a cultural obsession with the body that was enabled by digital and medical technologies, furthered by a relaxation in film censorship, and encouraged by a "wound culture," which Mark Seltzer explains as a "public fascination with torn and opened bodies . . . , a collective gathering around shock, trauma, and the wound."[57]

Such instances of disgust, corporeality and physical deterioration are theorized by Julia Kristeva as sources of abjection.[58] She relates these predominantly to the feminine/maternal body, but they also extend beyond these parameters. Her account of policing abjection centers on maintaining the physical integrity of the body and distancing oneself from sources of disgust. Nonetheless, she maintains that the abject continually exerts a fascination for us, explaining why there is a "pleasure" in viewing horror. For Kristeva, the exposure of bodily interiors and leakage of contaminating bodily fluids constitute further elements of the abject. Also fundamental is one's physical reaction upon encountering the corpse, which she considers the utmost in abjection.[59] The broader conceptual basis of her analysis moves beyond the body's physical reactions to include such transgressions as immorality and xenophobia, as well as describing various neurotic and psychotic states. As noted, a significant aspect of her theory derives from the recognition, formation, and maintenance of boundaries. While she discusses these primarily in bodily terms, her model

also involves social and psychological aspects that are essential to developing and retaining a coherent social identity. In fact, the integrity of one's (physical and social) identity is crucially implicated in keeping the abject at bay and any contravention that "disturbs identity, system, order" and "does not respect borders, positions, rules" is consequently liable to abjection.[60]

Branagh's *Frankenstein* resonates profoundly with Kristeva's analysis of horror and, as Victor Frankenstein recounts his story in flashback to Walton, one of the first events he recalls is the death of his mother during childbirth (a departure from the novel, in which she dies of scarlet fever). Following Kristeva's association between abjection and childbirth, the scene is replete with blood, bodily fluids, and bodily transgression.[61] In fact, Frankenstein's mother, Caroline (Cherie Lunghi), demands of her husband, who is a doctor, to "cut me, to save the baby, cut me!" The camera circles quickly around the dramatic scene before a point of view shot from Caroline's perspective cuts, accompanied by a scream, to an image of a window flooded by liquid, the editing of the sequence momentarily suggesting this to be amniotic fluid. However, as Frankenstein and his adopted sister Elizabeth (Helena Bonham-Carter) anxiously look out of a window below, it becomes apparent that the "fluid" is rain lashing against the house. At that moment, lightning strikes a tree spectacularly (echoing the "blasted tree" scene cited earlier from the novel), as if to connect childbirth and creation to electricity, and sparks shower through the air before Frankenstein's wailing father, who is saturated in blood, descends the vast Gothic staircase of their cavernous abode. Victor enters the room where his mother lies to find her dead and also drenched in blood. "Bring her back, bring her back," he cries, looking heavenward.

A flash-forward of three years reveals Frankenstein in the Alps placing flowers at his mother's grave and vowing to stop death. The mention of galvanism in the novel is here expressly visualized when the Frankenstein family ventures into the mountains on an overcast

day. Frankenstein drives a conductor into the ground and they lie down adjacent to it just as it is struck by lightning. The current appears to pass through the earth into their bodies so that sparks arc between their fingers, viewed in extreme close-up. Frankenstein asks, "How do you feel Elizabeth?" She responds, "Alive!" The link between electricity and life is clear.

