The Victorian Posthuman: Monstrous Bodies in Literature and Science

By

Wietske Smeele

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Approved:

Jay Clayton, Ph.D

Rachel Teukolsky, Ph.D.

Vera Kutzinski, Ph.D.

Ole Molvig, Ph.D.

for Fabian: *for your admirable perseverance and your cherished friendship*

and

for my grandparents: *for your gifts of strength and creativity*

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"Let me go, … monster! Ugly wretch! You wish to eat me and tear me to pieces. You are an ogre" (Shelley 100). These are the words that William, the younger brother of Victor Frankenstein, cries out moments before his death. The "ogre" to whom William speaks is the creature created by his brother, and the act of murdering a young child seems to confirm the creature's monstrosity. In fact, the creature of Mary Shelley's *Frankenstein* (1818) epitomizes the monster: he is a hybrid creature of human and animal, constructed as assemblage out of materials gathered from "the unhallowed damps of the grave" and "the slaughterhouse" (34); he is an ugly being with "yellow skin scarcely cover[ing] the work of muscles and arteries" with "watery eyes, that seemed almost of the same colour as the dun white sockets in which they were set" (35); he is a being of immense size, strength and "superhuman" power, able to "bound… over the crevices in the ice" that coat Mount Blanc, run "with the swiftness of lightning," and scale the perilous cliffs of mountains (67, 141). The creature's monstrosity originates not in his violence—that only comes later—but in his physical aberration from the dominant human form. As young William's exclamation reveals, it is not the creature's strength that makes him so monstrous, but his "ugly" appearance as an "ogre," and the thought that something so inhuman is innately a threat to the human: William is terrified that the creature will "eat [him] and tear [him] to pieces." Notably, it is the eating of human flesh not the violation of that flesh through tearing that is the dominant threat to William. Unlike tearing, eating suggests that the creature will remove William and thus the presence of the human from the scene. The creature is monstrous in his inhuman appearance, his existence as a creature of monstrous bodily inhumanity.

Shelley's creature appears at the start of the nineteenth century and sits at the meeting of two competing worldviews: the sublimity of natural theology and the dawning of a scientific age.

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The monsters that came after Frankenstein's creature moved away from this gothic sublimity to embody the dawning fascination with how science, not mythology or magic, could alter the human form. These monsters appeared in the articulated skeletons of primordial monsters unearthed by paleontologists; in the factory machines that disrupted the pastoral quiet of rural England and spewed their smoke across previously verdant landscapes; in the painful labor of working at machines; in the bodies that were warped and distorted by malfunctioning machines; in the bodies of workers and soldiers and citizens alike who had to adopt prosthetics to continue functioning within Victorian culture; in the animalized human newly revealed through Darwin's theory of evolution; in the flayed and mutilated bodies of vivisected animals; in the bodies desiccated by fictional scientific experiments; in bodies permanently altered by the ravages of disease; and in the invisible bodies of bacteria and pathogens. The Victorian era was an age of monstrous bodies—of bodies that adopted the dictates of science to warp what had previously been thought of as solely animal or solely human. In this dissertation, I explore the way in which Victorian literature, art and popular culture reworked conventional notions of monstrosity within the paradigms of scientific, technological and medical developments. This reworking moved away from monstrosity as aberration to rather view the creatures made monstrous by science as heralds of a new human ontology: the Victorian posthuman.

Monsters have long held a place of fascination within the human imagination. They are protean creatures, appearing as hybrid bodies, as primordial creatures animated in the present, as beings who can exist in extreme environments, beings whose genesis defies known biology, as creatures of immense size or strength, as nightmare beasts. In each of their instantiations, monsters challenge a previously accepted method of understanding the known and living world. Indeed, monsters have traditionally been associated with folklore and in this way, they often bear

witness to the existence of fantastical worlds beyond the human: these mythologies are populated by creatures such as the centaur, a human-horse hybrid, or the sphinx, a splice of human, horse and bird, or even the unnatural genesis of creatures such as the dragon, born as a serpent from a chicken's egg incubated in manure (Smith). At their core, monsters are hybrid creatures: they bring together known biological entities into a single body and create out of the splice terrifying and terrifyingly destabilizing versions of life.

We can use definitions of the monster to trace a chronology of how humans have thought about this figure from the fourteenth to the nineteenth century. Although the monster is conventionally "a mythical creature which is part animal and part human, or combines elements of two or more animal forms," more than anything it is a creature "of great size and ferocious appearance," or even more, "any imaginary creature that is large, ugly, and frightening" ("monster"). The monster as a hybrid creature of immense size and strength first appeared in the English language in Geoffrey Chaucer's *A Monk's Tale* (1387). Chaucer's "monstre" was as yet disembodied, existing rather as a vague creature to be defeated by the hand of a tragic hero (571). However, since the fourteenth-century, monsters have taken on increasingly more terrible forms in the public imagination. Whereas traditionally monsters were confined to mythology alone, as "monsters" find purchase in the nineteenth century they extend to a more general fear of large, ferocious, and ugly creatures. The monster in the nineteenth century was not a nightmare creature of mythology alone, but a creature that could exist beyond mere tales.

Compound bodies, such as Frankenstein's creature, or the meetings of animal, human and technology in the Victorian era, have commonly been viewed as monstrous according to the definition offered above. However, I would like to rethink conventional monstrosity in the context of posthuman theory. I revisit the perceived monstrosity of these assemblages by

focusing on their subjectivity—both their projected subjectivity and the way in which the Victorian public accepted this subjectivity. For example, while the prosthetic leg of injured factory workers may have disconcerted the Victorian public, the workers identity as an amalgam of wood, steel and flesh did not bar them from participating in Victorian life. Rather, they came to represent both the potential and frightening power of the technological advances that were shaping Victorian England. Because of this changing concept of the monstrous in the nineteenth century, I use the term "monstrous" not to mark as aberrant bodies that appear monstrous, but to rather insist upon their significant sentience, of their experience of life, and their ability to encourage a reflection upon what composes life.

In this dissertation, I argue for a new way of understanding bodies in the Victorian era. To fully understand the significance of scientific, medical and technological developments on the Victorian public we must investigate the way in which these developments were seen to affect human identity—how they were experienced as lived realities influencing everyday life and everyday concerns. I propose a new lens which I term the Victorian posthuman: this category defines those beings that herald a scientifically determined way of understanding the human's place within an abundantly lively world. This argument sits at the intersection of Victorian science, Victorian literature and culture, and theories of the posthuman. Through this meeting of seemingly incompatible fields, I aim to revise on the one hand our understanding of what composed accepted life in the Victorian era, to reveal narratives of bodies that have often been overlooked as disabled, monstrous, or non-normative, and on the other hand to expand our understanding of what the posthuman can be. A Victorian posthuman lens reveals not only the potential felt by these developments, but also the deep unease about the humans' place within the world that resulted from some of the more destabilizing developments. Therefore, I explore the

way in which so-called anomalous bodies—bodies that do not reflect dominant humanity, but rather sit uneasily at the meeting of the human and scientific discovery—were represented as exciting potential as well as terrifyingly monstrous aberrations. These bodies as they appeared in the Victorian era challenged typically demarcated categories of being, such as compounds of human and animal, of sentience and thing, of biological and technological within a single body.

Posthuman Foundations

Posthumanism, in its broadest sense, explores what it means to exist in a state beyond the human. It is a theoretical field that reconsiders conventional notions of human subjectivity within techno-modernity, and through this expands an understanding of human life beyond anthropocentrism. Through rejecting historically humanist philosophies of the "human" or "human nature," posthumanism thinks of human identity as trans-species existence and communication, especially in a world that is increasingly integrating the human with new technologies, sciences, and life forms. That is to say, posthumanism thinks of the human as neither an exceptional nor stagnant being, but as a being existing in conjunction with other life forms and other technologies and one that is constantly adapting to developing techno-scientific knowledge. Thus, to be posthuman is the ontological condition of existing and thriving within techno-modernity.

However, posthumanism is not a stable category; it contains many interpretations and definitions. My argument for a Victorian posthuman draws heavily on the conflicting representations of futuristic existence characterized in Transhumanism and critical posthumanism. Transhumanism explores a futuristic vision in which human identity is separated from the body and exists as code instantiated in computers; alternately, critical posthumanism

regards the posthuman as a conceptual mode of viewing the inter-connectedness of biological

life with techno-modernity. In my overview of these fields, I use the term "Transhumanism" to

refer to the strain of posthumanism concerned with disembodied human identity, while "critical

posthumanism," or "posthumanism" for short, refers to the theoretical consideration of

dismantling anthropocentrism. While there are many versions of the posthuman, I position my

argument in conversation with Transhumanism and critical posthumanism because they have

found the firmest footing in both public imaginations of the posthuman and critical

conceptualizations of future human identity.[1]

In bringing posthumanism into conversation with Victorian literature and culture, I aim to

destabilize conventional ways of viewing these two fields. On the one hand, posthumanism, with

its emphasis on techno-modernity,[2] has typically been used as a method for investigating the

effects of contemporary sciences and technologies on our understanding of human identity.

However, by historically locating a version of the posthuman within the nineteenth century, I aim

to revise this contemporary focus of posthumanism and rather recognize that considerations of

human identity, and possible futures of the human, are not confined to techno-modernity alone,

but can and do exist before the information age. On the other hand, in arguing for a Victorian

posthuman, I aim to reconsider the universality of humanism within the Victorian era. The

Victorian era has typically been viewed as a bastion of humanism; it was an era rich with

novelists, social reformers, and philosophical thinkers who sought to celebrate and advocate

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[1] Francesca Ferrando, in a 2013 article, surveys the dominant strands of posthuman theory.
Ferrando identifies the profusion of competing definitions housed under the umbrella term
"posthumanism" as responsible for the unreliable way in which posthumanism has been taken up
in theory and popular culture. Despite Ferrando's detailed overview of prominent strands such as
posthumanism, Transhumanism, antihumanism, metahumanism and new materialism, she
nevertheless generalizes these theories as all being concerned with "possible futures" (26).
[2] By techno-modernity, I refer to our contemporary moment as a "modernity" in which
technology is seen as a necessity of daily life and the driving force of progress.

human progress. However, next to its humanism, the Victorian era also unearthed and explored uncanny and often disturbing bodies, bodies that revised widely accepted notions of the human. I explore the Victorian era through a lens of trans-species diversity, of the human as an entity in community with non-human and technological forms of life. Through this exploration, I seek to unearth the aberrant subjectivities that contradict an account of the Victorian era as an era of humanism, and to rather reveal that such subjectivities did appear, and did appear with vitality, within representations of Victorian life.

The Victorian posthuman arises out of the convolution of science and technology developing in Victorian England. It is a protean creature, taking on diverse forms depending on the bodies, materials and influences out of which it is born. The Victorian posthuman may be the giant form of an articulated dinosaur skeleton, the meeting of human and machine in Victorian textile factories, the fictional imagination of biologically enhanced human bodies, or the invisible pathogen that transforms healthy bodies into uncanny aliens. This multiplicity thus comments upon a shift in the way in which the human body was understood in the Victorian era, re-imagining what it means to be and to appear human.

Beyond Chronology: Human-Posthuman Coexistence

While I am importing the language of posthumanism from our digital age onto a pre-digital age, I contend that posthumanism need not be a historically confined term. The utility of the posthuman is not in its name but in how it signifies according to the specific historical and cultural contexts in which it is located. I continue using the term "posthuman" because theories of posthumanism deeply influence the way in which I explore representations of scientific, medical and technological developments in the nineteenth century. At the same time, I believe it

is time that we release posthumanism from its digital moorings and recognize that we have been fascinated with what the human is "becoming" since long before the information age.

I echo posthuman theorists when I contend that the posthuman comes both before and after the human. For most posthumanists, posthumanism doesn't herald a future in which human biology becomes obsolete. Rather, the human and the posthuman coevolve; there is always the potential for the human to become something more. In explicating the title of her seminal work on posthumanism *How We Became Posthuman* (1999), philosopher N. Katherine Hayles explains that the historical changes that lead to the formation of the posthuman "were never complete transformations or sharp breaks … The changes announced by the title [of the book] thus mean something more complex than 'That was then, this is now.' Rather, 'human' and 'posthuman' coexist in shifting configurations that vary with historically specific contexts" (Hayles 6). Likewise, Cary Wolfe explains that,

> posthumanism in my sense isn't posthuman at all—in the sense of being 'after' our embodiment has been transcended—but is only posthuman*ist*, in the sense that it opposes the fantasies of disembodiment and autonomy, inherited from humanism itself… [Posthumanism] comes both before and after humanism: before in the sense that it names the embodiment and embeddedness of the human being in not just its biological but also its technological world. … But it comes after in the sense that posthumanism names a historical moment in which the decentering of the human by its imbrication in technical, medical, informatics, and economic networks is increasingly impossible to ignore. (Wolfe xv)

For Wolfe and Hayles, the posthuman is an entity that coexists with the human. This coexistence manifests through the way in which the human is constantly implicated in its own future development. There are no "sharp breaks" between the human and the posthuman (Hayles 6). Rather, the two develop together according to the way in which the human uses the innovative technologies of its historically and culturally specific moment, and the way in which it begins to implicate its own body and identity in the development of such technologies.

The Victorian era offers a particularly rich case study for the exploration of this human-posthuman coexistence. Despite the maelstrom of developing scientific disciplines in the Victorian era, such as natural science, medicine, and technological advances, these new sciences were not outside public accessibility. Unlike today, the sciences and the humanities spoke the same language and could thus engage in cross-disciplinary communication. For instance, Jules Verne, in *Journey to the Center of the Earth* (1864), relies heavily upon the geological discoveries of Charles Lyell in order to paint a realistic picture of his subterranean world; Elizabeth Gaskell, in *North and South* (1855), demonstrates an understanding of the upheavals wrought on northern England by the introduction of steam-powered factory machinery; and Sarah Grand, in *The Heavenly Twins* (1893), is deeply aware of the role that theories of heredity play in her argument for female political autonomy. In texts such as these, the human is not eradicated in order for the posthuman to exist. Rather, Verne's subterranean explorers continue to exist even when they come face to face with prehistoric sea monsters; and the factory workers of Gaskell's novel cooperate with the machinery at which they work. Through identifying the coexistence of the human and posthuman, I explore the way in which Victorian written and visual culture uses the human body to mediate the potential of scientific, technological, and medical developments—the potential of becoming posthuman.

Through this emphasis on coexistence, I underscore Promod K. Nayar's definition of the posthuman, outlined in his 2013 book *Posthumanism*. Nayar describes posthumanism as, "the *radical decentering of the traditional sovereign, coherent and autonomous human in order to demonstrate how the human is always already evolving with, constituted by and constitutive of multiple forms of life and machines*" (11 emphasis original). For Nayar, posthumanism is about rethinking what we have conventionally identified as a normative human—the ideal man of

humanism. This rethinking results in recognizing that the human is always in conjunction with other materials, regardless of whether these are the materials of the information age or the materials of a pre-digital nineteenth century. The steam-powered machinery of Francis Trollop's *The Life and Adventures of Michael Armstrong, the Factory Boy* (1839) or the human-animal hybrids in H. G. Wells' *The Island of Doctor Moreau* (1896) destabilize conventional notions of the human by integrating machinery or animality into otherwise recognizable human forms. Out of these integrations emerge posthuman ontologies, posthumans that coexist with and move within the same world as humans.

The Cultural Posthuman: Posthumanity Beyond the Information Age

My dissertation calls for a revision to how we typically think of the posthuman—both within critical conversations and artistic representations. I seek to identify the posthuman characteristics that do not rely on techno-modernity and can therefore exist before as well as after the information age. However, within the public imagination, the term *posthuman*—or its commonly referenced sibling "the cyborg"—implies a future that has not yet been reached. To today's human, the posthuman suggests some kind of superhuman: a cyborg, an intelligent robot, a super-computer that has achieved singularity, or an advanced prosthetic being that has the potential to supplant the human. Each of these visions of the posthuman insists upon a separation of the human from the posthuman, a separation of bodily materiality from the information of identity. I resist this separation and rather call for the reintroduction of the body into the data of identity.

Donna Haraway is often cited as the foundational thinker for conceiving of a human future as cybernetic. In her now well-anthologized essay "A Cyborg Manifesto" (1985),

Haraway calls for the rejection of rigid ontological boundaries that have typically separated identities such as "human" from "animal," "living" from "machine." The being she proposes as the remedy to this traditionally fragmented vision of life is the cyborg, a being that "is not made of mud and cannot dream of returning to dust," but is instead a "lived social and bodily realit[y] in which people are not afraid of their joint kinship with animals and machines, not afraid of permanently partial identities and contradictory standpoints" (Haraway "Cyborg" 151, 154). The fallacy of this vision comes in how it has been taken up by thinkers who envision a future as disembodied: Haraway's cyborg has often been read as a disembodied being, or a being whose body is entirely cybernetic. However, Haraway never insisted upon disembodiment. For her, the cyborg—what we now call the posthuman—is an entirely embodied being. Although it may appear as an unsettling, even monstrous body in its "joint kinship with animals and machines," it is nevertheless one whose boundary-blurring potential is contingent upon how its body physically interacts with the world (154).

Although I reject the disembodied vision of posthumanism, disembodiment has nevertheless been a staple of some versions of posthumanism. For some, posthumanism refers to a futuristic vision of the human integrated fully with, or made obsolete by, technology. This is the version of posthumanism with which many people are familiar—the vision of the posthuman as Transhuman, as nanotechnologies, genetic engineering, or the technological singularity. Transhumanism, sometimes referred to as H+, is concerned with enhancing the human condition through medical and technological augmentation to release the human from its reliance on physical biology. According to Nick Bostrom, Transhumanism is the foundation of

posthumanism and can trace its roots as far back as the mythologies of ancient Greece.[3]

However, "Transhumanism" as we use it today first appeared in Julian Huxley's *New Bottle for New Wine* (1957). In this text, Huxley envisions a future in which the human species will transcend itself and calls this new human future Transhumanism: "man remaining man, but transcending himself, by realizing new possibilities of and for his human nature" (Huxley 17). Later transhuamnists, such as FM-2030 (also known by his given-name F. M. Esfandiary), envisioned the transhuman as an evolutionary link between the human and the posthuman—a necessary step along the way to disembodiment: Transhumans "are the earliest manifestations of new evolutionary beings" (FM-2030 149).

Many of my readers may be familiar with this vision of future life; it can be seen in the AI love interest, Samantha, in Spike Jonze's film *Her* (2013), or in the data of human identity that exists in hard drives in the Netflix original television series *Altered Carbon* (2018)—cultural products that imagine the technological singularity. Transhumanism's technological vision was popularized even earlier by thinkers such as I. J. Good who, in the 1960s first began imagining a future in which machines would gain intelligence. Vernor Vinge's vision of technological singularity from the 1990s similarly proposes that ultra-intelligent machines will far surpass human capabilities and eventually be able to reproduce themselves (Vinge). This central tenet of Transhumanism envisions a separation of the body from the data of the mind; whether human

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[3] Nick Bostrom's 2005 essay "A History of Transhumanist Thought" is a cornerstone text for Transhumanist study. The essay, published in the journal of the World Transhumanist Association, which Bostrom co-founded in 1998, provides a thorough overview of the history of Transhumanism from ancient Greece until today, as well as an overview of the various models of Transhumanism persisting in popular culture and academic discourse.

consciousness can be downloaded into a machine, or a machine can gain intelligence, the

medium in which that data is instantiated is no longer integral to who or what that being is.[4]

While Transhumanism focuses on the merging of human with technological life, critical

posthumanism envisions life as a symbiotic relationship—a collaborative meeting of humans,

animals, technology, the environment, and any other combination of cultural and social

influences. Posthumanism concerns itself with exploring what happens to subjectivities when the

human, that is to say the human of Humanism, is decentered through its relationship and

connection to other non-human life. David Roden, in *Posthuman Life* (2015), describes

posthumanism as a critique of the traditionally "human-centered (anthropocentric) ways of

understanding life and reality" (10). Rosi Braidotti conceptualizes the posthuman as "a relational

subject constituted in and by multiplicity" (Braidotti 49). And Wolfe puts it another way when he

envisions the posthuman as a being that exists within "the entire sensorium of other living

beings" (Wolfe xxv). Critical posthumanism insists upon life as a multiplicity—whether this is a

multiplicity of bodies, of influences, or of materials that compose a body.

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[4] By disembodiment, critics most often refer to the vision proposed by Hans Moravec in *Mind Children: The Future of Robot and Human Intelligence* (1988) that technology will very soon progress to the point at which the human mind can be uploaded into a machine. Hayles, more than any other theorist, takes up the challenge of dismantling this view of a potential posthuman future. Of the possibility of uploadable consciousness, Hayles writes,
> for information to exist, it must *always* be instantiated in a medium…. The point is not only that abstracting information from a material base is an imaginary act but also, and more fundamentally, that conceiving of information as a thing separate from the medium instantiating it is a prior imaginary act that constructs a holistic phenomenon as an information/matter duality. (13, emphasis original)

For Hayles, this embodiment isn't necessarily a sentient body, but the location of information—of code—within a form. Rosi Braidotti's embodied posthuman, however, is more concrete: "The posthuman subjectivity I advocate is rather materialist and vitalist, embodied and embedded, firmly located somewhere" (Braidotti 51).

Significantly, technology is not central to identifying the posthuman in these definitions of critical posthumanism. Posthuman identity is about relationality and multiplicity, not about disembodiment. However, despite its apparent expansiveness, critical posthumanism is nevertheless still confined to contemporary technologies and species relations within our contemporary moment.

My use of posthumanism embraces the embodied multiplicity of critical posthumanism while at the same time rejecting the emphasis on techno-modernity present in both Transhumanism and critical posthumanism. The physical, bodily manifestation of the posthuman is central to my theory because I contend that recognizing the embodiment of the posthuman contributes to a more expansive definition of the posthuman while also allowing it to be located across a vaster historical timeframe. Whereas the virtual, disembodied version of posthumanism relies heavily on computing and nanotechnologies that only began to be imagined in the twentieth century, an embodied posthuman has the potential to exist before the information age. However, that is not to say that I reject the presence of technology in the construction of the posthuman. Rather, I am calling for a broader vision, one that recognizes that cultural influences beyond technology alone can contribute to a re-imagination of what composes human and posthuman life. Therefore, I contend that the posthuman is an emergent, not a stable ontology. It does not have a definite moment of birth, but rather has developed and continues to develop in conjunction with its specific historio-cultural moment. Moreover, the posthuman also has the potential to manifest in multiple ways according to the context it inhabits and the perspectives with which it engages.

I believe it is time that we release posthuman explorations from digital technologies alone and recognize that each age has questioned its own conception of the human. Therefore, the

revision to posthumanism that I am proposing examines the posthuman as a *cultural* product rather than as a herald of futuristic ontology. I offer an additional category of posthumanism, one that creates space for historically locating versions of the posthuman before the information age. Broadly, I call this new posthuman category *cultural* posthumanism. It is "cultural" because it recognizes that the posthuman is dependent on the specific cultures—whether scientific, technological, or social—out of which it emerges. Because it isn't contingent on futuristic technologies, the cultural posthuman can therefore exist before the information age and before our modern computing technologies. Thus, to be posthuman is not to be futuristic, but to embody the innovative potential of one's scientific moment. The Victorian posthuman is one manifestation of this new cultural posthumanism.

The Victorian Posthuman

Although the broader claim surrounding this dissertation is that posthumanism is not contingent on techno-modernity, I focus on one manifestation of cultural posthumanism: the Victorian posthuman. In this exploration, the main question I want to address is: What is the Victorian posthuman? Or, more specifically, what makes the posthuman in the Victorian era uniquely deserving of its own ontological exploration?

I focus on the Victorian era for the way in which its scientific innovations destabilized understandings of the human body and human life. Evolutionary, geological, biological, and mechanical sciences were as destabilizing in the nineteenth century as computing technology is today. The Victorian era was a particularly fertile moment for scientific, medical and technological advances: disciplines such as paleontology, anthropology, and evolutionary biology were disrupting a previously accepted chronology of life's origins; innovative medical

technologies, such as the microscope, anesthesia, and sterilization were grappling with new versions of biology; and machinery such as the steam engine, factory machines, and early computing technologies decentered human power. Technologies such as these not only changed the makeup of the Victorian world, but also altered understandings of human life and the human body.

Despite their innovation, these scientific advances were still publicly accessible. The Victorian era was a time as yet unmarked by what C. P. Snow has called the two cultures divide between the humanities and the sciences. Literature, periodicals, illustrations, museums, and many other creative forms actively participated in the production of knowledge, using their arts to comment upon, dramatize, or critique the advances being made within the sciences. As such, the nineteenth-century marks the last point in recent history when the wider population could understand with ease the knowledge that was being produced and could actively participate in it.[5] In investigating the effects of scientific and medical specialization on human bodies, Victorian novelists and thinkers explore at the same time the different and varied instantiations of the posthuman.

There was no single version of the posthuman in the Victorian era. Posthumanism in the Victorian era spans from an inter-species awareness epitomized in Darwin's insistence that humans are animals to a full technological embodiment exhibited in the aliens and robots of late Victorian science fiction. All of these are posthuman ontologies, not because they have eschewed human identity, but because they possess an awareness of the fundamental similarities between species and technologies, an awareness that challenges human primacy over other species and

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[5] Jay Clayton, in *Charles Dickens in Cyberspace* (2003), makes a similar claim when he observes that Charles Dickens's fiction offers "some chance of bridging the two-culture divide" that was beginning o take root as the nineteenth century progressed (Clayton, *Charles Dickens* 192).

the idea that to be other is to also be inhuman. The Victorian posthuman is therefore a being that is at once indicative of the scientific, medical and technological developments of the Victorian era, and at the same time challenges previously-held beliefs about what composes sentience.

But why, one may ask, is the Victorian era deserving of its own unique posthuman? We do not have a Renaissance posthuman, or a Romanticist posthuman, or even a Cold War posthuman. *Yet*. As my survey of Victorian scientific developments has demonstrated, the posthuman is a matter of degree rather than of kind. There is no simple or neat boundary demarcating the posthuman from other ontologies. Rather, the posthuman emerges—sometimes in allusion, sometimes as a body, sometimes disembodied—out of the specific cultures that bore it. By historically locating a form of the posthuman in the Victorian era, I aim to challenge future-focused definitions of the posthuman; rather, I hope to demonstrate that unique life must not only imagine new technologies but can also harness the scientific and technological truths of its historically specific moment.

Bodies as Assemblage

As the title of this dissertation announces, there is something monstrous in the way in which the Victorian posthuman manifests. This monstrosity does not, however, result from a vision of the monster as nightmare creature. Rather, the Victorian posthuman is monstrous for the way in which it destabilizes conventionally demarcated categories of being. The boundaries between human and animal, between biology and technology are destabilized in the body of the posthuman, the way in which it appears as an assemblage of seemingly contradictory materials and cultural influences.

I contend that the details of the posthuman are most clearly and productively manifested in its body: how a body signifies is vital to the construction of the Victorian posthuman. Through this emphasis on the body, I distance myself from the disembodiment of digitally determined posthumanism, such as Transhumanism. At the same time, I align myself with early twenty-first century critical posthumanism through theorists such as Braidotti and Wolfe.

The body is a central tenet by which critical posthumanism both separates itself from Transhumanism and resists the centrality of humanism and the Enlightenment-born humanist subject. As Braidotti explains, the Enlightenment subject has historically been depicted as an "ideal of bodily perfection which, in keeping with the classical dictum *mens sana in corpore sano* [a healthy mind in a healthy body], doubles as a set of mental, discursive and spiritual values" (13). This "ideal" applies to both the body and the mind and implies that one's identity is contingent upon possessing a recognizably normal body. However, as Braidotti says, this tradition of humanism innately draws a line of difference between who is considered a subject and who is othered as outside recognized subjectivity: "In so far as difference spells inferiority, it acquires both essentialist and lethal connotations for people who get branded as 'others.' These are the sexualized, racialized, and naturalized others, who are reduced to the less than human status of disposable bodies" (Braidotti 15). Posthumanism aims to revisit these traditionally marginalized and dehumanized subjectivities. In doing so, it revitalizes their narratives and legitimizes their existence not as aberrations but as accepted beings.

This decentering of the ideal human reveals one of the key figures of posthumanism: the assemblage. In order to resist the anthropocentric and ableist ideas of humanism, posthumanism insists upon the innate multiplicity of all life—including human life. Wolfe writes that the human is "fundamentally a prosthetic creature that has coevolved with various forms of technicity and

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materiality, forms that are radically 'not-human' and yet have nevertheless made the human what it is" (xxv). In my exploration of Victorian posthuman embodiment, I emphasize the way in which these compound bodies appear as assemblages, as amalgams of apparently contradictory materials and influences. The posthuman is an innately embodied entity through its manifestation as assemblage—whether that is a conceptual assemblage, in which influences from competing cultures, sciences or technologies are apparent; or a physical assemblage, in which a body is composed of organic, inanimate, and technological matter. In being both a conceptual and a physical assemblage, the posthuman dismantles a worldview in which the human is the ideal and center of life. It is an assemblage whose identity is informed by its shared evolutionary history with other animals, its continued reliance on and relationship with other sentient and non-sentient entities, and its future co-evolution with modern technologies.

Posthuman investigations into the assemblage thus call into question ontological as well as conceptual boundaries between humans, between humans and animals, humans and technology, and humans and the environment. In doing this, they recognize that the posthuman condition is contingent upon blurring traditionally demarcated subjectivities or categories of being. Speaking of the bodily composition of the creature in Shelley's *Frankenstein,* Elaine L. Graham (2002) writes that the creature "confuses many of the boundaries by which normative humanity has been delineated" in that he is neither "alive nor dead, born nor made, natural nor artificial" (62). In this example, the creature's posthumanity surfaces in his bodily composition as an amalgam of organic matter, of alchemical curiosity and scientific inquiry. As Frankenstein's creature demonstrates, the posthuman as assemblage occupies a liminal space between the human and the other. The apparent incongruities of an assemblage do not resist

sentience, I contend, but rather allow for provocative investigations into what is so lively about life, especially life that appears to be unnaturally granted.

Looking Ahead

Although *Frankenstein* may be the most well-known engagement with the posthuman in the nineteenth century, the chapters of this dissertation seek to look beyond this text and show that the Victorian posthuman emerged across Victorian literature and culture. I focus on four case studies of the posthuman to illustrate the mutability of posthuman existence in the interactions of literature, art, science, technology and medicine in the Victorian era. These explorations of posthuman identity demonstrate that bodies were not inviolable in the face of scientific developments; when art and culture mediate the sciences, they also reveal the permeable boundaries between bodies, species, and things. I have chosen these four moments—the development of paleontology, advances in factory mechanization, the theory of evolution, and the discovery of germs and genes—not because they are the only instances in which the posthuman is present, but because they mark significant achievements of Victorian science. In these moments, literary and artistic representations of the human use scientific, medical or technological advances to comment upon a shift in how the human body was understood.

This dissertation is organized on two levels: first, although overlapping to some extent, the chapters progress chronologically from the 1820s to the 1890s; and second, the posthumans that I explore in each chapter decrease in size, beginning with gargantuan bodies and ending with microscopic bacteria. While each chapter can be read in isolation as a case study for how the cultural posthuman was perceived in the Victorian era, many of the scientific developments introduced in the early chapters are useful to understanding the posthumans of later chapters.

Chapter 1 begins in the 1820s with the gargantuan, seemingly mythological dinosaur. The human body and the human's place within a chronology of life become permeable in the face of the dinosaur. The dinosaur as it existed in the Victorian era required humans to reassess the authority of their own experience of life and their dominance over other species. As prehistoric bones were unearthed, they were constructed into bony renditions of their once-living selves and displayed in museums. These skeletal remains offered Victorians the opportunity to see and interact with dinosaurs as though they existed. These prehistoric monsters also enjoyed afterlives in literature, illustrations and periodicals, and their lingering presence forced a reassessment of the human. In these texts, dinosaurs were granted bodies and lives—lives that often threatened the safety and sanctity of the human. In museums such as the Natural History Museum and novels such as Jules Verne's *Journey to the Center of the Earth*, humans come face-to-face with creatures whose size and power far exceed that of the human. The result of these interactions with the dinosaur was to destabilize human observers, forcing them to recognize their own insignificance and helplessness in the face of this power.

Chapter 2 explores the permeability of the human form when it comes into contact with machinery. It follows a narrative of technologization from the floors of British textile factories to the pages of science fiction literature. The mechanical power of factory machines had devastating effects on the bodies of workers who spent their lives interacting with them: many workers suffered severe injuries at the machines. However, the factory machines themselves rarely if ever appear within the pages of Victorian literature. Instead, human bodies function as proxies for machines, with machines becoming visible not in their whirring cogs and wheels but through the way in which they alter and disable the bodies of factory workers. Factory fiction, such as Francis Trollop's *The Life and Adventures of Michael Armstrong, the Factory Boy*

(1839) and Elizabeth Gaskell's *North and South*, represent with brutal detail the reality of living with such injuries. However, these representations of mechanical disability do not continue into Victorian realist fiction. Because the factory machines dehumanize injured workers, these workers appear only in metaphor and on the periphery of more realist novels. Instead, the concerns of the injured factory worker, and the realities of living with machine-made injury, reappear in robot fiction of the late-Victorian era. Early science fiction, such as Edward Bulwer-Lytton's *The Coming Race* (1871) and H. G. Wells' *The War of the Worlds* (1897) return to these factory bodies, this time representing them as aliens living peaceably in conjunction with technology and using machines in their daily lives.

Chapter 3 turns to the way in which Charles Darwin's theory of evolution illuminated the porousness of human ascendancy in the face of the human's animal origins. I trace the apocalyptic futurism lurking at the edges of Darwin's theory of evolution and connect it to the way in which early science fiction depicted the figure of the scientist. While Darwin began to hint at a vision of future evolution in his occasional turns to potential coming catastrophe, science fiction authors take up this image of an evolutionary future in the experiments that their scientist figures conduct. Both Dr. Jekyll in Robert Louis Stevenson's *The Strange Case of Dr. Jekyll and Mr. Hyde* (1886) and Dr. Moreau in H. G. Wells' *The Island of Doctor Moreau* (1896) attempt to become the "first" of a new human species by excising their atavistic animality from their human form. While neither experiment is successful, they nevertheless reveal a vision of posthuman identity: to erase from the human body all marks of the animal that link it to an evolutionary past. These novels suggest that by severing bodily references to the human's animal past, the human may become posthuman.

The final chapter explores how invisible bodies, such as pathogens and genes, infiltrate the human form to create from it an alien entity. I argue that the anxiety evoked by unseen bacteria that appeared during the cholera epidemics of the 1830s-1860s resurfaces in the similar anxiety evoked by the eeriness of behavioral traits inherited from one's ancestors beginning in the 1880s. During Britain's cholera epidemics, rudimentary medical knowledge and competing theories of cholera transmission meant that very little was known about the disease except for how it manifested externally on the bodies of its victims. Because cholera transmuted its victims into deathly, hardly human forms, it was represented as alien itself within illustrations and descriptions circulating in periodicals. However, Victorian anxiety around invisible agents did not go away with the isolation of the cholera pathogen. As studies of heredity and the heritable trait became more prominent in the latter half of the century, a similar anxiety around how unknown and unseen agents of heredity could transform human bodies and human futures began to circulate. I focus on the area of greatest concern—the heritability of parental immorality. Whether an ancestor committed murder or contracted syphilis by living an immoral life, their offspring and future generations must pay the price for these crimes. This fear can be seen in novels such as Walter Besant's *The Fourth Generation* (1900) and Sarah Grand's *The Heavenly Twins* (1893).

Each of these case studies of the Victorian posthuman reveals that bodies in the Victorian era were not inviolable. Monstrous aberrations lurked alongside the representative ideal of humanism for which the Victorian era is known. I revisit narratives that circulated in widely read literature and popular culture that explore the apparent monstrosity of re-embodied dinosaurs, the half-cyborg factory worker, the amoral scientist, and the disfigured victims of disease and degeneration. Such beings were not monstrous because they represented the denizens of

nightmares. They were monstrous because they illuminated the permeability of the human form, the fault lines along which scientific, medical and technological inquiry challenged the primacy and exceptionality of humanism. The visibility and pervasiveness of these monstrous Victorian posthumans resists a narrative that unusual bodies are exceptions. Rather, such beings circulated widely in Victorian culture, confronting the human with reminders of the potential housed in lively existence—the potential of the Victorian posthuman.

Chapter I

Displaying Monstrosity: Dinosaurs, Fossils, and Prehistoric
Posthumans

"I send you herewith … a miniature sketch of the Iguanodon as he appeared with his

brains in and his belly full on the 31. of Decr. 1853," writes Benjamin Waterhouse Hawkins in a

letter to Edward Trimmer, the secretary to the Royal College of Surgeons (Hawkins). The

Iguanodon to which Hawkins refers was the still-incomplete model of the Iguanodon destined to

be one of the highlights of the Crystal Palace at Sydenham's geological exhibition. On the New

Year's Eve in question, Hawkins, the artist commissioned to construct the dinosaur models,

gathered with "many of the heads of science" in the Crystal Palace workrooms to attend a dinner

party held within the Iguanodon's cavernous body. An engraving of this dinner [Fig. 1],

published in the January 7, 1854 issue of *The Illustrated London News*, depicts this bizarre party:

the Iguanodon stands beneath the draped fabric of a festive tent, its body fragmented by both the

stage that severs its legs from its torso and by the gaping absence of its back. A group of twenty-

one men fill the hollow of its belly, lining a cheerfully illuminated table, which is presumably

groaning under the weight of food still being delivered by a bevy of waiters.

The layers of contrast within this image highlight the strangeness of holding a dinner

party within the body of an animal model. Although there is only one Iguanodon and the humans

number well over twenty, the eye is nonetheless immediately drawn to the figure of the

Iguanodon. Its size and shape dwarf the humans that surround and fill it. As a dinner party, the

focus of the evening is consuming: the clearest detail of this image is the Iguanodon's large

mouth crowned with a threatening nose-spike.[6] The sinister curve of the lip leads directly back into the monster's belly, which is filled to bursting with feasting men. Not only do the humans appear to have been eaten by the Iguanodon, but while within the creature's belly they continue the feast begun by their captor. Furthermore, the dinner is also set up on a stage, essentially on display. However, the humans who would typically be observing the spectacle rather become a part of the spectacle as they fill the Iguanodon's belly. The boundary between spectator and spectacle breaks down as the human becomes a part of the exhibition that is the dinosaur. And finally, in filling up the Iguanodon's belly, the humans repair the fragmentation of the Iguanodon's body enabled by the stage and by the absence of its back. Rather than remaining disjointed, the Iguanodon appears as a whole—if uncanny—being. The belly that would otherwise be a gaping chasm is filled with humans. In this image, the dinosaur becomes an amalgamation of fabricated dinosaur parts with biological human intestines. The human thus becomes a tool for the dinosaur, allowing the dinosaur to appear complete and whole.

Although Hawkins' illustration of the New Year's Eve dinner inside the Iguanodon model may be the apex of uncanny human-dinosaur interactions, a similar destabilization of human and dinosaur bodies is seen across the Victorian era. The nineteenth century teemed with antediluvian monsters, from the sciences that unearthed them, to the periodicals that reported on them, to museums that displayed their remains, and the literature that incessantly referenced them. These scientifically conscious contexts reanimated the fossilized remains of dinosaurs by both figuratively fleshing out their bony skeletons and by enacting a confrontation between

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[6] In the early nineteenth century, the Iguanodon's spike was misattributed to its snout. The more complete skeletons that have been unearthed since the Victorian era show, however, that the spike was located on the Iguanodon's hand in the position of the thumb.

dinosaur and human. This confrontation disrupts the sense of both what is human and what is dinosaur, revealing the posthuman in this space of destabilization.

Figure 1: Benjamin Waterhouse Hawkins. "Dinner in the Iguanodon Model, at the Crystal Palace, Sydenham." *Illustrated London News*. January 7, 1854

Among the many Victorian posthumans, the dinosaur as assemblage loomed as the largest and most obviously unsettling. It was huge, terrifying and visibly alien to the living Victorian world. The posthuman emerges when humans interact with dinosaurs and enter into an assemblage of animal and object, past and present, living and dead. These traditionally demarcated categories become disrupted in such human-dinosaur encounters. Although once a living and fleshly animal, the dinosaur as it existed in the Victorian era was neither purely animal, nor entirely dead, nor could it be thought of as completely biological. Instead, it was an amalgam of different materials and influences: from the bones that were unearthed by early paleontologists, to the steel and plaster used to assemble these bones into skeletons, to the merging of scientific fields harnessed to understand the dinosaur, and the imaginative animations

of the dinosaur in literature and art. In this way, the dinosaur was a more scientific version of the chimeras of folklore: it melded elements and fragments of known animals and familiar materials, and in this meeting of the recognizable became an innovative type of body. I want to emphasize this chimeric quality in what follows, because the dinosaur as chimera blurs the division between myth and reality, between the frozen past and an active and real present, between living flesh and prehistoric fossil remains.

In this chapter, I argue that depictions of the dinosaur in the Victorian era forced scientists, readers, spectators, and others to face their own posthumanness. The posthumanness of the dinosaur confronts the human with its own insignificance; in coming face-to-face with a being that was supposedly extinct yet appeared so lively and powerful, Victorians had to face their own position in what Cary Wolfe has called "the entire sensorium of other living beings" (Wolfe xxv). Although the dinosaur signified as monstrous to the human observer and was thus designated as "other," outside and beyond the expected animal realm, it was nevertheless surrounded by an aura of factuality: it was physically present in museums; it was scientifically articulated and could thus no longer be a creature of myth. Through this conflict, the dinosaur necessitated that the human observer face the place of humanity and human superiority within a Judeo-Christian origin story. In unearthing dinosaurs—beings that were long extinct and should therefore no longer be present on earth—the rigidity of time-scales had to be reevaluated in the Victorian era. The past was no longer relegated to deep time alone but could be collapsed into the Victorian present. The result of this was that the human as future—as distinct from species that have gone extinct—was dismantled in the face of the dinosaur. Through interacting with the dinosaur, humans had to rethink their status as the future, as separate from the dinosaur, and rather recognize that they could and did coexist in some Victorian spaces.

Through this collapsing of timescales, the dinosaur alienated the human bodies that encountered it. This destabilization is most apparent in the dinosaur's size and its scale in comparison to the modern world: it is impossible to overlook, impossible to ignore. Whereas the anomalous bodies of the Victorian poor could be locked away in workhouses or overlooked as they swept street crossings, the body of the Victorian dinosaur was of such an immense size that it overtook not only the scientific field, but also the Victorian imagination. Indeed, buildings were constructed in which to view these beings, specific societies established to theorize them. The size and awesomeness of the Victorian dinosaur was such that it shaped the literature and art culture of the Victorian era, as well as the way in which the Victorian human sometimes viewed itself.

However, the reaction to the dinosaur was more than terror at its size. The dinosaur triggers something unprecedented in the human: when faced with what is anomalous in the dinosaur body, the human struggles between staring with awe and cringing into the self. I identify this reaction as the combination of the sublime with an unsettling uncanniness. On the one hand, the dinosaur's size invokes the awe-inspiring terror at nature's grandeur epitomized in the sublime art, literature, and poetry of the Romantic era. On the other hand, the dinosaur was also an inescapably uncanny creature; while it resembled known reptiles, these familiar reptilian features were alienated by the dinosaur's dimension. This uncanny sublimity, therefore, inspires a duel reaction of awe and discomfort; encountering subjectivities that are unexpected or different forces a reevaluation of what is thought of as "normal" or even plausible in a life form.

This investigation of the dinosaur as posthuman leads us to unearth and reevaluate archaic subjectivities—Paleo ontologies, if you will. Whereas paleontology in the Victorian era excavated the fossilized remains of extinct dinosaurs, the periodical accounts, museum

exhibitions and literature that engaged with these newly emerging creatures gave them full

bodies and brought them to life. In what follows, I begin by tracing the literal unearthing of

dinosaur remains by geologists and naturalists before turning to the way in which written and

displayed cultural artifacts brought them into being for the amusement and education of the

Victorian public. Periodical articles that described the experience of viewing such monstrous

fossils in museums animate these creatures through an intertextual network established among

the explorers who discovered the fossils, the naturalist writings that informed, on different levels,

the public and experts alike, and the spectators who observed them. Meanwhile, museums such

as the Hunterian Museum at the Royal College of Surgeons and the Natural History Museum

facilitated destabilizing encounters between living and extinct, human and animal subjects

through their displays. Finally, popular literature such as Jules Verne's *Journey to the Center of

the Earth* figuratively reanimated primordial monsters through stories of confronting creatures

that should long ago have been extinct. Together, these artifacts, articles, and stories gave life to

the bony dinosaur forms that paleontologists were unearthing, figuratively fleshing them out.

Meanwhile, this fleshing out challenged the human viewers to think about their own fleshliness,

their own embodiment in a world that was becoming progressively more populated with bodies

that did not look or move or act like the human. While this cultural engagement with

groundbreaking paleontology may seem to be wholly Victorian, it in fact continues unabated into

our contemporary moment. Science fiction bestsellers such as Michael Crichton's *Jurassic Park*

bring this imaginative fleshing out into the era of genetic engineering by not only displaying

fossil remains, but by re-embodying and reviving extinct monsters.

The posthuman dinosaur grows to be ubiquitous in the Victorian era, seeping into many

aspects of Victorian culture. While some of the most recognizable Victorian dinosaurs appear in

the canonical literature of Dickens, Tennyson and others, these are less provocatively posthuman than are other more scientifically conscious texts and artifacts. Because the posthuman dinosaur was so pervasive, a wide range of Victorians experienced it. For that reason, this chapter focuses on dinosaur artifacts that were accessible to the broadest possible Victorian public: widely published accounts of paleontology in periodicals, fossilized remains on display in museums, and popular early science fiction literature. Whereas canonical and traditionally realist authors envision the dinosaur as a metaphorical beast, the public literature and artifacts did not shy away from the dinosaur as monstrous, if archaic, reality. Its posthumanity thus lies in its brute materiality, its evidentiary status of an actual and disturbing order of existence.

The Golden Age of Paleontology

The history of paleontology is a narrative of scientifically coming to grips with creatures so large that previously only mythologies could account for them. In order to understand who these creatures were, where they came from, and how they signified in the modernizing Victorian world, scientists had to piece together the bodies that they were unearthing. Many scholars, such as Peter J. Bowler, Adrian Desmond, and Martin J. S. Rudwick, among others, have already published complete histories of the development of paleontology.[7] However, in their comprehensiveness, such works gloss over how fragmented was the field of paleontology in the early nineteenth century. With many paleontologists working separately to unearth and articulate the skeletal fragments of dinosaurs, very few complete pictures of these primordial life forms existed.

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[7] The rich array of scholarly publications on paleontology from the past decade illustrate that revisiting Victorian science, especially Victorian earth sciences, is a popular topic today. See, in addition to Bowler, Desmond and Rudwick, scholars such as Claudine Cohen, Mark Jaffe, and Ralph O'Connor.

While the actual unearthing of dinosaur fragments was itself fragmented between many paleontologists, the scientific methodologies used to understand these bones was also a piecemeal collection of disciplinary expertise. French naturalist and geologist Georges Cuvier (1769-1832) began, in the early nineteenth-century, to apply what he called "comparative anatomy" to unfamiliar and unclassified fossil fragments. He used what he knew about the skeletal structure and habits of living animals to understand not only to what type of being a fossil fragment belonged, but also the habits of the extinct animal. By studying the "relation of structure to function," Cuvier was able to determine that these bodies that appeared to be anomalous and unnatural were in fact the remains of once-living but now extinct creatures (Owen, *Paleontology* 1). Additionally, Cuvier used a relational methodology to try and understand how fragmented remains may shed light upon the composition of a complete body: "The bones that compose each part of an animal's body are always in a necessary relation to all the other parts, in such a way that … one can infer the whole from any one of them" (qtd. in Dawson 25). This methodology of inferring the whole from a part was central to the work of paleontologists; because the fossils they were unearthing were only fragments of larger beings, paleontologists needed tools that allowed them to understand what the whole may have looked like.

