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Strange Compositions: Chemistry and its Occult History in Victorian Speculative Fiction

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Abstract

This dissertation examines how depictions of chemistry in Victorian literature are influenced by concerns regarding the history of chemistry and its relationship to the occult. Among these depictions, I consider non-fiction writings of the period, such as histories of science and articles from periodicals, but I focus on novels that prominently feature chemistry, including Edward Bulwer-Lytton's *A Strange Story* (1862), Robert Louis Stevenson's *Strange Case of Dr. Jekyll and Mr. Hyde* (1886), George Griffith's *Olga Romanoff* (1894), T. Mullet Ellis's *Zalma* (1895), and Richard Marsh's *The Beetle* (1897). These texts link chemistry with its origins in alchemy, the occult, and the East in order to question chemistry's legitimacy as a professional, materialist science and to critique the rapid progress of chemistry by foregrounding the threat that experimental substances posed to society. The frequency of negative depictions of chemistry during the Victorian period indicates how, despite discoveries that revolutionised industry and medicine, the British public regarded the science and its practitioners with suspicion. During a period as fascinated with origins as with progress, these texts expand upon the uncertainties of a society struggling with the tumultuous relationship between chemistry's past, present, and future.

Popular fiction responded to societal concerns about the origins of chemistry with speculative narratives that depict a collision between chemical innovations and elements of chemistry's occult or Eastern past. In *A Strange Story* and *Jekyll and Hyde*, this clash results in nineteenth-century reinterpretations of the traditional alchemical quest for the Elixir of Life and prompts re-evaluations of the nineteenth-century vitalist debates and discourses on the existence of the soul. Meanwhile, *Olga Romanoff*, *Zalma*, and *The*

Beetle depict the monstrous return of chemistry's marginalised histories—namely, of female and Eastern practitioners—to reclaim authority over chemical knowledge and new technologies, including chemical weapons and mind-altering potions. These five novels explore how the "nightmare" of chemistry's origins—as early science historian Thomas Thomson dubbed them—not only influence contemporaneous chemical practice, but also impact future progress. Ultimately, these texts do not critique chemistry itself, but rather how scientists and governing bodies employed chemistry prior to both the popularisation of science fiction and the first recorded instance of atomic transmutation—when chemistry's future, not its past, became the new nightmare.

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There are other spectres that haunt these pages, but I will end with thanks to my parents for their patient support of the lone writer in the family. The six long years of expectation may be over, but the odd hours and eccentric topics of conversation have only just begun.

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History, Stephen said, is a nightmare from which I am trying to awake.

— James Joyce, *Ulysses*

Introduction: Chemistry in the Victorian Literary Imagination

> Chemistry especially has always had irresistible attractions for me from the enormous, the illimitable power which the knowledge of it confers. Chemists—I assert it emphatically—might sway, if they pleased, the destinies of humanity.
>
> – Wilkie Collins, *The Woman in White*

One of the first histories of chemistry to appear in the nineteenth century, Thomas Thomson's *History of Chemistry* (1830), makes immediate reference to chemistry's ambiguous, occult past, thus revealing the depth of his concerns regarding public perceptions of chemistry. He asserts that, "to claim its station among the physical sciences," chemistry had to "shake off the trammels of alchymy, which hung upon it like a nightmare, cramping and blunting all its energies, and exposing it to the scorn and contempt of the enlightened part of mankind" (v, 1). This strikingly Gothic imagery positions chemistry in the role of Radcliffean heroine: haunted, imprisoned, and despised until made useful—not, as in gothic novels, as wife or mother, but as a science whose "utility and ... importance began to attract the attention of the world" (Hoeveler 54; Thomson 1). Thomson thus suggests that, for chemistry to become respectable and rational, it has had to "free itself" from "delusion and superstition" in much the same way that many Gothic narratives conclude with an expulsion of the Other to restore the status quo (Byron 49; Halberstam 41; Thomson 1). The origins of chemistry were a source of "nightmare" to Thomson because they served as a reminder that chemistry—a leading physical science of the period—was not a comfortably Western science founded in practical application and respectable laboratories. Chemistry's origins in alchemy challenged the basis of Western scientific authority by raising questions regarding the legitimacy of chemistry and whether it had, over the course of its development, entirely

overcome its associations with a despised occult Other. Although Thomson, like many of his colleagues, sought to legitimise chemistry by distancing it from its gothicised past, Victorian authors of popular fiction drew attention to the preternatural quality of chemistry and its historical basis in alchemy, witchcraft, and mysticism. In doing so, they not only explored chemistry's nightmarish origins; they also suggested that, as the descendant of occult practices, chemistry may never escape its lineage.