Thereafter, Frankenstein goes to medical school at Ingolstadt University where he rents an attic room to house his laboratory. At the University, he argues with Professor Krempe (Robert Hardy) who supports the study of "medicine, biology, physics, and hard science" and condemns Frankenstein's philosophical approach, their intense debate concerning what constitutes life recalling the aforementioned conflicts about vitalism and science that took place between William Lawrence and John Abernethy. Their dispute is renewed in a subsequent anatomy scene (viewed in a rapidly circling camera shot) where a body lies partially dissected, reflecting the change in audience sensibilities, as well as a relaxation in censorship, since Whale's version. "Life is life and death is death!" argues Krempe, but Frankenstein retaliates with, "we don't know where life ends and death begins. Hair and nails continue to grow. We know that a man's brain may die but his heart and lungs may continue to pump and breathe." His comments clearly reflect late twentieth-century debates around the notion of cerebral life and the medical difficulties of defining the point of death.[62] Traditionally, death results from the irreversible failure of cardio-pulmonary functions. Since technology can now prolong those functions, determination of death currently depends on brain function. Even this is fraught with ambiguity and uncertainty, since whole brain death is difficult to ascertain and brain stem death can prevail while other areas of the brain or isolated brain cells continue to function.[63] Such ambiguity has resulted in numerous high-profile court cases regarding the withdrawal of treatment for individuals with extensive brain damage.[64]

Branagh's film further resonates with the era of production given that the post-1970s

cultural preoccupation with the body, just as in Shelley's era, was marked by revelations concerning controversial and criminal organ use, including the longstanding illicit storage of body parts. [65] Developments in transplant surgery since the 1960s also affect the film's portrayal of Frankenstein's science. University anatomy lecturer Professor Waldman (John Cleese) takes Frankenstein and his friend Henry Clerval (Tom Hulce) back to his laboratory. Here, he demonstrates the reanimation of a dissected primate's arm whereby its hand clenches as if it is alive when Waldman activates the current, an event that closely matches the description by Andrew Ure detailed earlier. Their discussion then moves on to the replacement of body parts and Frankenstein asks Clerval, "if someone you loved had a sick heart would you give them another? And if we can do that, we can replace every part," his remarks resonating with notions of organ transplantation. The concept of multiple contributory body parts taken from cadavers, medically impossible at the time of the original novel, has become a scientific reality since 1967 when Christiaan Barnard pioneered the first heart transplant. As Friedman and Kavey note, Barnard actually referenced Frankenstein post-operatively.[66] Moreover, body tissues have increasingly become commercial products, thereby converting abject parts into commercial objects that can ultimately be transplanted into viable subjects. In this respect, Roger Cooter comments, "dead bodies now have living parts, and living bodies have parts from the dead. . . . The valuation of body parts by commercial 'organ vendors' compounds the violation, trivializing the wildest dreams of nineteenth-century secularists and Gothic fantasy writers. Indeed, the transplantation enterprise of modern medicine puts at stake the entire concept of individuality."[67] At the core of such concerns lies the concept of a "denaturing and de-territorialization" of the body and the way in which contemporary science considers the body as a series of fragmented entities rather than a unified whole.[68]

Such fragmentation arises in real-world scenarios in the way that blood products and

organs may be commercialized, either illegally through organ trafficking or legally in the production of commodities such as fetal material for research. While being a concept central to the story of *Frankenstein*, these new forms of corporeal fragmentation have nuanced the content and meaning of Branagh's adaptation. As Cooter observes, transplantation was rare before the 1960s but by the 1980s "more than 400,000 transplants were performed in the US; in the UK 5,200 were performed in 1992 alone."[69] Additionally, whereas living donors had been required in earlier pioneering work, the United Kingdom Human Tissue Act of 1961 "permitted the medical removal of cadaver tissue not only from those who had expressed a wish for this during their lifetime but also from those who had never expressed any objection during their lifetime and whose surviving relatives made no such objection."[70] The possibility of a trade in organs led to a focus on the definition of brain death to avoid premature removal of organs by overzealous doctors, a theme that is explored in the films *Coma* (Crichton 1978) and *District 9* (Blomkamp 2009). Both films depict medicine and science as flawed and doctors as evil. The trope of the evil doctor is one overtly apparent in Branagh's film, occurring during the scene when Professor Waldman is murdered by one of his patients when trying to administer a vaccine for smallpox. "You doctors are killers. You murder people. You're evil," shouts the killer, who goes to the gallows (but whose body is later retrieved by Frankenstein). The killer's comments chime with contemporaneous controversies in the field of medicine, including iatrogenic disease, and the many reports of negligence and criminality in medical staff that had contributed to a loss of confidence in medicine in the decades before Branagh's film appeared.[71] This loss of confidence was subsequently exacerbated by the controversies about Alder Hey Hospital's illicit storage and sale of body parts and the Bristol 'baby hearts' controversy but has included multiple instances of doctors "playing god"[72] that have come to light since the 1970s (the most recent example including the conviction in January 2018 of transplant surgeon Simon Bramhall for inscribing his initials into patients'