Early fossil hunters in especially Great Britain used this new comparative methodology to examine and understand the gargantuan skeletal fragments that were being unearthed across Western Europe and North America. Although fossil hunting—especially for fossils of prehistoric monsters—was a popular vocation in Victorian England, three early paleontologists were key to developing this pastime into a recognized discipline: William Buckland (1784-1856), Gideon Mantell (1790-1852) and Sir Richard Owen (1804-1892). A theologian and

president of the Geological Society of London, Buckland's key contribution to the development of paleontology was the discovery and naming in 1824 of one of the largest fossil reptiles unearthed until that point: Megalosaurus, meaning "great lizard." Buckland's description of the skeletal fragments of Megalosaurus focused largely on its immense size; according to Buckland's calculations using comparative anatomy, it stood about forty-feet long and was held up on four stocky legs. The fact that only fragments were unearthed during Buckland's early excavations of the Stonesfield Slate limestone formation in Oxfordshire emphasizes the significance that size played in understanding this ancient reptile. Even with only a few fragments upon which to draw, Buckland still stunned the paleontology community with the immense vastness of Megalosaurus.[8]

While Buckland was wrestling with Megalosaurus' bulk, his fellow paleontologist Mantell was struggling to determine whether the collection of giant teeth he had unearthed in Tilgate Forest, Sussex, in 1822 were those of a carnivorous or an herbivorous animal. Although the teeth appeared to Mantell to resemble at times those of a rhinoceros and at other times those of a crocodile, in both cases the teeth defamiliarized these recognizable animals: they were simply too large, too reptilian and too unfamiliar to belong to a relative of either the rhinoceros or the crocodile. Eventually in 1824, Mantell concluded that the teeth resembled those of the iguana, and named the extinct giant to which they belonged "Iguana-saurus," which he later revised to "Iguanodon" (Cadbury 384).

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[8] Today, Buckland's calculations of Megalosaurus' size have been revised: the partial skeletons we have of the Megalosaurus lead us to believe that it was a bipedal dinosaur about 25 feet long.

But it was Owen who brought together much of his predecessors' work;[9] realizing that the giant specimens that Buckland and Mantell were unearthing appeared to belong to a distinctive class of reptiles, in 1842 Owen named the focal creature of the Golden Age of paleontology "dinosauria." Dinosauria, which translates to "fearfully great … lizard," emphasizes both the size of dinosaurs and the terror that they inspired (Owen, "Report" n. 103). The combination of the familiar reptilian form with the dinosaur's alien size inspired, as we will see later in this chapter, a sense of fearful awe in the humans that encountered them. Additionally, the report in which Owen introduced dinosaurs to the scientific world recognized that dinosaurs are defined by qualities of assemblage and heterogeneity, both in that multiple scientists collectively unearthed them—Buckland's Megalosaurus, and Mantell's Iguanodon and Hylaeosaurus form the basis of Owen's definition of dinosauria—and also in that dinosaurs are constructed of elements belonging to many different animals. They were chimeras, containing aspects "peculiar among Reptiles" as well as other attributes that belong to animal "groups now distinct from each other" (Owen, "Report" 103).

Writing the Dinosaur: Fragments in Science and Periodicals

Even before scientists had definitively determined the anatomy, habits, and names of specific dinosaurs, the fossil specimens were made available to a non-specialist audience through periodicals, museums, and literature. These public engagements with dinosaur remains were influenced by the scientific work being done not only in the field of paleontology, but in animal

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[9] Although Owen did collaborate with many of his fellow scientists, he was also a contentious and wildly unpopular figure. As Desmond and Dawson have shown, Owen's career was plagued by accusations both of plagiarism and jealousy-inspired slander. His extended conflicts with especially T. H. Huxley and Charles Darwin that natural theology, not evolution, was the correct way in which to view changes in species over time, were written about at length beginning in the mid-nineteenth century.

biology as well. This marks the field of paleontology as distinctive: not only was the public entertained by these monstrous fossils, they also had an opportunity to actively contribute to public imaginations about who these creatures were.

Periodical culture that wrote about paleontology relied, more than any other public engagement, on an image of the dinosaur as assemblage—an assemblage of diverse materials, of multiple expert discoveries, and of the past and the present. Journal and newspaper articles that wrote about developments in paleontology emphasized the fragmented nature of these beings, how these fragments were compiled into a complete body, and the way in which many of these assembled fragments seemed deeply contradictory. For the dinosaur to be understood by the public, it had to be couched in recognizable terms, such as the teeth of the crocodile or the violence of carnivorous lizards. Periodical portrayals of the dinosaur can be traced to an intertextual network of explorer-scientists and paleontologists. While explorers such as Alexander von Humboldt wrote about the contemporary descendent of the dinosaur, the crocodile, in fragmented terms, the periodical authors took these fragments and, combining them with parts from other known-animals, constructed the complex body of the dinosaur. The disparate parts of dinosaurs thus borrowed from both the remnants of prehistoric animals and from present-day animals as well. In this way, public engagements with the dinosaur relied heavily on the collapsing of timescales around the body of the dinosaur. The Victorian public was thus confronted with the dinosaur through its posthuman amalgamation.

Many of the images that influenced the way in which dinosaurs were imagined as ferocious and toothy reptiles in the Victorian era originate in Humboldt's vivid descriptions of the crocodiles of South America. The crocodile, the dinosaur's nearest living relative, provided the most tangible and recognizable elements with which to describe the dinosaur. Humboldt, the

renowned German geographer, naturalist and explorer, spent the years between 1799 and 1804 traveling through Central and South America, collecting specimens and notes of the American ecosystem. Upon his return to Europe, he began publishing his observations in a seven-volume set entitled *Personal Narrative of Travels to the Equinoctial Regions of America, during the years 1799-1804* (1814-31). The early volumes of the series, translated by Helen Maria Williams, began appearing in England shortly after their initial publication in France and are notable both for being one of the few books that accompanied Charles Darwin on his HMS Beagle voyage (1831-36), and for their popularity in England. Of equal significance in constructing the body of the dinosaur was Humboldt's *Political Essay on the Island of Cuba* (1826, first translated into English in 1829), his travel account infamous for being censored due to its strong anti-slavery sentiment (Kutzinski & Ette xxii-xxiii). Whereas *Personal Narrative* fragments the crocodile by focusing on its ferocious habits, *Political Essay* physically deconstructs the crocodile through extracting observations of its teeth. Thus, the dinosaur's nearest living relative appeared before the nineteenth-century in an already fragmented form.

In his descriptions of the crocodile in the *Political Essay*, Humboldt emphasizes the disparate elements of a crocodile's body rather than the entire animal. Describing a pair of crocodiles captured for examination, Humboldt writes:

> Their color was a little darker, blackish-green on the back and white on the belly; their sides were speckled in yellow. I counted 38 teeth on the upper jaw and 30 on the lower, as is the case with all true crocodiles. On the upper jaw, the tenth and the ninth were largest, on the lower, the first and the fourth. … the lower fourth tooth *extends freely* along the outside of the upper jaw. The back teeth were flat. (Humboldt, *Political Essay* 158 emphasis original)

This description does not recognize the crocodile as a whole being with a sturdy spine, legs that kick in protest to the examination, or even a set of eyes that can look back at Humboldt; rather, the crocodile is a "blackish-green… white… [and] yellow" hide behind which are concealed an

upper and lower jaw. This jaw is broken down into the rows of teeth embedded within it, which are then further fragmented into individual types of teeth. The way in which Humboldt closely examines and describes these body parts serve to erase the crocodile as a complete animal and rather emphasizes it as a disjointed being, the fragments of which may be picked out and reapplied to other animals.

While the crocodile's teeth are passive objects of study in *Political Essay*, they become actively engaged in the life of the animal in *Personal Narrative*, through Humboldt's emphasis on the ferocity of the crocodile in its native habitat. As with *Political Essay*, the crocodile is not a complete being, but rather remains confined to its jaws and teeth. For example, horses grazing in the waters of the flooded banks of the Orinoco often exhibit "the prints of the teeth of these carnivorous reptiles on their thighs" (Humboldt, *Personal Narrative* 394); crocodiles are seen sunbathing in the shallows of the Orinoco River with their "jaws opened at right angles" (422); or they react to a passing heron by raising "the head, opening their wide jaws… to show him their teeth, which [are]… very long and sharp" (509). In each of these excerpts, the crocodile is seen only through the mark of its teeth, whether those are imprinted on the flanks of horses, seen from afar, or directed towards a passing bird. This tendency to see the crocodile by its teeth alone therefore results in the crocodile being known primarily by its ferocity. As the animal that most closely resembled the primordial dinosaur, descriptions of the ferocity of the crocodile's teeth deeply influenced the way in which the Victorian public imagined the dinosaur as a violent reptile.

Whereas Humboldt broke down the most dinosaur-like reptiles that walk the earth today into toothy parts, the periodicals that wrote about dinosaurs adopted these toothy fragments, added them to fragments from other animals, and constructed an image of the dinosaur as

assemblage. These descriptions not only emphasize the posthuman effect of the dinosaur—it is an assemblage of disparate parts—but they also break down the distance between the present and the past by ascribing to prehistoric dinosaurs elements from present-day animals. An October 1843 article in *The New Monthly Magazine and Humorist* entitled "Recreations in Natural History: Ancient Amphibious and Terrestrial Dragons" constructs the dinosaur as just such an assemblage. Describing the violent dinosaurs that roamed the earth when England was "an oozy, spongy, reeky land," the author writes (211): "The Megalosaurus' terrible jaws and trenchant teeth, which partook of the structure of of [sic] those of the crocodile and monitor, attest its great destructive power" (222). In this article, Megalosaurus is equated with the crocodile, and especially the crocodile's teeth. The violence of the Megalosaurus' teeth is emphasized three times: they are "terrible," "trenchant" *and* "destructive." Like Humboldt's descriptions of crocodiles, the Megalosaurus is broken down into its teeth alone. It is also built up again when compared to both the infamously ruthless "crocodile" and the large, carnivorous monitor lizard. In the Megalosaurus being described as both the crocodile and the monitor, the reader must construct an imaginative assemblage of a creature that possesses characteristics of both the crocodile and the monitor—neither of which is indigenous to Britain. Without a factually exact version of the Megalosaurus upon which to draw, such periodical descriptions relied heavily on imaginary splices of extant creatures, splices that emphasize the dinosaur as assemblage.
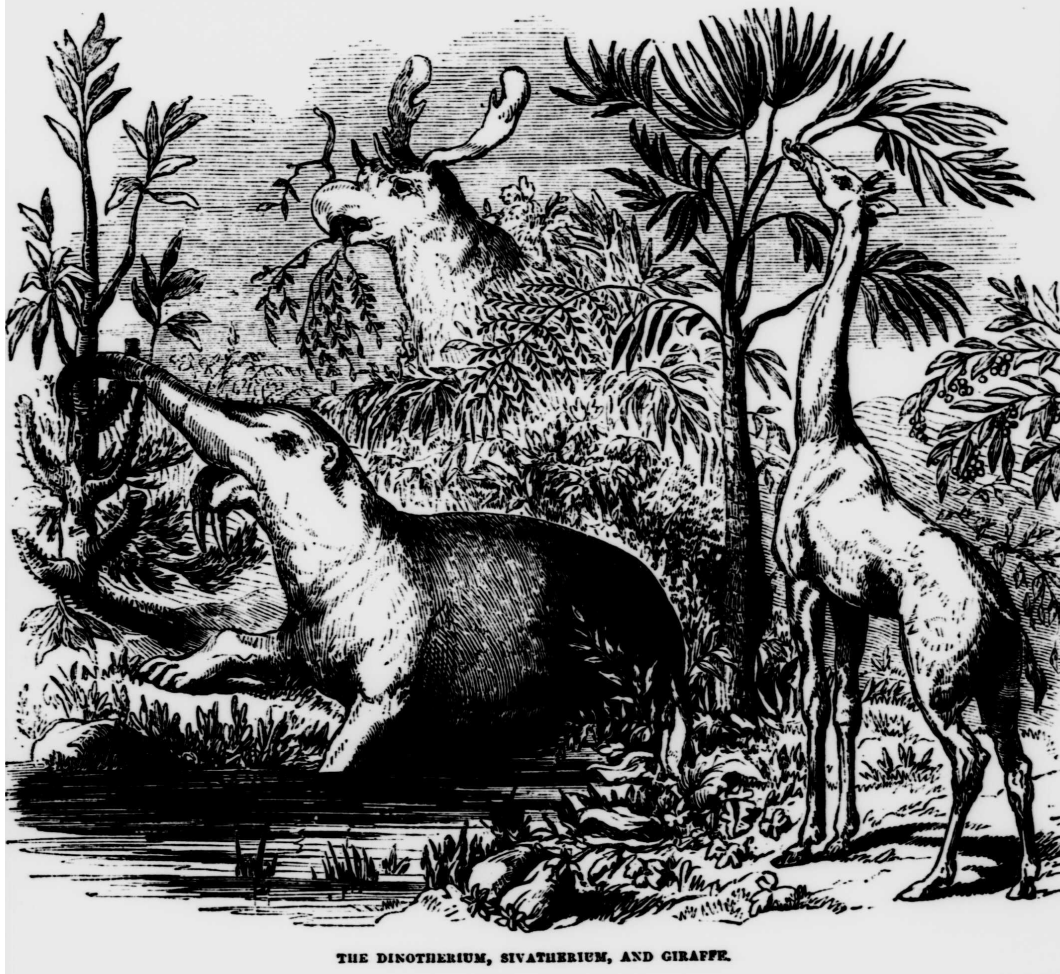
Figure 2: "The Dinotherium, Sivatherium, and Giraffe." *The Leisure Hour*. 1855.

But the dinosaur as assemblage can also be seen in periodical articles less closely related

to Humboldt's description of crocodiles. In 1855, the periodical *The Leisure Hour* published a

series of articles entitled "Extinct Monsters," in which they described groupings of prehistoric

animals in each installment. The October 4, 1855 segment of the series featured a collection of

herbivorous "pachydermatous, or thick-skinned animals" (633). The descriptions of these

animals rely heavily on an imagination of the prehistoric animal as an amalgamation of multiple

animal parts:

> The Paleotherium, or *ancient wild beast* … was about the size of a horse … [and the]
> upper jaw was longer than the lower, like that of the tapir… [while] the Dinotherium is

far beyond anything that the animal creation has yet presented us with: the body is barrel-shaped, like that of the hippopotamus; it … has a short trunk, longer than the tapir, but shorter than the elephant's. (634 emphasis original)

Each of these animals seems to be constructed of parts from multiple others; Paleotherium is an uncanny splice between the horse and the tapir, creatures that live in vastly different environments, while Dinotherium combines elements of the hippopotamus, tapir and elephant. These descriptions are also accompanied by an image that features Dinotherium in the company of the elk-like Sivatherium and the familiar giraffe [Fig. 2]. While the giraffe's body is also exposed, as a familiar animal it stands in the foreground of the image as a way to emphasize Dinotherium's size. But the completely exposed body of Dinotherium reveals the odd combination of its fragmented attributes of familiar animals—the rotund body of the hippopotamus with the tapir-elephant-like trunk—within a whole body. This contrast between parts and whole emphasizes that, although the body of an extinct monster may be composed of fragments, these fragments come together into the intact body of the assemblage.

Even periodical publications that had nothing to do with explaining the developments of paleontology engaged in this chimeric construction of the prehistoric bodies. A poem entitled "The Terrors of Paleontology," appearing in *Fun* in 1878, satirizes the process of constructing the dinosaur out of incomplete bone fragments. Featuring a "learned" professor who possesses a collection of "unlikely bones," the poem follows the medley of animals upon which the professor draws in order to construct his "Unlikelisaurus / Which measured a million feet" (124). The imaginative gymnastics that paleontologists had to undertake when constructing the dinosaur is described as "a jungle tangle" in which the professor meets:

…the nasty devouring bear,
And terrible elephants, too, were there :
    The leopard that fights
    The tiger that bites,

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And similar things that mangle. (124)

Although clearly a satire, this poem nonetheless reveals just how hodge-podge the paleontological process appeared to the Victorian public. The combination of diverse animal elements appeared as an imaginative and even nonsensical exercise to the reading public—whether that was the logical combination of crocodile and monitor in *The New Monthly Magazine and Humorist* article, or the unexpected melding of hippopotamus with tapir in *The Leisure Hour* article, or the completely fanciful and bizarre meeting of bear, elephant, leopard and tiger in "The Terrors of Paleontology." What these diverse examples of dinosaur creation have in common is the way in which they put together the fragments of known animals and combine them with imagined dinosaur elements. The monsters that appear in the writings of scientist-explorers such as Humboldt are the fragments that the periodical articles pull together into the amalgamated body of the posthuman. However, these compound bodies remained firmly within the imaginative realm in the writings of scientist-explorers and journalists.

Displaying Monstrosity: The Hunterian and Natural History Museums

When the assemblages of prehistoric life reached the museums as displayed dinosaur fossils, their previous distance in printed text faltered. In the museum, the assemblage became complete dinosaurs, and in their completeness they confronted not only the assumed wholeness of the human observer but also the assumption that the human was separated from these creatures by the long progression of time. In being unearthed and reconstructed, the dinosaurs were no longer relegated to the past alone, but were physically present as complete bodies in the present. While many Victorians encountered dinosaurs through newspapers, periodicals, and

literature, as the century progressed they also began to *see* these monstrous denizens of deep time in museums.

Dinosaur remains and models fit perfectly into a society that was becoming progressively more fascinated with the anomalous and the unusual. Critics such as Richard D. Altick, Marlene Tromp, Samuel J. M. M. Alberti, and Lillian E. Craton, among others, have investigated the Victorian fascination with spectacle, particularly the spectacle of the anomalous body.[10] Because London was the launching point for many travelling shows, from circuses to the notorious "freak" shows, the public was familiar with the spectacle of anomalous bodies as entertainment (Alberti 90; Freeman 231-2; Tromp 1). In addition to the travelling shows, increasingly more collections of spectacular objects and bodies became established in London. The Regent's Park Zoological Garden, established in 1828, displayed wondrous and exotic animals for the entertainment and education of the British public (Freeman 232-3). Existing museums began expanding their collections; new museums cropped up across Britain as well; and the Great Exhibition of 1851 was one of the first display arenas to make these spectacles accessible to the general public. Historian Michael Freeman, in *Victorians and the Prehistoric* (2004), examines the Victorian museum in terms of how the architecture of the museum reinforced a separation between living and extinct, human and non-human. Contrary to Freeman, I argue that the binaries between living and extinct, human and other break down in the space of the museum.

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[10] See, for example, *The Shows of London*, in which Altick traces how the development of London's shows of especially "freakish" bodies were linked to the intellectual and public taste; and Tromp's edited collection *Victorian Freaks*; and *Monstrous Curiosities*, which follows how "freakery" was understood by the general public in the Victorian era; and J. M. M. Alberti's *Morbid Curiosities*, in which Alberti argues that the specimens in medical museums became and physical and conceptual hybrid through the apparatus of display, spectatorship and commerce surrounding it.

The specimens of dinosaurs on display thus undermine the divisions that the architecture of the museum attempted to enforce, allowing for the posthuman collapse of binary categories.

The medical museum presented one of the first venues in which anomalous human and animal bodies were displayed for education and entertainment. The most notable of the Victorian medical museums was the Hunterian Museum at the Royal College of Surgeons in London. Before public natural history museums began to open in the second half of the nineteenth century, unusual biological specimens were collected and displayed in private collections. In 1799, the British government bought physician John Hunter's medical collection and established a private museum at the Royal College of Surgeons. Although the space was not open to the public, it was used as a museum and a resource for members of the Royal College of Surgeons. In 1837, the Hunterian was renovated and reinvented under the direction of Sir Richard Owen (Freeman 237). The renovation of the museum expanded the collection to include many more paleontological and geological specimens side by side with the medical and anatomical ones. As Freeman notes, the newly renovated museum now displayed "examples of extinct as well as living creatures" next to one another, not to mention the "eight-foot high skeleton of the giant Irishman Charles O'Brien," creating a space in which the human, the animal and the prehistoric monster coexisted (237). Before the renovation it had primarily been a collection of human specimens; after the renovation and the inclusion of Owen's fossils, the Hunterian became a space in which human biology, animal biology and ancestral animals integrated into one educational and entertaining experience.

One of the clearest examples of what this marriage of living, extinct and human bodies looked like is seen in Thomas Hosmer Shepherd's illustration of the newly renovated central gallery [Fig. 3]. This image was published in Shepherd's architectural book *London Interiors* (ca.

1841) in combination with a short chapter describing the "unprofessional horror" experienced by Shepherd while visiting the specimens on display (Shepherd 131). In this image, diverse specimens are crammed neatly into a long rectangular room—one of the two new main galleries designed by Charles Barry in the 1830s. Shepherd's illustration depicts the display hall as a medley of all things biological. There is no separation of human specimens from animal specimens, or living from extinct; all are crammed into one space with very little apparent logic. In the foreground on the left, we see the boney remains of Mylodon, a gigantic relative of the sloth, and on the right are the remains of Glyptodon, an extinct relative of the armadillo. These two prehistoric creatures tower over the neat lines of display cases, the contents of which are invisible in this illustration. In the background stands an even more bizarre collection of large bodies: a Grecian statue stands on the left; the skeletal remains of the famous Regency elephant Chuny stands in the center of the hall; Chuny is flanked by the skeleton of a giraffe on its left and that of a camel to the right; and on the far right the eight-foot skeleton of Mr. O'Brien towers above his Grecian counterpart. This display hall seems to be organized for shock value rather than for biological logic: art is placed alongside animal remains, which are accompanied by human remains. And in the middle of all of this preserved biology stands a collection of living human visitors.

Figure 3: Thomas Hosmer Shepherd. Interior of the Hunterian Museum at the Royal College of Surgeons, London after it was renovated. *London Interiors*. ca. 1842.

There is an air of contrast in almost every aspect of Shepherd's image—between the complete animal skeletons displayed on plinths and the fragmented animal horns crowning the pillars; between the Grecian statue and glass-encased girl flanking the eight-foot tall skeleton of

Mr. O'Brien; between the gigantic specimens in the foreground and the indistinguishable

specimens housed within the small cases that line the walls to the ceiling; and especially between

the boney articulated skeletons of gargantuan animals and the fleshly yet seemingly-frail living

humans that observe them. While it may be tempting to read this scene as one of man's dominion

over the natural world, the fact that the humans seem so sparse, so small and powerless in this

image rather shows the fragility of humanity in the face of nature. Even when faced with

creatures that have long been extinct, the humans can do no more than observe, tilting their heads

skywards to stare the extinct monster in the eye. I want to suggest that, in positioning these

human visitors in the middle of the display hall, Shepherd is disrupting the separation of the

human from the animal and the prehistoric. On the one hand, the largest and most shocking

specimens on display are not separated from the visitors by glass cases or even by rope cordons.

Instead, fossils, animal remains, human remains and living humans all inhabit the same

undivided space. On the other hand, the visitors are physically interacting with the displays.

One of the more visible moments of interaction occurs in the background of the image.

The little gathering of skeletal and fleshy human bodies on the right-hand side of the image

emphasizes this uncanny coming together of diverse human forms. In this meeting, the human is

brought together with the largest and the smallest examples of the human frame, thereby

breaking down the division between so-called bodily monstrosities and assumed human

normativity; the human becomes just as bizarre as the other human forms surrounding it. In the

center of this gathering, the "eight feet four inches" skeleton of Mr. O'Brien rises above the other

human examples that surround it (Shepherd 131). Barely visible in this illustration, the skeleton

of a "Sicilian dwarf—a girl of ten years old, measuring twenty-inches in height," encased in

dusty glass and sharing Mr. O'Brien's plinth, forms the other extreme of human size (131). To

the left of the Sicilian girl and Mr. O'Brien, the third example of the human form is ensconced behind two pillars. This visitor to the Hunterian notably has his back turned away from the girl and Mr. O'Brien, as though trying to ignore their uncanny familiarity. However, despite his desire to separate himself from this grouping of anomalous bodies, the living human is nevertheless a part of them, standing on the same longitude as them and reaching the same height as the glass-encased girl. This grouping places the living human visitor in community with the Sicilian girl and Mr. O'Brien, thereby suggesting a shared likeness between all three, a communal monstrosity that extends to all bodies regardless of whether they are fleshly or not.

In contrast to human visitor's stance of rejection in the background, the grouping of men in the center foreground is actively interacting with the specimens. In the front of the group, three of the men are closely observing a glass-encased snake. While this specimen is separated from the human visitors by glass, the separation is negated by the fact that the men are handling the specimen. It is no longer something only to be observed at a distance, but it is brought into the human space, and is in fact at the very center of this human group. In the rear of this central group, this interaction with the specimens on display is extended to the gargantuan prehistoric. The black-cloaked man, presumably a faculty member of the Royal College of Surgeons, gestures towards Mylodon, seeming to include it into the group. Even more significant, the hat and umbrella of one of the men has been propped up against the plinth on which Mylodon stands. These interactions with Mylodon begin to place it more within the group of visitors—the gesture includes it while the hat and outerwear mark it as something unexceptional, something that is as much a prop of everyday life as are the hat and umbrella.

This illustration of the newly renovated Hunterian Museum establishes the museum a place in which bodies come together in unusual ways. Even when a human visitor attempts to re-

inscribe this separation by turning his back on the specimens, the human visitor is nevertheless integrated into the museum display by the fact of his shared humanness with the skeletons. And in the moments in which there is no shared species identity, the humans actively bring the monstrous specimens into their human grouping.

While the Hunterian still remained a closed-door museum, which visitors could only access if they were a member of the Royal College of Surgeons or held a letter of introduction from a member, museums became more accessible to the general public as the century progressed (Yanni 46). This accessibility ensured that all Victorians could come into contact with monstrous examples of life as well as grand collections of empirical might. The Great Exhibition of 1851, housed in the Crystal Palace, was one of the first exhibitions open to the general public, allowing all classes of Britons to admire the colonial might of the Empire.[11] This empirical undertone was also visible in paleontological and geological museums of the later-century, which in many ways functioned as "veritable showcases of Empire" (Freeman 228). Although dinosaur specimens were often collected under the reach of colonialism, the animals from which these specimens originate nonetheless resist the Empire's colonial grasp; the human could not enter the prehistoric world as a colonizing force, but only join the world of dinosaurs as an equally monstrous and unsettling body.

The Crystal Palace at Sydenham was one of the most popular places in which this unsettling meeting occurred. Rather than depicting actual fossil remains of dinosaurs, the Crystal Palace at Sydenham featured life-size steel-and-plaster models. Although the Crystal Palace Exhibition is not known for its engagement with paleontology, it is significant for forming the

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[11] See Jeffrey A. Auerbach's history of the planning and execution of the exhibition in *The Great Exhibition*; and *People on Parade*, in which Sadiah Quereshi traces the exhibition of people throughout the Victorian era and especially within the Crystal Palace.

basis of the popular geological exhibits at Sydenham (Freeman 230). When the Crystal Palace

was moved to the London suburb of Sydenham in 1854 after the Great Exhibition, a vast array of

gardens and outdoor exhibits were constructed around it, most notably the geological exhibit.

This exhibit featured a series of islands stranded in a small lake, upon which flourished

primordial vegetation and on which stalked the life-sized models of prehistoric creatures such as

the Megalosaurus, Iguanodon (whose image opened this chapter), Ichthyosaurus and

Plesiosaurus, all constructed by Benjamin Waterhouse Hawkins. These models were a wildly

popular "sensation," attracting "hundreds of thousands of" visitors (Freeman 160). As *The

Routledge Guide to the Crystal Palace and Park at Sydenham* (1854) notes, the geological

exhibition was not intended to educate a visitor but rather to "land him in realms far beyond the

limits of recorded time, and below the dust of any of the representatives of the human race"

(MacDermott 185). In transporting visitors to "realms far beyond the limits of recorded time,"

the geological exhibition continued the collapsing of time begun in periodical descriptions of

dinosaurs and in the Hunterian Museum; visitors were able to imagine themselves walking with

dinosaurs. Gone was the separation of the prehistoric monster from the living human. In this

way, the Crystal Palace models differ from museum exhibitions in that they intentionally

attempted to draw the viewer back in time through the entertaining spectacle of creatures created

by the artistic hands of Hawkins. In the same way that Hawkins' New Year's Eve dinner party

within the Iguanodon model unsettled the division between human and monster by placing the

humans within the dinosaur's body, so the primordial islands attempted to break down the eons

that separated living humans from extinct dinosaurs.

The entertainment of the Crystal Palace models joined with the education of the

Hunterian Museum when the Natural History Museum opened its doors to the London public in

1881. Because it was a public museum with free admission, the Natural History Museum extended the uncanny meeting of human and monstrous bodies to the general British public. Indeed, the public was well prepared for the opening of this museum by the many articles that followed the planning, building, and organization of The Natural History Museum. However, when the museum did open to the public, the articles that reported on its collections showed that the public was disappointed and in fact baffled by the specimens on display. I want to draw out this perplexity to explore the Victorian experience of viewing the gigantic, alien bodies of prehistoric creatures and to consider what happens when the living human comes into contact with the remnants of an extinct world.

One very early visitor, publishing an account of the newly opened museum in *The Saturday Review* in April 1881, introduces the museum by way of its policy of not allowing umbrellas into the exhibition halls: "Geological specimens and stuffed beasts are not particularly in danger from umbrellas," writes the anonymous visitor. "They do not offer the same attractions either to the idler or the iconoclast as are presented by works of fine art" ("The Natural History Museum" 517). While we can only speculate on why the visitor was so attached to an umbrella, the conclusion that geological and zoological specimens have nothing to fear from a dripping scepter reveals that fossil remains were viewed as much more robust than the fine arts found in other Victorian establishments such as the British Museum. This is emphasized in the visitor's focus on the size of these specimens and their assumed ferocity and self-sufficiency in life: the "colossal fragments of antediluvian life" that fill the halls include "the remains of the Toxodon, that alarming rodent which, in shape like a mouse, but in size like a horse, gnawed and squeaked on a grand scale," and "Megatherium, whose vast forearms and blunt huge claws are lifted in a minatory fashion from the pedestal in the center of the small gallery" (518). The visitor imagines

Megatherium, a relative of the sloth, "[crashing] lazily through the forests, gripping young trees in its paws, and stripping off the bark with a muscular, cylindrical tongue" (518). Both Toxodon and Megatherium impress the visitor with their size and ferocity. As a horse-sized rodent, Toxodon's gnawing seems much more threatening than the passive nibbles of the mouse that we know today. Similarly, despite being only a fragment, Megatherium's arm is raised threateningly to passing visitors. This robustness of fossil remains is emphasized in the visitor's animation of them: Megatherium has no need for the delicacies of safely disposed umbrellas if it has the power to "strip off the bark" of young trees with its "huge claws" and giant tongue. In imaginatively animating and empowering the antediluvian fossils in this way, the visitor sets them apart from the passive and delicate works of art displayed elsewhere in London, and shows them as formidable creatures in their own right.

Author and playwright Arnold Golsworthy continues this skepticism about the Natural History Museum in an 1899 article published in *The Idler*. Similar to the author of the 1881 *The Saturday Review* article, Golsworthy's "Natural History and Things" begins with enumerating the deficiencies of the museum before being entrapped by the paleontology exhibition. However, unlike the 1881 author, who seems compelled to envision the monsters in a prehistoric and pre-human world, Golsworthy cannot escape the presence of the human in the exhibition:

> When the authorities [i.e. paleontologists] come to size up their haul [of excavated bones], as it were, and find a limb short here or there, they "restore" the balance in order to heighten the dramatic effect of the show. For instance, a few large bones, piled up in a glass case and labeled in Latin, will never go straight home to the hearts of the people. But if you stand the bones on end in their right order and "restore" a head and body to them, and label the concern "Jumbo," you strike a tender chord that gets right there— even if you have to lie to do it. (686)

This dramatization of the paleontological process acknowledges—though with admitted skepticism—the role that reaction plays in constructing dinosaur bodies. To make a fossil

fragment appeal to the viewer, or so Golsworthy argues, it has to be whole, fierce, and understood as a once-living animal. A fragmented bone alone does not evoke terror or even interest in a viewer, whereas one that has been incorporated into a complete animal certainly does. Equally significant in this description of constructing the dinosaur is Golsworthy's emphasis on the presence of artificial materials and human influences. By acknowledging that the human and a "hundredweight of modeling-clay" are involved in the construction process, Golsworthy unwittingly emphasizes the dinosaurs as assemblage in museums (687). Thus, Golsworthy suggests a posthuman effect of the dinosaur, one in which bones, spalter, and steel combine to form an impressive body; they are amalgamated forms, both in that they combine elements from known animals, such as *The Saturday Review* author acknowledges in the mouse-horse splice of Toxodon, and in that they use a combination of biological and man-made materials.

But the collapse of the boundary between human and dinosaur becomes even more apparent as Golsworthy wraps up his somewhat scathing report of visiting the Natural History Museum: "The visitor to the Museum must not, however, spend too much time in the bone department," warns Golsworthy. "He should come out again into the large central hall and watch the mothers of families sitting on the benches and producing from a piece of newspaper or a red pocket-handkerchief the mid-day meal for the children who are playing hide and seek around a glass case of rare and valuable exhibits" (692). Through recommending how a respite from sightseeing should be taken, Golsworthy inadvertently reveals how the binary between human and dinosaur, living and extinct becomes destabilized within the space of the museum. Viewing the specimens of fossilized dinosaurs is equated with watching one's fellow museum visitors. Like the paleontology exhibition, which had a dedicated display place, the human exhibits are

also confined to their own gallery in "the large central hall." This inclusion of the human in the

museum display is reminiscent of the tripartite human collection in the Hunterian Museum—the

skeletons of Mr. O'Brien and the Sicilian girl, and the living visitor. In both museums, the

human becomes implicated in displays of the monstrous body.

Whereas the human fluctuates between being a visitor to the Hunterian and a part of its

human monstrosities display, it becomes a part of the geological and zoological displays at the

Natural History Museum.[12] In this way, the dinosaur body is just a step away from the medical

monstrosities displayed in the Hunterian. Whereas in the Hunterian the human was grouped in

with two extremes of so-called human bodily monstrosity, in the Natural History Museum this

similar human body is grouped with the dinosaur bodies. Thus, the boundary between the human

and the dinosaur breaks down, inspiring a disruption of the division between living and extinct as

well. The result of this is that the place of the human in a continuum of life is disrupted: if the

dinosaur can be displayed alongside the human, the two are no longer as firmly separated as the

gulf of time would have one believe.

***Journey to the Center of the Earth* and the Prehistoric Present**

Whereas museums provided a space in which the Victorian public could see the newly

unearthed specimens of colossal prehistoric animals, these displays were often more confusing

than illuminating. For example, in the early months of the Natural History Museum, the display

cases were still half empty and the explanatory plaques were not yet installed. Literature,

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[12] Another way of viewing this difference between the Hunterian and the Natural History
museums is to recognize that these two displays are separated by the publication of Darwin's
theory of evolution. When taking this into account, the partial division of the human from the
monstrous in the Hunterian becomes rather one of not yet considering the human as entirely in
parity with animal life, whereas the Natural History Museum directly includes the human into
the displays of both living and extinct creatures.

however, gave fleshly bodies and lively activity to the confusing specimens displayed in museums. The human was often brought into the prehistoric space in these literary animations. Thus, in novels such as Jules Verne's *Journey to the Center of the Earth*, the safe boundary between living and dead breaks down when the humans enter the center of the earth and the domain of fossils.

Written and published in France in 1864, *Journey to the Center of the Earth* is one of the earliest novels that directly references prehistoric reptiles, and as such can be read as popularizing the dinosaur for an amateur audience. Although it wasn't published in English until 1871 (and indeed, an unadulterated translation didn't appear until 1876[13]), it drew immediate attention from the English readership when it was finally available. Advertised to a juvenile audience, the novel's emphasis on science and logical scientific methodology illustrates how significant science was becoming even to a public audience, and especially to a younger readership. Whereas many critics focus on how the novel's engagement with science is indebted

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[13] I use Frederic Amadeus Malleson's 1877 translation for this chapter. The history of *Journey to the Center of the Earth*'s translation into English is somewhat fraught; while a 4-page summary of the novel appeared in the 31 December 1864 edition of *All the Year Round*, the first full English translation came out in an anonymous 1871 publication. However, this anonymous translation changed many of the original aspects of Verne's novel: much of the science was removed, plot points were edited, and even the characters nationalities and origins were altered (Professor Liedenbrock became Hardwigg; Axel became Harry). The first translation that was relatively true to the French came out in 1876, with Malleson's still more accurate translation quickly following in 1877. However, the damage done by the initial anonymous translation couldn't be reversed: it was still widely read in the Victorian era, and even today is repeatedly republished because of its accessibility in the public domain. I have chosen to use the 1877 translation for several reasons: first, it is one of the more accurate Victorian translations of Verne's original text, and therefore can be seen to reasonably represent—for an English-speaking audience—the story that Verne intended to share. Second, because the references to science are the main focus of my discussion, this translation contains more scientific references than does the anonymous 1871 translation. For more details on the publication history, see Evans "Journey to the Center of the Earth" and "Jules Verne's English Translations."

to Charles Lyell's *Principles of Geology*,[14] I focus on the ways in which this novel is concerned with the science of paleontology. Indeed, in featuring the prehistoric sea monsters ichthyosaurus and plesiosaurus, *Journey to the Center of the Earth* is deeply embroiled in paleontological developments. Although ichthyosaurus and plesiosaurus are not categorized as dinosaurs, they nonetheless fall into the same biological class as dinosaurs: reptiles. Both ichthyosaurus and plesiosaurus were some of the first near-complete skeletons of prehistoric reptiles found in the early nineteenth century. Their discovery in the 1820s gripped the public with excitement (Rudwick, *Earth's Deep Time* 138); this excitement was apparent not only in the wider public knowledge of ancestral lizards but is also demonstrated in Verne's literary representation of these creatures.

Journey to the Center of the Earth is part science-fiction, part adventure novel, and a wholly imaginative marriage of science with spectacle. It concerns Professor Liedenbrock, his nephew Axel, and their Icelandic guide Hans's exploration of an extinct volcano. Discovering a strange runic message in an antique book, Liedenbrock follows its direction to Iceland, the volcano Snæfell, and eventually into the volcano's interior. Underground, the three explorers witness many wonders, from fossilized creatures frozen in layers of rock, to an electrically illuminated forest of gigantic trees, to an epic battle between the prehistoric sea monsters ichthyosaurus and plesiosaurus. Eventually Liedenbrock, Axel and Hans are borne out of the earth's bowels on a sea of lava and deposited on the slopes of Stromboli, a volcanic island off the Italian coast. They have traversed not only some two thousand miles and through the hidden

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[14] Such as Allen A. Debus' "Re-Framing the Science in Jules Verne's Journey to the Center of the Earth;" and Nigel Harkness' "'Textes fossils:' The Metatextual Geology of Verne's *Voyage au centre de la Terre*."

interior of the earth, but also through time to observe the fossilized as well as living denizens of the past.

The Victorian museum displays that made dinosaur specimens accessible to the public also appear in *Journey to the Center of the Earth*. The organization of the underground specimens echoes the familiar architecture of the Victorian museum. However, whereas the display cases in museums formed a boundary between the living and the extinct, there is no boundary in the underground museum. As Liedenbrock, Axel and Hans descend through the subterranean corridors leading to the center of the earth, they pass by the fossilized remains of early life forms. But, unlike a jutting cliff that releases its fossil prisoners at its own discretion, the underground corridors display the layers of life in their proper order. And it is the language of "display" that is particularly pertinent here. Carefully observing the geological evidence to determine whether the explorers have taken the correct corridor, Axel notices the richness of fossilized specimens embedded in the rock walls around them:

> Specimens of magnificent marbles clothed the walls, some of a greyish agate fantastically veined with white, others of rich crimson or yellow dashed with splotches of red; then came dark cherry-coloured marbles relieved by the lighter tints of limestone.
> The greater part of these bore impressions of primitive organisms. Creation had evidently advanced since the [fossils displayed the] day before. Instead of rudimentary trilobites, I noticed remains of a more perfect order of beings, amongst others ganoid fishes and some of those sauroids in which palaeontologists [sic] have discovered the earliest reptile forms.
> It was evident that we were ascending that scale of animal life in which man fills the highest place.
> … The whole history of the carboniferous period was written upon these gloomy walls, and a geologist might with ease trace all its diverse phases. (Verne 84-85)

The underground corridor down which Axel, Liedenbrock and Hans walk is set up like a museum gallery, displaying the fossilized remains of early life within its many stone cases. Like descriptions of the Natural History Museum, the sketch of this subterranean museum begins with an outline of its architecture: the museum is constructed of many-colored marbles— "greyish

agate," "white," "rich crimson" and "yellow," or "dark cherry-colored marbles." The different types of marble mirror the different rooms or display cases in a museum. Each of the colored layers of marble house "impressions of primitive organisms," as though they are separate display cases in which the wandering visitor can see the evidence of life neatly arranged. In fact, they are so neatly arranged that Axel can imagine that "Creation had advanced" from layer to layer.

However, while Axel, Liedenbrock and Hans appear to be outsiders walking through this underground museum, they are nonetheless directly implicated in the beings that they view. . In entering the domain of fossils, the human is no longer an external observer in the museum but is rather inserted into the museum display. Although humans are not present as fossils in the museum-like corridor, they are there as living and walking specimens; to Axel, the display is a narrative of ascending "animal life in which man fills the highest place." As with the Natural History Museum, the prehistoric body—whether a gargantuan dinosaur or small trilobite—dares the human to consider its own body: where does the human fit in this array of early life? The human disrupts the narrative of ancient life here: it breaks into the center of the earth, imposing its presence in a narrative where it does not yet have any representation.

While Axel's musings on the human's position amid the fossilized trilobites still sees the human as the apex of evolution, when faced with the enormous scale of prehistoric monsters the human becomes insignificant—in power, in size and in its continued importance in the continuum of life. The awesomeness of the dinosaur—or prehistoric sea monsters, in the case of the battle between ichthyosaurus and plesiosaurus— as well as the fact of its extinction, has immense implications for the human observer. Just as the small trilobites have faded, the gargantuan dinosaurs that once ruled the planet have gone extinct as well. Perhaps, or so Axel's

musings on the fossils imply, humans are not at the apex of animal life, but are fated to extinction just as the dinosaurs were before them.[15]

But the measure of security that Axel finds in the humans' continued existence compared with the extinction of their monstrous predecessors is dismantled when Liedenbrock, Axel and Hans come into contact with living prehistoric monsters. This initial meeting of men and monsters merges the familiarity of violent animals with the unfamiliarity of immense size and power. As Liedenbrock, Axel and Hans traverse the underground sea, Hans uses a pickax to sound the water's depths. Withdrawing the pickax from the seemingly bottomless water, Hans' exclaims "*Tänder*" (Verne 131). Axel translates from the Danish while elaborating on the teeth marks:

> Yes, indeed, those are the marks of teeth imprinted upon the metal! The jaws which they arm must be possessed of amazing strength. Is there some monster beneath us belonging to the extinct races, more vicious than the shark, more fearful in vastness than the whale? (131-32)

This description of the teeth marks is reminiscent of not only the periodical descriptions of the "terrible" and "destructive" Megalosaurus teeth, but can also be read as a direct reference to Humboldt's description of the marks left by crocodiles on the flanks of grazing horses ("Recreations in Natural History" 222). Like the crocodile that influences descriptions of dinosaurs, the shark is used in *Journey to the Center of the Earth* as an exotic yet recognizable contemporary parallel. Although not the largest creature in the sea, the shark has a reputation for being one of the most ferocious and bloodthirsty, and therefore accurately reflects the public imagination of the monstrous and vicious dinosaur. The familiarity of the shark and whale, however, is overturned by the simple fact that this hypothetical creature must be "fearful in [its] vastness" (Verne 132). This description of the unseen teeth requires multiple layers of reflection

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[15] This is a conclusion to which Tennyson's meditations in *In Memoriam* lead him as well.

in order to understand the creature to which the teeth belong: first, readers must imagine an amalgamation of familiar characteristics; then, they defamiliarize these characteristics by translating them onto a huge, never-before-seen creature.

When these creatures do materialize before Axel's sleepy eyes, their monstrous bodies appear as an amalgamation of fragments from familiar animals. Liedenbrock, Axel and Hans are awoken in the middle of the night by the perilous pitching of their raft. Around them, the sea churns and swarms with a vast array of creatures: "an enormous porpoise,… a sea lizard of vast size,… a monstrous crocodile, … a whale,… a tortoise forty feet long, and a serpent of thirty [feet]" throng the water (Verne 133). While Axel initially assumes that several sea creatures are battling one another, he is quickly corrected of this misconception: "What two?" asks Axel of Liedenbrock, "Does [Hans] mean there are only two animals?" (134). The professor explains patiently—amid the turmoil of battling monsters—how the various physical attributes of each creature combine to compose their distinctive bodies:

> the first of those monsters has a porpoise's snout, a lizard's head, a crocodile's teeth. … It is ichthyosaurus (the fish lizard), the most terrible of the ancient monsters of the deep. … The second is a plesiosaurus (almost lizard), a serpent, armoured with the carapace, and the paddles of a turtle; he is the dreadful enemy of the other. (134)[16]

The way in which this passage uses parts from familiar creatures to construct the bodies of ichthyosaurus and plesiosaurus goes much further than reciting properties of known animals to describe unfamiliar ones. In the novel, the monsters first appear as fragmented bodies, as *parts* of bodies that are not their own. The ichthyosaurus is not comprised of a complete porpoise, lizard and crocodile, but severed *parts* of each of these creatures: "a porpoise's *snout*, a lizard's *head*, a crocodile's *teeth*." As the skeletons of these dinosaurs were extracted piece-meal from the rocks

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[16] Just some years previous, fossilized skeletons of plesiosaur and Iguanodon had been found in the south of England. Paleontologists and periodical articles had theorized that they were enemies (Rudwick, *Earth's Deep History* 138).

in which they had been fossilized before being carefully put together by practiced scientific eyes, so the writhing bodies in Verne's narrative are described piece by piece before Liedenbrock can combine them into complete chimeras. This scene echoes the unsettling contrast seen in the image of the dinner in the Iguanodon model, in which familiar human bodies are alienated by juxtaposing them with the enormous and fragmented monstrous body. In the battle between ichthyosaurus and plesiosaurus, familiar animal bodies become uncanny: they are joined in disturbing combinations as well as being magnified into monsters.