In this dissertation, I examine how negative representations of chemistry in Victorian literature are influenced by uncertainties regarding the history of chemistry and its relationship to the occult. My analysis focuses on texts that link contemporaneous and future chemistry with historical practices such as alchemy, occultism, and Eastern mysticism, all of which experienced a renaissance during what scholars have called the nineteenth-century occult revival (Morrison 11; Owen 11). In highlighting such links, these texts critique the practice of chemistry in the nineteenth century in two ways: first, they question chemistry's legitimacy as a professional, materialist science by calling attention to chemistry's emergence from a tradition of magic, charlatanism, and ancient religious rites; and, second, they critique the progress of chemistry by foregrounding the threat that experimental potions, poisons, and chemical weapons pose to society. At stake in both of these critiques is the public perception of both chemistry and its practitioners. Depictions of chemistry in Victorian popular fiction suggest that British society was suspicious of the science; such narratives perpetuated notions of chemistry as the tool of criminals, murderers, and madmen; such conceptions are linked to post-Enlightenment characterisations of alchemists as tricksters, quacks, or madmen (B. Moran 9; Principe "Restored" 306, 308). These negative images exist in sharp contrast to the remarkable

developments made by nineteenth-century chemists, from the creation of the modern periodic table to the discovery of radium, which, by the end of the century, transformed scientific study, industrial technology, and medicine (Levere 190; Morrisson *Modern* 5-6). Yet Victorian popular fiction does not celebrate these positive developments; instead, it questions the practical value of chemical innovations, chemistry's ability to expand—even defy—the limits of possibility, and the production of weapons and poisons capable of large-scale destruction. In this way, Victorian popular fiction reflects and distills the concerns of a society struggling with the tumultuous relationship between chemistry's past, present, and future.

Although my study largely focuses on fiction, I also analyse how non-fiction of the period, from histories of science to articles in popular periodicals like *Household Words,* struggle to narrate the history of chemistry. These histories reveal the depth of uncertainty experienced by writers of the period with regard to chemistry's origins—origins which exist beyond the limits of Western, materialist ideology. Victorian writers of both history and fiction questioned whether chemistry could ever truly overcome its origins in the Othered spaces of magic, mysticism, and the East. Chemistry thus joins the larger cultural concern with heredity and the influence of origins on future progress—a concern that was heightened, if not inspired, by Romantic vitalist theory, evolutionary theory, and *fin de siècle* theories of degeneration (Beer, *Darwin's* 184; Cooper 88). Asking the question, in her reading of *Daniel Deronda*, as to whether "one [can] escape from one's genetic and cultural inheritance—from the genealogical imperative," Gillian Beer determines that such an escape is indeed possible (*Darwin's* 218). However, while such options may exist for the characters of realist fiction, they do not extend to the

chemists of popular fiction, nor to the science they practice. Fictional chemists emerge as unable to escape their inheritance—be it an inheritance of madness, an empire, or a science long-steeped in the occult—because they are literally haunted by the long-suppressed history of the science they practice. Both the fictional and non-fictional texts I examine, moreover, suggest that the real-life counterparts of these characters are equally able to escape their inheritance.

Evidence of chemistry's origins in Victorian fiction primarily take the form of alchemy or magic in the modern Victorian laboratory, but it also emerges more literally as *revenants*: monsters or spectral figures that, like the "trammels of alchemy" that Thomson claims "hung upon" chemistry "like a nightmare" (1), act as physical reminders of chemistry's past.[1] These figures influence or jeopardise the future of chemistry and of British superiority in an already rapidly-transforming world. The presence of these *revenants* in popular fiction indicates the strength of the association between chemistry and its occult history in the Victorian popular imagination. However, this association is not merely the result of ignorance or fear of the mysterious workings of chemistry. Victorian chemists inherited both the methods and the language of alchemy, including distillation and such terms as magnetic, electric, and the vital principle (Sullivan 434). These developments occurred during periods when practitioners also blended the material with the spiritual and in fact influenced the discovery of alcohol, the medicinal properties of antimony, phosphorus, and the composition of air (Thornbury 349). In this way, the

[1] I draw my use of *revenant* from Jacques Derrida's *Spectres of Marx*, in which the spectre represents "a thread that some would like to believe is past and whose return it would be necessary … in the future, to conjure away" (48). The spectre cannot be controlled "because it begins by coming back" (11), and thus its presence is always defined by its return, the return of the past it represents, and the cultural memories, or historical interpretations, it possesses. See also Wolfreys, *Victorian* 3.

so-called spectres of alchemy were already part of the day-to-day practice of chemistry across Britain, but they had been purged of their mystical aspects when post-Enlightenment scientists like Thomson sought to suppress occult influences on the development of science, and particularly chemistry. The simultaneous rise of occultism and creation of histories of chemistry function to revive the past in the Victorian imagination. This revival resulted in an explosion of mid-Victorian texts that probe the implications of that history and, increasingly as the *fin de siècle* approached, its ability to determine chemistry's future directions.