livers while they were undergoing surgery).[73] These instances too have parallels with Shelley's text, in particular when Victor imagines that "A new species would bless me as its creator and source."[74] Frankenstein initially sees himself as a godlike figure who can create a new race that will view him as its maker. His vision of being revered quickly fades in the face of a Creature who he rejects and who takes revenge through a murderous rampage aimed at eliminating his creator's family and friends.

In the film, Frankenstein tries in vain to resuscitate Waldman by striking his chest, the scene framed in an extreme overhead shot that displays the bloodied body of Waldman. Unable to save him, Frankenstein uses Waldman's journals detailing his own experiments to create life and then retrieves Waldman's brain and the killer's body for use in his experiments. As he robs graves and disinters their contents, Frankenstein tells himself that "it is tissue to be reused, raw materials, that's all they are," as if to persuade himself that his behavior is ethical. The scenes that show Frankenstein collecting raw materials once more focus graphically on bodily fluids and corporeality. For example, one scene frames a woman in labor as amniotic fluid pours into a bucket for use in the animation, and Frankenstein's voiceover reveals that "amniotic fluid is the chief biogenic element." Another extreme close-up frames a dead toad with what are described in Frankenstein's voiceover as acupuncture needles puncturing it at various points, the event directly mimicking the experiments described by scientists working at the time when Shelley penned her novel. While the close-up detail of this scene graphically illustrates the bodily transgression that was absent in Whale's version, it also indicates Branagh's pursuit of authenticity. Following the successful reanimation of the toad, Frankenstein then attempts the procedure on a larger scale with the Creature, and extreme close-ups disclose him stitching together body parts just as Elizabeth and Clerval arrive to warn him of a cholera epidemic.[75]

Even as it reflects recent medical concerns, Branagh's creation scene demonstrates

contemporary cinema's technological capacity, advanced from 1931 in its ability for low-level, extremely rapid panning and tracking shots as Frankenstein prepares to bring his creation to life. The sequence in which he lowers the assembled body into a huge vat of amniotic fluid has a significantly faster pace than the equivalent scene in Whale's film, and displays a greater variety of camera angles and perspectives that includes rising crane shots in combination with revolving camerawork. Sparks fly dramatically so that the scene still draws on notions of electricity as a life force and there is a similar urgency about the scene, with Frankenstein impelled by a passion for discovery. Extreme close-ups reveal the violent insertion of long needles into the Creature's hands and feet, and the entire design of the structure that gives life to the Creature has tropes of livingness in its fluidity, perpetual motion, and interconnecting passageways. Indeed, the *mise-en-scène* of Branagh's version is replete with reproductive connotations, including a gigantic pulsating uterine-like chamber that is connected by a channel to the vat of amniotic fluid containing the Creature, to which he adds electric eels (fish that are capable of generating an electric current, overtly connecting biology and electricity, while their slippery physical qualities further contribute to an abject aesthetic).

The whole process of creation has elements of dynamism and is far different from the machine-orientated, electrically motivated scenario of Whale's film. As Frankenstein releases a mechanism, an extreme close-up of the connecting canal between the pulsating chamber and the vat of amniotic fluid shows a torrent of fluid surging through the canal as if towards the spectator in an impact-aesthetics type of shot. Close-ups of the Creature within the vat reveal electric currents coursing through its body, creating rapid involuntary movements, with extreme close-ups of the current penetrating between the crude stitching used to sew it together, and suggesting that the electricity is entering into the body. The Creature at first appears lifeless, before a close-up camera shot reveals a hand suddenly becoming animated,