While the text does engage with the vastness of these monsters, Eduard Riou's 1864 ink-on-paper illustration, which accompanied the French first edition of *Journey to the Center of the Earth*, emphasizes what is posthuman about the contrast between the human and the prehistoric creature [Fig. 4]. This illustration depicts the battle between the long-necked plesiosaurus and the crocodile-like ichthyosaurus. At first glance, the image appears to be of only the two sea creatures. Their bodies—joined where ichthyosaurus bites into the neck of plesiosaurus— dominate both the water in which they are partially submerged and the sky into which their necks thrash. Meanwhile, it is only when viewers dare to tear their eyes away from the battling monsters that they notice a dinosaur circling above an outcropping of rock on the left-hand side of the image. On this cliff, the miniscule figures of two humans are barely visible, easily passed over in favor of looking at ichthyosaurus and plesiosaurus. The two humans are dwarfed by both the rock on which they stand and by the battling sea monsters. Furthermore, the human is made yet more insignificant by the reappearance of teeth in Riou's illustration. A single tooth of either ichthyosaurus and plesiosaurus is just as large as the human heads. Indeed, the humans seem to be in dire risk, with plesiosaurus' gaping mouth directly facing them. But beyond the danger to the humans that the layout of this image threatens, it also recalls the sublime landscapes of

nineteenth-century paintings. As with sublime paintings, the humans are dwarfed in Riou's illustration by the dramatic landscape. However, the fact that two prehistoric monsters dominate this landscape translates this from purely the sublime into rather an uncanny sublimity; that conflict between awe and fear that is central to the posthuman dinosaur comes to fruition in the contrast between the small humans and the gargantuan monsters.
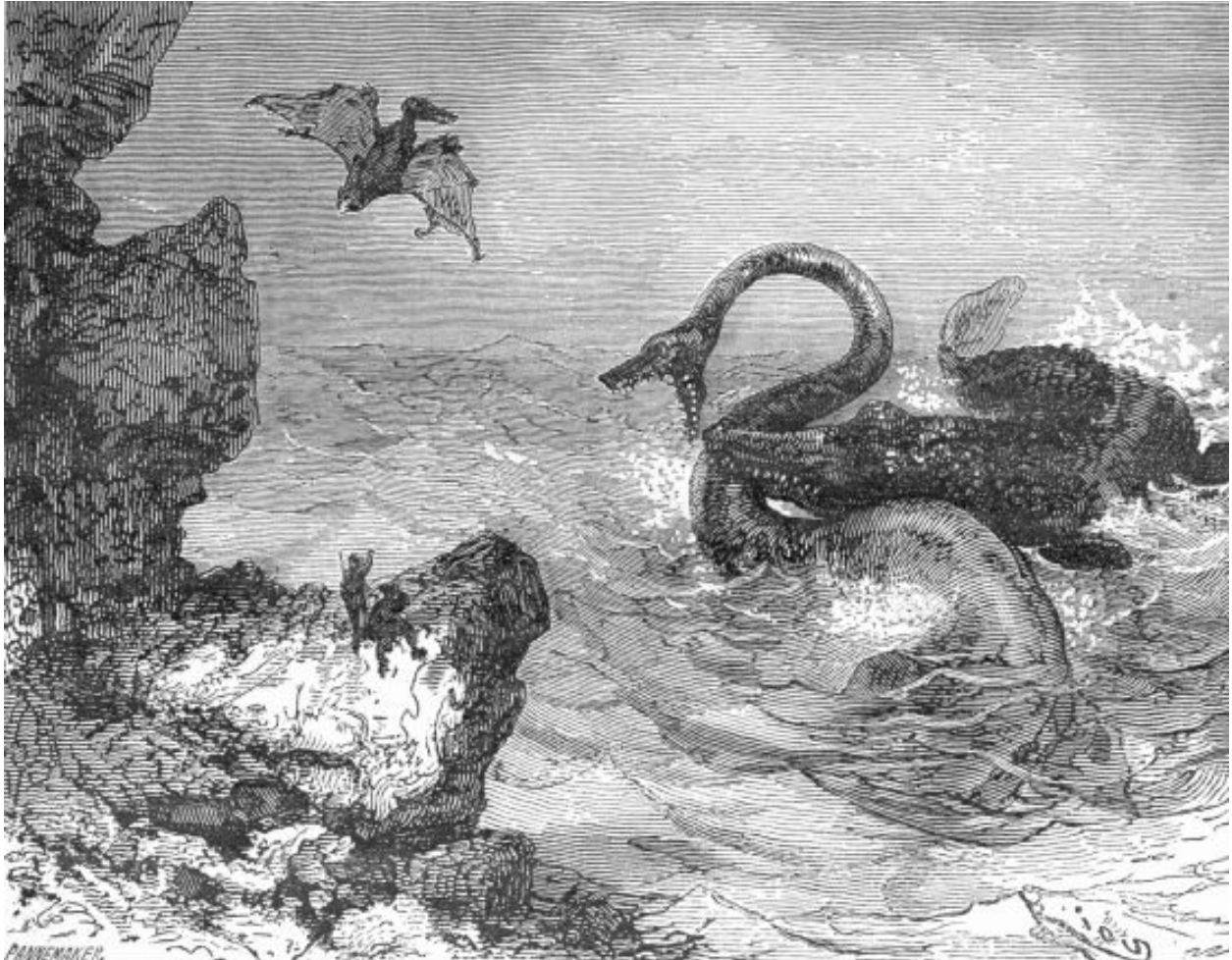
Figure 4: Eduard Riou. Illustration of the battle between ichthyosaurus and plesiosaurus. *Journey to the Center of the Earth*. French first edition. 1864.

As the battle rages within the novel, the defamiliarizing effect of ichthyosaurus and plesiosaurus' size extends to their surroundings as well, and especially to the way in which time is perceived. The meeting of the human and the dinosaur instigates a collapse of past and present,

of the deep time of prehistoric life and the present of the human; both the human and the

dinosaur exist in these moments of posthuman meeting. In foreshortening the time-scale of the

battle between ichthyosaurus and plesiosaurus, Verne highlights another aspect of the dinosaur's

uncanniness—the temporal dimension these monsters inhabit is not only archaic but moves in a

way wholly unfamiliar to humans. This manifests in a fluctuation between the vast extension of

time and its minute compression:

> One hour, two hours, pass away. The struggle continues with unabated ferocity. …
> Suddenly the ichthyosaurus and the plesiosaurus disappear below… Several minutes pass
> by while the fighting goes on under water. (134-35)

When the battling creatures are within sight of Liedenbrock, Axel and Hans, time stretches into

hours; they battle for "one hour, two hours" before sinking below the waves. However, once they

are below the water, hours transform to "minutes." This manipulation of time recalls not only the

non-chronological inclusion of humans into the subterranean museum of fossils when

Liedenbrock, Axel and Hans begin their underground journey, but is also reminiscent of the way

in which the dual museum displays of humans and dinosaurs inspired a disintegration of time. In

the same way that humans collapse time by becoming a part of the underground museum space

alongside the fossils of prehistoric creatures, so the battle between ichthyosaurus and

plesiosaurus permits a version of time travel. Liedenbrock, Axel and Hans exist in an extended

prehistoric timeframe of hours when in the presence of the battling creatures, but as soon as the

creatures disappear they are returned to a timescale familiar to humans.

True to the characteristics of the posthuman, the giant reptiles of Verne's novel

destabilize the humans that come into contact with them. In entering the center of the earth,

Liedenbrock, Axel and Hans also enter a space dominated by creatures that challenge

preconceived assumptions about the human—namely, the truism of Victorian scientific thought

that humans belong at the apex of the pyramid of life. Dinosaurs, with ichthyosaurus and plesiosaurus as their representatives in *Journey to the Center of the Earth*, destabilize not only the humans, but also their wider surroundings. In this, the reaction of awe that is indicative of the sublime is augmented by the uncanniness of the monster's unfamiliar body. It unsettles what is generally thought of as familiar by appearing as a gargantuan amalgamation of body parts from recognizable living animals.

Unsettling Dinosaurs in *Jurassic Park*

The distinctions between the ancient and modern, the monster and the human that began to break down in the Victorian museum, periodicals and literature continues into the literature of the twentieth century. In a novel such as Michael Crichton's *Jurassic Park* (1990), the most well known of modern dinosaur narratives, humans come face-to-face with their own insubstantiality when encountering dinosaurs. When the boundary between the ancient and the living breaks down through genetically reanimating dinosaurs, the artificial division between the human and the other breaks down as well.

Although prehistoric specimens are no longer unearthed today at the same pace that they were in the Victorian era, the cultural fascination with prehistoric monsters has by no means waned. Like the Victorian era, whose periodicals, newspapers and literature thronged with dinosaur references, twentieth- and twenty-first century entertainment is overrun with the gigantic inhabitants of the pre-human world. These written and visual media repeatedly feature the terrifying animation of creatures that are supposed to have been petrified in stone eons ago: from the *Night at the Museum* movie trilogy (dir. Shawn Levy: 2006, 2009, 2014), to *Ice Age: Dawn of the Dinosaurs* (dir. Carlos Saldanha: 2009), to Pixar's *The Good Dinosaur* (dir. Peter

Sohn: 2015), to *Jurassic Park* (dir. Steven Spielberg: 1993), and its three (soon-to-be four)

sequels (1997, 2001, 2015, 2018). Like Verne's *Journey to the Center of the Earth* in 1864,

many contemporary film animations of dinosaurs are geared to a juvenile audience— *Ice Age:*

Dawn of the Dinosaurs and *The Good Dinosaur*, among others. However, dinosaur narratives are

not exclusively juvenile, as more suspenseful and grizzly films such as *Jurassic Park* attest.

Because they appeal to both child and adult audiences, dinosaur narratives hold as significant a

place in the entertainment psyche as they did in the Victorian era. I focus on Crichton's novel

Jurassic Park (1990) both because the novel's descriptions of human-dinosaur interactions

poignantly illustrate the boundary disruption central to the posthuman and because the novel

accentuates the collapsing of deep time seen in Victorian writings, museums, and literature.

Tracing the interactions between humans and dinosaurs in Crichton's *Jurassic Park* reveals that

the destabilization of the human body that began in the Victorian era only accelerates in the

twentieth century.

The novel *Jurassic Park* narrates a daring scientific experiment in which the company

International Genetic Technologies (InGen) genetically engineers dinosaurs back to life for the

purpose of human entertainment and education. Arranged into a safari-like museum, the living

dinosaurs are confined to outdoor cages scattered across an island-sized amusement park.

Although the island is referred to as a "zoo" within the novel itself, this space can also be

thought of as a museum. Because Jurassic Park features the living bodies of once-extinct

dinosaurs, it is established as a successor to institutions such as the Museum of Natural History;

when paleontologist Dr. Grant is confronted with the reality of Jurassic Park, he muses that, "the

museum halls with their giant skeletons and flocks of echoing schoolchildren …—all of it was

going to end" and be replaced by the dynamic model of the island (Crichton 94). The drama of

the novels centers on the breakdown of the museum; spurred on by a thunderstorm that disables the electrical cages, the dinosaurs escape onto the island and into the previously safe and separate human sphere.

The meeting of extinct monster and living human that we saw in the Victorian museum and in novels such as *Journey to the Center of the Earth* takes on an accentuated threat in *Jurassic Park*. Unlike the fossilized dinosaur remains in museums, which remain safely immobile in their glass cases, the dinosaurs of Jurassic Park are fossils that have been animated. This animation, however, is more than simple movement—it is swift and predatory; the velociraptors in particular are "incredibly swift hunters" whose "quick movements" are one of the most unsettling things about them for the human observers (Crichton 133, 371). No longer are they the skeletal and lumbering figures displayed in the Victorian museum; rather they are creatures that have complete bodies and instincts that move separately from and indeed threateningly to humans. While the reanimation of once-extinct animals certainly appears to be an exercise in human power and control over the natural world, this assumption proves to be deceptive as the novel's drama picks up. What were assumed to be controlled specimens— controlled both in that humans have control over their life and death, and in that they are confined within cages—are in fact entirely out of human control and understanding.

Indeed, this loss of control epitomizes the breakdown of neat categories of distinction, a breakdown that began to appear in the Victorian era. Whereas the breakdown in the Victorian museum appeared in the human entering the primordial museum space, here the breakdown of the museum goes a step further, in that the museum literally falls apart and the dinosaurs, not the humans, enter a space from which they were barred. The reversal of this museum space is apparent from the moment that the human visitors to Jurassic Park enter the park dormitories.

Surveying the room in which he is to spend the next few nights, Dr. Grant observes: "Directly

over the bed was a large pyramidal skylight. … Unfortunately the glass had to be protected by

heavy bars, so that striped shadows fell across the bed" (97). Unlike the traditional museum, in

which specimens are encased in glass, the visitors to Jurassic Park are separated from the outside

world by glass windows; indeed, there is also a sense that they are trapped in the display by the

bars that cover the glass display casing. The museum is turned inside out, with the humans inside

the cases and the specimens tapping on the glass outside. This reversal is accentuated in the

height of the novel's drama, when a pack of velociraptors attempts to enter the hotel through a

similar bedroom window: "One raptor gripped the end of the bar and tugged, pulling it back. It

put its powerful hind limb on the skylight and the glass shattered" (358). Like a child who

presses their hand against a glass museum case or grips the bars of a zoo enclosure, the

velociraptor is eager to interact with the display within—it taps and tugs at the window into the

human sphere. However, in this instance, it is not the tapping of curiosity, but rather a violent bid

to break down the museum boundary.

In entering into the human space, the dinosaurs reveal their true terror—they are not

merely objects to be observed in a museum, to be gaped at; they are terrifying, intelligent and

predatory. The uncanny sublimity thus becomes solely uncanny because nature's power does not

remain distant, but rather comes face to face with the human. This predatory terror is especially

apparent when Tim, the child-protagonist of the novel, hides from a hunting velociraptor in the

catering wing of Jurassic Park:

> Tim felt his heart pounding. Somehow it was worse to be confronted by an animal like
> this in a kitchen, instead of the open forest.... Up close, it was a much more frightening
> animal than the tyrannosaur. The tyrannosaur was huge and powerful, but it wasn't
> especially smart. The velociraptor was man-size, and it was clearly quick and intelligent.
> (Crichton 371)

The velociraptor hunts Tim into the most domestic of human spaces: the kitchen. Although the kitchen is often associated with family, warmth and safety, this safety evaporates when the raptor enters. The sanctity of the human form also disappears as the raptor invades the domestic sphere; although it is not as "huge and powerful" as the tyrannosaur, it is even more frightening for its resemblance to the human. It is "man-size" and exhibits the intelligence and swift mobility of a bipedal human. By entering into the human space of the kitchen, the man-like velociraptor breaks down the boundary between the human and other, overtaking the human space and threatening to remove the human from their apex atop the animal pyramid.

This adulteration of a previously assumed hierarchy is reiterated time and again through the dual attacks on both herbivorous dinosaurs and on the humans themselves. By depicting both humans and dinosaurs as vulnerable to attack, the separation between the two distinct species is collapsed. One of the first attacks to take place at Jurassic Park is that of the tyrannosaur on Tim, his sister Lex, and an executive of the park, Ed Regis. Although the attack itself is described in vague terms from Tim's perspective as he struggles to maintain consciousness, detailed evidence of the attack is unearthed when some park employees stumble upon a severed leg some hours later: "The flesh of the leg was pale blue-white, terminating in a ragged bloody stump where the knee had been. Below the calf [Gennaro] saw a white sock, and a brown slip-on shoe. …'Torn at the joint line… Didn't bite it—twisted and ripped it. Just ripped his leg off'" (247). A few hours later, another group of park workers come across an equally grizzly scene, but this time with a herbivorous dinosaur as the victim: "the hadro[saurid] was brought down by a bite on the neck— you see the big slash there, above the shoulder blades— and that's the T-rex, no question" (304). In both scenes, the tyrannosaur attacks in a decidedly vicious manner, not to eat the victim but rather to brutalize and then leave the body in scattered fragments. But even more poignant is the

fact that, in both being attacked by the tyrannosaur, the human and the herbivorous hadrosaurid

are lumped into the same category: that of prey to a stronger and superior predator. The human is

no longer the top predator; by animating dinosaur bodies, InGen has assured that the boundary

between the human and other, between the predator and prey is dissolved.

And it is this breakdown that shows how posthuman are the dinosaurs of *Jurassic Park*.

On the one hand, they embody some of the attributes of the posthuman as defined by critical

posthumanists: they are the embodiment of genetic data, created through a hybrid process of

technological engineering and biological reproduction. But they also alienate the human body:

the dinosaurs destabilize an assumed hierarchy through their strength, intelligence and quasi-

humanness while also breaking down the museum boundary. The spectacle of the anomalous

body that was the dinosaur on display is turned around onto the human observer when the

museum boundary breaks down. No longer is solely the dinosaur body anomalous, but the

human body also becomes strange, alien, almost useless when it is compared to and comes into

contact with the dinosaur.

One of the most brutal attacks of the novel exhibits precisely this alienation of the human

body. When Dennis Nedry, the InGen programmer hired to code the computerized security

system of the dinosaur enclosures, leaves the apparent safety of the human dormitories to locate

the escaped tyrannosaur, he comes face-to-face with the carnivorous dinosaur Dilophosaurus.

Dilophosaurus begins its assault on Nedry by spitting blinding poison into Nedry's eyes, before

attacking him:

> there was a new, searing pain, like a fiery knife in his belly, and Nedry stumbled,
> reaching blindly down to touch the ragged edge of his shirt, and then a thick, slippery
> mass that was surprisingly warm, and with horror he suddenly knew he was holding his
> own intestines in his hands. The dinosaur had torn him open. His guts had fallen out.
> (219)

Nedry's interaction with Dilophosaurus results in his body not only breaking apart into fragments, but becoming wholly unfamiliar to his touch; he does not initially realize that the "thick, slippery mass" snaking out of his abdomen is in fact his intestines. This alienation of the human happens on a literal level through the brutalization of human bodies. But there is also a more symbolic instantiation of this in the inability of the human body to act properly or expertly when faced with the dinosaur. Even before Dilophosaurus brutalizes Nedry, his eyes fail him. His body literally breaks down into blindness and unfamiliarity when faced with the dinosaur.

The promise of human alienation that we began to see in the Victorian era, especially in the Victorian museum, comes to fruition in modern dinosaur narratives. By animating fossilized dinosaurs, *Jurassic Park* breaks down the boundaries of living and extinct, of fact and fiction, of human and other. Dinosaurs are no longer confined to the realm of mythology or scientific theory, but rather become terrifyingly real threats to human safety. They move into the human realm, both by entering traditional domestic spheres and by exhibiting characteristics previously confined to the human—bipedalism and cunning intelligence. In so doing, the dinosaurs of *Jurassic Park* bring together the technological aspects of posthumanism—namely, the manipulation of biological and technological bodies—with the posthuman's propensity to disrupt assumed norms.

Conclusion

I began this exploration of posthuman dinosaurs with examining the dinner hosted by Benjamin Waterhouse Hawkins' within the half-finished belly of the Iguanodon model. In concluding, I want to return to these most provocative of dinosaur replicas. Figure 5 depicts Hawkins' studio at the Crystal Palace at Sydenham in 1853, a few months prior to the New Year's Eve dinner party. The studio in this image is crammed with half-finished models of

prehistoric animals. In the center towers the half-finished model of Iguanodon. His mouth is ajar, revealing a row of spiked and serrated teeth, his nose is crowned with the misattributed thumb spike, and his one visible eye stares daringly at the viewer. Around Iguanodon lurk four additional models, each in varying stages of completeness. And around this grouping of uncanny creatures is scattered a plethora of materials, animals and workers. One worker is propping up the cast protecting Iguanodon's legs, another is attaching spikes to the tail of Hylaeosaurus. And in the very front of the image, a crow perches daringly next to a threatening row of teeth while a pair of mice gamble playfully amid the detritus of dinosaurs.

"Model Room at the Crystal Palace" epitomizes the fragmented environment out of which the public image of the dinosaur emerged. While paleontological expertise provided the scientific image of the dinosaur as a gargantuan reptile, zoological knowledge and the public imagination added to the bony fragments of paleontology a scaly and toothy body. The process of building the dinosaur into a verifiable and understood being was the process of stitching together seemingly incompatible fragments of material, of knowledge and the public imagination. The exposed teeth of the Crystal Palace models recall Humboldt's descriptions of crocodile jaws; the shrunken bodies of human workers emphasize how powerfully large the dinosaurs were depicted to be; and the almost invisible animals playing at the feet of these models reminds a viewer that, in order to fully comprehend how startling were these denizens of deep time we have to frame them in concert with our knowledge of living animals.
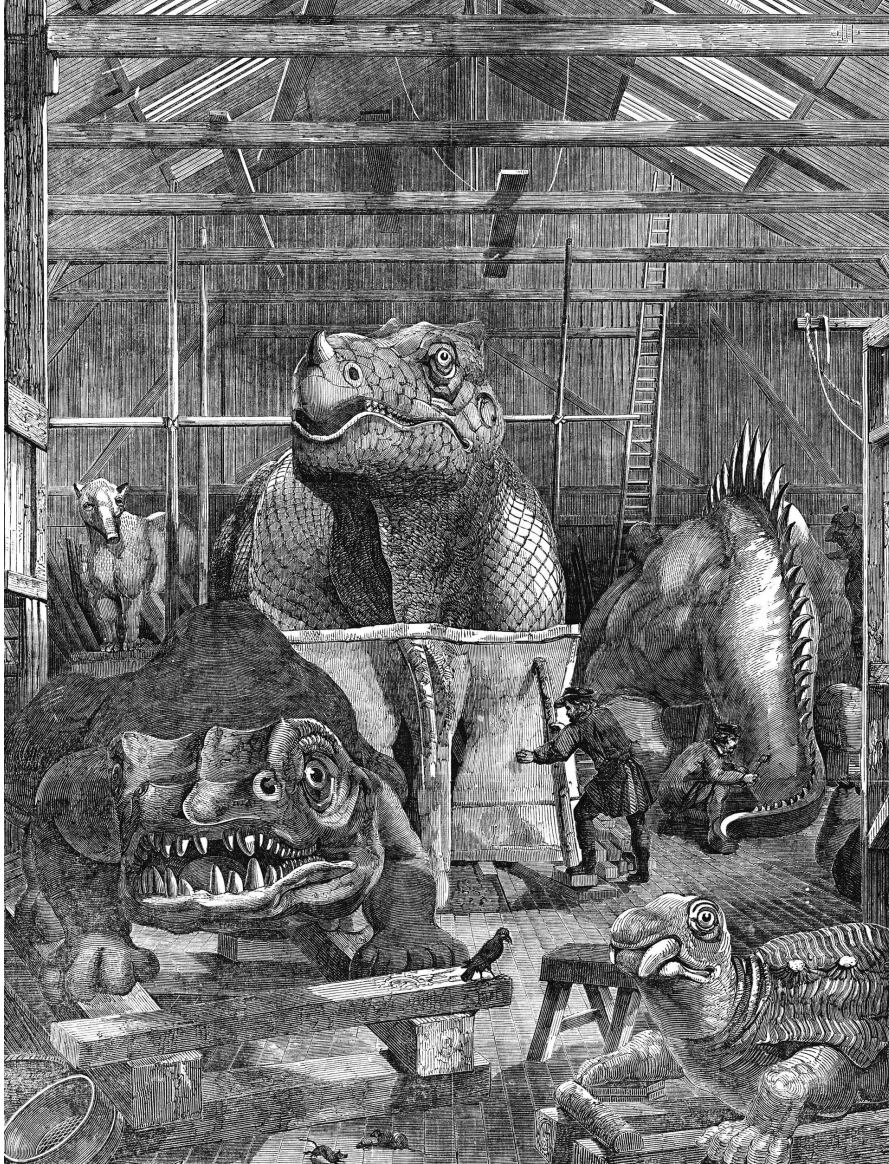
Figure 5: Philip Henry Delmotte. "The Model Room at the Crystal Palace." 1853.

The dinosaur emerges as a posthuman out of this plethora of seemingly incompatible data. As it existed in the Victorian era, the dinosaur appeared to contradict accepted knowledge about life and the emergence of life. As fossilized fragments, dinosaurs were already amalgams of known animals expanded to impossible sizes. As reconstructed skeletons, they were assemblages of biological bones, steel wires, and plaster additions. As representations in the public and literary imagination, they were frightening monsters that collapsed the safe distance

of deep time into the Victorian present. The dinosaur thus destabilized the position of the human within a chronology of time. In relying on human mediation to become an articulated body in the Victorian era, it required the human to enter into prehistoric time through unearthing boney fragments, through imagining what life before the human looked like, and especially through confronting the dinosaur face to face within museums, art and literature.

Chapter II

Disorderly Bodies, Disruptive Machines: Robot Futures in
Industrial Fiction

> "in a cotton mill … the perfection of automatic industry is
> to be seen; it is there that the elemental powers have been
> made to animate millions of complex organs, infusing into
> forms of wood, iron, and brass an intelligent agency."
> Andrew Ure (1835)

> "The course of things demonically possessed is to imitate
> the human, while the course of human possession is to
> imitate the inhuman."
> Dorothy van Ghent (1950)

There is a scarcity of functioning machines in Victorian novels. While machines are occasionally referenced in Victorian literature and even more occasionally depicted, they rarely take center-stage. In fact, machines are kept staunchly at arms-length, only appearing at the periphery of narratives. Elizabeth Gaskell describes the din of the factory machines and low-hanging smog in *North and South* (1855); Charles Dickens features in detail Daniel Doyce's struggle to receive parliamentary funding for his innovative yet enigmatic machine in *Little Dorrit* (1857); and George Eliot repeatedly hints at elements of steam power in her novels, from the threat of a steam-powered mill in *Mill on the Floss* (1860) to the power of the railway to disrupt the pastoral peace of Middlemarch (1874). However, we never see the factory machines at work in *North and South*, nor discover the purpose of Doyce's apparatus, nor even see steam rising from mill or train in Eliot's novels. Machines in canonical Victorian novels are present, influential, and yet almost always invisible.

Instead of featuring the machines themselves, Victorian novels represent machines through intermediaries. In this chapter, I explore human conduits for machines—humans who

have worked at machines, been injured by machines, and thus carry on their bodies the taint of machines. I argue that these bodies come to represent the machines in the absence of active cogs, wheels, and spewing steam, becoming human-machine interfaces that herald the dawn of the machine-era. Through exploring the way in which the Victorian psyche responded to these human-machine interfaces, I trace a trajectory through the second half of the Victorian era that links factory workers in the realist novel to early robots in science fiction. Although perhaps an unlikely link, Victorian literature reacted to the factory worker and the science fiction robot in similar ways: they are both entities peripheral to or unknown to middle-class Britain and are thus depicted as spectacles; they are both closely linked to industrial and machine advances; and they are both described in ways that break down a biology-technology binary that remained firmly in place for realist representations of the human body.

Divided into four stages, this trajectory from factory worker to robot takes into account not only mainstream literary responses to the working bodies, but also the way in which non-fiction writing highlighted these bodies' mechanistic taint. The first stage occurs within the factory, where the working body becomes a prosthetic part of the machine at which it works. While this is a standard critique of dehumanization in the industrial world following Karl Marx and Friedrich Engels, I argue that this mechanistic taint is not confined to the factory alone; it enters the bodies of workers and, through their bodies, exits the factory. The second stage occurs when the human-machine interface malfunctions, when the human part of the machine breaks down and must be replaced. Although factory injuries are occasionally acknowledged in mainstream Victorian fiction, the extent of such injuries is as invisible as are the actively working machines. Viewing factory workers as part of the machine, mainstream literature is thus unconcerned when the human part malfunctions and breaks down; the part is discarded and

replaced by a new human prosthetic. The third stage sees the discarded part of the human-machine interface exit the factory and, carrying the taint of the machine upon its often-injured body, causing a disturbance in the field of the realist novel. Although realist literature can overlook the bodies that are locked within factory walls, when these bodies exit the factory and join the wider Victorian world they resist invisibility. In the fourth stage, the human-machine interfaces that could only be stared at in realist novels become activated through the fantastical lens of science fiction. The machine prostheses are reactivated as robotic devices.

Although machines and Victorian industrialization have held an interest for scholars of literature and culture since Herbert Sussman examined the joint fascination and repulsion that novelists show towards machines in *Victorians and the Machine* (1968), recent scholarship focuses on the interplay between the machine and the human. Tamara Ketabgian's *The Lives of Machines* (2011), for example, rereads the way in which machines were represented in Victorian literature to show that the stereotype of machines as dark and threatening does not hold up under close scrutiny. Rather, Ketabgian argues that representations of machines, in particular the factory and the dual-acting steam engine, reshaped the way in which the human psyche, and its emotional and mental life, were viewed in Victorian literature and culture. This fascinating exploration of the connection between the mind and the machine revisits some of the key novels of the Victorian era. Ketabgian focuses, for example, on emotional machines and emotional workers in Charles Dickens' *Hard Times* to show how the emotional life afforded the "melancholy mad elephant" factory machines reflects fears of unpredictable violence in the working class of Coketown. She finds a similar relationship in the threat of steam-power in George Eliot's *Mill on the Floss*. The conflicts that surround mill mechanization in Eliot's novel are in fact reflective, argues Ketabgian, of Maggie and Tom's emotional turmoil and

imbalance. This turn towards the emotions of machines demonstrates that the machine was not to be avoided and feared in the Victorian era but was in fact a significant actor in understanding representations of the human.

Recent scholarship has also focused in on the role of the physical body in industrial anxiety. For example, Peter J. Capuano, in *Changing Hands* (2015) uses the human hand as a lens through which to explore the social, religious, scientific and mechanical upheavals that were overtaking the nineteenth century. He argues that scientific and industrial changes are responsible for the shift in focus "from gaze to grasp" in Victorian literature (Capuano 19). His exploration focuses on Victorian representations of the hand to argue that rapid industrialization and the advances of evolutionary theory brought the hand into new significance in the nineteenth-century. Unlike much previous work on the hand, Capuano does not explore the symbolic hand, but is rather invested in the physical, fleshly hand. He argues that the hand has been "hidden in plain sight" across Victorian literature and culture, and insists that it holds a central place (11). Capuano explores the many contexts in which the hand appeared in the Victorian era, from evolution, to female needlecraft and handwork, to the individuality of handwriting. But Capuano's most provocative exploration of the hand is in his examination of the threat that industrialization brought to the hand, both physically and symbolically. There is a cruel irony, notes Capuano, in the hand's position in industrialization: it became both "the most valuable and most vulnerable part of the human body for a factory worker," since it is the primary means by which factory workers could earn a living, but was also the part of the body most often irreparably damaged by the factory machine (48). This industrial centrality to depictions of the hand, shows Capuano, led to interesting ends. Exploring Charles Bell's 1833 treatise *The Hand*, Capuano demonstrates how this best-selling account of human anatomy

brings in the language of divine design; the hand was designed to be a perfect appendage by God, and therefore any sense of machine perfection necessarily pales in comparison to the divine perfection of the human hand. This conflict between machine perfection and divine perfection, argues Capuano, colored representations of the hand throughout the rest of the century.

This study builds upon the work of scholars such as Ketabgian and Capuano and attempts to fill the niche left open between their books. Following from Ketabgian, I argue that the machine in the Victorian era had a significant impact on understandings of the human. However, rather than focusing on the mental and emotional human, I focus on the physical body of the human. But this physicality is more extensive than Capuano's hand alone; I consider the body as a whole. My argument insists that the human body was a key mover in understanding how the Victorians responded to the machine, industrialization, and how understandings of human diversity changed in light of these new mechanical devices. But even more than this, I push beyond the bounds of industrial development in the Victorian era to take into account the significant changes in genre fiction that began to occur at the end of the century. Beginning with how the physical human body interacts with the machine in factory fiction, I trace the way in which the factory worker laid the foundations for conceptions of the robot as it began to appear at the turn of the century. In tracing this connection between mechanized bodies in the mid- and late-century, I look at how medical prostheses contributed to thinking about the mechanization of the human. While the machine was often depicted as a prosthetic to the human, and occasionally the human as a prosthetic to the machine, the third step in this process was viewing the prosthetic itself as a machine. While it may seem haphazard to discuss the machine and the medical prosthetic in tandem with one another, early literary representations of robotics no longer drew a distinction between machine, body and prosthetic—they were all one entity.

The aim of this chapter is to illustrate how comprehensive was the integration of the machine into the body in the Victorian era. In that vein, I survey the way in which a myriad of written accounts, from literature, to periodicals, to medical and official reports, similarly explore the enigmatic body of the human-machine interface. Beginning in the 1840s with Fanny Trollop's *The Life and Adventures of Michael Armstrong, the Factory Boy* (1840), I show how the interior of the factory was eschewed in favor of depicting the effects of machines on the bodies of factory workers. Although factory fiction did not depict the factory interior or the workings of factory machines, it did explore how this mechanical environment altered the human body; Trollop's characters become physically distorted by their proximity to machines, while the mill workers in Elizabeth Gaskell's *North and South* (1855) carry the taint of the machine outside the factory where it transforms all life in a northern mill town.

While the brutal realities of an injured body may be obscured in fictional accounts of factory conditions, this silence around mangled bodies is broken in non-fictional arenas. Medical accounts of factory dismemberment published in *The Lancet* and investigative journalism published in *Household Words* in the 1850s, for example, show the brutal realities of getting too close to the machine. The proximity of the human body to the machine can, on the one hand, transform the body into a prosthetic to the machine; on the other hand, it also risks injury to the body that necessitates that the factory worker herself obtain a prosthetic.

Although the factory and its machines faded from the literary landscape towards the end of the 1850s, its injured workers remained on the periphery of realist fiction. Often disguised as deviant bodies either physically or in their characteristics, these human-machine interfaces break into accounts of the normative human condition. They can be seen in especially the fiction of

Charles Dickens as bodies that exude mechanical elements—their minds run like the railway, they move like steam engines, or even get transformed by the prostheses they wear.

I conclude this investigation of the human-machine interface by looking at the way in which labor and machinery are taken up as central tropes in the rising science fiction genre. Here, we see how elements of the factory worker that were sidestepped in literature since the 1840s appear as central, activated and powerful figures. The mechanical prosthetic becomes the body itself in Edward Bulwer-Lytton's *The Coming Race* (1872) and H. G. Wells' *The War of the Worlds* (1896), transforming the factory worker from a body in conjunction with the machine to a body as machine.

Mechanization in Factories, Novels, and Prosthetics

Questions about the role of the human in an increasingly mechanized world began to be raised during the Industrial Revolution—the period of mechanical and industrial growth that overtook England between the 1770s and 1840s. Although critical studies since the 1980s have questioned exactly how rapidly this revolution took place,[17] it was nonetheless a period of extreme upheaval across England: the population moved from rural areas into urban centers, shifting from a largely agrarian society into an industrial one (Bailey xiv). As the population in urban centers increased, so did a slew of urban troubles such as overcrowding, crime, and the spread of infectious disease. However, this population boom also brought with it an ample supply of workers for the increasingly productive factories that began to crop up across England.

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[17] See especially: Berg, Maxine. "A Question of Machinery ." *The Making of Britain. The Age of Revolution*. Berg argues that, despite the rise of the factory, domestic industries were not completely eradicated in the early nineteenth-century.

The cotton industry was the largest and most significant industry for Britain's growing

economic might, and thus its development illustrates most effectively the industrial explosion in

nineteenth-century Britain (Berg 25). The increase in raw cotton production in the United States

and its relative cheapness from 1800 onwards was a key factor in the rise of the cotton industry

in England (Ashworth 226). Importing cheap cotton from America, manufacturing it into goods,

and then exporting it for a large profit to countries such as India, China, West Africa and South

America was responsible for what Ashworth estimates to be about 40 percent of "all profits from

Britain's exports" (226).

Such a large production also necessitated efficient manufacturing, and the hands to

manage the machinery. Powered looms, which began to be a staple in Victorian mills in the early

nineteenth-century, harnessed cotton manufacturing innovations that had appeared in the mid- to

late-eighteenth-century (Ashworth 226). By 1833, over 100,000 powered looms, such as William

Horrock's 1803 patented powered loom, were used within British mills. Another factor in the

increase of such machinery in the cotton mills was the shift to steam power. With the fall in the

price of coal in the 1840s, factories and mills could switch from waterpower to steam power,

allowing for a rapid increase in production (Ashworth 227). This rise in the number of powered

looms corresponded to an explosion in the number of cotton mills in the north of England; by

1835, 1,113 cotton mills crowded the industrial north, employing around 219,000 hands, a

number that would increase to well over 400,000 by the 1870s (Ashworth 225, Cook 209-10). By

the middle of the nineteenth-century, 38 percent of England's working population worked in

factories (Simmons 337).

The increase in mill and factory mechanization also brought with it a change in the

population employed in these mills; the Victorian era saw a shift from largely female and child

factory workers to increasingly more men managing the machinery. Some scholars estimate that 75 percent of factory hands were women and children in the early half of the century (Berg 27). While in 1818 over half of the hands employed in mills and factories were women, with the remainder being composed of men and a not insubstantial percentage of children, by the mid-century attitudes to women's place in the home and women's inability to manage the new machinery saw a rapid decline in the number of women employed in factories (Ashworth 227).

The passage of labor laws throughout the century also contributed to the decline of women and children working in factories. The passage of the Factory Act of 1802, for example, limited the hours a child was permitted to work in a factory to twelve; later amendments to this act also limited children from night work and required some form of education to be provided to employed children (Simmons 338). Only in 1819 did further amendments to this act restrict the age at which children were allowed to be employed in factories: a child under sixteen was not permitted to work for more than twelve hours a day, while cotton mills were not permitted to employ children under the age of nine. However, mill owners who did not comply with these new regulations suffered only meager fines, and therefore improvements were minimal at best. It was only with the Ten Hour Movement and the passage of the Ten Hours Act in 1847 that significant changes to factory and mill labor conditions were seen across the population; men, women and children were not permitted to work for more than ten hours a day in factories (Ashworth 225-26).

The factory novel, which brought to the attention of the middle-class the conditions under which the working class labored in England's factories and mills, played a significant role in promoting and passing such labor laws. A sub-genre of the Condition-of-England novel, factory fiction flourished in the early Victorian era when both fictionalized accounts of factory

conditions and first-hand accounts from one-time factory workers began to appear. The most influential of these came from Robert Blincoe, who spent his childhood working in the cotton mills of northern England. *A Memoir of Robert Blincoe* was published in 1828 by Charles Brown and was perhaps the most famous factory narrative of the Victorian era; it inspired not only political reforms but also a slew of novels that explored child labor in England's factories (Simmons 339-40). This early form of factory fiction, however, also received criticism for its moralistic tone and its depiction of characters in often-unrealistic terms—for example, the ever-evil factory master and the angelically good working child. The factory novel was significant for the reforms it inspired in the working conditions of children: Robert Blincoe's testimony in 1833 lead to reforms in child labor laws, and Fanny Trollop's *The Life and Adventures of Michael Armstrong, the Factory Boy* (1840), inspired by Blincoe's memoir, played a crucial role in activating the Ten Hour Movement (Simmons 340). But once many reforms to child and female labor rights had been undertaken by the 1850s, this form of the genre began to fade, to be replaced by the industrial novels that we are more familiar with today—novels such as Charles Dickens' *Hard Times* (1854) and Elizabeth Gaskell's *North and South* (1855). This more mature instantiation of factory fiction no longer relied as heavily on the moralistic tone that defines the early factory novel; rather, its characters had more depth, struggled with their conscience, and were no longer simply evil because they owned a factory or simply good because they labored in the mills for their daily bread (Simmons 348).

As the century progressed, the factory novel faded almost completely from the literary landscape. The realist novel took its place as the widely popular and widely read genre of the mid- and late-Victorian era. This most Victorian of genres is deeply concerned with exploring the human condition. Although the factory worker was a part of the human landscape, she does

not appear in this genre. Rather, she crops up time and again on the periphery of narratives in new guises, exhibiting new ways for the machine to enter and influence the human body. But these bodies are not peaceably depicted in the realist novel. Because they have been altered by the machine and thus in some way dehumanized, they are not central characters to the human condition. Nevertheless, as I argue in this chapter, injured bodies reflective of the factory worker fascinate the realist authors to such an extent that they appear time and again as oddities across the realist opus: bodies that are portrayed as deformed, bodies that require the assistance of prosthesis, or bodies that metonymically exude mechanical attributes, especially in Dickens' fiction. The human-machine interface reappeared as a central literary trope as science fiction literature began to flourish towards the end of the nineteenth-century. This new genre transforms the factory worker from a partially mechanized entity into a wholly technological one; it becomes a machine, a robot, a body that has fully embraced the possibilities of industrial machinery.

Although the labor theories of Karl Marx may appear to be central to such claims of human mechanization, they in fact play only a peripheral role in my project here. While Marx was certainly concerned with the effects of mechanization on the bodies of workers, his focus was primarily on the mechanization of the factory system as a whole. I, on the other hand, seek to explore a more focused element of this system: the physical bodies of workers and how the written artifacts of the Victorian era struggle to understand and come to terms with these bodies that have been physically maimed and altered by the machines.

Central to this exploration of mechanized bodies in Victorian era is the role of medicine in treating the injured bodies of factory laborers. Amputations and prosthetic limbs were a frequent feature of the Victorian landscape. Because of the advances in machinery and the rise in

factory work, the laboring class in the Victorian era was one of the largest recipients of

prosthetic limbs, second only to war veterans (Mihm 290). The large conflicts in the nineteenth

century, such as the US Civil War and the Crimean War, were the primary drivers behind

improvements in methods of amputation and prosthetic technologies (Ott 14). The use of

anesthesia and chloroform beginning in the mid-nineteenth century allowed surgeons to advance

techniques of amputation rather than having to rush through a surgery in which the patient was

conscious and writhing in pain on the operating table; and antisepsis and disinfection that began

appearing in the 1870s allowed more patients to survive the operations rather than succumbing to

infection (Ott 13).

But most revolutionary were the advances in prosthetic technologies. Whereas prior to

the eighteenth-century prosthetic legs had not advanced beyond the rudimentary wooden peg leg,

the mid-eighteenth century saw new developments in prosthetics. For example, the "Anglesey

leg," a forerunner of advanced prosthetic technologies, was an above-the-knee prosthetic

developed for Lord Uxbridge after his leg was shattered and amputated during the Battle of

Waterloo, used a series of iron cogs and gears "to approximate the movements of an actual limb"

(Mihm 284). This approximation of a joint allowed the leg to bend, something that the simple

peg leg could not do. As revolutionary as such technologies were, they were still rudimentary;

according to Stephen Mihm, who explores Victorian attitudes towards prosthetics in "'A Limb

Which Shall Be Presentable in Polite Society': Prosthetic Technologies in the Nineteenth

Century" (2002), the Anglesey prosthetic and other early mechanical prosthetics were loud,

broke frequently, and required regular and profuse oiling.

A combination of changing Victorian attitudes, however, lead to the greatest

improvements in prosthetic technologies. As the Victorians began to conceive of the human body

as a machine, they transferred this attitude to prosthetics as well (Mihm 284). By combining different materials, such as ivory, leather, rubber, and steel, prosthetic technologies attempted to "replicate the workings of the human body": a ball of ivory served as a joint, and rubber or leather functioned as the muscles, allowing for smoother and more natural movement. At the same time, Victorian emphases on external presentation also spurred prosthetic developers to create ever-more lifelike limbs. As Mihm remarks, Victorian culture was deeply concerned with reflecting internal morality in external appearances (287-89). The taint of deformity for middle class amputees was to be avoided at all costs, and therefore the majority of prosthetic developments were geared towards the middle class (292). However, for the lower and working classes, prosthetics were not meant to conceal disability, but rather to allow the wearer to remain employed. Function and reliability were the key elements in working class prosthetics, not innovation and an approximation of natural movement. Thus, the disabled working body continued to be visibly associated with the machine through displaying its prosthetic technology.

There are, however, pitfalls in examining this connection between prosthetics and working bodies, of which scholarly investigations of prosthetics in twentieth- and twenty-first-century society are critical. David Serlin, in *Replaceable You: Engineering the Body in Postwar America* (2004), traces the connection between prosthetic developments and industrial mechanization following the Second World War and the Cold War. While, for example, the USSR may use a set of technologies to develop a prosthetic arm, Serlin shows how the USA used the same technology in an industrial setting (49). However, Serlin, like other scholars of the history of medicine and disability studies, takes issue with the scholarly tendency to equate prosthetics with cyborgs. Depicting amputees as cyborgs fails, claims Serlin, "to give agency to the people who use prosthetic technology every day without glamour or fanfare" (26). Katherine

Ott, in "The Sum of Its Parts: An Introduction to Modern Histories of Prosthetics" (2002), is similarly critical of this trend to forego the lived realities of obtaining and living with a prosthetic in favor of emphasizing the cyborg aspects of prosthesis. "The material and social tales of prosthetics," insists Ott, "provide a more intimate and compelling history of embodied technology than any postmodern cyborg can account for" (Ott 3). Rather than telling a story of domination of human over machine or of human-machine integration, the history of prosthetics, insists Ott, is a story of how the "evolution and design of technologies of the body are intertwined with the subjective and practical needs of people" (Ott 5).

But Victorian depictions of injured bodies and machines dance dangerously close to this tendency to think of machine-human integration. Rather than being critical of such an equation, I seek to understand what made this connection between the working body and the working machine so provocative to Victorian writers and thinkers. The connection between labor and the prosthetic is provocative for two reasons. First, because of the bodily risk involved in working with machinery, many factory and mill workers sustained injuries that necessitated the use of prosthetics. Second, the laborers themselves function, to a certain extend, as prosthesis to the machines. In this way, the prosthesis is both metaphorically and physically central to the Victorian factory; any explorations of the one must take into account the other. And Victorian authors certainly did portray this connection to great effect in their writings.

Factory Fiction and the Machine Body

The factories of the Industrial Revolution are a defining characteristic of the Victorian era and of its literature. Their chimneys rise above the houses of manufacturing towns, their smoke spews into the sky, and they generally mark the march from a pastoral to an industrial England. However, for all of their physical dominance, factories are rarely entered in the industrial novels

of the Victorian era, and their machines are still more seldom described. When exploring the

Victorian factory, scholars of industrial fiction dwell largely on the class relations that lurk under

the surface of factory fiction, the role that such fiction played in publicizing the inhumane

conditions of the factories, and especially how factory fiction assisted in instigating labor law

reforms in the mid-nineteenth century. In *The Industrial Reformation of English Fiction: Social*

Discourse and Narrative Form (1985), Catherine Gallagher explores the formal inconsistencies

in industrial fiction in order to argue that they critique the conditions of industrialism not only in

their content but also in their form. Patrick Joyce, in *Work, Society, and Politics: The Culture of*

the Factory in Later Victorian England (1980) explores how mill mechanization in Lancashire

versus the West Riding effected social relations between workers and masters; he argues that,

rather than creating social disruption, mechanization in Lancashire actually inspired a new social

harmony. And James Richard Simmons Jr. in "Industrial and 'Condition-of-England' Novels"

(2002) traces the way in which factory fiction instigated labor reforms between the 1820s and

1850s.[18] Although such critical investigations of the factory in Victorian fiction are significant

contributions to understanding the role that writing played in factory reform, they nonetheless

shy away from exploring the machines themselves. Only Stephanie Higgs, in her dissertation

"Invisible Threads: Fictions of Cotton in the Anglo-Atlantic Triangle, 1833-1863" (2016), has

remarked on the oversight in both fiction and criticism to enter the factory and explore the way

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[18] Early accounts of factory conditions, such as John Brown's *A Memoir of Robert Blincoe*
(1828), inspired an outcry amongst both working and middle-class readers at the conditions
under which young children worked in northern mills (Simmons 339-340). Such accounts also
inspired activist authors, such as Fanny Trollop, to visit factories and write their own
fictionalized accounts of working conditions, which in turn became evidence for necessary
reforms on especially child labor laws (340-341). As factory conditions improved, the genre of
factory fiction also matured, shifting from moralistic accounts of factory workers' fight against
their evil masters to more nuanced and realistic accounts, such as those written by Elizabeth
Gaskell, of the give-and-take necessary for true reform to take place (Simmons 349).

in which the machines work. While the workings of factory machines may be invisible in both fiction and scholarly writing, they make a displaced appearance in realist novels via the bodies of workers once they emerge from the factory.

By depicting the taint of the factory on the body of the factory laborer, novels such as Francis Trollope's *The Life and Adventures of Michael Armstrong, the Factory Boy* (1839) and Elizabeth Gaskell's *North and South* (1855) connect the human to the machine. This connection, however, goes beyond the tradition of theories of labor and industry introduced by Marx in the mid nineteenth-century. In *Capital: A Critique of Political Economy* (published in 1867; translated into English in 1887), Marx acknowledges that in the factory the laborer is turned into a cog in the machine: "Machinery is put to a wrong use, with the object of transforming the workman, from his very childhood, into a part of a detail-machine … in the factory, the machine makes use of [the workman]. … it is the movements of the machine that he must follow" (Marx 285). In realist fiction, the effect of machines on workers goes beyond dehumanization; workers do not lose their humanity, but rather meld with the machine to create a human-machine interface—a being that is both human and machine. The human that works with the machine is akin to a machine-prosthetic; it can be removed, added and replaced. Through this close relationship, aspects of the machine whether physical or behavioral infiltrate the human body. The factory worker is thus a part of the machine when working at the machine, and a proxy for the machine when apart from it.