Chemistry's ambiguous history compromised its reputation as a major physical science in the nineteenth century, and Victorian popular fiction incorporates this threat to chemistry's legitimacy into speculative narratives that depict a collision between that history and the latest chemical innovations. Such a clash manifests itself in the texts I examine in two ways: Edward Bulwer-Lytton's *A Strange Story* (1862) and Robert Louis Stevenson's *Strange Case of Dr. Jekyll and Mr. Hyde* (1886) depict nineteenth-century reinterpretations of classical alchemy, while George Griffith's *Olga Romanoff* (1894), T. Mullet Ellis's *Zalma* (1895), and Richard Marsh's *The Beetle* (1897) reveal the influence of chemistry's past on modern technologies, such as chemical weapons and mind-altering substances. However, all of these texts feature chemical products as destructive forces, rather than the miraculous cures promised by the alchemists, and the increasing threat these inventions pose highlights how chemistry had become progressively threatening to Victorian society as the nineteenth century came to a close. These texts raise the spectres of chemistry's origins as a means of drawing attention to the equally problematic ambiguities of modern chemistry; these ambiguities range from the fantastical

transformations that chemicals instigate to the limitation of public access to laboratories and even, as a result of the complexities of formulae, to chemical knowledge itself. Victorian depictions of chemistry, its ambiguous origins, and its equally problematic future, reveal that, however much chemistry appeared to have evolved, its core values and aspirations remained unchanged from those of ancient alchemists who sought gold and immortality—aspirations that satisfy personal desires, rather than benefit society. Thus, these depictions do not so much critique chemistry itself, but rather the ways in which chemical research and its findings are employed, both by individual scientists and governing bodies.

2. Indefinite Compositions: Victorian Chemistry and Literature

Chemistry garnered such popularity during the nineteenth century that, by 1868, a report on science education asserts that the term "science ... was generally supposed to mean chemistry" (Bud and Roberts 14-15; Donnelly 63). Yet despite this popularity among Victorian students of science, chemistry exists at the margins of Victorian literature and Victorian studies, overshadowed by the period's fascination with biology—particularly medicine, physiology, and evolutionary theory. The seemingly marginal role of chemistry in literature of the period has led Jay Labinger to contend that, while authors at the time "alluded to [chemistry] as a matter of course," there were "few really extensive considerations of up-to-date chemical theories and findings" (54-55). While Labinger's claim may apply to Victorian realist fiction,[2] it is not applicable to popular

[2] The sole exception I have discovered is George Gissing's *Born in Exile* (1892), in which the protagonist works as an analyst for a chemical manufacturer and, remarkably, finds chemistry over-commercialised and dull. See Russell 215-17.

fiction, particularly those genres that have not yet garnered significant scholarly interest. Occult fantasies, sensation fiction, and scientific romances offer detailed portraits of chemistry-in-practice, in which scientists employ contemporaneous chemical theories and methods to divide souls, control minds, and achieve eternal youth. These incredible feats threaten to dismantle the rules of the natural world in a period of such rapid developments in chemistry that these radical experiments still appeared to exist within the realm of scientific possibility.[3] At the same time, these fictional experiments frequently produce horrific results because they are driven by scientists who demonstrate an overpowering desire for vengeance or to possess god-like power over the natural world and its processes, or to unmask the secrets of the universe. Victorian depictions of chemistry reveal how popular conceptions of the science paradoxically link chemistry with both the fantastical and the horrifying in the nineteenth-century imagination. Consequently, chemistry, more than others field of science, inspires depictions of science at its most radical with experiments that blur the lines between the natural and the supernatural. These patterns and their prevalence in Victorian popular fiction elicit two questions: why is chemistry so frequently characterised as poisonous and threatening in these narratives, and what does this negativity suggest about Victorian perceptions of chemistry?

While biology, which continues to dominate studies of Victorian science and

[3] The turn-of-the-century myths that radium might be the Elixir of Life reveal how easily the Victorians were able to slip between fiction and reality in their conception of chemistry's power (Morisson, *Modern* 118). Even prior to the Curies' discovery, authors drew attention to the rapid nature of progress; for instance, an 1891 article from *The Spectator* reminds readers that both the telegraph and phonograph "would have seemed impossible to our ancestors," so "why should not anything else be discovered in its turn?"—including, the author argues, "the old dreams about manufactured gold, and the tincture which kept off death" ("Modern" 751).