harking back to Whale's creation scene in 1931 film and an ongoing trope in Frankenstein movies. The movement, accompanied by an ominous thud, alerts the viewer that the Creature is indeed "alive." The chamber rocks violently before crashing over and Frankenstein and the Creature slide about the floor in amniotic fluid. The Creature is naked and epitomizes Kristeva's notion of abjection; first in the explicit suggestion of birth and its associated fluidity, but also in the sense of bodily violation indicated by the stark crude stitching. The Creature initially lacks language, as well as identity (he subsequently asks Frankenstein "who are these people of whom I am comprised" and enquires if he has a soul), and is unable to stand unassisted, further rendering him infant-like and abject in the fact that his subjectivity is compromised.

This turn to the abject body in relation to Branagh's *Frankenstein* is likely influenced by reproductive technologies of the time, primarily suggested by the fact that the Creature is brought to life in a vat of amniotic fluid. Jon Turney contends that the film "highlighted many of the tensions in the original narrative around parenthood and sexuality, particularly in Branagh's reimagining of the creation scene."[76] Inevitably, the scenes of collecting the amniotic fluid, while perhaps harking back to Mary Shelley's own experiences of childbirth and miscarriage (commonly thought to have informed the novel), reflect the scientific advances in artificial and assisted reproductive techniques that have since emerged.[77] The development of the laparoscope during the 1960s was a vital step in the move to assisted reproduction and led to the recovery of eggs for successful in vitro fertilization in 1978.[78] The technique also enabled, for example, in 1992, a post-menopausal 61-year-old woman, Liliana Cantadori, to give birth following in vitro fertilization of a donor egg.[79] Effectively, as Naomi Pfeffer explains, "third party involvement in the reproductive process [is made possible] to an unprecedented extent; nowadays several reproductive bodies can participate in the parenting of a single child"; since 1990, these arrangements have been subject to the Human

Fertilization and Embryo Act which granted licensed doctors the right to "manipulate sperm, eggs and embryos."[80] Ostensibly, Branagh's film emerged in a climate where women's reproductive capacity was being extended and the generation of life could involve multiple participants. Moreover, Branagh's image of man as creator of life is antithetical to the real-world decline in Western male reproductive potency, as indicated by an "apparent diminution in sperm counts" and perhaps reflects a reclaiming of that lost potency.[81]

One might also argue that the associated development of magnetic resonance imaging (MRI) and computerized tomography (CT) during the 1970s and '80s, along with more sophisticated fiber-optic endoscopes in 1979, has had an equally profound impact on the trend towards exposing and visualizing the interior, taboo and abject body. Specifically, the rapid scanning of MRI produces sequences that are virtually real-time and therefore mediate the interior body as a kinetic living entity (rather than as the fixed imagery of the X-ray). So too has the Human Genome Project (1990–2003), spanning the time of the film's production, brought analysis of genetic and reproductive matter to the forefront of societal consciousness. Alongside the flourishing of transplantation and assisted reproductive procedures, as well as the technological means to achieve them, has come an increasing ethical awareness that governs real-world science. At various times, this awareness has led to bioethics legislation intended to halt work on fetal research.[82] If there was a sense of morality and shame in Shelley's original novel, signaled, for example, by Frankenstein's reluctance to make his work public, it is brought to the fore in Branagh's production, first in the scene when Clerval suggests that Frankenstein does not have the right to make the decision about creating life and later, when the Creature asks Frankenstein, "do you ever consider the consequences of your actions?" Nowhere is this sense of bioethics more apparent in the real world than in the field of cloning, the subject brought to public awareness in 1997 by the exact replication of "Dolly" the sheep, with the notion of asexual replication analogous to the creation of the

Creature. As John Robertson states, "Ethicists have speculated that cloning by embryo splitting might occur to facilitate, or might result in, the selection of stored embryos deemed to be particularly desirable" and therefore resurrects the eugenic concerns that informed the portrayal of the Creature in Whale's film.[83]