For all of the attention that industrial fiction pays to life in factory towns and the lives of factory laborers, the genre remains largely distant from the factory itself and especially from the machines that throng the factory interior. One of the first factory novels was Fanny Trollop's 1840 *Michael Armstrong*. Widely read at the time of its publication, *Michael Armstrong* has

received critical attention because of the significant role it played in promoting the Ten Hours Movement and eventually the passage of the Ten Hours Act (1847) (Simmons 340). However, literary investigations of this novel have been either sparse or critical. Gallagher, for example, refers to *Michael Armstrong* as a "deliberately shocking piece of propaganda" (127), while Simmons calls it "melodramatic" (340). Despite these reactions, howevr, recent critical explorations of the novel have focused largely on how *Michael Armstrong* comments upon social issues, and especially the role of gender in factory reform fiction.[19] But I contend that *Michael Armstrong*'s key significance comes in its rare exploration of the factory interior.

Unlike most factory novels of its time, *Michael Armstrong* depicts the melding of machines and workers' bodies. *Michael Armstrong* focuses solely on child factory laborers, the conditions under which these children work, and the adverse health effects of factory labor. The novel follows two intertwined narratives as they depict factory labor. The first narrative follows a young factory worker, Michael Armstrong who is temporarily adopted by a wealthy mill owner as a demonstration of the mill owner's benevolence. However, Michael displeases the mill owner by crying out when he is beaten and, as a punishment, Michael is bound as an indentured apprentice to Deep Valley Mill where he must work until his twenty-first birthday. Barely surviving an outbreak of fever, Michael is eventually able to escape the factory at the age of fourteen. The second narrative follows the intellectual coming-of-age of a young and independent heiress, Mary Brotherton, who becomes aware of the conditions in which children must work in the textile factories of northern England. In her quest to find out what has happened

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[19] See, for example: Carolyn Betensky's "Knowing Too Much and Never Enough: Knowledge and Moral Capital in Frances Trollope's: *Life and Adventures of Michael Armstrong, the Factory Boy*;" Susan Walton's "Industrial Sightseeing and Frances Trollope's *Michael Armstrong, the Factory Boy*;" and Dorice Williams Elliott's "Servants and Hands: Representing the Working Classes in Victorian Factory Novels."

to Michael Armstrong, Mary enters textile mills in which children labor at the machines. The novel ends with a happy reunion in which the wealthy Mary Brotherton arranges the education of Michael, his brother, and Michael's factory friend, Fanny Fletcher. This dual narrative structure allows Trollope to dramatize the realities faced by young factory laborers, to show how the upper classes were affected by these labor conditions, and to instruct the upper class on how they can act to change these conditions.

As far as I can determine, *Michael Armstrong* is unique among Victorian novels for entering the factory. All the same, the description of the factory interior disappoints a reader who wants to see how the machines work: despite mentioning the machines and briefly alluding to their movements, most descriptions focuses on the bodies of the children working at the machines. A young *"scavenger"* girl of "about seven years old" is described as she dances dangerously between the machines (Trollope 80 emphasis original). She must,

> collect incessantly from the machinery and from the floor the flying fragments of cotton that might impede the work. In the performance of this duty, the child was obliged, from time to time, to stretch itself with sudden quickness on the ground, while the hissing machinery passed over her; and when this is skillfully done, and the head, body and outstretched limbs carefully glued to the floor, the steady-moving but threatening mass, may pass and repass over the dizzying head and trembling body without touching it. But accidents frequently occur; and many are the flaxen locks, rudely torn from the infant head, in the process. (80-81).

Although the girl is working with the machine, the machine is barely described: it can be surmised that there is a small space between the bottom of the machine and the ground in which a slim child could fit; and it is apparent that the machine is loud and quick. But the mechanics of the machine are left unspoken. Rather, the focus of this description is the child and the way in which her body responds to the machinery. Significantly, the machine enforces an alteration of the human body. While theorists of labor such as Marx have read this kind of human adaptation to the machine as dehumanization, this careful dance between human and machine shows that

the human is forced to adapt itself, accommodate its motions and sometimes, horrifically, its limbs, to the whirling metal monster. The scavenger girl becomes a prosthetic to the machine when she performs the actions that the machine cannot perform for itself, namely crawling to retrieve the clogging wisps of cotton. She is depersonalized as "it" when she stretches herself "with sudden quickness." Likewise, her body parts are described without reference to her identity: "*the* head, body and outstretched limbs" and "*the* dizzying head and trembling body" are not ascribed directly to the girl, but rather appear as free-floating limbs. The use of pronouns emphasizes these moments of becoming a prosthetic; each of these instances of depersonalization describe her ability to work well with the machine, not her identity as human. While dancing this work-dance, the girl becomes a prosthetic, just another part of the machine to allow for its smooth running.

Although this scene with the scavenger takes place within the factory, it is one of the only scenes in *Michael Armstrong* that actually describes the factory workers. More frequently, the bodily effects of working with the machines—the coughs, the memory of the machines, the physical ailments—that alone are permitted to exit the factory. Although the primary aim of such depictions is to incite sympathy and to encourage factory reform, these depictions of factory laborers also point to the way in which the factory and especially the machines were seen to meld with the humans that had regular contact with them.

Agile as is the child worker who survives inside a factory, when this same child's body leaves the factory, it stands out. The crippled and mad Sally is just such an example of a body that signifies as exceptional outside the factory. Sally worked as an indentured apprentice at Deep Valley Mill as a child and is, as she puts it, the "only old woman in the world"—the only indentured apprentice child to have survived the mill. She escaped the mill while still a child, but

not before both her body and her mind were altered by the harsh conditions. Stooped and stunted, the influence of the factory on Sally's body is unmistakable: "her gait showed that her legs were dreadfully deformed, her uncouth garments hung about her in tatters, and … she painfully rolled herself at every step round the stick by whose aid she was supported" (267-68). Sally's body has adapted to the machines at which she worked in her childhood, shaping the way she moves: the way in which she "[rolls] herself at every step round the stick," a motion that reflects the rolling of the machine over the flattened body of the scavenger. However, Sally's movements are not agile, nor as smooth as those of the scavenger. Rather, she moves "painfully" and requires support for her every step. Her body is not only deformed *by* the machine but is a proxy *for* the machine. Through her prosthetic aid (the stick) and her artificial gait, Sally has become a twisted reflection of the machine that blighted her life.

This blight extends beyond the physical and into Sally's mental state as well. The novel insists that Sally has been driven mad by the repeated beatings that she received as a child, the multiple failed attempts at escape, and the overall effects of working in the unhealthy environment of the mills. However, this is a selective madness; although Sally may "talk nonsense about the moon sometimes, and is very wild when it comes to the full," she "never makes any blunder when she tells of her own troubles at the factory" (270). The use of the word blunder is significant here. Again, it recalls the scene with the scavenger, and the warning that "accidents frequently occur" in the mills (81). Sally's lucidity when she recalls life in the mill illustrates that she is still mentally living within the factory setting, where precision is a matter of survival. The factory, and with it the machines, have overtaken her to such an extent that they also dictate her sanity. The machines have become a part of Sally's speech patterns, and they are the only things that allow her mental lucidity. Even in a novel like *Michael Armstrong*, which

passionately advocates against the harsh conditions of working in factories and with the machines, the machines become a defining aspect of the characters that have interacted with them.

Similarly, in Elizabeth Gaskell's *North and South* (1855), the factory machines are hyper-visible not through their whirring cogs and straps but through the bodies of the factory workers. Set in the industrial town of Milton Northern, *North and South* explores the combative meeting-of-worlds when a southern family relocates to the wild industrial north of England. Focusing primarily on the southerner Margaret Hale's assimilation into this northern industry town, *North and South* explores the conditions in which the laboring class lives and works. Margaret becomes fast friends with a one-time mill worker, Bessy Higgins, who has had to retire from mill work in her late teens due to the respiratory maladies brought on by working in the mills' cotton-filled air. Before Bessy dies of respiratory failure, she reveals to Margaret and the readers of *North and South* just how pervasive are the machines over the lives of those who interact with them. Indeed, the textile industry touches all aspects of work-life in Milton and all aspects of human life: the mills dominate the landscape, fill the town air with their smog as the cotton particles fill the air inside the factories; and the machines likewise dominate the lives of the workers, requiring them to adapt their day-to-day lives to the rhythms of the machine.

This novel has attracted critical attention for its engagement in political reform and the strike culture of the mid-century, as well as for its exploration of gender and domesticity in industrial England.[20] As Stephanie Higgs has shown, however, the novel never enters the factory

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[20] For example: Beatrice Bazell, in "The 'Atrocious' Interior: Wallpaper, Machinery and 1850s Aesthetics in *North and South*," discusses how domestic motifs such as wallpaper echo the motifs of social critique central to the novel. Catherine Gallagher focuses similarly on the private versus the public sphere, but rather in the context of metonymy. *North and South*, Gallagher notes, does not follow the metaphor of father-children that dominated language around the

itself; we never see the laborers at work with the machines that dictate their lives. True, the novel

does enter the mill yard, and hears the "continual clank of machinery," and even speaks with the

laborers (Gaskell 111). But it never depicts them at work alongside the machines. Nevertheless,

the machines are present and even visible in this novel in the bodies of these workers. Erin

O'Conner has noted the melding of workers bodies in *North and South* with the machine in *Raw*

Material: Producing Pathology in Victorian Culture (2000) in the context of pathology.

"[I]ndustrial diseases," writes O'Connor, "embody a process by which the material body and the

raw materials of industry become hopelessly intertwined" (O'Connor 10). But this intertwining

goes beyond merely pathology. It is also a binding of the biological body with the body of the

machine. The workers carry the taint of the machine in their bodies and out of the factory. In this

way, the machines enter the wider human environment of the novel, creating machine prosthesis

of the humans in the industrial north.

The sway that the machines hold over the human lives around them is apparent in the

way in which every aspect of life in Milton is influenced by the factory machines: "There were

no smock-frocks, even among the country folk; they retarded motion, and were apt to catch on

machinery, and so the habit of wearing them had died out" (Gaskell 59). The influence of the

machines has spread beyond the factory too. Not only do the machines influence the laborers, but

they influence the entire population of the town as well:

> In such towns in the south of England, Margaret had seen the shopmen, when not
> employed in their business, lounging a little at their doors, enjoying the fresh air, and the
> look up and down the street. Here, if they had any leisure from customers, they made

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mater-man relationship, but instead employs metonymy to connect the private to the public
sphere through the moral influence of women (167-70). Conversely, Elizabeth Starr, in "'A
Great Engine for Good:' The Industry of Fiction in Elizabeth Gaskell's Mary Barton and North
and South," turns to *North and South*'s utilization of literary motifs to navigate the industrial
landscape. Communications between the classes are modeled, argues Starr, on norms of writing
and fiction.

themselves business in the shop—even… to the unnecessary unrolling and rerolling of ribbons. (Gaskell 59).

In fact, the machines' influence has gone perhaps even outside the bounds of Milton, "even among the country folk." Fashions have become more machine-friendly: the excess frills and fabric that could get stuck in the machines have been abandoned. Humans have rather altered their clothing so that they can more safely and effectively collaborate with the machines. Even those who do not work directly with the machines have adapted to the style of work necessary for working in close collaboration with machines. For example, the shopkeeper's incessant movements reflect the never-ending movements of the machines; and their "unrolling and rerolling of ribbons" reflects the repeated rolling to and fro of the spinning mules that dominated textile factories. The machines have infiltrated life in Milton so thoroughly that the human bodies begin to take on aspects of the machine, whether in their clothing or in their movement.

But it is the infiltration of the human body by the machine that reveals the suppressed presence of the human-machine interface. The workers bodies display the mark of the machine, a mark acquired within the factory and then transported into the outside environment. Margaret Hale's friend, Bessy Higgins, displays this machine-taint most clearly in *North and South*. Bessy spent her childhood working in the mills in and around Milton, before having to retire because her health could no longer withstand the conditions in the mills. While she has left the mills, Bessy still carries them in her body, and the mill machines still dictate all aspects of her life. In the midst of a coughing attack shortly before her death, Bessy confesses that,

> all I've been born for is just to work my heart and my life away, and to sicken i' this dree place, wi' them mill-noises in my ears for ever, until I could scream out for them to stop, and let me have a little piece o' quiet—and wi' the fluff filling my lungs. (Gaskell 101)

Bessy's body reflects the structure of the mill: like the mill-interior, she has "fluff filling [her] lungs" and the incessant "mill-noises in [her] ears." Bessy's body is akin to the factory here,

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filled with the detritus of machines; it is not her own, not entirely human. Through this infiltration of her body, Bessy is unable to properly escape the machines despite being away from them—they have become a part of her. Indeed, they are so much a part of her that her entire identity centers on being a part of the machines: like a machine, she has been "born for … work."

Indeed, while this overtaking of the human by the machine occurs on the micro scale in *North and South* in Bessy's illness, it is also the overarching narrative of the novel. The southern lady learning about, accepting, and eventually moving permanently to the north is not only a narrative of England having to unite in the new industrial age and accept its industrial prowess. It is also a narrative about the wider overtaking of English culture by the machine. The romance that develops between Margaret Hale and the northern mill-owner John Thornton reveals what it takes for Margaret, and by association the south, to become assimilated to industrial mechanization. As a mill owner and a northerner, Thornton is as much a part of the machines of his mills as are his workers. Only when Margaret has returned to London and to an indolent life of leisure does she realize just how pervasive was the mechanization in the north: "her thoughts went back to Milton, with a strange sense of the contrast between life there, and here. …There might be toilers and moilers there in London, but she never saw them; the very servants lived in an underground world of their own" (Gaskell 364). Milton seems to draw her mind time and again; having had contact with the mechanized life of an industry town, Margaret seems unable to let it go. For Margaret to realize that the machine is a part of her life, she must be temporarily removed from it, temporarily realize that she longs for a life in which the wheels of industry and the taint of the machine is visible across the environment. And when she has a "strange undefined longing to hear that Mr. Bell [her guardian] had gone to pay one of his business visits

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to Milton," her longing to hear about Thornton is a proxy for her longing to be reconnected with the human-machine interfaces of the north (Gaskell 393). Therefore, when the novel concludes with the reunion and betrothal of Margaret and Thornton, it goes beyond the completion of the love plot; it symbolizes Margaret's assimilation into the machine. By marrying the northerner and returning to Milton, she enters into the human-machine interface that defines not only this northern town but was beginning to define industrial Britain.

Beginning with the earliest Victorian factory fictions, authors cannot escape the connection between the bodies of workers and the machines at which they work. In *Michael Armstrong*, the scavenger girl and Sally have both adapted to the movements of the machine, moving with the machine in order to survive. Bessy's body is similarly linked to mechanization; the machine has entered her physically through her respiratory infection and the incessant mill noises that throng her head. Although factory novels are largely concerned with advocating for reforms in labor conditions, they nonetheless cannot escape the role that the machines have, for better or worse, on the bodies of factory laborers.

Machines and Dismemberment in Non-Fiction

This interest in the effects of the factory on the bodies of workers was not confined to the coughs and bodily ailments alone. Non-fiction writing that explored the physical effects of factory work, especially writings from the medical and the journalistic fields, exhibited a fascination with the gruesome injuries that factory machines inflicted upon the bodies of workers. By exploring the dismemberments and deaths received at factory machines in often-gruesome detail, medical and journalistic writings also explored the deep uncertainty around how to perceive the body post-machine injury. On the one hand, the human body appears as a

mechanical contrivance to be understood and, if necessary, repaired; on the other hand it is a sentient body that experiences pain and emotions. By dancing between these two interpretations of the human body post-injury, both medical and journalistic writings reflect the uncertainty about what to do with these machine-altered bodies that existed in the Victorian psyche: were they human or were they machine?

Medical writing predominantly took up the stance of depicting these bodies as mechanical contrivances that had malfunctioned and needed to be repaired. Because of the significant shift in medical practice and knowledge that occurred during the nineteenth-century, the professionalization of Victorian medicine has garnered extensive critical attention. The mid-nineteenth-century saw a shift away from lay, or untrained medical practice to a clinical model that used tests and scientific tools for diagnosis.[21] As historian of science Roy Porter notes, before "the clinic" appeared in the mid-nineteenth century, there was no such thing as the "patient" who "put himself 'under the doctor'", but rather a sick or ailing individual who "*opted … to put themselves in relations with medical practitioners*" (Porter "Introduction" 3 emphasis original). However, with the birth of the clinic and standards in medical education and practice,[22] the patient became merely "the raw material, the unwitting bearer of a disease or lesion" which

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[21] See especially Mary Wilson Carpenter's *Health, Medicine, and Society in Victorian England* (2010), in which she traces the role that medical tools such as the microscope, the stethoscope, and testing had on medical practice. Discussing such tools, Carpenter writes, "Practitioners became like prophets, able to see things about the body that were not visible to the naked eye, and thereby to forecast the patient's future, though they were not necessarily able to make any therapeutic intervention in that future. Patients were no longer the first authority about their bodily condition; with his, or sometimes now her, array of specialized knowledge about the body, the doctor had become the first and most valid authority. In the hospitals of the late nineteenth century, patients found themselves seen as cases: they were exhibits to be studied and demonstrated to classes of medical students, sometimes to be written up in case reports and published in medical journals for the benefit of other doctors. Publication, of course, also enhanced the doctor's own prestige and standing with peers" (Carpenter 5).

[22] See Meegan Kennedy's discussion of the professionalization of medicine and its integration into the novel in the nineteenth-century in "The Victorian Novel and Medicine."

the doctor examined (Porter "Introduction" 2). Michel Foucault, in *The Birth of the Clinic: An Archaeology of Medical Perception* (1963), terms this new method of treating and diagnosing patients the "medical gaze." The medical gaze performs diagnoses, on the one hand separating the patient's personhood from her body, and on the other hand transforming the doctor into a quasi-sage, able to deduce information abut the patient's body unknown to her and other non-professionals. In this model, the human body is separated from any notions of individuality, becoming a tool for exercising and obtaining new knowledge. Scholars have continued Foucault's focus on the body of patients by exploring how the shift away from a lay model of medical practice altered the status of the ailing body in medicine;[23] the status of the female ailing body;[24] and the significance of healthy bodies in Victorian culture.[25]

The medical journal *The Lancet* was at the forefront of publishing medical reports informed by these new medical methodologies (Kennedy "The Victorian Novel and Medicine" 459-60). *The Lancet* was also one of the non-fiction venues that published medical explorations of the human body after violent machine encounters. Launched in 1823, *The Lancet* was and still is one of the foremost journals of general medicine. In the nineteenth-century it published around 25 issues a year, with a small selection of articles discussing factory injuries and techniques of

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[23] See especially Roy Porter ("Introduction") and Mary Wilson Carpenter, who show how the patient body became an object of study rather than an ailing individual.

[24] In *The Female Body in Medicine and Literature* (2011), Andrew Mangham and Greta Depledge revisit the female body in a medical context. Moving beyond typical studies that use a solely Freudian lens, they explore how literary methodologies were incorporated into studies of the female body in nineteenth-century medicine. They consider the impact that medical contexts such as gynecology, women's surgery, and obstetrics had on literary production.

[25] In *The Healthy Body and Victorian Culture* (1978) Bruce Haley explores what the healthy body was in Victorian culture, and what was its significance. The preoccupation with health in the nineteenth-century, argues Haley, was used as a metaphor for the moral rectitude that governed Victorian culture and society. Tracing how the healthy male body was constructed through literature, periodicals and medical texts, Haley connects physical health to concepts of spiritual and intellectual soundness.

amputating or attempting to save the severely injured limbs of factory workers.

Many of the factory injuries discussed in *The Lancet* articles from the mid-nineteenth-century show that injuries sustained in factories were so severe that they often necessitated amputation. Two articles are particularly significant for illustrating how patients were portrayed during their surgery and recovery. "Severe injury to the upper part of the Arm by Machinery," appearing in an 1852 discussion of procedures undertaken at the London Hospital, describes the amputation and recovery under Mr. Poland's care of George C—, who sustained a severe arm injury while working at a paper factory. An 1857 report on procedures at the Royal Free Hospital likewise discuss factory injuries and recoveries, specifically two injuries sustained a few months apart at machinery used for biscuit baking. These two injuries each necessitated the amputation of part of the hands, which had been crushed and lacerated in the machinery. Focusing primarily on the body of the worker, these articles all frame that body as a mechanical contrivance that has been damaged and must be repaired. As though the human body has inherited some characteristics of the machine at which it works, the body is described in terms of its place within the factory industry, the effectiveness or damage to its parts, and the steps taken to ensure that it functions reasonably properly after repair.

The place of the patient within the factory system is apparent in both the 1852 account of George C—'s injury in a paper factory, and in the 1857 accounts of the biscuit-baking injuries. The 1852 case notes open with the remark that "George C—, aged seventeen, a healthy lad, of regular habits" was "employed for some years in a paper factory" ("Severe injury…" 84). Similarly, the 1857 notes remark that "D. R—, aged sixteen, … had been assisting at a factory for biscuit baking" when his injury occurred ("Royal Free Hospital" 90). In each of these examples, the workers' place is immediately identified as being with the factory. Like

specialized machines slated for one task alone, both George C— and D. R— belong within their respective factory niches. Although these are reports of injuries sustained within these factory settings, the reports are not as concerned with the injuries at the outset but are rather invested in establishing the type of patient in need of repair. Like a machine that is identified by its make, model, and year of production, the patients are identified by their age and employment—all of the vital information needed to understand what kind of machine is in need of repair.

Only after establishing this initial vital information do the medical reports turn to the injury itself. The descriptions of these injuries, however, continue the unemotional narration of the body-as-machine. George C—'s "left hand and arm were caught in the machine, whereupon the wheel completely crushed the arm in its upper third, tearing the integuments and muscles for some way above that region" ("Severe injury…" 84). George C— is divorced from his arm as soon as it is drawn, in the passive voice, into the machine. The biscuit baking accident is narrated with a similar detachment: D. R—'s

> right hand became entangled in the machinery, and much laceration was the result. Upon examination, it appeared that the thumb was torn from its attachment, and hung loose, and the metacarpal bones of the index and middle fingers were much crushed, and broken up into small fragments. ("Royal Free Hospital" 90)

In both George C—'s and D. R—'s accidents, once the appendage has been drawn within the machine, the arm is no longer associated with the worker but rather experiences the machine's power apart from the body to which the arm belongs. The pain that the worker must have experienced is not mentioned in these initial descriptions of the injuries, but rather the bare facts of what the machine did to the body, and how the body reacted to that violence. According to these initial descriptions, George C— felt no pain when his arm was "completely crushed," nor did D. R— flinch when his fingers turned into "small fragments."

Objectivity, especially when discussing severe injuries, is necessary in a medical context

in order to ascertain the facts of an injury and its repair. Foucault criticizes this medical objectivity, or the "medical gaze," that began to appear in the nineteenth-century clinical context as de-individualizing a patient, and scholars such as Carpenter and Porter have likewise shown how prevalent was the practice of viewing a patient as merely a set of symptoms or injuries.[26] In the context of injuries at machines, however, this tone of objectivity draws very little distinction between the scientific objectivity necessary to describe the workings of a machine, and the medical objectivity used in discussing injuries. The result is thus an occasional conflation between human and machine.

But this conflation is not persistent. Intermittently within the medical descriptions of factory injuries—and much more regularly within the journalistic context, as I will demonstrate below—the human being, with its feelings and its goals, breaks through the objective stance to assert itself. More often than not this occurs within the context of the hand. In both the 1852 report of George C—'s injury and the 1857 account of D. R— and his fellow's injuries in the biscuit-baking factory, the arms and hands of the boys are injured. The 1857 report opens by noting that, "The hand and forearm, of all parts of the body, are the most liable to mechanical injury, from their necessary exposure as the principle means of regulating and controlling the power of machinery" ("Royal Free Hospital" 90). As critics before me have noted, the hand took on renewed significance in the Victorian era in light of developments in the theory of evolution and beliefs that the hand and its opposable thumb were unique to the human form. Capuano has

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[26] Lorraine Daston and Peter Galison offer perhaps the most provocative discussion of the rise of objectivity in the nineteenth century. In *Objectivity* (2007), Daston and Galison trace the emergence of objectivity as a scientific practice in the mid-nineteenth century to argue that objectivity is an intrinsically collaborative endeavor. Although they do not speak about medical objectivity specifically, their claim that the visibility of the artist's hand became intrinsic to the practice of objectivity in the mid-nineteenth century is reflective of the dominance of the doctor—often at the expense of recognizing the subjectivity of the patient—in the context of medical objectivity.

recently noted that, whether present, absent, or injured, the hand is notable for its commentary upon the significance of the human body: "anxiety about the body" writes Capuano, "began to appear when the hand is dislocated, destabilized, or rendered otherwise changed by industrial mechanization and evolutionary theory" (Capuano 2). The hand becomes a stand-in for fears about what mechanical and scientific progress mean for the sanctity of the human form. While injuries to the hands and the arms of factory workers certainly do indicate a mechanical threat to the sanctity of the human form, I suggest that, within the context of factory injuries, the appearance of the hand, whether whole or injured, signifies the inability to keep the human entirely out of the objective equation. By detailing the injuries to hands, the physician acknowledges that, despite the injury and the objectivity that they must exercise, the human form attempts time and again to reassert itself.

Although hand and arm injuries were the most common factory injuries, because the workers' used their hands for almost every task at the machines, the *Lancet* articles occasionally overstep the objective stance to acknowledge the human significance of the hand. Indeed, the human significance of the hand seems to break through the clinical voice, as is the case at the close of the 1857 account of D. R—'s injury. After describing the trials of D. R—'s recovery, the article closes by noting that, "The two remaining fingers [which were not amputated from the patient's hand] admit of flexion and extension, and when educated, and aided, perhaps, by an artificial thumb, will be of the greatest service to the poor youth in writing and even prehension" ("Royal Free Hospital" 90). The human significance of the hand breaks into the middle of describing the condition of the patient's recovery with a simple "perhaps." This "perhaps" introduces human emotional depth into the stark objectivity of this medical report: perhaps the patient may be able to use his hand adequately in the future; perhaps he will be able to grasp, or

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even write.

Such moments of human feelings are, however, rare within medical writings of amputations, which place greater emphasis on the mechanics rather than the emotions of the body. The human side to factory injuries appears more starkly in journalistic writings of the mid-nineteenth century. Unlike the factory fiction of Trollope and Gaskell, which highlights the symbolism of factory injuries rather than the truthful brutality of what they actually were, journalistic articles do not shy away from the realities of working with machines. Articles on the conditions under which factory workers labored that appeared in journals such as *Household Words* show the interaction between man and machine, the moment of injury, and how the workers' bodies fare post-injury. While this descriptive objectivity does, to a certain extent, reflect the clinical objectivity of articles found in *The Lancet*, they extend the exploration further to account for the human as well as its body.

Journal articles about the conditions of English factories bring together aspects of highbrow factory fiction and the stark reality of medical writing. Like the factory fiction of Gaskell and Trollope, journalistic explorations of the factory took into account the emotional side of factory labor, from the long hours, to the poor conditions, to the dire risks under which workers labored. However, their descriptions also use aspects of medical objectivity to show the realism of factory conditions. By merging these two styles, journalistic explorations of the factories not only enter factories, but also expose the injuries that occur at the machines, something which traditional industrial fiction was unwilling to do. And like the medical descriptions of such injuries, the journalistic descriptions show the way in which machines are capable of changing the human body once that body has been fragmented.

Of the many journalistic explorations of factory conditions published in the mid-

nineteenth-century, Henry Morley series of articles published in *Household Words* between 1854

and 1856 is especially noteworthy for both its stark criticism of safety standards and for its use of

raw emotions in exploring the many instances of dismemberment that occurred because of these

lax safety measures.[27] Paul Schlicke even goes so far as to call these articles "Perhaps the fiercest

campaign Dickens wages in the pages of *Household Words*" (Schlicke 237). Scholarly

investigations of these articles focus partially on the personal conflict that arose between

Dickens, Morley and their fellow *Household Words* contributor Harriet Martineau. Martineau

published a pamphlet in 1855 that criticized Dickens and Morley's representation of factory

injuries in these articles, and a conflict that resulted in Martineau leaving the *Household Words*

staff and ending her friendship with Dickens (Schlicke 238, Fielding and Smith 410). Other

criticism looks at the relationship between these articles and Dickens' own burgeoning interest in

the factory question at this time, seen in his serialization of *Hard Times* shortly following the

publication of these articles (Bartrip 19). The purpose of Morely's articles is to denounce the

negligent interpretation of the Factory Acts by the mill owner. The Factory Acts, passed

beginning in 1833, restricted working hours in factories to a 10-hour day and sought to improve

ventilation, sanitation, and safety in factories. The aspect of the Factory Acts that Morley takes

up in *Household Words* is that of fencing off exposed machinery so as to prevent accidents—

especially workers getting tangled up into machines and thus being injured or killed. In his

articles, Morley devotes nearly as much attention to the machines as he does to the injuries that

result from workers becoming entangled in these machines.

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[27] This series of articles contains a total of eight articles, seven of which are believed to have
been written by Morley alone, and one co-authored with Dickens (Schlicke 237). However, as
Peter W. J. Bartrip notes, "It is … possible that Dickens originated the idea of a series of articles
on accidents, that he dictated its tenor, and even that he wrote large chunks of pieces wholly
attributed to Morley… [because] [Dickens] frequently replaced unsatisfactory passages with his
own material" during the editing process (Bartrip 18).

This interplay between worker and machine results in an array of injuries; unlike the injuries seen in traditional factory fiction, such as Bessy Higgins' coughs or Sally's rolling limbs, these injuries are more apparent, from dismemberment, to shattered bodies, to death. By laboring in close proximity to machines, the bodies of factory workers have been altered by and bear the mark of the machine. However, rather than merely relaying the injuries, Morley's articles add to the realities of injuries a more emotionally charged tone; almost every one of the injuries recounted in Morley's series of articles results in death. The first article in the series, published in 1854 and entitled "Ground in the Mill," provides an alphabet of factory injuries; beginning with A who, "putting a strap on a driving bully, is caught by the leg and whirled round at the rate of ninety revolutions in a minute," Morley traces a grizzly theater of injuries through the alphabet and beyond to the "many more men" who are killed "than there are letters in the alphabet to call them by" (Morley "Ground in the Mill 225). This list of injuries includes dislocated joints, fractured thighs, "an arm torn off," punctured lungs, another arm "torn off," a "left leg and right arm wrenched from their sockets," and no fewer than eight bruised and crushed bodies. The only survivor of this alphabet of accidents is "O, not killed, [but having] the hair of his head torn away" (225). Morley seems to be obsessed with the deaths that plagued factories.

However, as the figures published in the official factory inspection reports illustrate, of the many injuries that were sustained in factories, very few of them resulted in death. Published twice a year, the *Report of the Inspectors of Factories to her Majesty's Principal Secretary of State for the Home Department* collected population and safety data from factories across Britain. These reports and the investigative Factory Inspectors who wrote them were put in place to ensure compliance with the Factory Acts. One of the main functions of such reports was to

enumerate the injuries that had occurred in factories, the reason for them, and any medical measures undertaken to assist the injured worker. The *Report of the Inspectors of Factories … for the Half Year Ending 31st of October 1854* (1854) enumerates nearly two thousand injuries sustained over six months in British factories; about half of them are due to "Accidents arising from machinery" (4, Table I). The vast majority of these injuries are classified in the report as "Lacerations, Contusions" and various other miscellaneous injuries. Another 159 of these injuries are a form of amputation, ranging from "Amputation of the right hand or arm" to "Amputation of any part of leg or foot." Notably, however, only 22 of the injuries listed result in death. These figures stand in stark contrast to those enumerated by Morley in his alphabet of injuries. While it could be argued that Morley is following the hyperbolic tone of factory fiction like that of Trollope, I argue that he is doing something much more subtle. On the one hand, by emphasizing the deaths that take place at machinery that is not fully protected by fencing, Morley is highlighting both the failures of mill owners to adhere to the safety standards established in the Factory Acts, and also emphasizing the failure of the Factory Inspectors to properly enforce these safety standards. On the other hand, Morley is revealing a much subtler result of factory injuries: the inability of the human body to fully recover once injured. For Morley, the injured workers cannot survive their dismemberments because there is no place for such bodies—bodies that have been mangled by the machine and thus become a part of the machine—in the Victorian world. In his series of articles, Morley does not only reinterpret the Factory Inspector reports to highlight worker deaths but does the same with mainstream literary representations of factory labor.

This disconnect between so-called highbrow authors and the style of writing employed by Morley in fact opens "Ground in the Mill," the first article in the factory series. This article

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introduces Morley's primary issue with factory safety: factory machinery is too often inadequately fenced off, which results in countless injuries, as enumerated by the alphabet of injuries discussed earlier. However, rather than beginning the article with a clear announcement of his argument, Morley begins the article by quoting from Elizabeth Barrett Browning's 1843 poem "The Cry of the Children" before adapting the poem's narrative to the realities of factory labor: "'It is good when it happens,' say the children,—'that we die before our time'" (Morley "Ground in the Mill" 224). Browning's poem narrates the misery of factory children whose lives are confined to the noisy and unhealthy factory interior and who never experience the pleasure of outdoor, pastoral play. An early example of this misery in the poem is the burial of "Little Alice" who is envied by her fellow child laborers because there is, "no room for any work in the close clay" of her grave and "none will wake her" to "'Get up, little Alice!" and go to work in the factory (Browning).

Morley picks up the image of "Little Alice," and extends Browning's brief mention of this laborer into a narrative about how her death came about. He imagines Alice as a "factory girl who has not had the whole spirit of play spun out of her for want of meadows" and, in this exercise of childish play, "gambols upon bags of wool, a little too near the exposed machinery, that is to work it up, and is immediately seized, and punished by the merciless machine that digs its shaft into her pinafore and hoists her up" (Morley "Ground in the Mill" 224). In support of his argument about the dangers of exposed machinery, Morley takes Browning's image of a child's death in the factory. However, he expands Browning's image of a lonely funeral to rather show the exact way in which the machinery took the girl's life: the machine "tears out her left arm at the shoulder joint, breaks her right arm, and beats her out on the head." As Herbert F. Tucker remarks in "Of Monuments and Moments: Spacetime in Nineteenth-Century Poetry" (1997),

while "The Cry of the Children" may be "prosodically the queasiest" of Browning's poems, its formal elements "mimics the strain and clatter of steam-driven machinery" (Tucker 289). Morely likewise moves beyond the poem's emotional tenor about the short lives of factory children and places it within the context of a real factory. In fact, this incident was so poignant to Dickens that the original manuscript of *Hard Times* shows him planning to "carry it right into *Hard Times …* as Rachael's younger sister but [also] intending to footnote the text with a reference to Morley's article" (Fielding and Smith 412, Bartrip 19). Morley's article suggests that this factory leaves no space for a peaceful death; rather, the machines will tear any human emotions out along with the limbs that get caught in their wheels and pulleys. Like the alphabet of injuries, this one child worker cannot survive the alterations that the machines have inflicted upon her body.

Indeed, these active machines set such journalistic writings yet further apart from mainstream factory fiction. In Morley's articles, as in many other such articles from the mid-Victorian era, the machines at which factory workers labored are not only productive, but also very visible. Authors describe their mechanics, their actions and, in the case of Morley's *Household Words* articles, the injuries they inflict. In one of Morley's articles in particular, the human-machine interaction is so visible that the machine's movements are brought almost to life. Dated July 28, 1855, "More Grist to the Mill" opens by recounting a fatal factory accident:

> A boy aged fifteen was killed the other day in a cotton-mill in this manner:—Two persons were mending a strap that turned the dressing frame, and ran upon a horizontal shaft, four feet from the ceiling. He took hold of the strap to help them, and was instantly pulled up, and carried round the main line shaft (seven feet from the floor). When taken down, both his legs were torn off at the knees, and an arm was fractured. He died shortly afterwards. (Morley, "More Grist to the Mill" 605).

Unlike the factory workers of mainstream factory fiction, such as Bessy Higgins and Sally, and even unlike the list of amputees who survived the dangers of the mills in the Factory Inspector reports, this boy's ordeal inside the machine is recounted in detail. We begin with an image of

two individuals at work on a machine, which is named as a dressing frame. The structure of this machine is then recounted in enough detail to understand its size and movements: it reaches to a height of "seven feet" and is powered and turned by a series of straps that run from the floor to the uppermost height of the machine. This detailed description is a stark departure from the machines that are occasionally heard and still more rarely seen in Victorian industrial fiction. Compared to the spinning mule around which the scavenger girl must dance and duck in *Michael Armstrong*, the dressing frame in this article is visibly at work—its straps and pulleys running up and down. Alongside the machine, the body of the worker is passive, following the movements of the machine rather than his own: the boy is "pulled up" and "carried around the main line shaft," both of which are actions not taken by the boy but by the machine. Although the boy did enact some agency in taking "hold of the strap" in the first place, the machine commandeers the action originally instigated by the boy. When interacting with the machine, the human body is powerless and affected in every possible way: both of his legs and one of his arms suffer severe injury. Like the scavanger dance illustrated in *Michael Armstrong*, this boy must also move at the whim of the machine; but unlike *Michael Armstrong* in which the focus is on the scavenger's body, in *Household Words* the primary description is on how the machine forces the movements of the boy. Morley is not only aware of what the interior of a factory looks like, but he also describes that interior in great detail; and he uses a similarly detailed lens through which to examine the injuries sustained within these industrial settings.

In fact, although death is most often sustained by a blow on the head in these articles, Morley devotes excessive explanation to the dismemberment that occurs before death. While this gruesome tendency certainly does emphasize the inhumane conditions inside factories, it also emphasizes the way that factory machinery fragments the human. Like Gaskell and Trollope,

Morley is concerned with the way in which machinery can distort the human body, making it something not quite human. The unrelenting death in Morley's articles seems almost a necessity: for these beings who have been torn apart by the machinery and for whom no Victorian medical art exists to put them back together again, death is the kindest way to preserve their humanity. The body that has been so drastically altered by the machine has no possibility of becoming whole again.

Non-fiction depictions of factory injuries, while more explicit than fictional descriptions, follow a similar thesis to factory fiction: the human body that has been altered by the machine has no place within the normative Victorian social landscape. Both the medical writings and the journalistic articles shy away from depicting these injured workers outside the clinic or the factory, and rather describe how the machine changes the body. The descriptions in *The Lancet* are systematic, describing the human body as a machine that has malfunctioned and requires repair rather than as a living and feeling body in pain. Instead of focusing on the emotions behind the injuries, the authors describe the appearance of the injury—diagnosing the problem—before explaining the steps taken to repair the injury. Conversely, the more investigative journalism that is apparent in *Household Words* does not view the human body as a mechanism that can be repaired once injured, but rather focuses on the emotional toll that such factory injuries can inflict upon the body. The body in these articles is a living organism that has sustained injury and suffers under the injury. It is an entity that interacts with the world around it rather than, as in the *Lancet*, only displays an issue that must be medically remedied. In *Household Words*, the body interacts with its fellow human workers, the machine, and the pain and emotions that come after a failed encounter with the machine.

This divergence between medical and social reporting on factory injuries is noteworthy

because it illustrates the conflicted way in which the Victorian psyche viewed the bodies of factory workers, especially those that had exited the factory bearing the mark of the machine. They are on the one hand machines themselves, like all humans with bodies that pump blood and live in an apparently rhythmic way; but they are machines that have malfunctioned, that have been repaired and have had parts replaced. At the same time, they are machines that interact with the world around them and experience the un-machine-like emotions of pain and fear. The factory workers straddle an uncomfortable line between broken machine and feeling human, a line that Victorian non-fiction was fascinated with, but which Victorian fiction was reluctant to explore too deeply.

Charles Dickens and the Machine Taint

Although mainstream realist novels do acknowledge the factory and its workforce—as seen in Gaskell's *North and South*, Benjamin Disraeli's *Sybil*, and Dickens' *Hard Times*, to name just a few—they rarely if ever follow the lives of factory workers once they have left the factory system, especially those workers whose bodies have been injured by machines. There is a taboo in the Victorian psyche around exploring, depicting, and humanizing these characters. However, as I will demonstrate in the following pages, these bodies that have been altered by machines cause a disturbance across the landscape of Victorian realism. They incessantly crop up in narratives in which they, arguably, have very little place. In some cases, they appear physically as monstrous bodies described with painstaking detail; in other cases they infiltrate the narratives metonymically, with a single mechanical or inanimate attribute standing in for the entire character.

I do not claim, however, as has Herbert Sussman in *Victorians and the Machine* (1968), that the machine was a repulsive entity to many realist authors. Although such authors do not

know how to incorporate these bodies, as evidenced by their relative omission from mainstream fiction, these figures nonetheless incessantly break into narratives of mainstream fiction, cropping up as mechanistic taints. Unable to incorporate human-machine interfaces into their realist narratives, mainstream authors can do little more than stare and describe. This act of staring that identifies such bodies as grotesque in the context of mainstream realist fiction.

While there is a long critical history behind the grotesque, I will draw on Shelagh Wilson's discussion of the Victorian grotesque in my exploration of what happens to the human-machine interface when it exits the factory.[28] Rooted in Victorian visual culture, Wilson's construction of the grotesque takes into account the conflicted preoccupation with bodies that began to occur in the Victorian era: on the one hand, bodies garnered new attention through natural history's focus on how evolution effects the physical construction of life; and on the other hand Victorian cultures of decorum shied away from depictions and discussions of the natural body. In her chapter exploring the development of the grotesque in Victorian design, "Monsters and Monstrosities: Grotesque Taste and Victorian Design" (1999), Wilson outlines the "simultaneous revulsion and fascination" that the visually grotesque inspires (146). Wilson argues that, in a Victorian "culture preoccupied with an aesthetic of decorum" that "[policed] the boundaries of form," the grotesque is characterized by the "disturbances" that it causes in this structured culture (145). The grotesque plays with the boundaries of what is considered

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[28] In *Rabelais and His World*, especially in the chapter titled "The Grotesque World of the Body," Bakhtin outlines what he calls the "grotesque body." For Bakhtin, the grotesque is a conflicted state of being, on the one hand full of carnivalesque humor and on the other hand full of disgust. The grotesque body is focused on the open aspects of the body that both allow for entrance, but also gruesome excretions. Geoffrey Galt Harpham, in *On the Grotesque Strategies of Contradiction in Art and Literature,* argues that the grotesque is a central concept in the development of Western art and literature. And John R. Clark, in *Modern Satiric Grotesque and Its Traditions*, traces how the grotesque has been used in satire and comedy in a way that moves away from humor.

aesthetically "normal" or acceptable through pairings of contradictory stimuli: "savagery within domesticity"; objects placed where one would not expect to find them; and a "tension between humour and horror" (151, 147, 146). These contradictory pairings, suggests Wilson, construct a spectacle of bodily transgression and invasion that is both compelling and disturbing to the viewer (148). This dual reaction to the grotesque most often dances between horror and humor, between an impetus to turn away from the grotesque body and a desire to be entertained by it. Encountering a grotesque body, one made up of what Isobel Armstrong calls incompatible materials, results in a reaction of shock, surprise, and most often uncomfortable laughter (Armstrong "Bodily Things" 26-7). And it is this multi-faceted reaction that Dickens harnesses so effectively in his constructions of injured characters.

The grotesque is especially pertinent in the way in which mainstream realist authors engage with factory-injured bodies. For Trollope, Sally's physical disability becomes a spectacle, constantly breaking through the description of her mad ravings; for Dickens, the spectacle becomes the body that has merged with inanimate matter, and who signifies as humorous and ludicrous. Dickens is arguably obsessed with bodies that have been, in some way, broken and then repaired: individuals using crutches, the elderly confined to chairs, and especially amputees wearing prostheses.

Despite his fascination with injured bodies, Dickens never directly animates an erstwhile factory worker who has survived an injury. The moments in his novels that engage factory workers are transitory and focused on whole and properly functioning bodies. *Hard Times* (1854), Dickens' sole factory novel, is a particularly significant example of this. Scholars have placed it alongside *North and South* as marking the more mature style of later factory fiction: there is no moral message relayed in the novel, nor do Dickens' characters devolve into stock

good and evil characters (Simmons 348). Set in the factory town of Coketown, *Hard Times* follows the conditions of life for both the upper and the working classes in an industrial town. By depicting a variety of romances across the social strata, the novel illustrates that life's struggles appear consistently regardless of class status. *Hard Times* was published during the mid-century upheaval of factory safety laws. In fact, it appeared in serial form alongside Morley's *Household Words* articles criticizing the poor safety measures in factories and the lackluster responses by the Factory Inspectors to these oversights of the Factory Acts safety measures.

The limits of what type of human-machine interface Dickens is willing to represent are explored through the character of Stephen Blackpool, an erstwhile factory worker in *Hard Times* who has been dismissed from the factory for displeasing the factory master. Hale in body and mind when he leaves the factory and Coketown to find work, Stephen is accused of robbery and returns to Coketown to prove his innocence. On his journey back to Coketown, Stephen falls down an abandoned mineshaft. Although he survives many hours in the dark and cold, his injuries are so severe that he dies shortly after his rescue. While he does not work in the mines—another of Britain's machine-driven industrial enterprise—at the time of his injuries, Stephen is nevertheless injured by an apparatus that symbolizes industrial machinery. As with the injuries enumerated in *The Lancet* and *Household Words*, the mine shaft damages Stephen's body to a point of near inhumanity; he is described as, "a poor, crushed, human creature ... [a] form, almost without form" (*HT* 262). But for Dickens, there is no afterlife for bodies that have been so drastically altered by the machine: "the best that [the surgeon] could do was to cover *it*" (*HT* 262 emphasis mine). This damaged body cannot exist in the realist imagination; it must be hidden from sight. For Dickens, there is no path to recovery and thus no hope for existence for bodies that so clearly represent the human-machine interface.

Although Dickens' sole one-time factory laborer does not survive his industrial accident, Dickens nonetheless allows the machine taint to enter his fiction time and again. Machine attributes are associated with fully fleshly human bodies, and prosthesis-wearing characters so fully integrate with their mechanical appendages that the flesh-thing boundary begins to blur. For Dickens, these machine attributes break into his fiction through metonymy. Dorothy van Ghent's 1950 exploration of metonymy in Dickens' work is perhaps the foundational scholarship on how Dickens constructs detailed worlds through simple explanation. In this piece, van Ghent argues that Dickens' overwhelming descriptions—the metonymical descriptions that transport attributes between humans and objects—serve to construct the vast systems in which his novels take place. "No thing may be lost," writes van Ghent, "as it is doubtless essential to the organization of the system" (29). But more recent scholarship on Dickens and metonymy has turned to the deep interiorities that such metonymies create. Rae D. Greiner, for example, has looked at "sympathetic metonymies" in Dickens' work, metonymies that do not fill an object with meaning but rather give verbal meaning to sympathies that are unspoken. John R. Reed explores similarly concealed metonymies. Focusing on the gentleman in the white waistcoat in *Oliver Twist* and extending the methodology to Dickens' oeuvre as a whole, Reed argues that Dickens subverts the realist trope of metonymy to delve below the surface of facts and rather harness fancy and invention via a playful use of metaphors.

This obsession with humans possessing non-human characteristics positively overflows across Dickens' oeuvre. In *Dombey and Son*, Toodle's mind becomes the railway system for which he is an engineer, with thoughts lining up like "a whole train of ideas" (*DS* 534); Father Smallweed in *Bleak House* is equated to the beaten and reshaped pillows on which he sits and which he throws at his dozing wife; and Wemmick's mouth consumes food like a post office

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does letters in *Great Expectation*. Although Dickens' use of metonymy is not confined to the mechanical alone, I will briefly focus on one especially mechanical character, Mr. Pancks of *Little Dorrit*, before turning to how Dickens combines his obsessions with metonymy and prosthesis in the character of Silas Wegg in *Our Mutual Friend*.

Little Dorrit (1857) follows the impoverished childhood and coming of age of little Amy Dorrit. Amy Dorrit was born in and grew up in the Marshalsea prison where her father was held as a debtor. Entrenched in the minutia of bureaucracy, from the legalese of discovering before-unknown fortunes, to the struggles of patenting new mechanical inventions, *Little Dorrit* explores the classes through which the Dorrits traverse through deep Dickensian satire and metonymy. Although just a minor character, whose role it is to collect rent in Bleeding Heart Yard, Pancks' mechanistic taint makes him one of the more memorable figures in this novel. Mechanical attributes break upon Mr. Pancks, transforming him from a fleshly body into a steam engine on wheels. He steams through Bleeding Heart Yard and the novel, constantly moving, incessantly transporting finances, and disrupting the domestic tranquility of Bleeding Heart Yard by steamily demanding the rent. Through this movement, machine-like attributes break into Pancks' character, transforming him from a man into a forceful engine. He is never described without some reference to his being a steam engine on legs: he is "like a little labouring steam-engine," a "panting little steam-tug," announces his presence through "steam-like breathings," and is "a little steam-engine with more steam than it knew what to do with" (*LD* 148, 276, 712, 284). The humorous undertone in these descriptions gesture at the grotesqueness of Dickens' machine-tainted characters; Panks's labored puffing and steaming may seem laughable, but they also indicate that he suffers physically under the taint of the machine. Although these steam-like qualities may be attributed to Dickens' unique style of personifying the inanimate in a fleshly

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body, I want to push further to suggest that this type of metonymy shows that, like the Victorian psyche in general, Dickens was fascinated with the mechanical and industrial alterations that were occurring across Britain throughout the nineteenth-century. As the industrial apparatuses, including the steam engine, were altering the pastoral peace of England, they were likewise altering the population. However, unable to fully account for these new human-machine interfaces that now thronged both the urban and suburban landscapes, and at the same time unable to ignore them as they became an increasing part of the fabric of England's population, Dickens allows them to break into the otherwise fully human realms with which his novels engage. The mechanical attributes that shaped and altered human lives forced their presence upon the mainstream literary landscape.

For Dickens, this goes yet further than metonymy. His deep fascination with inanimate and mechanical attributes extends to his near obsession with characters who physically rely on inanimate materials to function within a human world. Although these are not characters who have sustained injuries in factories, they nonetheless use the same kinds of prostheses that such individuals used in the Victorian era. The most provocative of such characters is the ballad seller from *Our Mutual Friend*, Silas Wegg. *Our Mutual Friend*, Dickens' last completed novel, centers on the role that money plays in social interactions. When the lucrative Dust Contractor Old Harmon dies, and his son John Harmon also apparently passes away on the return voyage to Britain, Harmon's good-natured employee Mr. Boffin inherits the valuable Harmon dust heaps. The effects of Mr. Boffin's upward mobility spread to all corners of London, binding together the narrative of John Harmond's return from the dead with various narratives of love, and the attempts of the ballad-seller Silas Wegg and the skeleton-builder Mr. Venus to blackmail Mr. Boffin for their own gain. At the center of all of these intertwined narratives is the juxtaposition

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of money with waste. At every turn the novel investigates how waste can be collected, arranged and then transformed into money, from bodies scooped out of the River Thames and pick-pocketed, to dust heaps that divulge immensely valuable wills, to piles of unclaimed bones that are arranged into lucrative skeletons for anatomical study.

In *Our Mutual Friend,* Silas Wegg most clearly demonstrates the disruption of the machine into the fabric of the realist novel. Through his prosthetic leg, he brings together Dickensian metonymy with a focus on the injured body as grotesque. Indeed, Wegg is a unique case of Dickensian prosthesis in that his identification with his prosthesis goes beyond metonymy into cohabitation. It is well-known that Dickens has a fascination with bodies that have been altered, especially bodies that have lost limbs. His novels throng with characters who rely on walking sticks, crutches, chairs, and prosthesis for mobility; Dickens' favorite prosthetic is the wooden leg. Critic John Carey, in *Here Comes Dickens*, has gone so far as to call this fascination with wooden legs "a positive obsession" (91). Cary writes that, "The things you can do with a wooden leg, the damage it is subject to, its relation with its owner, are endlessly fascinating to [Dickens]" (91-2). But the Dickensian focus on wooden legs, and prostheses in general, goes beyond only a fascination or obsession. Some critics have read them as phallic symbols that exhibit a life of their own that propriety prevents the fleshly body from showing;[29] or a repeated attempt to reconcile the new Victorian focus on machines as ancillary to the human

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[29] In *Sexual Analysis of Dickens' Props* (1971), for example, Arthur Washburn Brown notes: "A wooden leg signifies, on the one hand, that a real flesh and blood leg has been cut off. On the other hand, it is a more rigid member than that which it replaces. It is an example of the way in which the unconscious ideation which produces dreams unites opposite meanings in a single image. A wooden leg represents simultaneously a castration and the rigid phallus that has been cut off" (47).

body with an older model in which the machine was merely a tool.[30] Although Cary claims that

wooden legs are only "chance spectators" in novels "quite without justification in the plot" and

largely confined to minor characters, I want to disagree with this relative dismissal of Dickensian

prosthesis. Wegg is an example of a minor character in possession of a wooden leg who is

anything but peripheral to the plot of the novel: he provides the context in which Boffin can act

his miser ruse, which eventually brings about the revelation that his secretary is John Harmon,

heir to the dust heap fortunes. Wegg is the catalyst through which the romance plot can be

concluded and all the strands of the narrative are neatly brought together. But beyond this

necessary plot function Wegg also demonstrates that, although there is no space within the realist

novel for them to exist in their true amalgamated form, human-machine interfaces do garner

attention by breaking into the realist novel.

In fact, the moment in which Mr. Boffin meets Silas Wegg and offers him the job of

educating the *nouveau riche* dustman epitomizes the disruptive effect that the human-machine

interface has on Victorian society. Stopping to observe the literary articles on display at Wegg's

stall with the aim of asking Wegg to be his tutor, Mr. Boffin remarks upon Wegg's wooden

appendage:

> "Oh!—Morning, morning, morning!" [said Boffin]
> "Appears to be rather a cracked old cock," thought Silas, qualifying his former good
> opinion, as the other ambled off. But, in a moment he was back again with *the* question:
> "How did you get your wooden leg?"
> Mr Wegg replied, (tartly to this personal inquiry), "In an accident."
> "Do you like it?"

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[30] In "Prefiguring the Posthuman: Dickens and Prosthesis", Herbert Sussman and Gerhard Joseph trace Dickens' vacillating representation of prosthesis across his body of work: at times Dickens is enraptured by the ability of prosthesis to overtake the fleshly human form, while at other times he seems ambivalent about the significance of melding the human with the machine. They do, however, note that Dickens' obsession with prosthesis reflects the Victorian concern with machinery overtaking the human body. They argue that Dickens' prosthetic depictions reflect a proto-posthuman line of thinking that was beginning to emerge in the nineteenth-century.

"Well! I haven't got to keep it warm," Mr Wegg made answer, in a sort of desperation occasioned by the singularity of the question. (*OMF* 55 emphasis mine)

Mr. Boffin, a member of mainstream Victorian culture, does not know what to do with the prosthetic leg nor its placement on Wegg's body. Not uncomfortable with it, he nonetheless can do nothing but stare and ask probing questions about it. Indeed, Mr. Boffin's question of where Wegg acquired his leg bursts into the middle of a scene that has no relation to prostheses or to accidents, or anything relating to the human-machine interface. Mr. Boffin appears to be drawn back to Wegg because of his wooden leg. Having already taken his leave, he is quickly "back again" to ask *the* question. By modifying "question" with the definite article "the," Dickens insinuates that this question already hung in the air around Boffin and Wegg's encounter. But rather than quailing under this personal question, Wegg makes a joke of it, seeming to take control of the way in which Boffin perceives his body. By joking that he doesn't "got to keep [his leg] warm", Wegg tows the delicate line between horror and humor that Wilson identifies as indicative of the grotesque.

While Boffin's rather personal inquiry does reflect the open geniality of his nature, it also points to the inescapable visibility of the non-normative body. In 1857, Frederick Gray wrote about the social expectations surrounding prostheses in *Automatic mechanism, as applied in the construction of artificial limbs in cases of amputation* (1857). *Automatic mechanisms* is a treatise on the techniques of creating lifelike prostheses; it traces the state of prosthesis in mid-century England, especially the different techniques used to create and attach prostheses and the variation in prosthesis between the classes. On the subject of observable prostheses Gray writes that the primary aim of "the artificial substitute" is to "prevent detection from the eye of an observer, … [and] such detection should, if possible, be avoided, both in regard to the feeling of the patient and to the idle criticism which will arise from an apparent incongruity" between an artificial and

a biological limb (Gray 90-91). Disability must be hidden from the notice of non-disabled bodies in mainstream Victorian culture. Mr. Boffin, however, immediately fixes on the "incongruity" between Wegg's fleshly and wooden legs. Wegg is not successful in blending into society in the way that an amputee is expected, according to Gray, to do. His wooden leg immediately catches the attention of Boffin, and the narrator of *Our Mutual* Friend as well, and sets him apart from mainstream Victorian culture.

Indeed, throughout *Our Mutual Friend*, Wegg is set apart as something not quite human, as something more machine-like than fleshly. This mechanical quality is most apparent in the negotiations Wegg undertakes with his friend Mr. Venus, the constructor of composite skeletons, to re-acquire the bones of his amputated leg. Discovering that Mr. Venus has purchased his bones for the purpose of incorporating them into a new skeleton, Wegg convinces Venus to sell him the bones instead. The conversation that ensues when Venus finally delivers Wegg's bones in a "sort of brown paper truncheon" reveals that Wegg is not quite human in the eyes of the world (*OMF* 295). Taking issue with having to purchase his one-time bones from Venus, Wegg comments,

> "I've my doubts whether, if I had consulted a lawyer, you could have kept this article
> back from me. I only throw it out as a legal point."
> "Do you think so, Mr. Wegg? I bought you in open contract."
> "You can't buy human flesh and blood in this country, sir; not alive, you can't," says
> Wegg. (295)

Because he was born with the leg, Wegg believes that its bones are rightfully his, and not Mr. Venus' to buy and sell. Indeed, Wegg cites the 1807 "Slave Trade Act," which banned the sale of "any Slave, or Slave, or any Person or Persons" within the England and British Empire ("An Act for the Abolition…"). However, Wegg's leg has been bought and sold: first sold by the hospital to Mr. Venus, then purchased by Wegg from Mr. Venus. Wegg's emphasis on the illegality of

selling a person who is "alive" cuts directly to the heart of how this novel perceives him: as a wooden, grainy, knotty person whose humanness fades in the face of his prosthetic, Wegg is not classified as being "alive," and thus his body parts can be purchased and sold without risking the wrath of the law. Despite Wegg's taking issue with being bought and sold, he nonetheless also participates in this market, implying that he himself doesn't quite believe in his "alive"-ness.

This not-quite-humanness is further emphasized by Wegg's general disposability. While the bones of his leg are themselves disposable to a certain degree, at least within an open market, Wegg himself is seen as a piece of disposable rubbish throughout the novel as well. Although *Our Mutual Friend* is a novel that deals with the many inventive ways one can employ to transform rubbish into gold, Wegg is one of the few pieces that cannot be transformed into something valuable. The first glimpse of him is amid rubbish collected on a dusty London street corner, and at the close of the novel he is dumped unceremoniously into "a scavenger's cart" and hauled away from the domestic bliss of mainstream Victorian culture (*OMF* 770). Like the factory worker, who is seen as a replaceable piece of machinery and, once injured, is disposed of and replaced by a new human piece of machinery, so Wegg is a disposable piece of machinery amid the urban detritus.

However, all of this embellishment carries with it a note of humor. Equating the purchasing of amputated bones with the slave trade is hyperbolical, perhaps even laughable, as is the exaggerated disposal of Wegg in a rubbish cart at the end of the novel. And this humorous undertone carries throughout *Our Mutual Friend*'s depictions of Wegg and his wooden leg. In typical Dickensian fashion, the boundary between Wegg and his wooden leg breaks down through metonymy.

> Wegg was a knotty man, and a close-grained [sic], with a face carved out of very hard material, that had just as much play of expression as a watchman's rattle. When he

laughed, certain jerks occurred in it, and the rattle sprung. Sooth to say, he was so wooden a man that he seemed to have taken his wooden leg naturally, and rather suggested to the fanciful observer, that he might be expected—if his development received no untimely check—to be completely set up with a pair of wooden legs in about six months. (*OMF* 53-4)

The characteristics of the wood have seeped so much into Wegg that he is almost indistinguishable from it. The "knotty" and "close-grained" aspects of wood are identifiable in Wegg's "carved" face. Similarly, the woodenness of the leg seems so "natural" to Wegg that there is an expectation that the rest of Wegg's body will likewise turn into a wooden prosthetic. Although, as I have already noted, Dickens is well known for using metonymy to great humorous effect, the undertones of humor in this depiction of Wegg's woodenness are more akin to the grotesque than to lighthearted humor. It is not a humor born out of pleasurable entertainment, but rather what Wilson characterizes as the "tension between humour and horror" (Wilson 146): it is discomfort at the way in which Wegg's body has been infiltrated by a material so very inhuman and the impetus to find entertainment in this body. The humor that surrounds depictions of Wegg's "close-grained" and "carved" face is more akin to the uncomfortable laughter of one observing the grotesque. Wegg's body is affected by his prosthetic: the wooden legs that the poor wore in the Victorian era were anything but comfortable, and therefore a face twisted in pain is not at all unexpected in one who must wear a second-hand and presumably ill-fitting wooden leg. Although Dickens' metonymy may, on the surface, seem lighthearted, it hides the more sinister laughter that the able-bodied and uncomfortable Victorian expresses when coming face-to-face with the grotesque, or the human-machine interface.

While humor is absent from the factory fiction of earlier in the century, it begins to appear as a way to mediate and make acceptable depictions of the human-machine interface in fiction of the later century. The mangled bodies of factory workers that were depicted in factory

fiction and in the non-fiction explorations of factory injuries cannot incite laughter, only reform. However, although such depictions of human-machine interfaces faded as the reforms were achieved, the bodies themselves did not fade. Thus, they enter fiction in a more peripheral way, dancing between uncomfortable laughter and horror.

From Factory Worker to Fighting Machine: Wearable Technology in Science Fiction

Whereas grotesque human-machine interfaces are peripheral in mid-century realist fiction, they become plot catalysts in the imaginative worlds of late-century science fiction. Although realism and science fiction may appear at first glance to be widely different genres, I want to suggest that they are actually closely linked through the figure of the human-machine interface. What was the factory worker or the impoverished amputee in mid-century realism becomes the technologically advanced alien in late-century science fiction. Novels such as Edward Bulwer-Lytton's *The Coming Race* (1871) and H. G. Wells' *The War of the Worlds* (1897) bring the overlooked factory worker out of the hidden realms of realism and activate it, highlighting the capabilities and futurism of the human-machine interface. I suggest that the human-machine interface's new visibility is due to the removal of the factory context from science fiction. Innovation and production are no longer confined to the factory and labor within the factory, where they are invisible and easily overlooked; rather, they occur throughout the science fictional worlds, where they are celebrated and acknowledged for their power and the change that they can inspire.

Edward Bulwer-Lytton's *The Coming Race* (1871) features the integration of technology into everyday life, and how this technology simplifies many tasks and the morals around labor that troubled the Victorian context. The novel is concerned with the accidental discovery of a subterranean alien species. Isolated below ground from their terrestrial human relatives, the Vril-

ya have undergone their own industrial developments separate from those experienced on the surface. The story follows how its unnamed narrator, after having descended a chasm on a mining reconnaissance trip, is adopted by the Vril-ya people. These people are named after vril, the mysterious, electricity-like element that powers every aspect of their lives. They have harnessed the immense power of vril to live a pacifist, egalitarian life, and to power myriad technological tools, from domestic automata to prosthetic wings.

H. G. Wells' *The War of the Worlds* focuses less on the role of technology for domestic ease, but rather on what happens when technology is necessary for an alien species' survival. The novel dramatizes the invasion of Earth by technologically advanced Martians, and how Earth's humans respond to this intelligent technological invasion. Following its unnamed narrator as he witnesses the arrival in the British countryside of a ship of Martians, the novel is deeply interested in how the Martians use their technology to dominate human infrastructure. Having to flee his home when the Martians exit their cylindrical ship, the narrator spends the duration of the invasion hiding in abandoned homes and observing the way in which the Martians build and activate their mechanical fighting machines. The narrator eventually travels into London, now destroyed by the Martian machines, just in time to witness the death of the Martians by earthly bacteria.

Because it allows for the construction and activation of technological worlds, science fiction is the ideal genre in which the potential of the human-machine interface can be explored. Philosopher of science fiction Istvan Csicsery-Ronay, Jr., in *The Seven Beauties of Science Fiction* (2008), asserts that science fiction "embeds scientific-technical concepts in the broad sphere of human interests and actions … It is an inherently, and radically, future-oriented process" (Csicsery-Ronay 3). Science fiction brings together the human sphere with the

technological sphere and, by merging these two seemingly disparate worlds, paints a picture of

what a future will look like in which the human and the technological meet. Csicsery-Ronay also

emphasizes the way in which science fiction plays with the human and human worlds, from

collapsing ontological categories to creating monsters and aliens, or what he calls "spectacle[s]

of impossible fusion," to depicting how "technoscientific projects" can transform human

societies (5-7). Both *The Coming Race* and *The War of the Worlds* are fascinated with how

human-machine fusions alter the known human world, and what effects these fusions will have

on a future. Unlike the realist context, in which the human-machine interfaces of the factory

were a taboo that could not be depicted, these fusions in the science fiction context are celebrated

because of the way in which they highlight the potential of technological progress.

In *The Coming Race* manual labor transforms from a hidden and injury-prone profession

to an automated one. The novel is deeply concerned with the effects that evolution and machine

technology will have on human society. In particular, automata are employed in all aspects of

life in *The Coming Race* that require some form of labor or service. Critics have fluctuated

between reading *The Coming Race* as a key utopian science fiction novel of the later century,[31]

or as a dystopia because of the way in which it satirizes Victorian ideologies.[32] However,

scholarship largely agrees that the novel is invested in exploring what the logical extension of

Victorian science will look like, especially when models of evolution are paired with developing

technologies such as electricity. What will the future look like, asks Bulwer-Lytton, when

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[31] See, for example: B. G. Knepper's "The Coming Race: Hell? Or Paradise Foretasted?" in *No Place Else: Explorations in Utopian and Dystopian* (1983).

[32] For example, in "The "Seamy Side" of Human Perfectibility: Satire on Habit in Edward Bulwer-Lytton's the Coming Race" (2009) Jennifer Judge argues that Bulwer-Lytton constructs a dystopian world by satirizing Victorian radical notions of utopianism—namely, feminism, Darwinism, and democracy.

technologies of modernity infiltrate all aspects of life? *The Coming Race* is Bulwer-Lytton's answer to this question.

The automata in *The Coming Race* are vastly different from the way in which machinery is seen in the realist novel. Whereas machines are seen as damaging and even murderous in realist fiction, especially in the industrial context, Bulwer-Lytton depicts the machine as a fully accepted and peaceably integrated aspect of life for the Vril-ya. The automaton is the clearest example of this. Employed primarily as domestic servants who deliver food and drink to the Vril-ya, and generally stand silently in the corners of Vril-ya homes, the automata are "mechanical contrivances" that are nonetheless allowed into the domestic space, and thus also into the human space (Bulwer-Lytton 11). These automata appear to be in almost every Vril-ya household, either standing "dumb and motionless by the wall," "phantom-like at each angle in the wall," conducting guests into the home, or even serving refreshments. The working-class bodies that labored in factories have become machines in the science fiction context. However, they are not frightening machines, as were the human-machine interfaces in the factory; rather, they are peaceable. By losing the taint of threatening and exceptional machinery, the automata are no longer grotesque figures that are either fully invisible in the factories or grotesquely visible when they infiltrate the normative Victorian world; rather, they are merely there, seen when they come into the narrative and otherwise unseen, as is any other everyday aspect of the science fictional environment.

Life in *The Coming Race* is further mechanized through the way in which the Vril-ya use technology to adjust their own bodies to their environment. The Vril-ya have engineered mechanical wings, which can be strapped onto the human body, to allow them to move through the rocky and mountainous underground terrain. It is here that technological replaceability

moves away from the context of labor and rather into the everyday. Indeed, the way in which the narrator describes these fascinating "mechanical contrivances" emphasizes not only the link between science fictional technology and the factory, but also shows that the link between human and machine is beginning to be accepted as the century progresses (11):

> These wings… are very large, reaching to the knee, and in repose thrown back so as to form a very graceful mantle. They are composed from the feathers of a gigantic bird that abounds in the rocky heights of the country—the colour mostly white, but sometimes with reddish streaks. They are fastened round the shoulders with light but strong springs of steel; and, when expanded, the arms slide through loops for that purpose, forming, as it were, a stout central membrane. As the arms are raised, a tubular lining beneath the vest or tunic becomes, by mechanical contrivance inflated with air, increased or diminished at will by the movement of the arms, and serving to buoy the whole form as on bladders. The wings and the balloon-like apparatus are highly charged with vril; and when the body is thus wafted upward, it seems to become singularly lightened of its weight. (65)

Remnants of the factory can still be seen in this description: engineered materials, such as steel and straps, form the primary structure of the mechanical wings; as in the factory, these engineered materials merge with and transform raw materials—in this case, the feathers of mountain-dwelling birds—to create from them a tool of modernity; and like the factory descriptions seen in Morely's *Household Words* articles, the mechanical contrivances have the power to draw human bodies to great heights. However, unlike the factory context, in which the machines damage human bodies, these mechanical wings are fully integrated and accepted into the human body, and therefore bare the body gracefully to the ground rather than dropping or dismembering it on its downward journey.

This description is also awash with the language of replaceability. It is not, however, the replaceability seen in the factory, in which the human body is a prosthetic to the machine and, when damaged, will be replaced by a new human prosthetic. Rather, both the wings and the human wearing the wings are prostheses to one another: the wing is a prosthetic that allows the human to fly, whereas the human arm is the prosthetic that provides the wing the structure to be

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able to fly. Without the arm functioning as "a stout central membrane," the wing does not have the structure with which to fly (Bulwer-Lytton 65). Thus, while the human relies on the wings for flight, the wings also rely on the human arm in order to have the strength to be launched into the air.

In *The War of the Worlds*, Wells similarly harnesses the imagery of technological replaceability in his depiction of the invading Martian army. While scholars have looked at *The War of the Worlds* in terms of technophobia and the unsettling depictions of the alien technology,[33] I contend that the novel actually depicts a striking collaboration between the biological and the technological. Like the Vril-ya's mechanical wings in *The Coming Race*, the technological prostheses in *The War of the Worlds* are fully integrated into the alien body. But, unlike *The Coming Race*, these technologies are not used to merely simplify daily life but rather for survival. This transition to technology's role in biological survival demonstrates the way in which technology was being seen progressively as a necessity for modernity.

The technologies in *The War of the Worlds* epitomize the successful integration of biological alien and its technological prosthetic—an integration that was so fraught in mid-century realism. The Martians' intelligence has evolved so far beyond that of earthly humans as to make their bodies obsolete. They are merely large heads with a few tendril appendages, and therefore rely on their technologies for both labor and movement. Indeed, the fleshly Martians collaborate with their machines so effectively that they are akin to clothing, a second skin. The

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[33] For example: Colin Manlove's "Charles Kingsley, H. G. Wells, and the Machine in Victorian Fiction" (1993), which discusses Wells' depiction of technology at war with biology; and Michael Livingston's "The Tripods of Vulcan and Mars: Homer, Darwin, and the Fighting Machines of H. G. Wells's the War of the Worlds." (2009), which explores the illogicality of the three-legged design. Living argues that Wells made his fighting machine tripods in order to highlight their alien nature. Since there are no terrestrial three-legged creatures, making an extra-terrestrial three legged emphasizes just how foreign it is.

narrator notes that it is the Martian's willingness to gather to themselves "artificial additions to their bodily resources," which is the reason for their "great superiority over man" (Wells *WoW* 129). This acknowledgement of the benefits of human-machine collaboration is a stark departure from the way in which the human bodies within industrial fiction suffer at the machines. Rather than being trapped, like Bessy Higgins, by the "endless, endless noise" of the machines (Gaskell 133), the Martian machines are akin to "different bodies," which the Martians wear "just as men wear suits of clothes" (Wells *WoW* 129). In fact, the pairing between the Martians and their machines is so strong that the fleshly Martian bodies are only rarely seen outside their machines, and in the cases where they are machine-less, they are at their weakest.

The first such instance of machine-less Martians occurs as the narrator is hiding in an abandoned house near the landing site of another Martian ship. From this unique vantage point, our narrator observes how the Martians set up their fighting machines: the Martians lie "panting, stirring ineffectual tentacles, and moving feebly after their vast journey across space," while at their sides smaller machines busily build large fighting machines, seeming "infinitely more alive than the actual Martians" (130). The second and final instance where a Martian is seen beyond its machine is when the narrator journeys to London and finds both the city and the Martians destroyed: in one case, dogs have left a "gnawed gristle of [a] Martian," while a few streets over a "lank shred of brown" hand hangs out of the hood of a tripod-fighting machine, at which "birds pecked and tore" (166, 168). This comparative weakness of the Martians when they are divorced from their machines shows that, when the machine is accepted as a useful and even necessary prosthetic, it becomes a central part of the fleshly body; machine and body merge into one being.

Indeed, the way in which the Martians' tripod fighting machines are described shows that this collaboration is highly effective and powerful. Fully integrated with their machines, the Martians can effortlessly conquer the environments around them:

> A monstrous tripod, higher than many houses, striding over the young pine trees, and smashing them aside in its career; a walking engine of glittering metal, striding now across the heather; articulate ropes of steel dangling from it, and the clattering tumult of its passage mingling with the riot of the thunder. … Can you imagine a milking stool tilted and bowled violently along the ground? That was the impression those instant flashes gave. But instead of a milking stool imagine it a great body of machinery on a tripod stand. (Wells *WoW* 46)

Central to this description of the Martian tripod fighting machine is the contrast between the mechanical and the natural. Time and again aspects of nature are contrasted against, diminished and destroyed by the "glittering metal" and "ropes of steel" that comprise the "monstrous tripod." It is only by describing familiar objects such as "houses," "pine trees," "heather" and "thunder" that aspects of the Martian machine can be conveyed. Indeed, this description relies upon contrasting well-known natural objects with unknown mechanical ones in order to depict these wholly alien, uncanny beings; the milking stool is transformed into a machine hoisted upon three long mechanical legs. On the one hand, this image is reminiscent of Morley's descriptions of the bodies of factory workers hoisted seven-feet into the air by the unfenced machines at which they work. On the other hand, it transforms this image of violence into one of ingenuity and power—the machine is no longer in conflict with the body and brain atop it, but rather collaborating with such perfection that they dominate the landscape around them.

However, both *The War of the Worlds* and *The Coming Race* are not completely devoid of that technological anxiety that paralyzed depictions of human-machine interfaces in realist fiction. *The Coming Race* ends with a note of warning: "the more I think of a people calmly developing…powers surpassing our most disciplined modes of force…the more devoutly I pray

that ages may yet elapse before there emerge into sunlight our inevitable destroyers" (Bulwer-Lytton 102). Similarly, although the first invasion in *The War of the Worlds* is thwarted because the Martians do not contain antibodies to terrestrial bacteria, the narrator acknowledges that, "It may be, on the other hand, that the destruction of the Martians is only a reprieve. To them, and not to us, perhaps, is the future ordained" (Wells *WoW* 179). In both novels, the narrators acknowledge that terrestrial humans have limited powers against the technologically advanced alien species. These aliens possess "powers surpassing" those of humans, and as such "the future" belongs to them. Although this anxiety about the future of the human is vastly different from the technological anxiety that turns a critical if not a blind eye to the human-machine interface in the realist novel, it is nonetheless an anxiety about the relationship between the human and the machine. What both Bulwer-Lytton and Wells seem to acknowledge is that, without complete technological integration and acceptance, terrestrial humans have very little hope for a future.

Conclusion

Linking factory workers of the early- and mid-nineteenth century with mechanized aliens of later-nineteenth-century science fiction illuminates the Victorian psyche's deep preoccupation with the machine. Concern about the machine did not fade as conditions in Victorian factories improved. Rather, as the Industrial Revolution developed beyond Britain's industrial power to encompass the technological advances that were overtaking all aspects of Britain, the preoccupation with the machine likewise became broader, more expansive, and more present across all aspects of Victorian life. This preoccupation is apparent in the way in which the

machine or elements of the machine continue to crop up in literature that appears to have little if nothing to do with technological advancement.

Depictions of the factory and working bodies in the early and mid-century do not claim to be concerned with advances in machine power. However, the indelible link between flesh and machine is inescapable through the way in which such writings depict and discuss working-class bodies. The working body becomes transformed time and again by the machines with which they interact. In factory fiction, these transformations are inescapably visible, marking the bodies of workers as well as their actions and behavioral attributes. In *Michael Armstrong*, both the scavenger girl and Sally have adapted their bodies and actions to the machines at which they work, moving just as the machines do. In *North and South*, the machines have not only influenced the behavior of all residents in Milton Northern, but have also physically entered Bessy's body as coughs and fatal illness.

And it is this fatality of getting too close to the machine that the nonfiction writings of the mid-century take up. Articles in publications such as *The Lancet* and *Household Words* show how impossible it is for a body that has been altered by the machine to function and continue to exist within the Victorian social sphere. In *The Lancet*, the bodies that have been indelibly marked by the machine are never permitted to exit the clinic; their lives beyond their injuries are not discussed because Victorian social norms have no place for such lives. And in *Household Words*, Morley goes so far as the kill off each of the injured workers his articles depict. Interacting with the machine not only alters the workers' bodies, but also marks them as impractical, unfit for normative Victorian society.

The invisibility of the injured body continues as the factory fiction genre fades in the latter half of the century. However, it is a selective invisibility. While the injuries themselves are

not depicted nor are the lives of erstwhile factory workers, the pervasiveness of mechanization is repeatedly featured. Dickens seems unable to look away from the way in which the machine has managed to enter all aspects of British life. The metonymic invasions of the machine in Dickens' fiction illustrates that, although there is no place for human-machine interfaces to play critical roles in mainstream Victorian life, these beings are nevertheless always present. As an author deeply concerned with depicting all aspects of Victorian life, Dickens cannot deny the central role that mechanization was beginning to play in his culture as the century progressed.

But it is only with the rise of the science fiction genre that the human-machine interface can truly be depicted. Science fiction provides a venue in which the seemingly impossible is given license to flourish. For the Victorians, this impossible was more often than not imagining what the world would look like were machine integration to be accepted and celebrated. In these new imaginative worlds, the melding of flesh with machine engenders exciting, powerful and unforgettable new versions of sentience: humans who have so fully integrated with machines that they become the powerful and dominant species. The workers that were once locked within factories and bound to the machine are now permitted to exit this confinement, enter the world and make it their imaginative and mechanical playground.

While this study has focused on the Victorian context, its more significant goal has been to reveal just how suggestive are those moments of apparent oversight in understanding the role that technology plays in everyday life. Victorian fiction's apparent occlusion of the factory interior and factory machines opens up a venue in which the intermediaries for the machine become visible. Such intermediaries continue to crop up across Victorian literature, and indeed across venues beyond the factory. As mechanization entered more aspects of daily life in the Victorian era, the machine taint can likewise be found beyond the factory sphere.

Chapter III

Augmenting Biology: Posthuman Futures in Evolution and Fiction

> "Man may be excused for feeling some pride at having risen, though not through his own exertions, to the very summit of the organic scale; and the fact of his having thus risen, instead of having been aboriginally placed there, may give him hopes for a still higher destiny in the distant future." Charles Darwin, *The Descent of Man* (1871)

Charles Darwin's theory of evolution, and in particular his argument that humans evolved into their modern intellectual form from primates, revealed a past that had long been confined to theological theory or supposition alone. In outlining how species evolve, Darwin's theory of evolution released the domain of human origins to discussion, to evidence, and to concrete answers. But along with this revelation of the past, Darwin's evolution also promised to illuminate the future, opening it up as a site for potential answers. At the close of *The Descent of Man and Selection in Relation to Sex* (1871), Darwin writes that his new theory of human evolution "may give [the human] hopes for a still higher destiny in the distant future" (*Descent* vol. 2, 405). This stirring remark challenges readers of *Descent* to take the tools of evolution beyond the present and look at them in the context of human futures. Despite the largely past-oriented nature of Darwin's work, evolution need not be confined to previous eras—the future of the human was suddenly accessible, if only in a speculative vein. This chapter follows how Victorian writers took up Darwin's challenge and used evolution to mine their present moment for the promise of a human future.

Darwin's theory of human evolution caused ripples in fields well beyond the sciences. In this chapter, I focus on the way in which late-century novelists attempted to utilize Darwinian references in their projections of humanity's "distant future." I argue that novelists such as

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Robert Louis Stevenson and H. G. Wells use their early science fiction and especially their representations of scientifically curious humans in their stories and novels to explore the tension between past and future apparent in Darwin's theory of evolution. This tension, surprisingly, concerns the human itself. Although much of Darwin's well-known work on evolution is invested in unearthing the hidden pasts of animal and human life, works such as *On the Origin of Species by Means of Natural Selection* (1859) and *Descent* nevertheless turn time and again to projections of what evolution may look like in the future. In Darwin these possible futures, while often marked by violence and calamity, are nevertheless only loosely explored. It was science fiction writers influenced by Darwin's theory of evolution that began to flesh out these futures in the 1880s. They took the language and imagery of evolution and transcribed it onto modern human bodies in a way that Darwin avoided. In doing so, these authors took the human as a starting point for evolution rather than an end-point, as Darwin sometimes did. For Darwin, the human sits at "the very summit of the organic scale," and is therefore always beholden to the animal bodies that came before it (*Descent* vol. 2, 405). Early science fiction authors, however, begin with the human and, rather than tracing it back to its animal origins, trace it forward to what we can recognize as a posthuman future.

Darwin has many afterlives, and this focus on the posthuman and science fiction is just one. His intellectual legacy has notably formed the foundation of our Modern Evolutionary Synthesis; it has promoted the conservation of the Galapagos Islands; and has also inspired darker afterlives, such as social Darwinism and eugenics. Beyond his scientific influence, however, Darwin has long been the domain of social and literary scholarship. In the 1980s Darwin took on new importance for Victorian literature with Gillian Beer and George Levine's well-known readings of the evolutionary undertones in Victorian realist fiction. Today, we are

undergoing a similar revival of Darwinian relevance for literature. Current literary scholarship, however, focuses not only on the Victorian era but also on Darwin's continued relevance for contemporary science fiction. Such scholarship fluctuates between thinking about Darwin as a proto-posthumanist who lays the foundation for understanding that to be human is to be descended from multiple species and multiple ancestors, and thinking about how Darwin inspired the posthuman's relationship to the monstrous. Nicole M. Merola, for example, argues that Darwin is a proto-posthumanist because his vision of human identity is grounded in species multiplicity: to be human is to also be animal as well. Stephen T. Asma explores the other strand of this ancestral multiplicity in his book *On Monsters* (2009). Although Asma does not specifically argue for Darwinian posthumanism, he does show that Darwinian monsters are evolutionary aberrations because their bodies do not conform to evolutionary standards of multiple ancestry, just as the posthuman is today. Conversely, Colin Nazahone Milburn takes up the other side of Darwinian monstrosity to show that, because of their bodily exceptionality, monsters disrupt categories of artificial and natural, thereby creating beings that exist beyond the human category. This scholarship, however, is primarily concerned with Darwin's influence on contemporary literature.

On the rare occasions where such scholarship looks at the posthuman within the Victorian context, it only envisions Victorian monsters as a starting point for what we know today as the posthuman. Chris Danta, in a 2012 article that explores futurity and monstrosity in *The Island of Doctor Moreau*, looks at the way in which the novel's monsters anticipate the posthuman chimera creations that today dominate discussions about ethical genetic engineering. Rather than viewing the Victorian era monsters as merely foreshadowing contemporary ideas

about the posthuman, as previous scholarship has largely done, I contend that the posthuman did circulate in the Victorian era.

Darwin plays a central role in understanding what is so posthuman about our evolving human identity, and his work shows that it may not be as restricted to our techno-scientific present as we like to believe. We often think of the posthuman through an AI lens, in terms of a Cartesian dualism in which the mind is so separate from the body that it can be uploaded and downloaded into a new shell. This, however, is a distinctly contemporary form of posthuman thinking, one inspired by the digital technology of today. Posthumanism has another side to it, one that takes as its foundation the body itself. As posthuman philosophers have noted time and again, to be posthuman is to be comprised of multiple bodies. Cary Wolfe, in *What is Posthumanism* (2010), observes that posthumanism

> forces us to rethink our taken-for-granted modes of human experience … by recontextualizing them in terms of the entire sensorium of other living beings. … But it also insists that we attend to the specificity of the human… [by] acknowledging that it is fundamentally a prosthetic creature that has coevolved with various forms of technicity and materiality, forms that are radically 'not-human' and yet have nevertheless made the human what it is. (xxv)

To be posthuman is to be aware of one's innate multiplicity—to understand that the human is an evolved animal as well as understanding that modern humans move within a technologically advanced world. Therefore, posthumanism is not a mental experience, it is not one of uploadable consciousness; rather, it is a bodily experience influenced by the way in which our bodies interact with the world around us. And I concur with Wolfe when I contend that the most provocative way in which to view this multiplicity of the posthuman is in the physical body. Because humans are animals and continue to hold their ancestral animality within the human form, they are already communal, already multiple in their very identity. Victorian

posthumanism is focused on the body, and my goal here is to bring the posthuman back into the body.

The evolutionary theory that flourished in the Victorian era was based entirely on this bodily multiplicity—the idea that to be human is to be already multiple, to contain in one's body elements of the animal, of the human, and of an environment as well. In this corporeal version of posthumanism, I am pushing against the post-ness of posthumanism. By accepting that posthumanism is a corporeal experience, I concur with N. Katherine Hayles that we have "always been posthuman" (279). To be posthuman is not to be technological, it is not to be modern. To be posthuman is to be a body that consciously thinks about and consciously uses the many different bodies that make it move. In our modern world that means that we are aware of the technological accouterments that make us modern humans—our smartphones, our cars, our glasses. In the Victorian era, this meant the acknowledgement of the animal elements present in the human body. The posthumans of Victorian literature that I explore in this chapter are products of a reevaluation of human exceptionality. For the Victorian context, the posthuman was not only a robot, not only a genetically engineered chimera.[34] The Victorian posthuman was rather a concept of being, an understanding that the human body was complex, multiple, and something that need not always wait for the slow progression of evolution.

The chapter is divided into two parts, the first of which focuses on Darwin's contribution to evolutionary posthumanism, and the second of which turns to the way in which literature extends Darwin's foundations. In part one, "Futurity and the Human in Darwin's Evolutionary Writing," I explore the occasional turns to futurity in *Origin* and *Descent*. The moments in which Darwin's past-oriented vision of evolution fractures to reveal what evolution may look like in the

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[34] Although, as Chapter 2: "Disorderly Bodies, Disruptive Machines: Robot Futures in Industrial Fiction" suggests, these technological posthumans certainly were present.

future are marked by violence and, most provocatively, extermination. Evolution is not an admirable striving, suggest these moments of fracturing, but rather a battle without morals. And the human is often among the casualties in Darwin's futuristic imaginings. Part two, "Literature and Posthuman Futurity" turns to the way in which early science fiction added details to Darwin's cataclysmic future visions. I begin by exploring the way in which the dual personality of Jekyll/Hyde in Robert Louis Stevenson's *The Strange Case of Dr. Jekyll and Mr. Hyde* (1886) dramatizes a striving to suppress animalistic ancestry in favor of a posthuman future. I conclude by looking at the artificial evolution in H. G. Wells' *The Island of Doctor Moreau* (1896). By using the tools of modern Victorian medicine to forcefully alter both his own and other bodies, Moreau attempts to create posthuman bodies that are no longer subject to what he views as the mark of the animal.

Futurity and the Human in Darwin's Evolutionary Writings

The nineteenth-century revealed new modes of thinking about the human's place within the world: new sciences such as geology and paleontology began to unearth previously hidden histories of animal life; technology such as the steam engine allowed the human to access its environment with revolutionary ease; and medical advances saw the human body overcoming old ailments. But perhaps the greatest revision to human ontology came through Darwin's theory of evolution. This theory began to dismantle a worldview that had envisioned the human as a static being at the center of terrestrial life. Instead, it revealed the changes to life that occurred over vast expanses of time, and affinities between the human and animals. But this new vision of the human was not past-oriented alone; the future and how life may evolve in that future were also opened as sites for scientific exploration. Within Darwin's work, this dual emphasis on past

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and future emerges as a tension—a tension between what the human was and what it may become.

As many critics have noted, evolutionary theory was neither an over-night phenomenon nor Darwin's domain alone. Darwin's evolution followed a gradual build up towards dismantling the creationist vision of human origins that had previously dominated studies of natural history. James A. Secord's *Victorian Sensation* (2000), for example, shows how Darwin's precursor Robert Chambers was lambasted for upsetting the theory of spontaneous generation. A recent revival of interest into the life and science of Alfred Russel Wallace likewise shows that Darwin was just one among many Victorian thinkers considering human origins.[35] Other current explorations of Darwin, such as Cannon Schmitt's *Darwin and the Memory of the Human* (2009), likewise situate Darwin's travels and publications within a larger intellectual environment that was already partially familiar with the ideas of evolution. In his monograph, Schmitt uses anthropological works to show that the Victorian redefinition of the human was predicated on understanding that the human past was a "savage" past; the human, contends Schmitt, is the animal "that remembers it is no longer animal" (Schmitt 4). Thus, despite the myriad other evolutionary works that began appearing in the nineteenth-century, Darwin's theory of evolution stands as a turning point in human identity from an anthropocentric worldview to a recognition of the species community in which the human moves and which composes human identity. However, while an understanding of the animal origins of humanity is certainly crucial to Darwin's theory of evolution, the occasional futuristic projections in *Origin* and *Descent* begin to emphasize posthuman potential over originary animality.

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[35] For example, Ross Slotten's biography of Wallace, *The Heretic in Darwin's Court* (2004), traces Wallace and Darwin's simultaneous discovery of natural selection, the two men's' mostly-harmonious rivalry, and Wallace's scientific travels.

The application of evolution to the human did not, however, occur immediately for Darwin. His "big books"— *Origin* (1859), *Descent* (1871), and *The Expression of Emotions in Man and Animals* (1872)—exhibit a progression from thinking of evolution as an invisible yet active entity influencing plant and animal life to thinking about evolution as a vibrantly visible presence that holds significance for human identity. As critics and biographers of Darwin have noted, this slow progression towards discussing human evolution was likely caused by Darwin's caution about introducing such radical notions. Adrian Desmond and James Moore, in their 1991 biography of Darwin, describe Darwin's caution as an understanding that "the idea of evolution [was] a social crime in early Victorian Britain" (Desmond and Moore, *Darwin* xviii). To Darwin, evolution as "dangerous knowledge, and tempting." Indeed, in his *Autobiography*, Darwin writes of his early thoughts on the struggle for existence in 1838 that he "was so anxious to avoid prejudice, that [he] determined not for some time to write even the briefest sketch of it" (Darwin, *Autobiography* 120). Having witnessed the critical reception of Chambers' *Vestiges* in the 1840s, Darwin was well aware of the ramifications of his theory of human evolution. This reticence is seen in his delay in writing down his early inclinations about the struggle for existence—his first thoughts occurred in 1838, but it wasn't until 1842 that he finally wrote a 35-page sketch of evolution (Darwin, *Autobiography* 120)—and his long delay in publishing *Origin*. Although Darwin had been thinking about and writing about evolution since his return from the Beagle voyage in 1836, it was only once a similar manuscript written by Wallace became known to Darwin that Darwin finally published his theory. Because of this sudden publication pressure, *Origin* was framed as the "Abstract" of a fuller theory to follow; indeed, Darwin writes in his Autobiography that the "moderate size" of *Origin* was largely due to "the appearance of Mr Wallace's essay" in 1858 (124). As Darwin's ideas about animal evolution began to gain

currency, he explored in more definite language human evolution. However, the human body remains largely hidden across Darwin's writing; it circulates beneath the surface, occasionally cropping up, occasionally mentioned, but rarely explicitly explored.

As many scholars have noted, Darwin's evolutionary writings consistently engage the human and human codes of morals and ethics, despite the fact that his theory of evolution was persistently anti-humanist. Beer, in *Darwin's Plots* (1983), remarks on the way in which "humanity lurks in the intricacies" of *Origin*, requiring a reader to find "an anthropocentric significance for a text that extrudes humanity" (108-109). Paul Farber, in *The Temptation of Evolutionary Ethics* (1994), points out that for Darwin morality "was a natural development for an intelligent social animal;" the natural striving of all beings is towards a "moral sentiment" (Farber 15). This humanism is apparent in the way in which Darwin frames evolution as a struggle from primitive to developed, from the "lower" to the "higher" animal.

In Darwin's writings, the human stands as the highest accessible animal form currently in existence. This vision of evolution thus relies on emphasizing the admirable, human-like qualities of plants and animals, rather than showing how the human may in fact be animalistic. Darwin imagines, for example, "a plant on the edge of a desert" struggling "for life against the drought" (*Origin* 41); or the evolution of the "higher animals" despite the barriers "from the war of nature, from famine and death" (307). These passages suggest that, to survive odds such as drought, famine and death, and to do so still capable of procreating and furthering the evolution of the species is admirable indeed—qualities that any human would gladly replicate. However, despite this humanist focus in his writing, Darwin cannot escape what I identify as a posthuman evolution. A posthuman Darwin emerges in the moments where his humanist disposition

fractures, where the brutality of his animal subjects and of nature cannot be entirely tempered with the language of admirable humanism.

The violence of Darwin's narrative of evolution is especially poignant in his vision of the struggle for existence in *Origin*. The standard narrative of the struggle for existence is that of an individual or a species striving to survive despite the obstacles that nature and other species may throw in their path. We can, for example, sympathize with the struggle experienced by our little desert plant cited above; it must overcome all of the natural and circumstantial odds stacked against it in order to survive and reproduce. However, Darwin cannot avoid the innate violence in this vision of evolution. Describing how populations can increase exponentially and the necessary checks on population growth that the struggle for existence engenders, Darwin turns to an image of Nature as a test subject for overpopulation:

> The face of Nature may be compared to a yielding surface, with ten thousand sharp wedges packed close together and driven inwards by incessant blows, sometimes one wedge being struck, and then another with greater force. (*Origin* 43)

This description of the effects of overpopulation on nature embodies what I have called the posthuman in Darwin's theory of evolution. This portrait of Nature is in no way noble, in no way admirable; rather it is terrifying and violent. Nature's face is featureless, possessing no definable attributes to humanize it. In fact, it doesn't even seem to have definition, but is rather a "yielding surface" that must conform to the agencies of the beings that impress their form upon it. And these forms are "ten thousand" in number, driving with sharp and incessant force into this featureless face. The patience and striving of the little desert plant is subverted in this vision of the struggle for existence, framed rather as a violent act that drives out of nature any resemblance to humanistic admiration.

As this violence continues to appear in *Origin*, it dismantles the morals of evolution seen in, for example, the higher animals' victory over evolutionary odds that I mentioned above. Instead, the evolutionary struggle takes on an increasingly immoral and inhuman form that affects all life—plant, animal, and human:

> When we look at the plants and bushes clothing an entangled bank, we are tempted to attribute their proportional numbers and kinds to what we call chance. But how false a view is this! … it has been observed that the trees now growing on the ancient Indian mounds, in the Southern United States, display the same beautiful diversity and proportion of kinds as in the surrounding virgin forests. What a struggle between the several kinds of trees must here have gone on during long centuries, each annually scattering its seeds by the thousand; what war between insect and insect—between insects, snails, and other animals with birds and beasts of prey—all striving to increase, and all feeding on each other or on the trees or their seeds and seedlings, or on the other plants which first clothed the ground and thus checked the growth of the trees! Throw up a handful of feathers, and all must fall to the ground according to definite laws; but how simple is this problem compared to the action and reaction of the innumerable plants and animals which have determined, in the course of centuries, the proportional numbers and kinds of trees now growing on the old Indian ruins! (*Origin* 48)

The passage gives us a different vision of Darwin's famous entangled bank: his microscopic investigation of the plant and animal life that will grow over centuries on a newly razed swath of land. He begins by dismantling the supposition that chance dictates how life grows, and instead shows that there is purpose behind the species that finally establish themselves. But this is not planned purpose; it is random and it is violent. Darwin frames it as a "war" that is waged "between insects, snails and other animals with birds and beasts of prey." However, it is not a humanistic war fought on a moral plane, but one marked by feasting, by cannibalism. It is an image of creatures "all feeding on each other," engaging in a banquet of foe eating foe to ensure an individual's or a specie's survival. Notably, the stage for this struggle of plant, animal and insect life is human-made: the "old Indian ruins." The humanism of Darwin's theory breaks down still further here. While humans may observe sacred ground, may bury the dead, and erect monuments to them, Nature has no regard for such sentiments. It will use the burial mounds as a

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battlefield, and in this battle further resist a humanistic moralism by consuming the dead rather than burying them.