Conclusion

Shelley's novel was penned during a period of scientific interest in the reanimation of life, when galvanism, vitalism, and the development of the voltaic pile were at the forefront of scientific and philosophical debate. Whale's 1931 version reflected a move from experimentation with electricity to its industrialization, leading to widespread mechanization. This trend was mirrored in the art movement of Futurism, as well as the mechanical connotations of Frankenstein's creation. Moreover, the discussions of criminality and brain taxonomy, and the anomalous appearance of the Creature, are consistent with the notions of atavism, degeneracy, and eugenics promoted by Lombroso. The 1994 film version also coincides with a significant socio-cultural moment, namely, a post-1970s return to exposing the abject body. This was a period marked by concerns about body parts that were stolen for artistic purposes or stored/commercialized without consent; a renewed preoccupation with bodily interiors, especially at the microscopic and cellular/genetic level (the Human Genome Project is one example); and advancements in the transplantation of artificial and animal organs. In addition, the last decade of the twentieth century witnessed the preservation and public display of entire bodies by anatomist, Gunther von Hagens, and, in 2002, the first public autopsy in 170 years. If Shelley's creation was conceived in an era of discovery and quest for knowledge about the human body, Branagh's *Frankenstein* plays to a different

milieu whereby, as Squier suggests, the "value and significance of a human organ or body part is no longer self-evident but rather is produced through a complex set of institutional negotiations involving medicine, art, society, the legal system, human emotions, and economic calculations."[84] Ostensibly, while it is a film that closely dramatizes Shelley's original, it nonetheless has attained its own cultural resonances in its intersections with the contemporary scientific zeitgeist.

NOTES

1. Shelley variously refers to Frankenstein's creation as a creature, wretch or daemon; this essay adopts the term Creature throughout.
2. Kristeva, *Powers of Horror*.
3. Various, Channel 4.
4. Various, Channel 4.
5. Worland, *Horror Film*, 157.
6. Worland, *Horror Film*, 31.
7. Ure, "On Galvanism," 22.
8. Ure, "On Galvanism," 24.
9. See Holmes, *Age of Wonder*, 325; Morus, *Frankenstein's Children*, 15.
10. Holmes, *Age of Wonder*, 311.
11. Fulford et al., *Literature, Science and Exploration*, 132.
12. Holmes, *Age of Wonder*, 331.
13. Holmes, *Age of Wonder*, 313.
14. Holmes, *Age of Wonder*, 311.
15. Holmes, *Age of Wonder*, 331.
16. Mellor, "Frankenstein," 10.
17. Mellor, "Frankenstein," 2.
18. Mellor, "Frankenstein," 3.
19. Shelley, *Frankenstein*, 8. Subsequent page references will be cited parenthetically in the text.
20. Goulding, "The Real Doctor," 257.
21. Goulding, "The Real Doctor," 257.
22. Goulding, "The Real Doctor," 257.
23. Goulding, "The Real Doctor," 259.
24. Goulding, "The Real Doctor," 259.
25. Goulding, "The Real Doctor," 259.
26. Hetherington, "Creator."
27. Marshall, *Murdering*, 6–7; 23.
28. Holmes, *Age of Wonder*, 335.
29. Butler in Worland, *The Horror Film*, 159.
30. Friedman and Kavey, *Monstrous Progeny*, 92.
31. Worland, *The Horror Film*, 158.
32. Worland, *The Horror Film*, 160.
33. Whale, *Frankenstein*
34. Worland, *The Horror Film*, 163.
35. Lombroso, *Criminal Man*, 222.
36. Cantor, "The Diseased Body," 356–57.
37. Worland, *The Horror Film*, 168.
38. Worland, *The Horror Film*, 157.
39. Friedman and Kavey, *Monstrous Progeny*, 110.
40. Worland, *The Horror Film*, 165.
41. Hughes, *Shock of the New*, 15.