This anti-humanism—what I have begun to describe as posthuman—becomes still more poignant in the moments when Darwin is drawn from the legible past of evolution to consider what an evolutionary future may bring. These futures are violent, not with the specific violence enacted upon the face of Nature by a mass of struggling bodies, but with a general violence that snares everything around it. In fact, it is so general that it holds the potential to also ensnare the human. During the discussion of natural selection, for example, Darwin explains that large and successful species are at lower risk for future calamity. However, he tempers this positivity with a warning: "which groups will ultimately prevail, no man can predict; for we well know that many groups, formerly most extensively developed, have now become extinct" (*Origin* 79-80). Present or past success, warns Darwin, is no guarantee that a species will be one of the lucky few to increase into the future. As past successful species have "become extinct," so species in the present may suffer this fate too. But this threat becomes still more specific in the conclusion to *Origin*. Following his suggestive comment that a future publication may throw light "on the origin of man and his history" (306), Darwin warns that:

> we may safely infer that not one living species will transmit its unaltered likeness to a distant futurity. And of the species now living very few will transmit progeny of any kind to a far distant futurity; for the manner in which all organic beings are grouped, shows that the greater number of species of each genus, and all the species of many genera, have left no descendants, but have become utterly extinct. (*Origin* 306)

Darwin makes possibly his most cataclysmic claim in this passage: this quote appears in the paragraph directly following his reference to human evolution, thereby encompassing the human in this vision of future extinction. The future holds nothing identifiable, warns this passage; the

species we know now will be unrecognizable or extinct, and the human may well be among them.

This interest in violence and in the future of life—specifically human life—continues into *Descent*. Darwin plants the seed of human evolution in the concluding pages of *Origin*, where he suggests that a future publication will contend with human evolution. The early pages of *Descent* seem to respond directly to this provocative promise: "man is the co-descendant with other species of some ancient, lower, and extinct form," claims Darwin, and *Descent* will question, "whether man, like every other species, is descended from some pre-existing form; … [and] the manner of his development" (*Descent* vol. 1, 3). Unlike *Origin*, the explicit focus of *Descent* is the human and how the human has evolved over generations. But the two texts hold many similarities too: like *Origin,* the evolutionary past is the primary focus of this text. Indeed, "descent" suggests a past, a history from which the human has come. And the tension between this legible past and an imaginative future that we observed in *Origin* continues into *Descent*, again via violent images of how these potential futures could manifest.

However, the cataclysmic futures that Darwin paints in *Descent* are more focused than are the animal extinctions of *Origin*. While Beer touches upon Darwinian futures in *Darwin's Plots*, she claims that, "Nowhere does Darwin give a glimpse of future forms: and rightly, so, since it is fundamental to his argument that they are unforeseeable, produced out of too many variables to be plotted in advance" (Beer xix). However, as I will show below, these futures *do* begin to take on more definite forms than those proposed in *Origin*; in *Descent*, the cataclysmic futures explicitly refer to the future of humanity. In the chapters describing human genealogy and how the human evolved from primates into modern humans, Darwin meanders from his aim of illuminating the human past to projecting how humans may evolve in the future.

> At some future period, not very distant as measured by centuries, the civilised races of man will almost certainly exterminate, and replace, the savage races throughout the world. At the same time the anthropomorphous apes, … will no doubt be exterminated. (*Descent* vol. 1, 201)

In this quote, the future is described as a separation of the human into distinct sub-species. "Civilised" humans will continue to evolve and become vastly different from what Darwin refers to as "savage" humans. Like Darwin's darker, less frequently quoted vision of the entangled bank in *Origin*, the path to this future is envisioned as violent; it is not a passive progression of evolution, but rather the "extermination" of one species so that the other may continue. But whereas in the entangled bank the violence is committed between different species, this vision of future human extinction is committed by one group of humans against another. But more than that, this violence extends even beyond the human to the "anthropomorphous apes." This vision of extinction presents a future in which the human species, and the descendants from which the human evolved, will be almost unrecognizable.

The possible future of humanity takes on still clearer detail when Darwin discusses the mental and social differences between humans and primates. Describing the continued existence of immoral or animalistic instincts in the human as markers of the human's recent emergence "from a state of barbarism," Darwin goes on to project how this will change in the future:

> Looking to future generations, there is no cause to fear that the social instincts will grow weaker, and we may expect that virtuous habits will grow stronger, becoming perhaps fixed by inheritance. In this case the struggle between our higher and lower impulses will be less severe, and virtue will be triumphant. (*Descent* vol. 1, 104)

This passage describes the future of evolution as a future in which human virtue will obliterate animalistic reflexes. Provocatively, in this future the tension, or "struggle," between past and future that dominates much of Darwin's writings about human evolution no longer exists. The

human will evolve beyond animalistic instinct, beyond the mark of atavism and towards what I have been calling a posthuman future.

The past, whether that is an animal past or a primate-past, appears to be the dominant concern across much of Darwin's evolutionary writing. *Origin* explores how animal life originated, how life evolved through artificial, natural and sexual selection into animals that today are familiar. Likewise, *Descent* investigates the origins of the human, whether those are primate or "savage" origins. However, amid this detailed focus on the past, Darwin cannot avoid turning the lens of evolution onto the future as well. This refocus results, on the one hand, in a tension between what is past and what is future. This tension seems to question: if the primate is the human's past, what will the human become in the future? And on the other hand, this refocus on the future emphasizes the anti-humanistic struggle by which this future is achieved. Evolution is not a righteous struggle for survival, but a brutal battle in which human morals have no place. But Darwin's occasional turns to the future in *Origin* and *Descent* remain fragmented; they are imaginative musings rather than concrete meditations. Victorian literature, and especially early science fiction, takes up the imaginative mantel where Darwin left off, imbuing it with the specificity and tangibility that is avoided in scientific writings. The result is to imagine the future of human evolution as a separation from the animal—as posthuman.

Literature and Posthuman Futurity

What was so revolutionary about Darwin was not his theory of evolution alone but the impact that this theory had on Victorian society. This can be seen in the caricatures of evolution published in the pages of satirical magazines, the multiple revisions and re-printings of *Origin*, and the Darwinian subtext that began to dominate Victorian literature from 1859 onwards. Such

literary adoptions of Darwin's language focused more than anything on the human, whether that was how the human exists and survives in a brutally competitive social environment, or imaginings of what the evolutionary future of the human will look like. For example, the community relationships in George Eliot's *Middlemarch* (1871) operate on a basis of species-wide interactions, while Thomas Hardy's *Tess of the d'Urbervilles* (1891) and to a lesser extent *Jude the Obscure* (1895) depict the brutal struggle for existence experienced by the working classes in the Victorian era. Other more futuristic explorations use evolutionary theory to lend authority to their depictions of how the human species will evolve in the future: Samuel Butler's *Erewhon* (1871) imagines what a future could look like were machines to evolve as Darwin argues species do, while H. G. Wells' *The Time Machine* (1895) envisions a future in which the class stratification of Victorian England results in the separation of humans into two distinct species. Darwin's theory of evolution sparked the imagination of Victorian authors and lent a new scientific undertone to the way in which they presented the realities and possibilities of life. In particular, authors of early science fiction such as Robert Louis Stevenson and H. G. Wells take up the human body as a test subject for evolution. They inscribe upon human bodies—and they are often the bodies of scientists—the language and imagery of evolution. In doing this, they both mediate the tension between past and present seen in Darwin's evolutionary writings, and also follow Darwin's call at the close of *Descent* to look at the "distant future" of humans.

While Darwin's theory of evolution was primarily geared towards unearthing the evolutionary *past* of animal and human species, literary explorations that took up evolutionary theory were neither confined to the past alone nor solely to the animal as an influence upon human evolution. Novels of the late Victorian era that consciously engaged with evolutionary theory complemented their past-oriented evolutionary explorations with explorations of what the

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human *could* become. Through depicting radical, often questionable, scientific techniques aimed at creating new humans, these novels constructed their scientist figures as posthuman subjects. By and large, these explorations focused on the scientist as the catalyst for evolution beyond merely human-animal relations. They are physicians, such as Dr. Jekyll, or experimental biologists, like Dr. Moreau.[36] In each case, the scientist is invested in pushing the parameters of their science towards new and radical ends. Through these revolutionary experiments, these scientists become catalysts for future-oriented evolutionary thought because they so drastically depart from the evolutionary subjects on whom Darwin focused in his writings. In order to extend evolution beyond Darwin, authors such as Stevenson and Wells had to find subjects on whom evolution had not yet been tested.

In what follows, I explore Stevenson's *The Strange Case of Dr. Jekyll and Mr. Hyde* and Wells' *The Island of Doctor Moreau* in the context of Darwin's apocalyptic futurism. I argue that these two texts should be read as Darwinian allegories; they reflect the violence and unpredictability inherent in unnaturally accelerating evolution to posthuman ends. Whereas Darwin only hinted at these violent posthumanisms in his evolutionary writings, Stevenson and Wells take up the imagery from one of Darwin's visions of an entangled bank—of foe eating foe in order to thrive in a specific niche—and activate this imagery within the parameters of contemporary medical discourse. The posthumans that emerge out of these Darwinian allegories are the result of the temporal tension alluded to in Darwin. While Darwin dances between human

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[36] While this chapter takes only one scientist from each Stevenson and Wells as exemplars, Wells' fiction is especially rife with experimental scientists who attempt to push the boundaries of the possible by using evolutionary science. The time traveller, in *The Time Machine* (1895), uses his science to discover a future in which the human has bisected into two distinct species. Griffin, in *The Invisible Man* (1897), uses chemicals to render himself invisible and thus defy the norms of human corporeality. The superfluity of scientists who experiment on the human in Wells' fiction exhibits, I believe, a marked fascination at the end of the Victorian era with exploring the limits of the human body.

ancestry and human futurity, Stevenson and Wells attempt to excise the animalistic past from the human in order to accelerate it towards a posthuman future.

Exploring the symbolic significance of science in fiction through the bodies of immoral scientists is by no means new. Literary scholars have long been fascinated with the figure of the "mad" scientist—that intellectual being who takes the paradigms of modern science and extends them to troubling, even unethical ends. Andrew Bartlett in *Mad Scientist, Impossible Human* (2014), for example, explores our continued obsession with the Frankenstein myth—the narrative of a scientist who attempts to play God by re-creating human origins but fails disastrously. John Rieder (2013) likewise traces the patterns of the Frankenstein myth into twentieth-century science fiction to show how this myth continues to illuminate new concerns for science and human identity; and author-specific investigations, such as Anne Stiles' 2009 essay on Wells, traces the history of Victorian correlations between genius and mental illness. Nor is it unique to take *Jekyll and Hyde* and *Moreau* as textual examples. Bartlett dedicates an entire chapter to *Moreau*, while Rieder acknowledges that both Jekyll and Moreau are key stepping-stones between Mary Shelley's *Frankenstein* and our more contemporary mad scientist figures. However, we need to look beyond the sanity and the ethics of these literary scientists and consider why these engagements with Darwinian evolution lead to the construction of the posthuman. The way in which Stevenson and Wells utilize evolution is in fact reflective of the tension between past and future seen in Darwin's writings. By locating their scientist-protagonists at the heart of this tension, novels such as *Jekyll and Hyde* and *The Island of Doctor Moreau* attempt to make sense of it through constructing the scientist as posthuman.

Shedding the Past, Becoming Posthuman in *Jekyll and Hyde*

Robert Louis Stevenson's 1886 novella *The Strange Case of Dr. Jekyll and Mr. Hyde* (hereafter referred to as *Jekyll and Hyde*) explores the way in which the tools of science and medicine can be harnessed to escape the confines of Victorian social expectations. It tells the story of how a physician, Dr. Jekyll, chemically splits the atavistic side of his personality from his more respectably human side to allow him to live a dual life of propriety and licentious freedom. Told largely from the perspective of Jekyll's lawyer Mr. Utterson and his colleague Dr. Lanyon, *Jekyll and Hyde* follows the format of a detective novel that traces Mr. Hyde's licentious activities before revealing that Hyde is the alter ego of Jekyll. The climax of the novel comes when Jekyll begins to lose control over his transformation into Hyde and must commit suicide to prevent his permanent reversion into a being who has no respect for the dreams of scientific grandeur held by Dr. Jekyll. The duality of this character cannot exist if Jekyll's posthuman dream is to come true.

Scholars have largely focused on the psychological themes in this novel, especially the divide in human nature between good and evil. This divide has often been read in terms of split identity, whether that is a gendered divide, or a divide informed by psychology and psychological ailments. For example, Janice Doane and Devon Hodges (1989) situate *Jekyll and Hyde* within the New Women's movement and the revision of gender roles heralded in the late Victorian era. They explore the Jekyll-Hyde split as a collaboration between "the masculine and feminine that subverts the identity of each" (63). Nancy Gish (2007) also locates *Jekyll and Hyde* within concurrent science, specifically within growing research into psychology and split personality disorders in the late nineteenth-century. Gish insists that Hyde's monstrous embodiment as "pure evil" has informed the moral representation of split personalities: our true

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self will always react with fear and attempt to check that "other" self that is entirely evil (2). In another take on how *Jekyll and Hyde* engages in contemporaneous science, Anne Stiles (2006) argues that Stevenson's engagement with late-nineteenth century research on bilateral brain hemisphere asymmetry and his satirization of the psychological case study marks *Jekyll and Hyde* as Stevenson's intervention into debates on split personality resulting from brain injury circulating during his writing of the novella. While such criticism begins connecting Stevenson's novel with concurrent developments in psychology, these explorations are confined largely to the realms of the psycho-sexual.

I would like to focus instead on what I identify as evolutionary themes. Scholars have in recent years begun exploring the evolutionary and Darwinian undertones in *Jekyll and Hyde*, but have focus largely on evolutionary anxiety. Christine Persak (1994) and Lisa Butler (2006), for example, read Hyde as a representation of cultural anxiety about the destabilizing effects of theories of human evolution; Julia Reid and Olena Turnbull's essays in *Robert Louis Stevenson: Writer of Boundaries* (2006), on the other hand, read the psychological elements of the novel through an evolutionary lens: Reid argues that Stevenson did not agree with the gradualist understanding of evolution, but rather saw the past and present, the primitive and developed living concurrently in the human mind; and Turnbull shows how Stevenson resisted evolution as a guide to modern life because it did not account for the variety of expressions seen in artistic representations. While much of *Jekyll and Hyde*'s drama does occur in the psychological realm, I find the more provocative—and indeed often critically overlooked—change to occur on the corporeal level. Jekyll's physical transformation into Hyde demonstrates an engagement with Darwin's discussions of species transmutation.

The stage for the unethical bodily experiment in *Jekyll and Hyde* is London intellectual society. In being the lens through which Jekyll's forced evolution is explored, London intellectual society serves as a way to mark as exceptional, as aberrant, the transformed bodies of Jekyll and Hyde. The novel opens, not with Hyde, nor even Jekyll, but with Jekyll's lawyer Mr. Utterson. Stevenson dedicates the first paragraph to an exploration of Utterson's character:

> Mr. Utterson the lawyer was a man of a rugged countenance that was never lighted by a smile; cold, scanty and embarrassed in discourse; backward in sentiment; lean, long, dusty, dreary and yet somehow lovable. At friendly meetings, and when the wine was to his taste, something eminently human beaconed from his eye; something indeed which never found its way into his talk. (Stevenson 5)

These opening lines serve to define what the novel and the society that it depicts define as human. Utterson is an austere man who moves within an equally austere world. Almost everything about him is cold and static: Utterson's face seems to remain constantly in the same expression, "never lightened by a smile," while his body is similarly "dreary." At the same time, and in seeming contrast to the grim figure that this description paints, Utterson is described as "somehow loveable," implying that he is moving in a society that prizes—perhaps even expects—such austerity. His "cold" and "backward" sentiments are not seen as negative attributes, but rather as ones inspiring feelings of affection. In fact, by showing that "something eminently human" emerges in Utterson's eyes in social gatherings, Stevenson extends this rigidity to society at large; despite his restraint, Utterson signifies as human because he is within an equally restrained society. As the first sentences of the novel, this description of Utterson establishes a society that prizes the reliable, if cold, constancy of the lawyer rather than the fluctuating personhood of Jekyll and Hyde.

Jekyll and Hyde stand in stark contrast to the rigid ideal of personhood epitomized in Utterson. They are anything but static, fluctuating instead between different bodies and different

identities. In my reading of *Jekyll and Hyde*, I conceive of the doctor-criminal as a three-fold identity with two corporeal manifestations. The first is a compound identity of both Jekyll and Hyde. This identity exists in the moment of transformation from Jekyll into Hyde and back again. It possesses, on the one hand, the scientific knowledge of the doctor while also enjoying the criminal personality of Hyde. The second identity is that of Hyde alone, and is both an internal identity and a physical manifestation. Internally, Hyde seeks to live a life outside the reproofs of London intellectual society, and this degenerative focus manifests in an atavistic body, one who is more closely linked to primate ancestry than to future identity. The third identity is that of the doctor, Jekyll. Jekyll's identity is marked by the absence of Hyde and thereby the absence of Hyde's atavism. Jekyll therefore exists as a future being, excising reminders of an animalistic past from the human body, and thus existing as a posthuman entity. These three identities do not coexist within the novella, but rather each appear as separate moments along a timeline of evolution, on a continuum from past to future, from atavistic to posthuman. And it is in this continuum of evolution and the interplay between Jekyll, Hyde and the identity in transformation that the Darwinian allegory appears. Each identity represents a moment on an evolutionary timeline; these moments are constantly in flux, and their constant conflict with one another reflects the struggle in nature to adapt and thrive in competitive niches.

Jekyll and Hyde are physically absent at the novella's opening. This absence has a twofold implication: on the one hand, the lack of a physically present Jekyll or Hyde signifies the existence of that third identity—that disembodied transitional identity that is both Jekyll and Hyde while at the same time being neither, because it is in the process of transitioning between the two. It is the identity of the present moment, of the moment of evolutionary transformation. On the other hand, the physical absence of Jekyll and Hyde from the novella's first pages also

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highlights their otherness in the face of London intellectual society. This otherness is highlighted in the way in which the identities do crop up in second-hand conversation. While Jekyll and Hyde are not physically present in these early pages, they are alluded to in documents and through conversation. The first mention of Jekyll is through Utterson's memory of reading his will, which bequeaths all of Jekyll's earthly belongings to Hyde. Because of this odd request for an unknown man to inherit Jekyll's belongings, Utterson "had refused to lend the least assistance in the making of" the will, and indeed calls the document "offensive" to his love of the "sane and customary sides of life" (Stevenson 8). In setting Jekyll outside of custom and sanity, Utterson emphasizes Jekyll's divergence from Utterson's London society. This is further emphasized in a conversation between Utterson and Jekyll's colleague Dr. Lanyon a few pages later. Explaining why the two colleagues have recently drifted apart, Lanyon justifies: "Jekyll became too fanciful for me. He began to go wrong, wrong in the mind" (9). Lanyon describes the product of this apparent mental deficiency as "unscientific balderdash"—an unexplained professional disagreement that caused Lanyon to break from Jekyll. As with Utterson's dismissal of Jekyll, Lanyon paints Jekyll as an oddity, someone who does not fit within the parameters of acceptable professional life. These two early mentions of Jekyll are made without his physical presence. The absence of both Jekyll and Hyde here implies that their bodies do not circulate successfully in Utterson and Lanyon's society—a society that is presented as human. Instead, they are outsiders, existing before and after the humans of contemporary London.

But this existence as a three-fold identity with two bodies is not a chance evolutionary glitch. Rather, it is an experiment undertaken by Jekyll himself to allow for the peaceable yet separate simultaneity of his dual identities. Jekyll dreams of escaping the societal confines epitomized by Utterson through accessing "man's dual nature" and releasing it from forced

coexistence (Stevenson 34). Jekyll's experiments are based upon a theory that the human is

composed of two sides: the "provinces of good and ill" (34). Inside each human, one being with

good inclinations coexists and sometimes struggles with another being with corrupt inclinations.

This idea that the human could contain multiple personalities was beginning to gain notice at the

end of the nineteenth-century, primarily from investigations of split personality disorder

undertaken in France, but also to a lesser degree through British publications.[37] Frederic W. H.

Myers, the founder of the Society for Psychical Research, for example, published a series of

articles in the 1880s and 1890s in which he explored "the multiplex and mutable character of that

which we know as the Personality of man" (Myers 133). His 1886 article "Multiplex

Personality," for example, relates the story of "Louis V.," a man who experiences epileptic

attacks that temporarily transform his personality into one that is "violent, greedy, and

quarrelsome" (134). Myers surmises that these moments of madness occur when Louis V.

"manifests himself through nervous arrangements which have reached a lower degree of

evolution" (135). Myers' focus on evolutionary regression as playing a role in psychosis is

provocative, especially when placed into conversation with *Jekyll and Hyde*.[38] Jekyll's dream is

to find a way to separate these two identities so that "life would be relieved of all that was

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[37] There is a rich critical archive on nineteenth-century explorations of split or multiple
personalities. Stiles, in "Robert Louis Stevenson's *Jekyll and Hyde* and the Double Brain," for
example, explores *Jekyll and Hyde*'s engagement with late-nineteenth-century psychology;
specifically, she claims "that Jekyll and Hyde embody the polarities inherent in the dual-brain
theory" of the nineteenth century (n.62). More general explorations, however, include Anne
Harrington's *Medicine, Mind, and the Double Brain a Study in Nineteenth-Century Thought*
(1989), which explores Victorian attempts to understand the two-hemispheric brain and the
implications of this innate duality of the human; and Rick Rylance's *Victorian Psychology and
British Culture 1850-1880* (2002) takes a broader look at developments in psychology in the
nineteenth century, focusing specifically on the interdisciplinary development of the field of
psychology.
[38] Indeed, the two writers communicated through letters following the publication of *Jekyll and
Hyde*, when Myers shared how deeply the novel had impressed him (Stiles "Robert Louis
Stevenson's *Jekyll and Hyde* and the Double Brain", n.22).

unbearable," relieved from the strain of having to live with an atavistic identity that prevents the evolution of a posthuman identity (Stevenson 35).

This separation manifests in *Jekyll and Hyde* through the existence of two separate bodies. If we take the duality of human nature proposed in *Jekyll and Hyde* as an allegory for Darwin's theory that the human, although evolved from the primate, still contains primate-like elements in its body, then the fact that Jekyll is able to separate his two natures into two bodies implies that he is extending Darwin's theory of evolution beyond its accepted Victorian incarnation. That is to say, Jekyll has manipulated the paradigms of evolution to become a new kind of being, one that is beginning to excise his animalistic nature from his person and through this process become posthuman. He is posthuman because he has, however temporarily, rid himself of all the marks of an evolutionary past and in this absence of the past embraces fully his existence as a futuristic being. Interestingly, readers of *Jekyll and Hyde* are never actually provided with a complete picture of what this posthuman body looks like. Jekyll appears at one moment as a disembodied head poking from a bedroom window, or in rumor when he returns, post-transformation, to London intellectual society. However, I contend that this corporeal thinness undergirds Jekyll's posthumanness; his posthumanness appears in his rejection of the animality that anchors him to the past and in his striving to release this anchor and become something else.

However, as I have already divulged in my summary of the novella, this separation of the posthuman from the atavistic human is not lastingly successful. Jekyll must commit suicide at the close of the novella in order to prevent his permanent reversion into Hyde. Yet this failure is another point of allegorical connection between *Jekyll and Hyde* and Darwin's evolutionary writings. As Darwin notes, the path to evolution is marked by multiple attempted and many

failed adaptations: "any variation in the least degree injurious would be rigidly destroyed …

[and] variations neither useful nor injurious would … be left a fluctuating element" (Darwin

Origin 51-2). To evolve is to try out new variations, to borrow aspects of their success and

discard other less successful ones. The adaptations that remain through generations are the ones

that lead to new and better-adapted species.

In Jekyll's attempt to become posthuman, he separates from his body the atavistic

remnants of the human-animal identity, thus leaving a physical reminder of what the human once

was. This reminder is Hyde. Notably, this transformation into Hyde is deeply marked by the

evolutionary imagery circulating at the time of the novella's publication; Hyde's atavism is

inescapable and, indeed, startling to many who encounter him.[39] Almost every member of

London society who comes into contact with Hyde has some comment to make upon his body,

and upon an unnamable "something wrong … something displeasing, something down-right

detestable" in his appearance (Stevenson 11). Upon meeting Hyde for the first time, Utterson

describes him as "pale and dwarfish" with "an impression of deformity without any nameable

malformation" about his body (11). Hyde is inexplicably odd and unsettling to those who

encounter him. Although there is initially nothing concrete cited to account for this deformity,

the fact that his displeasing nature is so apparent to almost every person that encounters him

signifies that he is in fact very exceptional, very unusual in polite society.

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[39] Other scholars have investigated atavism in *Jekyll and Hyde* before me. For example, Stephen D. Arata (1995) reads Hyde as the embodiment of the atavistic criminal, a late-Victorian concept of criminality introduced by Cesare Lombroso, who argued that the criminal was a "throwback… to humanity's savage past" (233). Stephan Karschay's chapter on *Jekyll and Hyde* in *Degeneration, Normativity and the Gothic at the Fin De Siécle* (2015) explores the way in which amateur detective work is predicated upon phrenological readings of atavism. Julia Reid's *Robert Louis Stevenson, Science, and the "Fin De Siécle"* (2009) explores Stevenson's fascination with "primitive" identity not only in *Jekyll and Hyde* but across Stevenson's oeuvre.

As the novel progresses, these "impression[s] of deformity" begin to take on more detail. To those who encounter him at unawares, Hyde appears "ape-like," a "masked thing like a monkey" (Stevenson 15, 26). These primate-like attributes suggest that Hyde is a degenerative form of the human. However, this is not degeneration in the social Darwinist sense, but rather that proposed by zoologist E. Ray Lankester in the 1880s.[40] In a short treatise titled *Degeneration, a Chapter in Darwinism* (1880), Lankester argues that degeneration is as significant a contributor to biological diversity as is "elaboration"—that is to say, adaptation to a more complex environment. Degeneration is not regression but rather "a gradual change of the structure in which the organism becomes adapted to *less* varied and *less* complex conditions of life" (Lankester 314 emphasis original). Progress is thus multi-directional; it is any change in biological form or utility. Hyde's "ape-like" attributes therefore suggest that he is degenerative in some form; his body has been altered to possibly function in a world less varied and complex than that in which Jekyll circulates (Stevenson 15). Fifteen years after the publication of *The Descent of Man*, *Jekyll and Hyde* enters a literary and scientific landscape that is very familiar with the revelation that primates are human ancestors. As a body marked with "ape-like" attributes, Hyde appears to be one still deeply influenced by its primate ancestry.

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[40] While I have been unable to find any concrete evidence that Stevenson was familiar with Lankester's work on degeneration, I am not the first person to suggest an affinity between *Jekyll and Hyde* and Lankester's *Degeneration, a Chapter in Darwinism*. In the introduction to Broadview's second edition of *Jekyll and Hyde*, Martin A. Danahay includes Lankester in an overview of evolutionary thinkers writing around the time that *Jekyll and Hyde* was published. Lankester was friends with H. G. Wells, and is often cited as having inspired much of Wells' early science fiction, especially *The Time Machine*. This connection between Lankester and Wells suggests that Lankester may have been significant to more Victorian authors who exhibit a scientific focus in their writing.
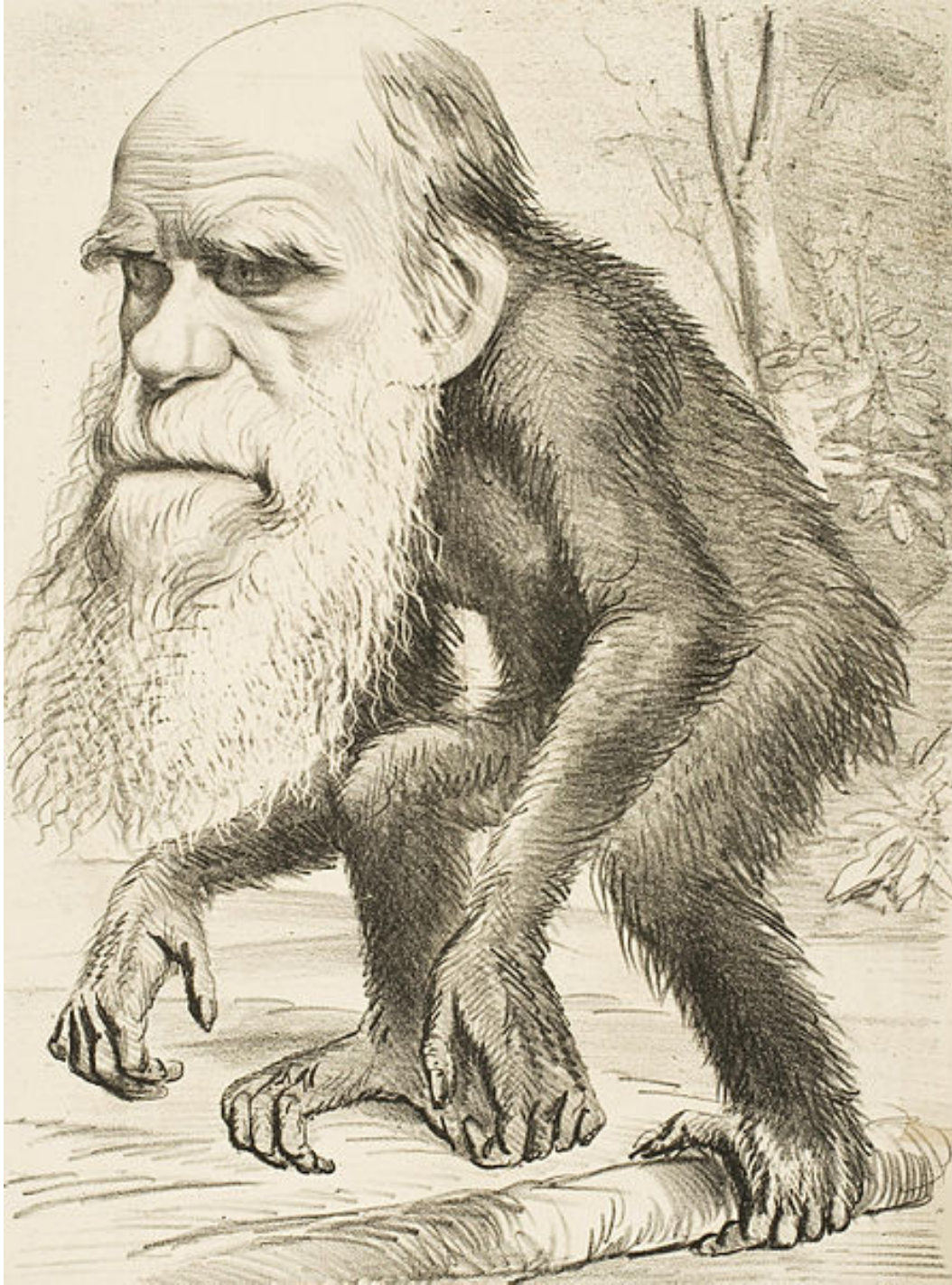
Figure 6: "A Venerable Orang-outang." *The Hornet*. March 22, 1871.

Indeed, these "ape-like" attributes recall evolutionary caricatures circulating in the

second half of the Victorian era in response to Darwin's argument for human evolution. Figure 6,

"A Venerable Orang-outang" was printed in the periodical *The Hornet* in March 1871. The

caricature depicts Darwin's head, adorned with his well-known white beard, bushy eyebrows, and deeply lined forehead perched atop the shoulders of what is unmistakably a primate body. This primate body, identified in the caption as an "Orang-utang," is covered in dark hair, possesses prehensile feet, and arms that are as long as the legs on which primate-Darwin stands. While there is a clear disconnect between what is recognizably Darwin and what is the primate in the creature's front—the white beard contrasts starkly against the hair-coated primate hands—the man and the primate blend perfectly in the back; Darwin's hair grows into the hair coating the primate's back. Through this blending of human and primate, the vast expanses of time that separate primate ancestors from contemporary humans are evaporated, creating instead a single atavistic body. It is easy to envision Hyde as an afterlife of such evolutionary caricatures. Hyde's monkey-like mask and ape-like body blend the animal past with the human present in the same way that the past is merged with the present in this illustration of Darwin-primate.

The animality of Hyde is further accentuated in the way in which he experiences the world. Unlike Jekyll, who is an intellectually driven individual, Hyde is a sensual being, experiencing the world through his bodily sensations and instincts. Describing the sensation of becoming Hyde, Stevenson writes, "I have more than once observed that in my second character, my faculties seemed sharpened to a point and my spirits more tensely elastic" (Stevenson 41). The sharpness and elasticity of Hyde's faculties are reminiscent of instincts; Hyde appears to experience the world around him through his body and senses rather than through intellectual assessment. This contrasts the opening of the novel and its description of Utterson's bodily rigidity. Whereas Utterson's "eminently human" side is manifested through his intellectual and assessing experience of the world, Hyde experiences the world rather through his body.

The result of separating into two corporeal manifestations is that each Jekyll and Hyde experiences a unique sense of freedom. However, this is not a general freedom, but rather a freedom that is deeply connected to their identity as either an atavistic or a posthuman identity. The physicality of Hyde's transformation imbues him with a sense of freedom, because it separates the atavistic and licentious side of his identity from the one that has the potential to become posthuman. Describing his initial transformation into Hyde, Jekyll explains that,

> I felt younger, lighter, happier in body; within I was conscious of a heady recklessness, a current of disordered sensual images running like a millrace in my fancy, a solution of the bonds of obligation, an unknown but not an innocent freedom of the soul. (Stevenson 36)

Hyde's primate-like attributes that are so noticeable to London society are translated into youth and a feeling of being "younger." To be more akin to one's primate ancestors is, or so the text might suggest, to be younger—both younger in years and younger in evolution. The experience of transformation and of primate ancestry is corporeal; the lightness and happiness that Hyde experiences is neither of mind nor thoughts, but of his body. All of Hyde's "sensual" and "reckless" thoughts translate into a bodily experience of freedom. And it is in this "reckless" feeling that Hyde's freedom appears: stripped of any connection to London society or to human morals, Hyde may move freely within the seediest corners of London, disregarding human rules and morals, and thereby live a life of sensual recklessness.

However, this description of Hyde's corporeal transformation also reveals the complexity of reading this novel as a Darwinian allegory. As I have already suggested, a third identity appears in such moments of transformation between Jekyll and Hyde—it is an identity that is not corporeal, yet is both Jekyll and Hyde because it can access both of their minds and personalities. While the Hyde personality feels "younger," the Jekyll personality understands that this is "not an innocent freedom of the soul," contrasting the innocence associated with youth. The years of

evolution have told on Jekyll as knowledge, and in this moment of transformation meet as both

ancestral freedom and the knowledge of a future identity.

Jekyll's freedom appears in his loss of the animal—the loss of that atavism that moors

him to the past—and also manifests in his knowledge of the potential of this posthuman future.

By separating the atavistic Hyde from Jekyll, Jekyll becomes freer than any other character in the

novella. Describing the effects of this transformation, Jekyll states:

> Men have before hired bravos to transact their crimes, while their own person and
> reputation sat under shelter. I was the first that ever did so for his pleasures. I was the first
> that could plod in the public eye with a load of genial respectability, and in a moment,
> like a schoolboy, strip off these lendings and spring headlong into the sea of liberty.
> (Stevenson 37)

Central to Jekyll's posthuman identity is the fact that he is unique. He sets himself apart as "the

first," inferring that he has found a new adaptation. To be the first on the one hand implies that

no other has come before, and on the other hand suggests that a second will follow. This

separation also allows Jekyll to enter into "the sea of liberty," a state in which he is free from the

atavism that had previously confined him. In realizing this separation, he becomes a new being.

Indeed, Jekyll acknowledges precisely this possibility of future versions of this posthuman

ontology: "Others will follow, others will outstrip me on the same lines" (34-5). The dream of a

future human that Stevenson proposes is of the human separated from the instinctual violence

and atavism that marks Hyde. Once Hyde is excised from Jekyll, Jekyll can become the first of a

new posthuman being.

As a Darwinian allegory, *Jekyll and Hyde* does more than merely echo Darwin's theory

of how humans evolve. It engages with the tension between past and future apparent in Darwin's

evolutionary writings, dramatizing the tension between thinking of the human as something

animal and yet something innovatively non-animal. The answer to this tension that *Jekyll and*

Hyde proposes is the posthuman. The posthuman is a necessary lens in reading evolution in this

novel because it reveals that, although a failure, the experiment was more than mere scientific

curiosity: it was an attempt to take control of the randomness of evolution and direct it towards

the future. That it is a transformation marked by darkness and violence—the criminal violence of

Hyde—is again reflective of what is also quasi-posthuman within Darwin's own writings. Like

the drive towards futurism seen in *Origin* and *Descent*, in which evolution occurs through

cataclysm and the violence of the entangled bank, Jekyll's posthuman evolution also scatters

violent casualties across its path.

Posthuman Bodies in *The Island of Doctor Moreau*

  H. G. Wells' novel *The Island of Doctor Moreau* takes the excision of the animal

demonstrated in *Jekyll and Hyde* to an almost ludicrous extent. Unlike *Jekyll and Hyde*, which

imagines only one atavistic relic of the human's animal origins, *The Island of Doctor Moreau*

presents an entire population of atavistic creatures that result from the construction of a

posthuman. Moreau, an experimental biologist, exists as a posthuman in the novel through his

rejection of animality. Published in 1896, *The Island of Doctor Moreau* is H. G. Wells' response

to the vivisection controversies that had been at the center of Victorian medical developments

since the mid-nineteenth century.[41] Told from the perspective of a shipwrecked Englishman,

Edward Prendick, the novel opens with Prendick's survival at sea and his eventual arrival on a

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[41] For a comprehensive account of the vivisection debates circulating at the turn of the century,
see Theodore G. Obenchain's *The Victorian Vivisection Debate: Frances Power Cobbe,
Experimental Science, and the "Claims of Brutes."* In this text, Obenchain surveys the major
proponents and opponents of vivisection in Victorian England while placing nineteenth-century
animal experimentation into conversation with contemporary use of animal subjects in medical
experiments. Scholarly works, such as Anne DeWitt's *Moral Authority*, have also explored
Wells' engagement in the vivisection debate. DeWitt argues that novelists, such as Wells,
utilized science in their fiction to represent the moral deficiencies of science, instead staking out
the novel as the domain of moral explorations.

mysterious Pacific island. On this island, Prendick encounters the island's myriad inhabitants and their self-appointed master, Doctor Moreau. Through observation and discussions with the esteemed doctor, Prendick discovers that Moreau and his assistant Montgomery are surgically altering animals into humans. These beings, named "beast people" or "beast folk" by the humans on the island, are each at an individual stage of development between the animal and the human, some possessing relative mental lucidity, some with clear speech, and others rapidly degenerating back to their original animal form. The climax of the novel comes when the most recent creature that Moreau has been transforming, a puma, escapes the surgical theatre and kills Moreau. Upon the death of the island's master, the beast folk rise in rebellion, killing not only one another but Montgomery as well. In order to survive, Prendick relocates from the human habitation into the forest with the beast folk, where he lives until the beast folk degenerate back into recognizable animals. At the close of the novel, Prendick returns again to a lifeboat and the Pacific Ocean, to be rescued a few days later by a merchant vessel and returned to England.

The Island of Doctor Moreau is one of the most provocative fictional engagements with late-Victorian scientific and medical developments for the myriad human-animal forms that it depicts. In particular, references to Darwin's theory of human evolution are present at almost every turn: the animality of Moreau's new human creations cannot be suppressed, nor can the beast people's drive to adapt to their natural environment, and even Moreau is subject to the laws of evolution. Critics, in exploring these themes within the novel, have largely focused on how evolution affects the beast people. For example, John Glendening, in his chapter on Wells in *The Evolutionary Imagination in Late-Victorian Novels* (2007), reads the beast people as a reflection of the innate confusion about human ontology prescribed by evolution; the beast people question their own humanity and at the same time inspire Prendick to question his animality (Glendening

54). Similarly, E. E. Snyder (2013) reads the beast people's continued monstrosity despite their rudimentary civilization as indicative of the impossibility of perfecting the human; any attempt at such a humanizing project is, suggests Snyder, itself monstrous. And Laura Otis (2009) argues that one of the novel's primary contentions is that the "willed, targeted interference with evolutionary processes cause mostly pain" (Otis 486). Other critical explorations of the novel engage with how it signifies today in a society that is focused on bioethics and modern tools of human-creation. Clayton, in "Victorian Chimeras, Or, What Literature Can Contribute to Genetics Policy Today," places *The Island of Doctor Moreau* into conversation with current guidelines on genetic engineering of chimeras to show that Wells anticipated many of today's concerns about the ethics of species creation. Similarly, Martin Danahay (2012), in an argument informed by both current and Victorian issues of selective breeding, reads *The Island of Doctor Moreau* as a narrative that critiques the ethics of "biopower." In my exploration, I do not wish to resist these readings of the novel. I do, however, want to expand the focus beyond the beast people alone while still remaining within the Victorian era. Moreau is himself a fascinating test subject for the effects of evolution. Looking at both Moreau and the beast people through an equivalent evolutionary lens reveals, I contend, an evolutionary striving to escape animality and become posthuman.

The Island of Doctor Moreau presents a complex image of human ontology striving to become something more, something posthuman. Moreau is the driver behind this creation of a posthuman identity. For Moreau, to be posthuman is to no longer experience pain. This lack of an experience of pain is equivalent to the excision of the animal because Moreau's theory of animality hinges on pain as an animal experience. For Moreau, to feel pain is to exist as an animal. This pain-driven animality is apparent, as I will show below, in the way in which the

beast people live lives dictated by pain. However, the experience of pain is not confined to the animal alone in *The Island of Doctor Moreau*. Because humans, within Darwin's theory of evolution, are an evolved version of the animal, humans continue to live a pain-centered existence. For the human, this is not a physical experience of pain alone; it is also the experience of sympathetic pain. Prendick stands as the primary exemplar of this human version of a pained existence—he is deeply affected by the cries that echo out of Moreau's surgical theatre, and he feels the pain of vivisection along with the animal. However, Moreau strives to exist beyond this animalistic identity, beyond the experience of physical as well as sympathetic pain. To become posthuman, Moreau must remove from his body all understanding of pain, all references to the animal, and therefore the human as well. For Moreau, to be posthuman is to exist as a pain-free being, a being that no longer carries any relics of animality in its bodily and mental experience.

From the outset of the novel, before the elimination of pain is revealed as the driver towards becoming posthuman, Moreau is already established as an exceptional being. This exceptionality manifests, on the one hand, in his difference from the wider scientific community to which he belongs; and on the other hand, he is exceptional because he is the first of a new posthuman kind. As an experimental biologist, Moreau belonged to a large scientific community in England. However, his vivisection experiments on "a wretched dog, flayed and otherwise mutilated" banned him from the wider scientific community, and necessitate his escape from England (Wells *IDM* 34). The scientific and medical fields will not accept the experimental nature of Moreau's work, and rather ostracize him. He is so different from the dominant stream of scientific inquiry that there is no place for him within it—there is no cohort of similar humans who seek to, however unethically, push the living frame beyond what evolution has molded. Like Jekyll, who departs from society in order to explore experimental biology, Moreau is also

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separated from the scientific community, establishing himself on an isolated South Pacific island instead.[42] Within Darwinian language, Moreau is choosing to relocate rather than to adapt—he is choosing to take evolution into his own hands.

The significance of this choice is further emphasized in the way in which Moreau is established as a pioneer, both in his discipline and in his body. Indeed, Moreau considers himself as the first of his kind. Describing to Prendick the history of his professional accomplishments on the island, Moreau explains that, although altering animal bodies "has been demonstrated… by all kinds of untrained clumsy-handed men working for their own immediate ends," Moreau "was the first man to take up this question armed with antiseptic surgery, and with a really scientific knowledge of the laws of growth" (Wells *IDM* 72). Like Jekyll, Moreau positions himself as the "first" of his kind, the first to use specialized techniques, such as antiseptic surgery and knowledge of the laws of growth, to the ends of understanding life. In adopting the tools of modern scientific medicine for innovative ends, Moreau begins to push the parameters of what science and what the living body can be. He pushes his work towards the posthuman.

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[42] The island is a dominant theme across Victorian literature and culture, inspired no doubt by the boundedness of the British Isles as the seat of the British Empire. In the context of *The Island of Doctor Moreau*, the island is both a familiarizing and a defamiliarizing trope. It is easy to read Moreau's South Pacific island as a stand-in for Britain: it is surrounded by water, can only be reached by ship, and thus possesses natural safe boundaries. However, its isolated position, especially in a tropical location, at the same time defamiliarize it as distinct from Britain. I contend that Wells harnesses this duality in order to safely—and from a distance—critique the British Empire. Although it is located in the south pacific and distanced from the British people by being home to primarily aboriginal animal figures, the island nevertheless critiques the unethical aims of scientific experimentation and the willingness to blindly follow such advances on the part of the British people. The failure of the island to sustain a healthy population and the ability of Prendick to come and go likewise suggest that Wells critiques the apparent safety and impenetrability of the British Empire. If Moreau's island symbolizes the British Isles, then Prendick's ability to permeate the island suggests that the borders are not as safe as one would believe.

However, Moreau's specialization is not only an intellectual one; his experimentation on animals is geared towards discovering how to remove pain from a body to make an innovative posthuman being. Speaking to Prendick about the ultimate aim of his vivisection experiments, Moreau sets himself apart as distinct from his fellow humans through his philosophy of his own body, and it is this belief that motivates his experimental drive. "I am differently constituted," he explains to Prendick. "We are on different platforms" (Wells *IDM* 73). Moreau's entire experimental apparatus is based upon his difference from other living humans, a difference that he claims extends to his very constitution. The primary base of Moreau's exceptionality is his ability to ignore pain:

> it is just this question of pain that parts us. So long as visible or audible pain turns you sick, so long as your own pain drives you, so long as pain underlies your propositions about sin, so long, I tell you, you are an animal, thinking a little less obscurely what an animal feels. (73)

Moreau equates the experience of pain with animality, and by extension the human animal. Leaning heavily on Darwinian ideas of the human as an evolved animal, he argues to Prendick that to feel pain is to still remain within the grasp of this animality. To dwell on pain is to think through the animal feelings of pain, and therefore to become fully integrated into an animal mode of living. However, by claiming that he is parted from other humans through his differing conception of "this question of pain," Moreau implies that he is a specialized adaptation of the human, one that is separated from animalistic pain (73). Indeed, he believes so firmly that he is no longer a part of the animalistic human species that he claims he can no longer access the experience of pain, whether physical or mental: "Sympathetic pain—all I know of it I remember as a thing I used to suffer from years ago" (75).

The way in which Moreau separates himself from pain—whether sympathetic or physical—is through repeated vivisection experiments on living animals. These experiments

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have a dual function. On the one hand, they inure Moreau to pain, and on the other hand are his attempt to extend the removal of the animal (and thus of pain) to his creations as well. Through these experiments, Moreau establishes himself as a force of evolution, a force that accelerates the evolution from animal to human and on to the posthuman beyond the slow progression of time. This is most apparent in the way in which Moreau describes his vivisection projects to Prendick. Moreau claims that, "I never yet heard of a useless thing that was not ground out of existence by evolution sooner or later. … And pain gets needless" (Wells *IDM* 73-4). To Moreau, pain is something destined to be made obsolete by the long process of evolution. However, impatient to move beyond this animalistic crutch, Moreau takes an active role in this process of evolution. Explaining his aim in vivisection, Moreau remarks that, "Each time I dip a living creature into a bath of burning pain, I say: this time I will burn out all of the animal, this time I will make a rational creature of my own" (78). These two quotes offer two explanations of animal transformation: the first refers to the long process of evolution, the second to Moreau's rapid and forced transformations. Typically, useless adaptations will be "ground out of existence" by evolution, but Moreau purposefully "burns out" all of the unwanted animal characteristics in his beast people. Both grinding and burning are forceful actions. While grinding reflects the long passage of time and recalls the heavy yet unstoppable path of geological forces, burning is reflective of a rapid yet complete force of transformation. Through this mirroring, Moreau paints himself as a force of evolution; he is a force that is enacting on a more rapid timeline the inevitable result of evolution: humans will evolve into pain-free beings.

While Moreau's vivisection enterprise attempts to impart to his beast people a pain-free existence similar to the one Moreau claims to enjoy, it is a notable failure. Pain and the fear of pain continue to dictate the beast people's lives. The continued presence of pain-dominated

animal beings subsist within *The Island of Doctor Moreau* as physical relics of Moreau's one-time human-animal existence. Like Jekyll, who must excise his atavistic side through the creation of Hyde, so Moreau's excision of pain and animality lead to the creation of the beast people. In this way, the beast people stand as physical relics of Moreau's own becoming posthuman—as missing links. Through reading *The Island of Doctor Moreau* as a Darwinian allegory, the beast people appear as links physically connecting Moreau's human-animal past to his posthuman present. Within mid- and late-Victorian natural and evolutionary science, missing links referred to hypothetical creatures that may have existed as intermediate species between a known fossilized creature and its living relative. Although we often associate the concept of "missing links" with Darwin, Darwin never actually used the language of "missing links" in his work.[43] Instead, he referred to the speculative species hidden within the imperfect geological record as "intermediate links" or as "connecting-links" in *Origin* and *Descent* respectively. In *Origin*, Darwin writes that, "the very process of natural selection constantly tends … to exterminate the parents form and the intermediate links" (*Origin* 113); while in *Descent* Darwin suggests that, "Even if it be granted that the difference between man and his nearest allies is as great in corporeal structure as some naturalists maintain, … yet the facts … appear to declare, in the plainest manner, that man is descended from some lower form, notwithstanding that connecting-links have not hitherto been discovered." (*Descent* vol. 1, 185). While the passage from *Origin* refers to animals and the passage from *Descent* refers to the elucidation of a human line of descent, both of them suggest that the development of new structures of life leave relics of

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[43] Despite Darwin's rejection of the term "missing links," I continue to use this language because it was widely popular in non-specialized accounts that reported on Victorian scientific developments. The language of "missing links" is also still widely circulating today, despite paleontologists' rejection of this idea.

the past behind them, whether these relics are still living or have been concealed within the geological record.

The beast people represent these relics of Moreau's once human past. Although they are not "missing," they nevertheless reveal what is "missing"—what has been selectively removed—from Moreau's posthuman existence. The continued relevance of pain for the beast people can most clearly be seen in the rules that dictate their lives. These rules, referred to as "the law" generally, are a set of dictates that require the beast people to suppress their animality and act in so-called human ways. The law is a rhythmic chant that prescribes how the beast folk should suppress their animality in favor of human-like morals. It is built around repetition, especially repetition that insists upon the humanness of the beings that follow it. Dictating that the beast people not "go on all-Fours;… suck up Drink; … eat Flesh or Fish; … claw Bark of Trees; [or] … chase other Men;" each of these prescripts are followed by the phrase, "that is the Law. Are we not Men?" (Wells *IDM* 59). It is adhering to the law—agreeing to suppress animal instincts—that makes the beast people "Men." The law is followed and recited not because the beast people believe in it, but because Moreau has promised consequences for disobeying it. If a beast person contradicts the law—that is to say, if they access their animal nature—they pay for this infringement by returning to Moreau's surgical theatre and experiencing the pain of vivisection again. Their law is predicated on the experience of pain: "Evil are the punishments of those who break the Law," proclaim the beast people; they will be brought to the "House of Pain" and, as in the case of the Ape Man, "burned, branded in the hand" (60, 59, 60). The beast people thus continue to stand as primary examples of the human-animal preoccupation with pain. In this way, Moreau constantly reinforces the existence of those links that prove his evolution beyond the human, while also incessantly creating new links to reinforce Moreau's posthumanness.

Looking at the beast people as missing links also requires that we recognize their innate hybridity—the multiplicity that composes their bodies. As links between two seemingly different species, the beast people possess attributes of both the animal and the human. Darwin writes that there is a "commonly-assumed hybrid nature of the intermediate link" (*Origin* 31), and the beast people, as players within this Darwinian allegory, possess that hybrid nature. In the context of *The Island of Doctor Moreau*, this hybridity is not a result of the slow progression of evolution, but rather of Moreau's surgical interference. He actively vivisects animal bodies into human-like beings, and in the process is not able to entirely excise animality. Moreau creates the beast people by taking one or more animal subject and surgically altering them into a single body until it resembles the human in body and in habits. Some of his beast folk are comprised of just one animal; others contain attributes of multiple animals. Among Moreau's subjects walk a Wolf-Bear, a Leopard Man, several Bull Men, a little sloth-like creature, a Horse-Rhinoceros, and a threatening Hyena-Swine hybrid. No two beast people are alike; each exhibits unique attributes and adaptations. This myriad of human-animal life presents to a reader a veritable garden full of living examples of evolutionary theory; each creature represents a link between the animal ancestor and the present human body. This multiplicity marks them as creatures constructed under Darwin's theory of evolution: they are human bodies that are innately animalistic in their very form. On the most basic level, the language used to refer to the beast folk reflects their human-animal hybridity. Referred to generally as "Beast Folk" or "Beast People" and specifically by a hyphenated list of the animals that comprise them, the hybrids in this novel cannot be simply summarized into a single creature, a single adaptation or species. They are multiple in their very nature, both "beast" and "people," both animal and human.

This concept of being multiple has been a hallmark of current theories of human ontology in which the human is no longer seen as a species in isolation from all other living organisms, but is rather ontologically and physically defined by its relation to other beings. Cary Wolfe, a philosopher of animal and posthuman ontologies, argues that humans are "always radically other, already in- or ahuman in our very being" (Wolfe 89). He expands this provocative claim by stating that, on the one hand, we are already *other* due to "the evolutionary, biological, and zoological fact of our physical vulnerability and mortality, our mammalian existence;" and on the other hand we are *other* "in our subjection to and constitution in the materiality and technicity of a language that is always on the scene before we are, as a precondition of our subjectivity" (89). On the one hand, the animality and evolutionary history that is marked upon our bodies places us within a system of all living beings and contradicts ideas of human exceptionality. On the other hand, our way of understanding what is human—whether linguistically or conceptually—is based in the human as a multiple identity, an identity that is both animal and human. The beast people inhabit precisely this bodily and conceptual multiplicity. Their bodies are always multiple, always both the original animal or animals and at the same time the vivisected humanized-animal. And the way in which we think of them is likewise multiple: as Wells emphasizes in their manifold names, we cannot conceive of these bodies without acknowledging their various original identities. This multiplicity reflects Darwin's insistence that the human came from animals. By combining multiple elements into one body, Wells seems to reflect the branching tree of life that is Darwin's theory of evolution. A creature can be traced back to ancestors with various adaptations; or, in the case of *The Island of Doctor Moreau*, an individual beast person is still easily identifiable as a link between the animal and the human.

While the beast people are unique when compared to the humans and animals that roam the world, they are nevertheless established as unexceptional in the novel through the way in which they are lumped into a single unified community. Unlike Moreau, who has no other innovative scientists on the island against whom he can be compared, the beast people are myriad and always moving in a community of other beast people. Their society is constructed around uniformity; each element of the beast people's lives encourages them to discard their differences and focus on what they share. They live communally in houses, share meals, and recite a rudimentary law in unison. And this uniformity is not confined to the beast people alone; they include into their community any being that appears to possess animal or human elements similar to their own. The significance of uniformity is apparent in one of Prendick's first encounters with a beast person. Meeting a human-primate hybrid, the Ape-Man, in the island forest, Prendick engages in an almost ritualistic greeting. The Ape-Man

> held his own hand out, and counted his digits slowly, 'One, Two, Three, Four, Five – eh?' … guessing this was in some way a greeting, [Prendick] did the same thing by way of reply. [The Ape-Man] grinned with immense satisfaction. (Wells *IDM* 55)

The Ape-Man's mode of greeting Prendick, whom he takes to be the newest addition to the beast people's ranks, is to find a bodily element on which they agree—in this case that they both possess five digits—and to celebrate that uniformity. The uniformity of fingers gives the Ape-Man pleasure, similar to the way in which Utterson's restrictive coldness gives pleasure to London society in *Jekyll and Hyde*.

Significantly, Moreau never engages in such an interaction with the beast people or even with the other humans on the island. And it is within this absence that his posthumanity is most apparent. While Montgomery "had come to regard [the beast people] as almost normal human beings" and Prendick, as can be seen in his interaction with the Ape-Man, is invited into the

beast people's community, Moreau has no mirror on the island, no other creature who possesses similar posthuman elements against which to view himself (Wells *IDM* 83). Moreau is an isolated and unique posthuman.

Although framed as evolved from the animal, the beast people are still far removed from posthuman beings such as Moreau. While they remain physically confined to their South Pacific island, the symbolism of their non-posthuman society extends to Britain in the final chapters of the novel. Surviving the beast people's revolt, Prendick joins the beast people in their woodland village. He observes as the beast people begin to lose their human characteristics and revert to more recognizable animal forms. Once the reversion is complete, Prendick is able to escape the island on an empty life raft that happens to run ashore. He is rescued by a British vessel, and eventually returns to England. However, although he escapes the island, he is unable to escape the evolutionary lessons imparted by the island:

> I could not persuade myself that the men and women I met were not also another, still passably human, Beast People, animals half-wrought into the outward image of human souls; … I feel as though the animal was surging up through them; that presently the degradation of the Islanders will be played over again on a larger scale. (Wells *IDM* 130)

Back in England, Prendick cannot escape the vision of humanity as bestial; the animality of the human is everywhere visible to him, just as it was on the island. Prendick sees in British society a reflection of the beast people of Moreau's island. And this vision shows how animalistic are humans; by calling the members of British society "half-wrought," Wells suggests that the human is still under construction, still changing. Just as the beast people's society on the island appeared rudimentary, so human society in England is animalistic, and far from the vision of a future posthumanity that Moreau attempted to construct.

Throughout the novel, however, Prendick appears to be the only character untouched by the myriad ways in which the human form can become animal or become posthuman. He stands

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as a witness to Moreau's becoming posthuman, his creation of the beast people as relics of his human pain, and to the way in which bestial nature enters every human-like form. In this way, Prendick takes on the role of the reader, observing how evolution can be manifested in nature and in science. At the same time, he also stands as a judge over the effects of posthuman striving. Whereas *Jekyll and Hyde* did not possess the critical lens that gave voice to how unethical was Jekyll's posthuman experiment, Prendick's mediation in *The Island of Doctor Moreau* provides a much-needed critique. His reactions, which range from "vague dread" at seeing a beast person, to "horror" at viewing vivisection in progress, to "shivers" of fear at hearing Moreau's story of how and why he vivisects animals into humans illuminates the unethical procedures dramatized in the novel (Wells *IDM* 41, 70, 79). Prendick's reactions when faced with the reality of Moreau's experiments reflect the apocalyptic futurism that runs below the surface of Darwin's evolutionary writings. Moreau's island is marked by violence—the violence of the scalpel on a living body, the violence of the restrictive law, and the eruptive violence of overthrowing Moreau that concludes the novel—reflects the cannibalism and natural violence of evolution dramatized in Darwin's scientific writings.

Conclusion

While we often think that Darwin's greatest influence upon Victorian literature was placing the human amid animal identities, this influence extends well beyond merely human animality. By investigating the way in which literature took up evolution—the moments that literature fleshed out—I have attempted to illuminate how this revolutionary theory circulated beyond the sciences alone. Through looking at literature's adoption of evolution, I show that much of what we think of today when we talk about evolution was in fact inspired by Darwin's

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literary afterlives. Literature inspired by Darwin put pressure on the human body and future human evolution. Understanding this future of evolution as posthuman is significant because it illustrates that thinking about the human body in an evolutionary context has always been future-oriented. To think about the human body as evolving is to think about where our bodies will be next, to think about being post- our current human form.

I will close this chapter as I opened it: with the concluding passage from Darwin's *The Descent of Man and Selection in Relation to Sex*.

> Man may be excused for feeling some pride at having risen, though not through his own exertions, to the very summit of the organic scale; and the fact of his having thus risen, instead of having been aboriginally placed there, may give him hopes for a still higher destiny in the distant future. (*Descent* vol. 2, 405)

This passage is an apt opener because it speaks about the origins of the human, about the struggles undertaken by life to reach the human form. It is also an apt closing remark because it speaks to the future of life, to the potential to continue changing. This dual focus on the past and future reflects that internal tension that is so central to reading Darwin as a posthumanist. While Darwin claims that the human is the "very summit of the organic scale," this is almost immediately contradicted. After the semi-colon, Darwin expands this "summit" to "the distant future" in which the "still higher destiny" of man will appear. The human is not, suggests this passage, the summit of any scale of life, but just another branch on the tree.

At the same time, this passage illuminates the openings left in Darwin's theory of human evolution that early science fiction writers in the Victorian era sought to fill. While Darwin claims that the human form was reached "not through [the human's] own exertions," authors such as Stevenson and Wells envision the future of human evolution as entirely instigated by the human. To become posthuman, suggest novels such as *Jekyll and Hyde* and *The Island of Doctor*

Moreau, is for the human to harness the power of evolution and use forceful exertion to become

something new.

Chapter IV

From Germs to Genes: Personifying the Invisible Posthuman

The scientific and technological advances of the Victorian era are often associated with the grand, the larger-than-life, and the immensely impressive. The railway, for example, reworked the English countryside surrounding London, marking the landscape with the high plumes of steam that escaped its engines; the Crystal Palace, a stunning feat of engineering, was large enough to encase entire trees within its glass walls; and the theory of evolution re-wrote the narrative of animal and human life. However, along with these colossal acheivements, a wave of scientific inquiry began to explore microscopic and previously invisible life forms. These early forays into microbiology, bacteriology, and the field that came to be called genetics sought to look beyond what the naked eye could see, and to reveal new environments for scientific inquiry. While these revelations heralded dramatic leaps in medical developments, they also inspired fear about the nature of these previously hidden communities of life. The invisible was at once lifesaving and frightening.

The first microorganisms were observed and recognized as living beings in the seventeenth-century. In 1674 Antonie van Leeuwenhoek, a Dutch scientist and the original father of Microbiology, applied his newly developed magnifying lens to a sample of lake water. He hoped to understand what caused the water to appear cloudy and murky in summer. He describes his observations in a letter to Henry Oldenburg, the Secretary of the Royal Society, on September 7, 1674:

> I took up a little … [water] in a glass phial; and examining this water the next day, I found floating therein … very many little animalcules. … [T]he motion of most of these animalcules in the water was so swift, and so various, upwards, downwards, and round about, that 'twas wonderful to see: and I judge that some of these little creatures were

above a thousand times smaller than the smallest ones I have ever yet seen, upon the rind of cheese, in wheaten flour, mould, and the like. (qtd. in Dobell 110-111)

In his sample of lake water, van Leeuwenhoek discovered an entire colony of microscopic life. The "animalcules," as van Leeuwenhoek called them, were at once familiar—they moved, as any other life forms, and recalled the mites that populate many common foods; at the same time, they were terrifyingly alien, their movements appearing more sporadic and various than those of familiar animals; and their size was so small as to be almost incomprehensible. Van Leeuwenhoek had observed the first colony of microorganisms. However, the Royal society with whom he shared these observations was not immediately convinced of their authenticity. Some years later, in 1680, van Leeuwenhoek describes how the Society received his observation of these fantastic creatures: "I … oft-times hear it said that I do but tell fairy tales about the little animals" (200). And it is on this tendency to greet the microscopic, the almost invisible colonies of life that live below the visible surface as fantastical and fictional that I wish to focus in this chapter.

By the mid-nineteenth century, the existence of microorganisms in water was a well-established fact. Ever-improving microscopes were used to observe and catalogue microorganisms for scientific investigation. Originally invented in the seventeenth century, early microscopes were primitive tools that provided only blurred images (Coleman *Biology* 22). The mid-nineteenth century saw great improvements in microscopy by combining different lenses that allowed for some control over the spherical aberrations of images. These improvements also allowed for the formulation of the cell theory, providing natural scientists with a key to observing that all beings, whether sentient or flora, are composed of cells. However, it wasn't until the 1860s that the microscope was adapted from primarily being used by geologists and natural scientists to being used in the medical field, allowing scientists to observe things

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previously invisible to the naked eye (Halliday 68, Coleman *Biology* 22). In the 1880s the

microscope neared the limits of its perfection for use in a medical setting, with improved lenses

allowing for crystal-clear images and microscopic techniques, such as sectioning and staining,

magnified material, allowing for the observation of organisms smaller than the cellular building

blocks of life (Coleman *Biology* 23). With these improvements, the microscope and microscopy

became a key component of modern biology and the developing field of microbiology, revealing

to the human eye for the first time subcellular structures. As Isobel *Armstrong* notes, the

microscope gave the human eye access to hidden, distinct and dream-like worlds (Armstrong

Victorian Glassworlds 319).[44] However, despite the relative reliability of the microscope,

miniature organisms were still greeted by the public with confusion and misunderstanding in the

mid-nineteenth century; and especially their function in everyday life and health was still a

mystery.

Because of this confusion, microorganisms in the early- and mid- Victorian era were

portrayed as monstrous—monstrous both in their imaginative manifestation as fictional creatures

and monstrous in the way they transfigured infected bodies. While medical texts and illustrations

presented scientifically detailed versions of how disease reacted with the human, cartoons in

popular periodicals such as *Punch*, added a more terrifying body: the invisible beings that grew

out of disease were depicted as warped humanoid beings, or as sickly, alien bodies.

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[44] For more on this subject, see Armstrong's *Victorian Glassworlds*, which provides a fascinating insight into the hallucinatory and distancing nature of the microscope. Lorraine Daston and Peter Galison's *Objectivity* likewise talks about how the enlarged image through the microscope occludes an image by decontextualizing it, rather than clarifying it. Meegan Kennedy's *Revising the Clinic* (2010), in a different take on the visual and medical development, draws a correlation between the selective visual representations of illness seen in medical case reports, and the selective representation of sympathetic bodies in Victorian novels.

These depictions of bacteria as horrific reflects the growing unease in the Victorian era about the ability of invisible organisms to change the human body, especially to make it something seemingly inhuman. As Victorian scientists turned their attention towards miniscule and apparently invisible organisms, they suddenly had to contend with an entirely new sphere of life that was neither as passive nor as invisible as had previously been believed. The cholera epidemics of the nineteenth-century proved just how drastically these hidden life forms could transfigure the human body. As a result, the Victorian era was awash with anxiety about bacteria's ability to change the lively vibrancy of the human into an alien, almost-dead creature.

These deep-seated anxieties about invisible organisms did not fade, however, with the introduction of the germ theory or the discovery of disease bacilli; rather, it remained present, finding new life in the unexpected domain of heredity. Public, medical and literary representations of the heritable trait echo representations of microorganisms from earlier in the century. Similar to the cholera victim, bodies tainted by mysterious heredity became alien and distorted. However, whereas cholera's expected end was death, there seemed to be no natural end to the heritable trait; it had the potential to be passed from one generation to the next, manifesting unpredictably from body to body and thus changing the entire future of a family line.

In tracing this narrative of monstrosity from cholera to heritability, I argue that late-century anxieties about the unknowability and unpredictability of heritable characteristics were deeply rooted in mid-Victorian representations of bacteria as monstrous. I focus on the way in which invisible bodies—especially bacteria and the heritable trait—were received beyond the scientific fields that observed them; literature and visual representations in the public presses made these scientifically invisible organisms tangible by ascribing to them strange, posthuman bodies. I call the fears engendered by the the invisible subjects of this chapter "posthuman" not

because these germs and genes are cyborg agents, but because the Victorian imaginations of them contained potential for terrifying transfigurations. Bodies infiltrated by cholera, for example, changed from living humans into beings that could barely be recognized as living. Likewise, genes—what the Victorians called heritable characteristics—seemed to have mutative powers over their human host. The invisible posthuman could enter the body and, without warning, change it into something unknown.

In attempting to understand why invisible biological agents were often depicted as frightening, I focus on two moments of medical change in the mid- and late-Victorian era. I begin in the 1830s with the arrival of cholera in Britain. Using illustrations from medical and popular journals, I show how cholera was represented as a frightening, unknown and invisible entity capable of creating alien beings out of infected human bodies. The water-borne theory of cholera propagation that appeared in the middle of the century began to give a microbial body to the previously invisible bacteria; but this microbial body was still depicted as humanoid in popular illustrations. Although cholera remained frightening at the end of the century, much of its terrifying power of transformation diminished once it had been identified as a bacterium. However, I show how late-century anxiety around heritability adopted some of the anxiety shed by the discovery of the cholera bacillus. Heritability was similarly invisible, similarly transformative, and just as life altering. Yet more frightening, it was uncontrollable: a heritable characteristic could not be avoided by boiling water nor healed with rehydration. Literary engagements with heritability, such as Walter Besant's *The Fourth Generation* and Sarah Grand's novel *The Heavenly Twins* as well as conversations around heritability appearing in the popular presses took up the enigmatic yet frightening potential of heritability; as with the threat

of cholera, heredity was seen to have the power to change not only the human body but also future human generations.

Cholera: Battling an Invisible Pathogen

When cholera arrived on the British coast in 1831, it instigated a wave of anxiety: what was this disease; where did it originate; and how did it pass from individual to individual? Although statistically cholera was by no means the most lethal disease circulating Britain in the nineteenth century—endemic diseases such as fever, tuberculosis and influenza, among others, claimed many more victims than cholera—the nature of cholera raised it to a uniquely terrifying level (O'Connor 32). Because of the novelty of the disease, the rapidity with which its victims died, and its mysterious proliferation, cholera was painted as a modern plague (Halliday 74). Those who contracted the disease quickly succumbed to its effects: they vomited profusely, expelled a colorless and odorless rice-water-like stool, and turned the distinctive blue-grey hue of the severely dehydrated. Many cholera patients died within a matter of days. Because of the virulence of this disease and the distinctive way in which it altered the appearance of its victims, cholera was given the plague-influenced name "the blue terror" (Carpenter 39).

This anxiety around how cholera changed the bodies of its victims persisted throughout the Victorian era, renewed each time cholera revisited Britain. Although doctors in Britain had been aware of cholera's existence from the beginning of the nineteenth-century, they only observed it from afar as it circulated in Asia and the Middle East. Originating in India, cholera migrated west from the Ganges River via a combination of increasingly popular pilgrimage routes and commercial trade routes. In combination with British military campaigns in India, the commercial routes assisted in spreading cholera between large cities and rapidly across the globe

(Carpenter 38). Cholera visited Britain as an epidemic four times: 1831-1832, 1848-1849, 1853-1854, and 1866-1867 (35). During its four visits, cholera claimed more than 120,000 British lives, which was a notable enough number to cause panic among Britain's citizens (Halliday 73, O'Connor 25).

Cholera arrived in Sunderland, England in 1831 by way of a package ship from Hamburg. Upon its arrival in England, cholera was immediately identified as "Asiatic" in origins—it was termed the "Asiatic cholera"—and was often depicted as a foreign invading force (O'Connor 23). As with the disease, cholera victims were likewise racially othered because of their darkened hue and near-black blood from dehydration. Critics have already explored in depth the relationship between race and cholera. For example, Erin O'Connor, in *Raw Material*, explores the intersection of Victorian hygiene and the racial and class prejudices present in Victorian cholera conversations. On the other hand, Pamela Gilbert, in *Cholera and the Nation*, looks at race and cholera within an imperial framework, insisting that cholera's Oriental origins reflect Victorian anxieties about orientalization. This racialization of cholera victims is worth mentioning because it demonstrates that othering cholera victims was not undertaken in comical illustrations alone, but that these seemingly other-worldly or foreign bodies posed a wide-reaching threat to Victorian ideas of normal bodies.

While today we know that cholera is a waterborne illness and passes from victim to victim through infected drinking water, in the mid-nineteenth century cholera was still believed to originate in noxious air. In the early- and mid-nineteenth century, doctors and public health officials flirted with a plethora of competing theories around how cholera was propagated. Some officials proposed the "Ozonic theory," which blamed a shortage of ozone for the cholera epidemics; others supported the "Telluric theory," which claimed that the earth emitted a poison

that caused cholera; while still others claimed that cholera was propagated via the "Electronic theory," which attributed cholera to electricity in the atmosphere (Halliday 59-60, Johnson 122). But the miasma theory was the most prominent. It proposed that this foul air was in fact poisonous disease-carrying gas exhaled from rotting matter, the earth, foul water, sewage, and any other noxious substances prevalent in the urban landscape. The filth and foul air customary in growing urban centers was therefore central in the acceptance of the miasma theory. With so many people packed into increasingly cramped spaces that were not adequately equipped with the sanitation measures necessary for such large populations, foul air became a norm of the urban space, as did infectious disease.

A series of Victorian public figures took an interest in the conditions and health of the poorer neighborhoods of London. Among them were social reformer Edwin Chadwick and physician William Farr. Farr, for example, conducted extensive research on the perceived correlation between cholera cases and the elevation above sea level of the neighborhoods in which these cases developed.[45] But it was Edwin Chadwick, best known as a social reformer and for his role in reforming the English Poor Laws, who was the most outspoken advocate of the miasma theory. His primary contribution to cholera in the Victorian era was his support of sanitation reform. Believing that the effluvia rising from London's aged and often open sewers

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[45] The elevation theory was dominant even into the 1850s and during the infamous Broad Street outbreak (1854). Although Broad Street was at a significant elevation above sea level and thus, according to Farr's theory, should have been relatively cholera-free, Farr and the Parliamentary committee working with him on his elevation theory nonetheless found some creative loopholes to keep the elevation theory relevant. Farr argued that, "the [Broad Street] outbreak arose from the multitude of untapped and imperfectly trapped gullies and ventilating shafts constantly emitting an intense amount of noxious, health-destroying life-destroying exhalations" (qtd in Halliday 143). As Bingham notes, the data that Farr collected also corresponded to Snow's data. However, whereas Farr only looked at elevation, Snow took into account the water suppliers and their water intake sources in these low-lying areas. Because Farr was a better-known physician and epidemiologist, and because the miasma theory was the better known and more respected of the two, Snow's theory remained on the sidelines even into the third epidemic in the 1850s.

was the primary culprit in the cholera epidemics, Chadwick lobbied for and passed regulations

that required all cesspools to be connected to London's newly built underground sewage

system.[46]

The influence of cholera on Victorian sanitation reform is a common lens taken by critics

exploring the cholera epidemics. Critics, such as Roy Porter and Mary Wilson Carpenter, look at

the pressure that poverty and poor sanitation in the London slums placed on implementing

sanitation reform. Other critics, such as Pamela Gilbert, Tom Koch, and Jules Law, focus on the

physical sanitation documents, especially maps, that contributed to combatting disease.

Explorations like these argue that, by mapping individual disease cases as group events, disease

came to be understood as a public event affecting general populations. Such large-scale

explorations of cholera miss, in my view, many of the significant implications of the epidemics.

For that reason, I focus my explorations on the way in which cholera manifested on individual

bodies and how these representations of altered bodies circulated—more widely than the maps—

in the public sphere. By focusing on depictions of human bodies, we are able to see that cholera

affected much more than the water and sanitation systems in Victorian England; it influenced the

way in which diseased humans were transmuted into posthuman bodies through the invisible

influence of unknown bacteria.

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[46] Public Health and sanitation reform—especially in the sewer-overrun capital—emerged out of
Chadwick's political work and the four successive cholera epidemics. While London's sanitation
was originally run by nightsoil men, working citizens whose job it was to empty the privy
cesspools and recycle the waste as agricultural fertilizer, changes in the manure trade, the water
closet system, and quality of human waste quickly put the nightsoil trade out of business
(Halliday 133-34). As London's cesspools filled up and overflowed into the streets, new
legislation—influenced by the miasma theory—was introduced to standardize sanitation in
London; all cesspools were connected to London's old and leaking underground sewage system,
which was in turn improved and directed to dump its contents into the River Thames (Halliday
133-35). For more on the decline of the nightsoil trade and its role in the cholera epidemics, see
Stephen Halliday's *The Great Filth: The War against Disease in Victorian England* (2007).

Alongside the medical, social and political reactions to cholera, the publishing world

played a substantial role in disseminating information about the disease. Cholera was often

depicted as a terrifying entity in the Victorian era—terrifying in the vastness of its reach, the

rapidity with which it spread, and in the way in which it distorted its victims. The public presses

and medical journals in Britain had, since the early nineteenth-century, followed its path from

India, into the Middle East, across Russia, and eventually into Europe. Accounts of the disease

are rife with disturbing reports of its disregard for human attempts to stay its progress. From the

British perspective, cholera seemed otherworldly. This alien sentiment is epitomized in an 1831

article by William Maginn, which follows the advance of cholera into Europe. Published in

Fraser's Magazine for Town and Country, Maginn's article "The Asiatic Cholera" traces the path

taken by the disease from "the low and swampy banks of the Ganges" in India to its arrival in

"Sunderland, where there is every reason to believe it is raging in all its Asiatic violence"

(Maginn 614, 616). But, for Maginn, the violence of cholera is not only the violence of the

disease upon the bodies of its victims, but also a violence of movement:

> The terrific ravages which … this disease has committed… —the steady and uniform
> pace at which it has travelled from province to province, and from city to city,
> surmounting every natural barrier hitherto deemed impregnable to infection—its apparent
> facility of communication from man to man—its very mysterious and intractable
> character, together with the slight modifications which, unlike all other epidemics, it
> experiences from variety of clime or season, are calculated to impress the mind with fear
> and dismay. Within the annals of medicine there are few, if indeed any, diseases which
> are attended with such a frightful array of symptoms, or which destroy their unfortunate
> victims with such relentless fury, as the pestilential cholera. (613)

Maginn paints a dire picture of cholera. It appears to have capabilities before deemed impossible,

such as adaptability to all climates. And especially terrifying, it seems to have no regard for the

preventative measures taken by humans to slow its progress. Neither natural barriers nor human

quarantine boundaries have succeeded in stopping the cholera. It is truly, warns Maginn, unique in the history of observable disease.

The horror of cholera, however, only intensifies as Maginn's article moves from cholera's global path to the mystery of its propagation. After tracing the apparent impossibility of escaping the epidemic, Maginn proceeds to detail the plethora of competing theories about how it is passed from human to human. Some have theorized that it originates in the atmosphere, others in noxious exhalations from the ground, and even others have suggested that it derives from "a particular electromagnetic condition of the earth" (Maginn 616). But Maginn's own theory is, perhaps, the most provocative when considering the posthuman nature of fears around contagious disease. Maginn proposes that,

> in connexion with certain favourable circumstances some invisible animal miasma or poison is spontaneously generated in the bodies on those infected with the disease, which is capable of transmission from person to person, either by actual contact, inhalation of the poison through the lungs, or absorption by the surface of the body. (616)

Maginn's suggestion that cholera is an "invisible animal" is less absurd to us than it would have appeared to a British public in 1831. With our modern understanding of cholera as a bacterium, this suggestion is very familiar to us now. However, in 1831 Maginn is writing some eighteen years before John Snow's initial suggestion that cholera is waterborne, and several decades before Robert Koch observed the cholera bacillus for the first time. Maginn's specification of cholera as an "invisible animal *miasma*" placed him much more within early-nineteenth-century theories of cholera as an air-borne disease (emphasis mine). However, it is upon the invisibility and the animality of cholera that I want to focus, and that I would like to inform my further investigation of public responses to cholera. To Maginn and indeed to many nineteenth-century individuals observing the advance of cholera, it appeared living and unstoppable, almost as though it exercised its own agency.

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The way in which cholera altered the bodies of its victims further emphasizes this agentic quality of the disease. Similar to the way in which Maginn describes it having no regard for natural or man-made boundaries, cholera appeared to have no regard for the sanctity of the human body. It changed the soft, warm and living bodies of its victims into alien beings. Victims of cholera adopted, in a matter of days, a sickly blue or black hue indicative of severe dehydration. An article from 1831 published in *The Lancet* and written by Drs. Barry and Russell describes the appearance of these alien bodies:

> The lips, the face, the neck, the hands, the feet, and soon the thighs, arms, and whole surface, assume a leaden, blue, purple, black, or deep-brown tint…. The fingers and toes are reduced at least a third in thickness; the skin and soft parts covering them are wrinkled, shriveled, and folded; the nails put on a bluish pearl-white; the larger superficial veins are marked by flat lines of a deeper black. ("Description of the Cholera Morbus" 721)

Drs. Barry and Russell's account of the symptoms of cholera is reminiscent of an inanimate rather than living body. Cholera alters the supple limbs of its victims into discolored "leaden" appendages; the victims' skin becomes much more indicative of death and decay than of life; and the disease even appears to petrify the inside of the body by blackening "the larger superficial veins."

As dehumanizing as is the picture painted by Drs. Barry and Russell, it nevertheless refrains from encompassing the entire body of the victim. They focus on the details: the way in which the limbs become shriveled, the discoloration of the skin, and the mutation of fingernails into alien crustaceans. However, images of cholera victims that began to circulate following the first epidemic in Britain in 1831 were not afraid to transplant these details onto living bodies, creating out of cholera victims beings that embodied the posthuman.

The images below both depict the late stages of cholera. Figure 7, although widely circulating today, is from an unknown publisher, most likely Italian. It depicts in bright color the

effects of severe dehydration from cholera upon a young Viennese woman. On the left, we see her smiling and healthy, while on the right her face has been shrunken and drawn by the disease that has also discolored her skin. Figure 8, published in *The Lancet* in 1831, is a British mirror of the Italian image. The image is a black-and-white pencil sketch depicting a young victim of the Sunderland cholera outbreak lying supine on a bed. Her eyes are as sunken as are those of the Italian woman, and the bones of her face are equally prominent. This sunken quality is mirrored in the hands and feet that lie exposed above the covers.

Figure 7: a young Viennese woman, aged 32, depicted before and after contracting cholera. Publisher unknown. Italy? ca. 1831.
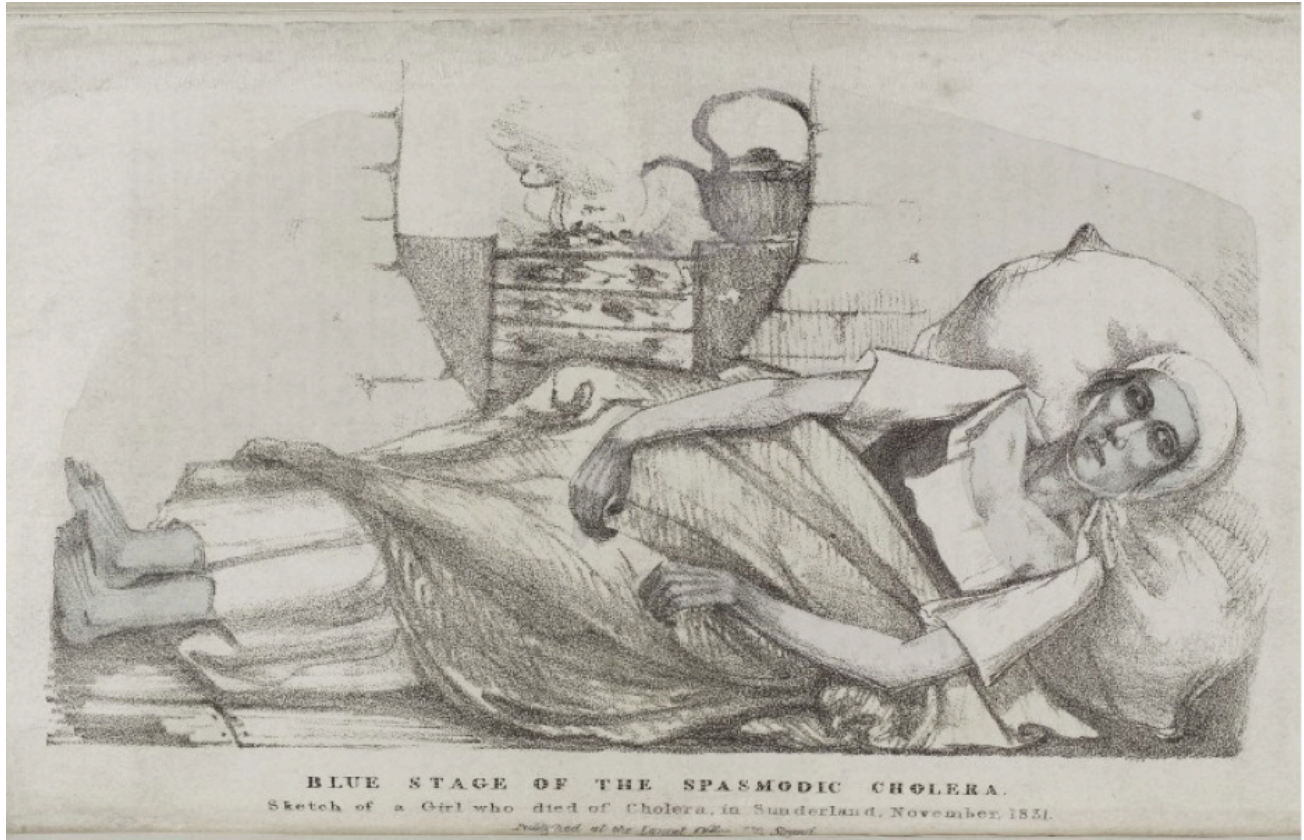
Figure 8: Blue stage of the spasmodic Cholera of a girl who died in Sunderland. *The Lancet*. November 1831.

I include both of these images because they each show the notable way in which cholera was depicted to transmute the human body from something recognizably living into a being more monstrous than human. While there is no evidence that the Italian image circulated in Britain in the mid-nineteenth-century, it offers a narrative of alteration not as clearly visible in the Sunderland image. Conversely, while the Sunderland image requires its viewer to imagine the blue hue of the victim's skin, the black-and-white sketch with its emphasis on shadow dramatizes more startlingly the full-body change not visible in Figure 7.

The Italian image invites its viewers to acknowledge the humanness of the girl before transmuting her into a victim of cholera. The girl on the left appears to be in the bloom of youth: her face is soft and round, her cheeks and lips a pale red, her hair is neatly combed back from her face, and her entire posture and dress suggest demure respectability. Although she maintains the

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same general posture in the right-hand image, in this second image she has morphed from prim into pained. The roundness of her face has given way to sharp lines, making her appear at once much older and also barely alive. Her death-like quality is echoed in the deep blue hue of her lips, which tilt not up in innocent amusement but down in apparent suffering. Much of this image seems to illustrate death, but at the same time her upright posture, echoing the posture of her healthy portrait to the left, and her still-seeing eyes mark her as unmistakably alive. The girl becomes, through this unnatural tension between living and dead, between composed and disarrayed, a posthuman being, one that straddles traditionally demarcated categories.[47] In the girl, these competing factions meet, creating a body that is startlingly unnatural.

However, the Italian image only gestures at an alien being; this quality sits uneasily around the tilt of the woman's lips and the unnatural hue of her skin. The cholera victim becomes much more alien, much more posthuman, in Figure 8, which depicts the Sunderland girl lying prostrate on her bed. Although the sketch is not colored, the caption tells viewers that the girl is in the "blue stage" of cholera, as was the Viennese woman in Figure 7. But this image does not need the blue-hued skin to signify that the girl is unnatural; her face, hands and feet are so drawn, so shrunken that they have removed from the girl all signs of childish youthfulness as well as

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[47] This suspension between living and dead most notably appears in vampire fiction of the nineteenth century and in today's zombie fiction. While I will refrain from digressing from cholera by digging too deeply into the connections between cholera victims and zombies, it is worthwhile noting that there is a correlation here, especially in terms of posthuman theory. Posthumanists have long turned to the zombie as a cultural representation of the unalterably "other;" at the same time, however, posthumanists also desire to revisit the zombie not as mindless, but as a being that may contain posthuman agency. That is to say, to view the zombie as posthuman rather than the mindless capitalist consumer of many interpretations is to explore what happens when all human limitations are superseded. For more on this discussion, see Nick Mamatas' article, "Everything of the Dead: The Future of Humanity is Zombie" (2009). Aside from the posthuman zombie, however, there is an unmistakable correlation between the way in which cholera was seen to dehumanize the human, and the refrain of a zombie virus infecting and likewise dehumanizing humans.

many indications of humanness. The girl's mouth doesn't even attempt to show lips, as did that

of the Viennese woman; instead, it hangs open, no lips framing it, and looking more like a

shapeless hole than a tool for speech. Most significantly, her hands—those appendages that are

often seen as markers of humanness because they are almost unique to the human—have mutated

into appendages more akin to claws. Lying above the covers, there is no pretense at hiding them.

Instead, they are fully revealed, bent in on themselves like claws starkly showing every bone.

Whereas the illustration of the Viennese woman attempted to maintain some softness despite the

woman's blue and shrunken face, the illustration of the Sunderland victim has departed from any

pretense at softness. The cholera victim is depicted as all angles, all shadow, and barely

reflecting her former human status.

Cholera created monsters from its victims, monsters that were human in shape but with

alien features. However, as the century progressed and as England was repeatedly ravaged by

cholera, the vague and unknown nature of the disease's cause began to solidify into something

more tangible yet perhaps as terrifying as an unknown agent. By 1850, doctors were beginning to

suggest that cholera may be caused by something identifiable. Physician John Snow was the

initial mover in changing Britain's perspective on how cholera was contracted. In 1849, at the

close of the second cholera epidemic, he first proposed his water-born theory of cholera

propagation. In a short pamphlet entitled *On the Mode of Communication of Cholera*, Snow

reasoned that, because the symptoms of cholera primarily affect the digestive and excretory

systems of its victims, it must be contracted orally (Snow [1849] 8-9). He concludes that the

excretions of the victims are the most likely originary source of the disease, and that, when these

excretions are emptied into the sewers which are in turn fed into London's drinking water

supplies, the disease spreads widely. Snow bolstered this claim by reevaluating data collected by

miasmatist William Farr during the 1849 cholera epidemic. Snow's pamphlet showed that the high mortality rates in the southern areas of London were not due to miasma congregating in the lower elevation, as Farr argued, but rather due to the polluted drinking water supplied to these areas by the Southwark and Vauxhall water companies (Bingham 387-88). However, these early observations were still ungrounded in concrete evidence.

During the third cholera epidemic and the notorious disease outbreak in Soho Snow was able, for the first time, to observe this water-born theory in action and obtain firm evidence of his new theory. Working as a doctor in Soho, he investigated the role that the Broad Street water pump played in spreading cholera in this small neighborhood of London. He expanded his original pamphlet in 1855 to include the result of his Broad Street investigation and his investigation into London's water companies to conclusively argue that cholera is waterborne. In the 1855 edition of *On the Mode of Communication of Cholera*, Snow narrates his investigation of the Broad Street outbreak, illustrating it with maps. While much has been written on both Snow's investigation and on his pivotal maps of the outbreak in recent years, a brief overview of this document is nonetheless contextually necessary. In the 1855 publication, Snow narrates how he traced the cholera outbreak to a sick child whose soiled linens were washed in a cesspool in the vicinity of the Broad Street pump. By mapping the location of cholera deaths in the area of the pump and interviewing the relations of those victims further from the pump, Snow determined that the pump and the sewage-contaminated water in the Broad Street well were the culprits for propagating cholera in the area (Gilbert *Mapping* 58, Coleman *Cholera* 33). In addition to these local observations, the Metropolitan Water Act of 1852 provided the perfect foundation for Snow's "grand experiment" (Carpenter 51).

Snow's "grand experiment" took advantage of the progressive re-location of London's drinking water. The Metropolitan Water Act of 1852 mandated that, by 1856, all drinking water companies must relocate their pumps to the unpolluted waters above the sewage dumps (Bingham 393, Carpenter 51). However, the Southwark and Vauxhall companies did not relocate their drinking water until after the 1853-54 epidemic, allowing Snow to observe the effects of sewage-tainted water on the areas of London supplied by these two water companies. As Snow illustrates in his map of the London water companies, the virulence of cholera in the second and third epidemics correspond to water companies still pumping sewage into London's drinking water supply. With this information in hand, Snow concluded that water tainted with sewage originating in the bowels of cholera victims contributed to the propagation of cholera.

The new water-borne theory, even before it was conclusively proven by Snow's Broad Street investigation, began to localize cholera much more than had the miasma theory. It was no longer an expansive and unseen cloud of tainted air but was located more concretely within the bowels of cholera victims and within the drinking water consumed by the healthy and the sick alike. There is a notable change in the way in which cholera was depicted following Snow's 1849 pamphlet, even though it only began to hint at the water-borne theory. The alien bodies of cholera are no longer the victims alone, but are also visible within the water itself, as seen in Figure 9. This illustration, entitled "A Drop of London Water," was published in *Punch* in 1850, almost a year after John Snow first suggested the water-borne theory. It also appears during a time in which the River Thames, at this time a cesspool of pollution, foul smells, and rubbish, was under increasing scrutiny and controversy. But most important, this illustration appeared the year following Brittan's second cholera epidemic.

Figure 9: "A Drop of London Water." *Punch*. January-June 1850.

Although a cartoon and much more imaginative than are the Italian and Sunderland illustrations, "A Drop of London Water" speaks more closely to the public imagination of cholera than do the other more realistic pictures. Despite the fictitious nature of this illustration, it still contains recognizable echoes of the ravaged bodies of cholera victims. "A Drop of London Water" depicts a magnified drop of water populated by a veritable menagerie of imaginative creatures, some identifiably animal, some more akin to mythological creatures, and some with recognizable human characteristics. These humanoid creatures are occasionally complete, with all of their extremities intact, and sometimes fragmented, with only floating heads, a disembodied arm or two, or a torso missing its feet. Amid theories of cholera being propagated in the sewage-contaminated water—sewage that originated within humans, and thus was part of a

human-to-human path of propagation—this illustration, with its humanoid subjects, acknowledges the role that humans play in proliferating cholera. In fact, some of the specific humanoid creatures within this drop of water contain elements familiar from our exploration of the Italian and especially the Sunderland illustrations. For example, the head that sits atop a bulbous body floating on the left-hand side of the sphere at the 10-o'clock position possesses a mouth as shapeless and gaping as that of the Sunderland girl. The disembodied head with spider-like limbs that sits at the 2-o'clock position appears as skeletal as do the ravaged faces of the victims in both the Italian and the Sunderland images. Its eyes appear more like dark holes than seeing organs, as though disease has sunken them deeply into the skull. And the alien creature hanging below this skeletal head, stretching from the 3- to the 4-o'clock positions, possesses limbs that frighteningly accentuate the depleting effect of cholera-induced dehydration. Whereas the hands and feet of the Sunderland girl were reduced to skeletal lines of light and shadow, the ankles and feet of this alien creature possess absolutely no recognizable qualities. They have rather morphed into warped and twisted bones, devoid of any soft flesh. Holding a coffin above its head, this humanoid creature seems to represent the uneasy tension between life and death seen on the bodies of cholera victims. And in the center of this image floats "Mr. Punch" himself, appearing to battle a tangled human-pathogen hybrid that is trying to wrap its feelers about his body.

FATHER THAMES INTRODUCING HIS OFFSPRING TO THE FAIR CITY OF LONDON.
(*A Design for a Fresco in the New Houses of Parliament.*)

Figure 10: "Father Thames Introducing His Offspring to the Fair City of London." *Punch*. July 3, 1853.