42. Morus, *Frankenstein's Children*, 155.
43. Morus, *Frankenstein's Children*, 159.
44. Hughes, *Shock of the New*, 44.
45. Worland, *The Horror Film*, 169.
46. Curtis, *James Whale*, 144.
47. Hughes, *Shock of the New*, 43.
48. Hughes, *Shock of the New*, 48.
49. Brooks, "Godlike Science," 594.
50. Whale, *Frankenstein*.
51. Holmes, *Age of Wonder*, 335.
52. Friedman and Kavey, *Monstrous Progeny*, 116.
53. Pheasant-Kelly, "Towards a Structure," 3.
54. Boss, "Vile Bodies," 22; Brophy, "Horrality", 8; Cooter, "Turn of the Body."
55. Pheasant-Kelly, "Towards a Structure."
56. Pheasant-Kelly, "Towards a Structure," 3.
57. Seltzer, "Wound Culture," 1.
58. Kristeva, *Powers of Horror*.
59. Kristeva, *Powers of Horror*, 3.
60. Kristeva, *Powers of Horror*, 4.
61. Kristeva, *Powers of Horror*.
62. Blank, "Technology and Death;" Lock, "Inventing a New Death;" Sharp, "Bodies, Boundaries;" Singer, *Rethinking*.
63. Blank, "Technology and Death," 194.
63. For example, the Terri Schiavo case in the United States involved a woman who was in a persistent vegetative state for fifteen years and whose feeding tube was eventually withdrawn in 2005 under legal jurisdiction.[64] More recently in April 2018, the withdrawal of respiratory support for a brain damaged infant, Alfie Evans, who continued to breathe unaided for several days after artificial ventilation was stopped, was legally and controversially enforced in the United Kingdom.
65. As Susan Squier recounts, in 1998 Anthony Kelly was convicted for the theft of anatomical specimens, while in 1999 there followed a Public Inquiry into the "Bristol baby hearts" scandal when cardiac surgeons James Wisheart and Janardan Dhasmana caused the unnecessary deaths of 30 infants from 1984 to 1995 by continuing to operate on them despite an unacceptably high failure rate. There was also the body parts controversy at Alder Hey Hospital in 1999, when body organs were harvested for partly for research and partly for financial gain, since children's organs were sold for profit. In addition, Squier goes on to report on "organ-stripping," whereby "an 'archive' of human and fetal organs had been discovered at the Alder Hey Hospital, including a heart collection containing more than two thousand hearts; a fetal collection containing around 1500 fetuses, and an additional collection that by December 1999 had accumulated more than 445 partial or full fetal remains." (Squier, *Liminal Lives*, 175).
66. Friedman and Kavey, *Monstrous Progeny*, 63.
67. Cooter, "Dead Body," 471.
68. Sharp, "Bodies."
69. Cooter, "Dead Body," 481.
70. Cooter, "Dead Body," 481.
71. Dixon-Woods et al, "Why is UK Medicine."
72. See Pheasant-Kelly, "Towards a Structure," 4–5.
73. Perraudin, "Surgeon burned."
74. Shelley, *Frankenstein*, 51.
72. The details of smallpox and cholera are absent from the novel and, given the time of the film, are possible metaphors for AIDS/HIV which first came to light in 1981 and into the public domain in the mid-1980s. It was therefore prominent at the time of the film and has since become pandemic. The significant references to blood and bodily fluids in the film, akin to its contemporary, *Bram Stoker's Dracula* (Coppola1992) further imply AIDS as a possible medical influence.
76. Turney, *Frankenstein's Footsteps*, 202–203.
77. Friedman and Kavey, *Monstrous Progeny*, 6; Hetherington, "Creator;" Holmes, "The Science," 492.
78. Pfeffer, "Reproductive Body," 288.
79. Pfeffer, "Reproductive Body," 277.
80. Pfeffer, "Reproductive Body," 288, 289.

81. Pfeffer, “Reproductive Body,” 277.
82. These included a moratorium on foetal research 1974-75, and cessation of all federally funded research on fetal tissue transplantation 1988-1993.
83. Robertson, “Question of Human.”
84. Squier, *Liminal Lives*, 178.

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