However, even after Snow's theory of cholera as a water-born disease agent became more widely known, the ability of cholera to alter the human body remained. Published in *Punch* in 1858, "Father Thames Introducing His Offspring to the Fair City of London" presents a frightening image of the ravages that disease can cause to the human body. In this illustration, the grisly and grim figure of Father Thames is rising out of the filthy water of the river. Around him are his three children, Diphtheria, Scrofula, and Cholera from left to right respectively. And scattered in the water are bloated and stinking animal carcasses. Father Thames is offering his children to England, represented by a classically-clad woman holding a shield emblazoned with

St. George's Cross. The centrality of water as a disease vector is very apparent in this image. But more noteworthy is the way in which the diseased children of Father Thames are depicted. Although each child represents a different disease, they all appear to be barely human as a result of these pathogens. Like the cholera images from the 1830s, these diseased bodies appear to straddle the boundary between life and death. Diphtheria's face is shaded dark, as though her blood is lacking the oxygen she needs to live; scrofula, despite its oversized head and stomach, is skeletal. Its right arm, raised to grasp Father Thames' hand, looks as though it is reaching out to England, almost like the grasping arms of zombies. And the pained grimace of cholera's mouth reveals a shocking set of teeth, making the face appear half like a skull and half like a suffering victim.

From the mid-nineteenth-century onwards, cholera was conclusively known to pass from one human to the other. John Snow's new water-borne theory demonstrated that cholera did not mysteriously dwell in foul air, waiting to infect unsuspecting citizens on a whim. Rather, he showed that its contagiousness was located in water—a visible, tangible and easily identifiable substance. Illustrations depicting the hidden depths of water, such as "A Drop of London Water" and "Father Thames," further emphasize this human-to-human path of propagation. When German physician and modern father of microbiology, Robert Koch, identified and isolated the cholera bacillus in 1884, this disease-agent lost some of its threat; while still frightening for the destruction it caused, it was at least recognizable.[48] Describing the bacillus seen through the

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[48] One important forerunner to bacteriology was Louis Pasteur, best known for his discovery of anthrax in the 1870s and for the development of the sterilization of fluids (i.e. pasteurization) (Carpenter 65). In the 1860s, Pasteur identified microscopic living creatures, or bacteria, that helped in the fermentation of liquids. He discovered that these bacteria were not created by foul smells nor did they spring up spontaneously, as had previously been believed, but were rather moving beings like all other living creatures that lived in the liquid (Coleman *Cholera* 8-9). He also discovered that, by heating liquid, these microscopic organisms were killed, thus sanitizing

improved microscope as "a little bent, like a comma," the cholera bacillus was known both as

Vibrio cholerae, the name given to it by Koch, and as the "comma bacillus," for the bacillus'

bent shape (qtd. in Halliday 82). This discovery of the cholera bacillus and its importation into

England through not only the popular presses but also journals such as *The Lancet* effectively

erased all credibility of the miasma theory so dominant throughout the century. Although cholera

had faded from England after the 1866 epidemic, it was still widely talked about in the medical

presses due to Koch's discovery.

    In tracing the path of cholera between people and identifying the cholera bacterium, a

new and agentic entity came onto the scene in the Victorian era—an entity that had the power to

infiltrate one's body, alter it, and then pass on to a new body. This new entity prepared the way

for other invisible agents that interacted with the human in disturbing ways. Chief among these

new agents, in the second half of the nineteenth century, was the invisible "factors," as Mendel

would come to name these agents, that governed inheritance. The representations of cholera as

mutative in combination with representations of germs and bacterium housed in water as living

and human-like laid the foundation for anxiety around heritability.

    Early theories of the agent that determined heritability (what would become the gene)

entered into the Victorian public consciousness following several decades of battle against

cholera. The uncertainty and anxiety that cholera produced—especially around the ability of a

seemingly invisible entity that was able to change the human body into something alien and

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the liquid (Halliday 83). With this important identification of bacteria, the foundation for the
germ theory of disease was formed, and specific germs, rather than foul smells and air, were
identified as the causes of specific diseases (Carpenter 64). Additionally, although Koch is
generally recognized to be the father of microbiology and the discoverer of the cholera bacillus,
Italian physician Filipo Pacini was the first person to identify the cholera bacillus in 1854, at the
same time that Snow was conducting his "grand experiment" (Halliday 81, Carpenter). However,
the two men never met, and even Robert Koch was not aware of the steps that Pacini had made
earlier in the century.

unknown—helped fuel public anxieties around the heritability of similarly invisible and unknown familial characteristics. While the one-time invisible cholera was now identified and observable, heritability now came to the forefront as the next frightening and invisible agent capable of transfiguring a body without that body's permission.

"Heredity is in the air": Acquired Characteristics and the Literature of Heredity

As the Victorian era drew to a close, the threat of the invisible posthuman transferred from cholera onto the heritable trait. While cholera was still a deadly disease at the end of the Victorian era, it was no longer the unknown and mysterious agent that had caused such panic in Britain in the early decades of the nineteenth century. With Koch's discovery of the cholera bacillus in 1887, the disease acquired visibility through its comma-like shape on a microscope slide. The causes of heritable traits, however, were still as invisible, as unknown as they had always been. In the following pages, I turn to late-century anxieties about heritable disease, disability, mental illness, and criminality. We find that the fear that had been focused on the invisible yet devastating power of cholera was transferred onto the heritable trait. As with cholera, the new scientific focus on heredity found a second life in the public imagination. Late-Victorian fiction and periodical publications adopted this new science of heredity and activated it as a frighteningly unknown agent that could transform bodies.

Biological sciences in the late-nineteenth century began to be fascinated with how the individual evolved. While Charles Darwin's theory of evolution offered answers to species-wide evolution, how these changes took place on the individual and familial levels was still relatively mysterious. This mystery resulted in a welter of competing theories around how characteristics were inherited across generations. Some thinkers revisited Jean Baptiste Lamarck's 1809 theory

of heritable acquired characteristics to contend that an individual's adaptation to a new environment could be passed on to future generations;[49] others followed August Weismann's contention that innate characteristics alone are heritable;[50] while still others staked out ground between these competing factions. As Peter Morton notes,

> during the few decades which elapsed between the publication of the *Origin* and the foundation of Mendelian genetics around the turn of the century evolutionary biology was in a state of extraordinary confusion and ambiguity, and a wide range of writers were able to exploit the science for their own aesthetic or polemic ends. (6)

No one knew with conviction how characteristics were inherited. These sometimes unsubstantiated and developing theories resulted in a plethora of misinformation circulating outside of the sciences around heritability, painting it as a nameless fear that mysteriously acted upon the body.

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[49] Writing in the late eighteenth and early nineteenth centuries, Lamarck was part of a pre-Darwinian wave of evolutionary thinkers. His 1809 text *Zoological Philosophy* argues not only for spontaneous generation and the simultaneous evolution of all species on earth, but also that "inheritance of acquired characters" leads to speciation (Lamarck 113). Lamarck's theory of evolution centered on two central laws: first, that all species are upwards striving from simplest forms to complex perfection (107). And second, that this striving towards perfection occurs through individual acquisition or loss of characteristics that reflect the changes in environment in which a being lives. These characteristics develop towards perfection or dwindle out of a species through use and disuse: "great alterations in the environment of animals lead to great alterations in their needs, and these alterations in their needs necessarily lead to others in their activities" (107). According to Lamarck, the environment in which a being lives influences the adaptations and characteristics that it can develop. Lamarck termed this acquisition of characteristics "soft inheritance." He takes this form of evolution yet a step further to argue that, once acquired, these characteristics have the potential to be inherited by an individual's offspring, thus assisting the entire species in its upward striving towards perfection.

[50] Weismann's theory of inheritance, contrary to Lamarck's, proposed that changes to an organism could only occur through changes made to the germ cell. Acquired characteristics were not heritable, according to Weismann. Key to Weismann's theory was the argument that, "Nothing can arise in an organism unless the predisposition to it is pre-existent, for every acquired character is simply the reaction of the organism upon a certain stimulus" (Weismann 289-290). Only innate characteristics rather than acquired characteristics could be passed on to offspring.

Criminality, and especially immoral behavior, became the primary way in which the popular press depicted heritability. In the scientific sphere, however, Francis Galton gave the nameless fear of heredity the most poignant body. In *Inquiries into Human Faculty and Its Development* (1883), Galton observes that, "the criminal nature tends to be inherited" (63). Criminality, warns Galton, "being transmissible by inheritance, may become the normal characteristic of a healthy race," and the "daughters [of criminals] consort with criminals and become the parents of criminals" (63). This kind of work gave a body—and a frightening one at that—to heritability. By arguing that criminality is heritable, Galton promoted anxiety around what inherited negative characteristics could create.

The confusion around what heritability was and how it manifested took on a dominant role beyond the sciences. Like public conversations about cholera, heredity appeared across myriad genres at the end of the Victorian era. The many ways in which medical, journalistic, literary and comical explorations engage with heredity reflects the cloud of misinformation seen in the sciences. Without any concrete ideas about the nature of heredity, these public and artistic engagements turn to sensational depictions of heredity, especially depictions of terrifyingly mutative heredity.

Despite these sensations, public engagements with heredity were nevertheless conscious of the speculative nature of hereditary science. For example, an 1894 article from *The Saturday Review* laments, as its title states, the "Fallacies of Heredity." Acknowledging that "Heredity is in the air," and that "everybody" is engaging in discussions of it, the unnamed author critiques the abstract nature of these hereditary investigations: "Hitherto, for the most part inquiry into heredity has begun at the wrong end—with the most complex instead of the most simple phenomena; with the mental instead of the physical; the morbid instead of the normal and

natural" (617). Notably, this author insists that heritability is apparent not only in the sensational or "morbid," but also within the everyday. Thus, this article suggests that in order to understand what heredity is and how it affects human lives, investigations of heredity must explore the moments in which it effects "normal and natural" individuals.

One notably humorous manifestation attempts to do just this—to show how an everyday citizen interacts with heredity. An illustration, titled simply "Heredity," is found in an 1892 edition of *Judy; or the London Serio-Comic Journal*. Like the better-known and more widely circulating *Punch*, *Judy* offered humorous representations of germane public and political information. Figure 11 depicts two women engaged in conversation. The woman standing on the left holds an infant in her arm while the woman on the right, still clad in her cloak and hat, bends over the infant. The text below the illustration reads:

> *Admiring neighbor*:— Do you think the pretty pet is going to be like his father?
> *Fond Mother*:— I shouldn't be at all surprised. He keeps me up every night as it is, and is fractious in the morning.

This racy quip between neighbors is in humorous juxtaposition to the polite scene of neighborly conversation depicted in the illustration. But more than that, it shows that the British public readily drew on the language of heredity to explain away everyday frustrations for everyday people. If the father is rowdy or sexually active in the evening, and hung-over in the morning, then the son must naturally follow this path.

Figure 11: "Heredity." *Judy; or the London Serio-Comic Journal*. 1892.

With so many references to heredity circulating in the late Victorian era across all genres of public discourse, some authors took to mocking it. "Heredity," a poem by lyricist Adrian Ross published in *The Butterfly* in 1899, uses the refrain "it is hereditary – nothing but hereditary" to emphasize this superfluity (Ross 110). The poem consists of a long list of characteristics that can be attributed to heredity, from vice, virtue, and rheumatism, to a coin collection, sloth, and a penchant for the dramatic. Heredity, claims the poem, is an excuse for all that is good and banal in a person, but especially for the bad:

> Since we needs must follow hereditary whim in all,
> Let us find an ancestor phenomenally criminal,
> And it won't be punishable imitating him in all,
> At least we want to have the option of a fine. (110)

The humorous note in this poem—especially the remark that, because one cannot avoid punishment for a crime because of a hereditary predisposition to criminality, one should receive a lower sentence—belies the underlying implications of the poem. This long list of hereditary attributes illustrates a feeling in late-century Britain that individuality, and perhaps individual will as well, are nothing but a fiction. Everything is attributed to heredity.

This attribution of everyday frustrations to heredity takes on an especially significant note in late-century literature about heritable characteristics. Referring to the plethora of competing theories of heritability, literary scholar Shafquat Towheed notes,

> With competing ideas about hereditary transmission, and in the absence of verifiable experimental evidence, scientists on both sides were forced to think creatively. For some scientists as well as non-scientists the only acceptable position was one of considered, speculative equivocation. (Towheed 38-39)

This environment of inventively thinking about individual evolution created an atmosphere in which authors took on an especially prominent role. Literary engagement with heredity proposed scenarios in which heredity was a key mover in novel plots. Among these many literary engagements are novels such as George Eliot's *Daniel Deronda* (1876), Wilkie Collins' *The Legacy of Cain* (1888),[51] and Thomas Hardy's *Tess of the d'Urbervilles* (1891). In these novels, the protagonists battle with, and in a few instances thwart, the traits inherited from their ancestors—whether these are a cultural identity, an inclination to evil, or merely one's hereditary

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[51] Jay Clayton, in his 2008 article "Inherited Behaviour In Wilkie Collins's The Legacy of Cain: Victorian Studies and Twenty-First-Century Science Policy," conducts a noteworthy close reading of heredity in this novel. Clayton argues that Collins utilized the themes of Neo-Lamarckism rife in the 1880s in his depiction of womanhood. Women's capacity to love, illustrates Clayton, is caused by neither nature nor nurture, but is rather intrinsic to womanhood.

helplessness. In novels such as these, heredity is an important aspect of moving the plot forward; but it is not the central focus.

Walter Besant, however, takes up the theme of hereditary criminality and uses it as the primary mover in his novel *The Fourth Generation* (1900). The novel follows as its protagonist, Leonard Campaigne, attempts to discover why, for the past four generations, all the members of his family have been subjected to misfortune. Leonard's father died early, forestalling what promised to be an impressive parliamentary career; Leonard's uncles are either impoverished delinquents or embarked on devious careers; Leonard's grandfather also died at an early age (it is later revealed that he committed suicide); Leonard's great-aunt married a bankrupt man below her station; his great-uncle dies as a young sailor at sea; and Leonard's great-grandfather has lived, for the past seventy years, in self-imposed isolation. After the great-grandfather's brother-in-law was mysteriously murdered and the great-grandfather's wife died in childbirth induced by the shock of hearing of her brother's murder, he receded from society and stopped speaking. I will not keep my readers in suspense as to why the Campaignes are "a family of misfortune" (Besant 21). At the close of the novel, Leonard discovers that his great-grandfather was the murderer of his brother-in-law, and that fate has delivered punishment for this crime "unto the third and fourth generation" of Campaignes (21).

This phrase—"unto the third and fourth generation"—repeats like a refrain throughout the novel. It connects the generations of unfortunate Campaignes, emphasizing that the past can never truly be left in the past. The plot of *The Fourth Generation* is woven through with this refrain of heredity, thus making the novel read partially as the story of an unfortunate family, but more so as a meditation on heredity. As Leonard's investigation of that long-ago murder unfolds, he entertains multiple versions of heredity. Initially, it is presented as "the arm of the Lord" that

stretches "out and vengeance falls, if not upon the guilty, then upon his children and his grandchildren" (Besant 21). In this interpretation of heredity, divine law delivers retribution for criminal acts. However, Leonard quickly dismisses this religious notion of heredity and entertains, instead, an interpretation of heredity as inheritance. Proposed by Constance, Leonard's wife-to-be, this alternate version of heredity takes materialism into account as much as actions: "we live in conditions made for us by our forefathers. … A man loses his fortune and position. Down go his children and grandchildren. … If a man commits a bad action, are not his children disgraced with him?" (121-22). Here, Constance conflates inheritance with heredity. Because our present condition—and by this Constance means primarily material condition—is dictated "by our forefathers," our fortunes depend upon the choices that our forefathers made.

But it is the association of heredity with criminality that seems to capture Leonard's attention. Acknowledging that, "Hereditary misfortunes are supposed to imply ancestral crimes," Leonard draws a connection between criminality and his family's current misfortune (Besant 147). He does not, however, look at inherited family misfortune as punishment for the crime of a forefather, but rather as a consequence of that crime:

> It is consequence, not punishment. We must not confuse the two. Take the case of crime. … The criminal is a diseased man. Body and mind and soul are all connected together. He lives in an evil atmosphere. Thought, action, impulse, are all evil. … The children may inherit the disease of crime just as they may inherit consumption or gout. That is to say, they are born with a tendency to crime, as they may be born with a tendency to consumption or gout. It is not punishment, I repeat. It is consequence. In such children, there is an open door to evil of some kind or other. … The son of a criminal naturally makes for the open door, which is the easy way. (234-35)

The descendants of a criminal do not inherit a punishment for a specific crime, but rather they inherit a certain propensity towards criminality. Galton's theory of heritable criminality is written starkly across this passage. But beyond that, Neo-Lamarckian notions of heritable environments are also apparent here. Children of a criminal grow up "in an evil atmosphere,"

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they inherit from their criminal father "a tendency to crime" and, as a result of these environmental factors, are more likely to follow this path. Or, as Leonard puts it, to "make for the open door, which is the easy way."

As if to signal to Leonard and the reader that this version of heredity is the most convincing one, the novel dramatizes a moment in which the descendant of a criminal follows this so-called "easy" path. Leonard's Uncle Fred, newly returned from Australia and attempting to sell his failing business as a lucrative concern to unsuspecting London bankers, is ready to give this scheme up. He has, instead, discovered that a wealthy Australian family owes his grandfather a debt of gratitude, and is willing to aid the Campaigne family in any way they can. "I shall give [the business] up," proclaims Uncle Fred to Leonard. "Why? Because an easier way lies open. I should be more than human if I did not take the easier way" (Besant 304). Uncle Fred, living with the hereditary taint of his grandfather's criminality, has identified the "open door" and chooses to take it, thus emphasizing the relevance of this consequential version of heredity (235).

However, this definition of heredity is refined yet further at the close of the novel. While the above definition recognizes a correlation between environmental factors and hereditary criminality, the final definition proposes that heredity is "the great law of Nature:"

> the great law of Nature, that nothing can happen save under conditions imposed by the record of the past. The dream of the sinner is that he shall be forgiven and go straight to the land of white clothing and hearts at peace forever, while down below the children and grandchildren are in the misery of the consequences—the inevitable consequences of his follies and his crimes. So every soul stands or falls by itself, yet in its standing or in its falling it supports or it drags down the children and the grandchildren. (Besant 310)

Coming after the revelation that Leonard's great-grandfather was the murderer and follow the great-grandfather's death, this definition of heredity negates the idea of individuality. It is a law of nature that the consequences of a life will become the consequences of future generations, and

thus an individual never acts in isolation. As I will discuss in more detail in the conclusion to this chapter, this notion of collectivity is prominent in posthuman theory. Leonard, his uncles, his grandfather and all members of his family suffering under the great-grandfather's crime are thus part of a collective hereditary consequence. By calling this collective heredity a "great law of Nature," *The Fourth Generation* also implies that it is inescapable and irrefutable; if heredity is a law of nature, it applies to all beings living within that nature.

The welter of definitions of heredity that *The Fourth Generation* proposes reflects the many scientific theories of heredity circulating in the late-nineteenth century. Like most Victorians, Leonard is confused by the myriad competing arguments that he encounters. Is heredity a religious retribution, or a scapegoat for a failed inheritance, or is it a natural and inescapable law? The fact that the novel lands on this final definition illustrates, I believe, Besant's desire to concretize heredity within the sciences. If heredity is a law of nature, it is therefore in the domain of scientific inquiry, and answers may be found within that domain.

A more prominent instance of misunderstanding the science around heredity is Sarah Grand's New Woman novel *The Heavenly Twins* (1893). Unlike Besant, who takes up heritable criminality, Grand's novel considers heritable disease and how it may affect future generations. Published in 1893, Sarah Grand's novel *The Heavenly Twins* is most often recognized for its depiction of the New Woman and its role in promoting the New Woman's movement. *The Heavenly Twins*, Grand's most prominent novel, is often considered her embodiment of the New Woman and her revelation of the struggles faced by women in a patriarchal world—struggles for autonomy, for health, and for opportunity. *The Heavenly Twins* follows the coming-of-age of three Victorian women who struggle to thrive in a patriarchal world. Comprised of three interwoven narratives each featuring a female protagonist, the novel centers on the role of

women within domesticity, whether that is the father's home or the husband's home.[52] Both

Evadne and Edith, two of the novel's protagonists on whom I will be focusing, make disastrous

marriages to aristocratic men. Edith contracts venereal disease soon after her marriage and, after

giving birth to a sickly child, she and her child pass away. Evadne, on the other hand, learns of

her husband's venereal disease before their marriage can be consummated and imposes a strict

embargo on sexual contact for the duration of their marriage. She witnesses her husband's

descent into illness, madness, and eventually death.

As with late-Victorian misunderstandings around heritability, Grand fundamentally

misunderstands the mechanisms around contracting venereal disease in this novel. She was not,

however, alone in this misunderstanding. While venereal disease had been a prominent blight

since it arrived in Europe in the fifteenth century, the public and medical fields alike were still

unsure about its transmission in the late-nineteenth century. This environment of confusion bred

uncertainty about the origins of syphilis and especially how it manifested between generations.

The medical profession in the nineteenth century recognized two forms of syphilis, acquired and

hereditary syphilis. While acquired syphilis could be "transmitted from an infected to a healthy

individual," hereditary syphilis was "transmitted from parent to offspring" (Mraček 1). It was

this latter form of syphilitic transmission that so engrossed doctors investigating venereal

disease. In his *Atlas of Syphilis and the Venereal Diseases* (1899), Franz Mraček notes that

"Syphilitic parents may produce syphilitic children" either "at the time of impregnation if the

germ-cells if one of both parents are diseased (so-called *germinal infection*), or the offspring

becomes infected during its development *in utero* before birth" (65, 64 emphasis original).

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[52] I will not be discussing Angelica's narrative because, although it shares many of the same themes of struggling to come to terms with inherited characteristics, Angelica conducts these battles on a personal path rather than in matrimony as do both Evadne and Edith.

Notably, he goes on to observe that this transmission can occur both during periods when the parents are experiencing syphilitic breakouts *and* "during the intermission periods" (65). In an environment that had not yet isolated the syphilis bacillus, the notion that the disease could be transmitted when it appeared not to be present was especially frightening. As doctor James Whitehead noted some decades before, syphilis "is liable to reappear in future generations, although apparently exterminated and lost sight of … for a period" (Whitehead 61). To the Victorian medical profession, syphilis was a threat not only to adults, but to their future generations as well.

And it was this possibility of inter-generational transmission that most concerned doctors and the public. As Whitehead notes in his treatise on heritable illness, *On the Transmission, from Parent to Offspring, of Some Forms of Disease, and of Morbid Taints and Tendencies* (1857), "the subject [of hereditary syphilis] is one which very nearly concerns the happiness and well-being of mankind" (Whitehead xiv). Current historians of medicine have revisited this notion that the heritability of syphilis threatened society to highlight that, even in an environment that did not know whether syphilis could be inherited, the mere danger of infecting future generations with such a deadly disease threatened the wellbeing of society. Rodger Davidson and Lesley A. Hall note that,

> the persistence of syphilis … fed into anxieties fueled by Darwinian doctrines. If the concept of the survival of the fittest initially seemed to confer an evolutionary basis for the superiority of the industrialized West, it also posed the threat that other organisms might endanger that hegemony. Thus, eugenic and degenerationist discourses at the turn of the century were powerfully influenced by the increasingly apparent congenital ravages of syphilis. (Davidson and Hall 6)

Likewise, Petra de Vries points to the late-Victorian notion that "syphilis was threatening the nuclear family, society and the human race. The married man infected his wife, she her unborn child, and thus succeeding generations" (de Vries 53). As Davidson and Hall, and de Vries note,

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syphilis was a menace on the overall wellbeing of society because it could be transmitted to the seemingly innocent future generation. Like Besant's *The Fourth Generation*, which visited the sins of the (great-grand)father onto future generations, syphilis threatened to do the same to Victorian families. While the medical field was wrestling with finding a cure for this disease, the public reacted to the social threat posed by syphilis by dramatizing it in their literature.

Syphilis was a perfect catalyst for airing anxieties around heritability in the public and literary spheres. Indeed, it had already been ascribed hereditary status, appearing as it did in unborn and newborn infants. Sarah Grand takes up this image of the syphilitic parent threatening to infect a future generation. Although there are no records clarifying whether Grand believed that syphilis was indeed a hereditary disorder or whether she merely recognized that it could be transmitted to a fetus *in utero*, she nevertheless uses syphilis in *The Heavenly Twins* as a vehicle to discuss the danger of unwanted or threatening heritable traits. Despite the prominence of discussion of heritable traits in the novel, however, few critics have read this novel as scientifically conscious or have connected it with late-Victorian discussion of heritable acquired characteristics. But the novel is, in fact, awash with references to traits that can be passed from parent to child. Each of these narrative strains focus on a different result of heritability, and the personal and social anxiety that accompanies such heritability. In Evadne's narrative, she must struggle against social expectations and her own desires in order to prevent her husband's licentiousness from propagating into future generations. Edith, on the other hand, must witness as her child succumbs to her husband's disease; syphilis becomes, in the novel, the father's punishment passed on to the child—a kind of genetic mark of Cain.[53]

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[53] Naomi Hetherington discusses late-Victorian understandings of venereal disease in "The Seventh Wave of Humanity: Hysteria and Moral Evolution in Sarah Grand's *The Heavenly Twins*."

In exploring venereal disease in *The Heavenly Twins*, critics have largely focused on Grand's feminist and New Woman argument. For example, William Driscoll argues that Grand deploys syphilis to critique the Victorian double standard around sexuality; men were permitted profligacy while women were expected to maintain their sexual innocence. Emma Liggins explores the way in which the New Woman novel harnessed syphilis to provide women with a venue in which to critique married life. I contend that, in order to understand the role that *The Heavenly Twins* plays in late-century anxieties around heritability, we must revisit venereal disease within the context of Victorian science. Syphilis is the vehicle in this novel by which Grand reflects cultural anxieties around how invisible heritability may affect the future of a family, or the future of society. The appearance of syphilis and Grand's prominent use of the language of heritability are not merely coincidental; they are integral to understanding the threat that heritability posed in the late-Victorian era. Appearing as an invisible force that altered humans into almost unrecognizable bodies, syphilis embodied the terrifying nature of heritability.

Heritability first appears, and is in its most prominent form, in Evadne's narrative. *The Heavenly Twins* introduces Evadne through her childhood before following her married life with a Colonel named Colquhoun and his eventual death. Very limited critical attention has been granted to Evadne's childhood education; scholarship that does look at education primarily examines the role that reading novels plays in *The Heavenly Twins*, specifically that Evadne is educated to be helpless through her avid reading habits.[54] However, I believe that it is within

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[54] See, for example, Anna Maria Jones' article "'A Track to the Water's Edge': Learning to Suffer in Sarah Grand's *The Heavenly Twins*," in which Jones places *The Heavenly Twins* into conversation with a tradition of late-Victorian novels that discuss possible negative effects that

Evadne's education that the most thorough discussion of hereditary characteristics takes place.

Evadne loves to learn, and does so with remarkable competence. Within the first chapter of *The*

Heavenly Twins, Evadne's thirst for knowledge is described as an acquired characteristic:

> It was a need of [Evadne's] nature to know. … Ages of education, ages of hereditary preparation had probably gone to the making of such a mind. … For generations knowledge is acquired, or, rather, instilled by force in families, but, once in a way, there comes a child who demands instruction as a right; and in her own family Evadne appears to have been that child … It was as if she only required to be reminded of things she had learnt before. (Grand 3)

Grand reflects, in this passage, late-century neo-Lamarckian assumptions that characteristics

acquired by past generations are inherited in future generations. Evadne's mind is the result of

"ages of hereditary preparation," suggesting that Evadne has knowledge already embedded into

her being from ancestors. Providing a broad overview of how learning usually occurs, this

passage rapidly focuses on Evadne as an exception to these norms of education. By altering the

word "acquired" to "instilled," the passage implies that most children are usually forced to learn.

However, Evadne's demand for "instruction as a right" suggests that intellect and a thirst for

knowledge goes beyond expectation for her; her ability to learn well correlates to the "acquired"

character of education rather than its forced instilment.

However, after this early positive description of hereditary intelligence, *The Heavenly*

Twins rapidly revises its portrayals of heritable characteristics to be darker. Evadne marries

Colonel Colquhoun when she is nineteen. Initially charmed by his vibrant personality, she

refuses to question his moral character. However, during their wedding breakfast, Evadne

receives a letter informing her that Colquhoun has lead a profligate past life that has left him

with syphilis. She immediately flees, taking refuge with an aunt whom she knows will be

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novel reading can have on young women, in particular the belief that novel reading would lead to a propensity to hysteria.

sympathetic to her cause. Sitting in the gardens of her aunt's house three days following her marriage and rapid escape, Evadne defends her decision to leave Colquhoun and to not engage in a sexual relationship with him. Explaining that she has no desire in "*helping to spread it* [syphilis]," Evadne justifies this decision by declaring, "there is no past in the matter of vice. The consequences become hereditary, and continue from generation to generation" (Grand 79-80 emphasis original). As Evadne's justification implies, the results of a man's pre-marital dissipation can never be fully placed in the past because they become encoded into his body. They will be forever present, and continue "from generation to generation," threatening not only Evadne, but her possible children and grandchildren alike. The mysteries of heritability are so terrifying to Evadne that, despite her affection for Colquhoun and their marriage, she initially escapes and, upon her later return to her husband, refuses to consummate their union.

Although Evadne is sufficiently frightened by the threat of heritable licentiousness and disease, her childhood friend Edith only learns of these realities after her marriage. Like Evadne, Edith marries a military man; but unlike Evadne, Edith does consummate her marriage and contracts syphilis. While critics have devoted much attention to Edith, their interpretations have not looked beyond her as a representative of the threat of male-induced syphilis and Grand's representation of Victorian medical discourse around hysteria. These perspectives, however, are not the only way through which Edith's fate can be read. While she certainly does stand as a cautionary tale for how women suffer under the double standards of Victorian sexual expression, her illness and that of her child build on a theme of hereditary vice that the first half of the novel establishes.

About a year into her marriage, Edith is ravaged by syphilis and forced to return to her parental home in England for her own and her son's care. The descriptions of the infant's illness-

ravaged body give substance to the previously intangible threat of heredity. The infant is described as "a little old man baby" "with a cold in his head" (Grand 288). Like the illustrations of cholera that appeared in Britain in the 1830s with their sunken-eyed victims, Edith's sick child is portrayed as unnaturally aged. The infant's body becomes a host for syphilis and, like the Victorian medical discourse that shows how "Syphilitic parents may produce syphilitic children," the baby embodies the vice inherited from his father (Mraček 65).

Grand's description of the syphilitic infant appearing prematurely aged is by no means hyperbolic; syphilitic infants in the nineteenth-century were often depicted as ancient, wrinkled creatures. Mraček's *Atlas of Syphilis and the Venereal Diseases* includes 71 colored illustrations of bodies and body parts infected by syphilis. A large number of these are also devoted to hereditary syphilis, particularly its manifestation on infant bodies. Figure 12, one of Mraček's colored illustrations, depicts a four-week old infant about 24 hours before death. This child is portrayed with the typical wispy hair of a baby, widely open eyes, and hands drawn up to his chest. However, the recognizable infant characteristics end here. More apparent in the image is his wrinkled skin, the glassy sheen to his eyes, the drawn mouth, and the pustules that cover every inch of skin. These sickly and aged attributes contrast starkly with the thin infantile body. As with the images of cholera from earlier in the century, this illustration of hereditary syphilis presents a body that straddles seemingly incompatible boundaries: life and death, young and old. Disease has made an alien creature of this child, one that is at once recognizable as human but at the same time seems to defy all expectations of humanness.

Figure 12: Franz Mraček. "Plate 58: Papulopustular Exanthema. Hereditary Syphilis." *Atlas of Syphilis and the Venereal Diseases*. 1898.

The depiction of Edith's syphilitic infant in *The Heavenly Twins* seems to be drawn

directly from images such as Fig. 12 in Mraček's *Atlas of Syphilis and the Venereal Disease*. The

syphilitic taint of the father is directly imported onto the infant's body, altering it from a child's

body into one much older, much more reflective of the father himself. But beyond paternal

inheritance, the infant in *The Heavenly Twins* is also depicted as a mirror to Edith, reflecting its

mother's own illness back at her. Shortly before mother and child die, *The Heavenly Twins* offers

a brief description of the post-birth nursing room in which heredity seems to find a body.

> The puzzled, pathetic expression again in [Edith's] eyes as she watched the child. She
> had no smile for him, and uttered no baby words to him—nor had he a smile for her. He
> was old, old already, and exhausted with suffering, and as his gaze wandered from one to
> the other it was easy to believe that he was asking each dumbly why had he ever been
> born? (Grand 288-89)

The suffering of the cholera patient is mirrored in this sickbed scene. Like Mraček's illustration

of infantile syphilis and the Sunderland illustration of the supine girl suffering from cholera, the

infant appears prematurely aged, prematurely exhausted, and unable to communicate to the

world around it. While in the context of the novel the infant's illness is a direct consequence of

its father's licentious behavior, this scene also implicates Edith in her child's suffering. Upon

Edith's arrival in England her parents had questioned, "What is the matter with your face",

presumably referring to the visible marks of syphilis upon her body (284). The marks of the

disease seem to be reflected in the infant's "old, old already and exhausted" body and face (289).

The lack of a maternal smile is also echoed on the infant's equally serious face. The infant seems

to be a catalyst for everything unhappy in its parents' lives, mirroring its parents' misery back at

them; it has acquired its father's disease and its mother's unhappiness, embedding them into its

body. The early environment in which Edith's child lives—both when in a syphilitic womb and

later in a home filled with illness and sadness—have become physically manifested upon the

child's body.

The limited agreement within the scientific community about the nature of heredity did

not remain within Victorian science alone. It found a vibrantly engaged and imaginative life

within the popular and literary presses. While some of these reactions to heredity were

humorous, others made serious attempts to reflect the varied scientific theories. These confused interpretations resulted in many non-scientific representations misinterpreting heredity, often ascribing to heredity conditions that were not heritable. Nevertheless, what all of these sources appear to agree upon is the invisible yet active agency that was the hereditary trait. Despite the fact that it did not have a body that could be seen through a microscope, it was nevertheless an active force, influencing the lives of many Victorians. Non-scientific representations of heredity attempted, again and again, to ascribe to this invisible body an agency and, in so doing, gave it a frightening body. Sometimes it was of disease, sometimes of criminality, but always it brought to the surface the internal secrets of an individual, a family, or a society.

The Germ and the Gene: Posthuman Collectivity

Rapidly improving technologies made new worlds accessible in the nineteenth century. In particular, medical and scientific technologies allowed the Victorians to see microscopic worlds that had previously been hidden from the naked eye. While slow, these developments had far-reaching impacts, especially in the realm of human biology. By tracing the way in which late-century representations of heredity echo mid-century representations of disease, I have attempted to illuminate one way in which these new technologies circulated beyond only the fields that claimed them as tools of scientific inquiry. Notably, these representations reveal how Victorians were interacting with the medical and scientific developments of their age, understanding not only their innovative but also their terrifying potential.

Today, the idea that the human body houses vast colonies of microorganisms is well known. We are becoming increasingly aware that a large percentage of our body mass is in fact microorganisms; the human body houses vast microbiomes that are responsible for digestion,

skin health, and oral health, among others. In recognizing that to be a healthy human relies on coexisting with these microscopic non-human organisms, we as humans are having to depart from a traditional understanding of the human as individual. To possess a human body is to be part of a colony of organisms.

This collective, inter-species fact of the human body has been taken up by posthuman theory in recent years as a way of showing that to be human is to be already posthuman. As humans, we have always been a collective posthuman thriving in collaboration with microorganisms. Donna Haraway, in *When Species Meet* (2008), describes the wonder of this communal existence in compelling terms:

> I love the fact that human genomes can be found in only 10 percent of all the cells that occupy the mundane space I call my body; the other 90 percent of the cells are filled with the genomes of bacteria, fungi, protists, and such, some of which play in a symphony necessary to my being alive at all, and some of which are hitching a ride and doing the rest of me, of us, no harm. I am vastly outnumbered by my tiny companions; better put, I become an adult human being in company with these tiny messmates. To be one is always to *become with* many. (Haraway, *When Species Meet* 3-4 emphasis original)

Although the human body may, at first glance, appear "mundane," it becomes an exciting environment of life and possibility if one looks below the surface and below what the naked eye can observe. Referring to herself as a collective "us," Haraway takes pleasure in recognizing her multiple personhood. However, she also recognizes the delicate balance in which this collective is held: "Some of these personal microscopic biota are dangerous to the me who is writing this sentence; they are held in check for now" (4). To be this collective posthuman is also to exist in an environment of risk, of consciously maintaining balance. And when this balance fractures, new forms of the posthuman emerge.

The Victorians were especially fascinated with these emergent posthumans—these bodies that grew out of the apparently natural human and created monstrous and alien beings. Although

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the Victorians did not understand that human genomes comprise bacteria, their literary and artistic representations of altered bodies suggests a correlation. The first steps to combining the bacteria and the heritable trait—to combining the germ and the gene—were occurring through imaginations of altered bodies as monstrous aliens. The body infected with bacteria was as frighteningly inhuman as was the body infected by unpredictable heredity. And these monstrous representations began to give a body to the previously invisible posthuman.

Conclusion: Busy RoboBees

"How doth the little busy bee
Improve each shining hour,
And gather honey all the day
From every opening flower!"
Isaac Watts, "Against Idleness and
Mischief" (1715)

"How doth the little crocodile
Improve his shining tail
And pour the waters of the Nile
On every golden scale
How cheerfully he seems to grin
How neatly spreads his claws
And welcomes little fishes in
With gently smiling jaws!"
Lewis Carroll, *Alice's Adventures in
Wonderland* (1865)

In a corner of the Boston Museum of Science, tucked behind exhibitions on current

science and technology, and in an alcove next to a room housing a full-sized model of

Tyrannosaurus rex, is a small display dedicated to innovative inventions. At the back of this

alcove is a little glass box containing a single bee. This bee sits in front of an informative

backdrop depicting blooming flowers alongside modern technology. The bee is no larger than the

common bumblebee that pollinates flowers and crops; it barely rivals a penny in size and can

perch delicately on a fingertip. However, it carries a marked difference from the bumblebee that

flies familiarly in our gardens: its body is a lightweight carbon filter frame, tipped with a few

stray wires, and haloed by two wafer-thin mechanical wings. This bee is a robotic insect, or

RoboBee, engineered by the Wyss Institute at Harvard University. It was designed to assist in

environmental monitoring, crop pollination, and search-and-rescue.

I visited the Boston Museum of Science in Spring 2014. I had wandered through the galleries at random, following the crowds to view the *T. Rex*, peering into the butterfly garden, and paying the predictable visit to the space exploration exhibition. Almost ready to leave the museum, I refocused my eyes to suddenly find myself face to face with this uncanny version of a bee. My first reaction was gratitude—gratitude that the little bee was separated from visitors in its little glass cube. It appeared so small, so delicate, I could have crushed it between two fingers. Its separation seemed to critique its human visitors, to remind them of the damage humans have done to native bees, and beg humans to extend consideration to the innovative bees of our future. Yet, at the same time, I was also grateful for the little glass box because its created a barrier between this uncanny bee and myself. RoboBee was shocking. It seemed to reflect the general shape and purpose of a bee, but it also recalled something more sinister; the conventional threat of a defensive sting became something much more unsettling in the company of wires, batteries, and mechanized movement. The familiarity of the bee was warped into an uncanny reflection of a new version of the bee. More than anything, it looked like surveillance technology—like a technological device designed to infiltrate human privacy, or even the human body. Despite this unsettling internal conflict, I nevertheless spent several minutes with the bee. It mesmerized me.

In Spring 2018 I was once again confronted with robotic insect technology. Scanning digital news outlets, I came across an article announcing that the retail corporation Walmart was filing patents on robotic bee technology (Garfield). Although five years more advanced than the RoboBee designed by the Wyss Institute, Walmart's robotic bee is also intended to assist in crop pollination. But despite this positive goal, Walmart's robotic bee is nevertheless just as sinister— perhaps more sinister—than RoboBee; that threat to human privacy and human sanctity seems

accentuated in the face of a global corporation. Reading the article in *Business Insider*, I was

transported to the Boston Science Museum, and to the mechanized gaze of RoboBee.
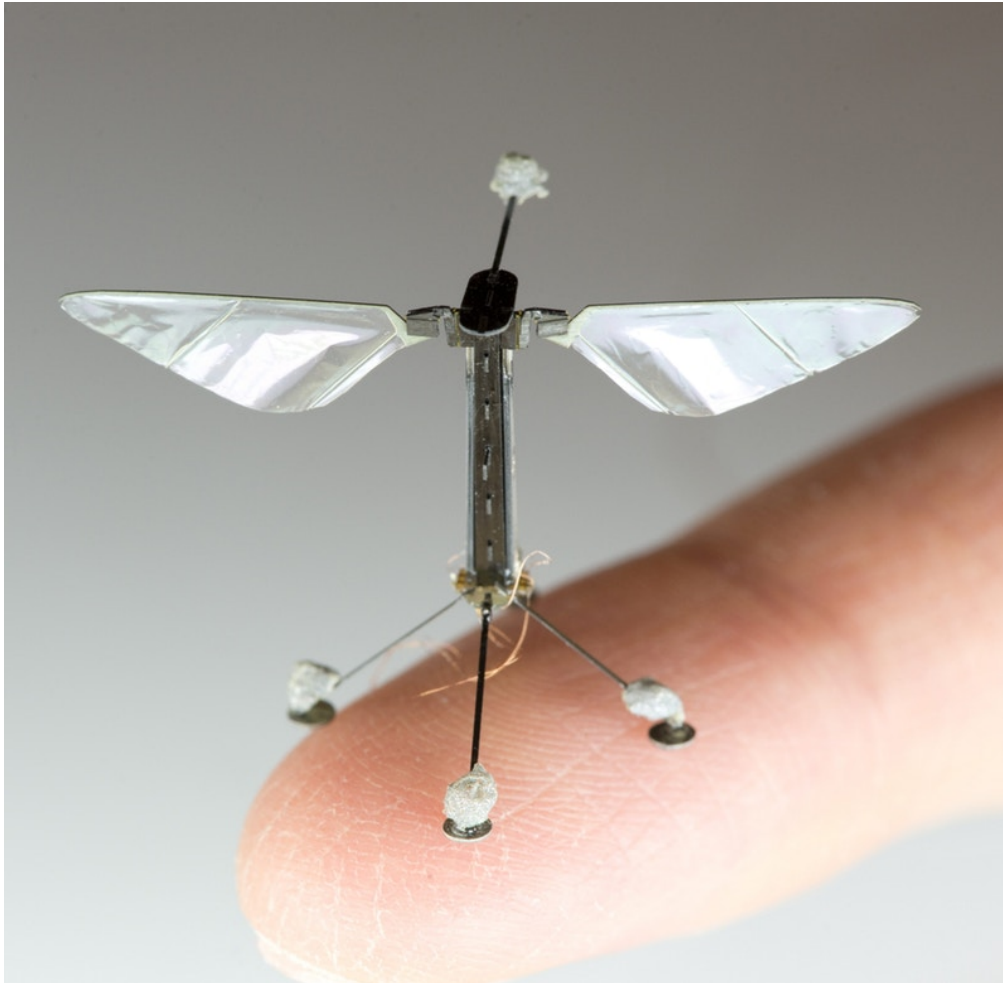

Figure 13: RoboBee. Wyss Institute at Harvard University.

RoboBee remains unsettling to me because of the mirror it holds up to my own

humanness and my own ideas about my posthuman identity. In our technologically determined

modernity, it is hard to deny that each and every one of us exists as a posthuman amalgam. We

live in concert with myriad technologies that determine our everyday life; and those are not only

technologies of luxury, such as televisions, SmartWatches, and advanced sensors on our SUVs.

They are also the technologies that flourish behind the scene, that maintain our water supplies,

our electricity, our daily safety. However, despite our own posthumanness, RoboBee seems still

more alien, still more of an amalgam of biology, technology, and environmental community. RoboBee is held up to me—to us—as a mirror to our posthumanness. However, like every mirror, it is unpredictable. Expecting to see one kind of reflection in the mirror, I am startled by the uncanny details echoed back at me. Expecting to appear human in the face of RoboBee, I am unsettlingly reminded of my technological accouterments, the reliance on mechanization that dictates my life as it dictates the existence of RoboBee.

I conclude with an image of RoboBee because of the unsettling reaction I experienced in its company. Although I have spent four chapters advocating the ontological productivity of such destabilizing encounters, I am nevertheless transported into the realm of Victorian reaction to posthuman identity in the company of RoboBee. Like the Victorian posthuman, RoboBee is an amalgam of seemingly incompatible materials and impetuses; like the Victorian posthuman, RoboBee unsettles the conventional human in its company, encouraging a reflection on the singularity of humanness; like the Victorian posthuman, RoboBee draws me towards it with a wary kind of fascination despite the internal drive to turn away in discomfort, fearful of the company of something so uncannily familiar. But RoboBee is not an articulated dinosaur, or a tripod-fighting machine, or a vivisected human animal, or even a threatening pathogen. It is a modern amalgam of nature, machine, and human ingenuity. Its general shape, reflective of the bee, unsettles one's understanding of what nature really looks like. Yet, the closer one looks at it, the more one believes that nature could—or should—look just as streamlined, just as mechanical as a RoboBee.

The Victorian posthumans that I have surveyed in this dissertation foreshadow RoboBee in their destabilizing implications for the human. Towering as an articulated and reconstructed

dinosaur, the Victorian posthuman dismantles the conventional assumption that the human sits

atop a chronology of animal life; as an amalgam of biological human and technological

prosthetic accouterment, the Victorian posthuman challenges assumptions about the non-

sentience of human-machine hybrids; it reveals that a posthuman future may also be post-animal;

and that to be human is to exist as a posthuman biome of microscopic bacteria and invisible

pathogens. In the Victorian era, the diverse posthumans were largely separate: each possessed its

own body, its own mode of manifesting. Like the busy bee of Isaac Watts' moral rhyme, it had

its own task. Yet, like Lewis Carroll's crocodile satire, that task was an unsettling one. The

perceived truisms of Victorian life are reframed and reworked towards unsettling ends within the

company of the Victorian posthuman. The value of the posthuman lens in the Victorian era is to

locate such anomalies, to find additional mischievous crocodiles and, rather than mark them as

aberrant, explore the potential held within their difference.

Today, such posthumans are vastly more visible than they were in the Victorian era. No

longer do they lurk at the edge of literature, or wander unnamed through the pages of periodicals,

or gape out of museum displays at a passing visitor. Today, the posthuman is a staple of

everyday life: we cannot exist within modernity without our posthuman trappings. However, that

is not to say that the posthuman no longer shocks. On encountering RoboBee, I was shocked into

a moment of wary self-reflection, of fearful confrontation with not only modern technology but

with my own concept of posthumanness. Despite the dominance of posthuman accouterments in

my everyday life, I was still surprised by RoboBee, still startled into a moment of self-reflection.

Perhaps, or so I consider in retrospect, it is because RoboBee as posthuman is no longer confined

to one task alone, as were Victorian Posthumans. Instead, RoboBee seems to embody multiple

posthuman elements that were still separate in the Victorian era. It is a miniscule creature, such

as the pathogens that shook mid- and late-Victorian England; it is also an amalgam of biological knowledge with technological tools; and at the same time seems to lead our imaginations on to the potential for a post-animal, post-biological future.

Yet what a herald of posthuman futurity is RoboBee! It is one that holds at its center human-posthuman co-existence. As a tool for search-and-rescue, RoboBee promises to collaborate with the human; it also appears to value the health of Earth's environment through being tasked with environmental monitoring; and as an agent of crop pollination, it plays a central role in the continued existence of global food supplies and thereby the continued survival of biological life. So, if you go to the Boston Science Museum, pay a visit to RoboBee. Admire its carbon scales for me; acknowledge the wide grin of its wings; and allow it, despite your trepidation, to welcome you to a posthuman encounter.

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