literature,[4] explores the mechanics of organic bodies and the relationships between those bodies, chemistry studies the substances that comprise all organic and inorganic entities, interactions between those substances, and transformations of matter. Chemistry furthermore offers scientists the unique opportunity to create synthetic substances, such as the "artificial alizarine" dye that, according to chemist Josiah Cooke in 1875, "the most expert calico-printer could not distinguish" from the naturally-derived dye (325). The creative potential of chemistry, which would revolutionise industry throughout the nineteenth and twentieth centuries, is only one element of what gives chemistry its "illimitable power" in the Victorian imagination as a science capable of manipulating the natural world (Collins 861). The lure of chemistry experienced by Victor Frankenstein and his alchemist forebears persists for the so-called mad scientists of Victorian literature, who insist that science is a "product-oriented activity" in which "the scientist's objective is to transform one thing into another" (Rauch 234; Schummer 100). This drive among fictional chemists of the period to transform or create is at the centre of the fantasy surrounding chemistry because, while acts of transformation and creation are essentially "neutral experiments in the laboratory," they have equal potential for "good" or "evil outcomes" (Beer *Open* 323). It is thus not a surprise that, as the most dualistic and volatile of the physical sciences, chemistry lends itself to fantastical narratives of extraordinary transformations, unclassifiable forms, and artificial substances. Such narratives enable authors to comment on contemporaneous discourse regarding the

[4] See Beer, Cosslett, Levine, and Morton. Their studies focus on the influence of biology and evolutionary theory on fiction, and, in each case, they pay particular attention to the realist novel. Although recent scholars are branching out into other fields of science, such as Allen MacDuffie's study of physics and thermodynamics in *Jekyll and Hyde*, subjects related to biology remain prevalent.

human-animal divide, gender social identity, and the origins of the universe, but they also reveal the struggle of Victorian authors to negotiate a rapidly developing field that yielded seemingly impossible results. Not only are these authors concerned with what chemistry is capable of achieving—the furthest extent of its powers—but also with the question of who would wield those powers. Chemistry's potential becomes particularly problematic in a period when it was increasingly found in the hands of a highly specialised, and thus highly exclusive, group of practitioners.

It is, however, important to note that there are other popular texts of the period that, like the texts I study here, present chemistry as an ambiguous science without making explicit reference to chemistry's history. In these cases, rather than link chemistry to alchemy and the occult, they portray its use by criminals to perpetrate and disguise the evidence of their crimes. For instance, four novels by Wilkie Collins, *The Woman in White* (1860), *Armadale* (1866), *The Haunted Hotel* (1879), and *Jezebel's Daughter* (1880), all feature Victorian chemistry as a means of producing poisons, sleeping draughts that mimic death, or body-dissolving acids.[5] Chemistry's role as the tool of criminals continues into *fin de siècle* fiction, most prominently in detective stories, but also notably in Oscar Wilde's *The Picture of Dorian Gray* (1890), in which chemistry plays a small, but sensational role in the destruction of Basil Halward's body—a convenient way of erasing the evidence of murder that Wilkie Collins had previously employed in *The Haunted Hotel*. In these texts, chemistry takes on a magical quality as a science capable of vanishing tricks and miraculous potions, and therefore ripe for exploitation by authors in need of plot contrivances for their fictional criminals. These

[5] See Pamboukian 102-104, 111-112; and Schummer 110-111.

depictions of chemistry remind Victorians that chemistry had historically been the tool of charlatans, poisoners, and others driven by selfish greed, including gold-making alchemists (Schummer 103).[6] Such associations between chemistry and crime consequently bleed into public perceptions of the science and resonate with widespread concerns regarding its purpose and potential impact on Victorian society.

The primary concern evinced in depictions of chemistry in Victorian popular fiction is the abuse of power, and particularly the chemist's power over the human body and the natural world. The most striking description of chemistry in Victorian fiction appears in Collins's *The Woman in White*, in which Count Fosco proclaims that the "irresistible" attraction of chemistry lies in "the illimitable power which the knowledge ... confers" on its practitioners (623). The focus in this passage, and in the novel's overall depiction of chemistry, is on chemistry's role in medicine and its ability to manipulate the body, whether to heal or to harm—or sometimes, as in the case of readily-available substances like arsenic, both (Price 204, 205). This passage from a widely popular novel of the 1860s presents chemistry as intimidating and chemists as worthy of suspicion, thus marking a significant transition between early and late-nineteenth century conceptions of chemistry. Fosco's initial words differ little from those of Waldeman in *Frankenstein*, who similarly describes the chemist's acquisition of "almost unlimited powers" to "penetrate into the recesses of nature" (76). But while Waldeman's description evokes a sublime wonder at the heroic chemist's ability to control the natural world, Fosco's words

[6] One example from the period is an 1878 article from the *Derby Mercury*, which describes cases of alchemists and swindlers of the eighteenth century in a way that promotes links between alchemy, chemistry, and criminality. The author states that "baths, powders, and essences now take the place of precious metals and volatile salts" in the practice of selling fake miracle cures and artificially-produced wealth (6).

are more ominous because they are tainted by his overwhelming desire to control the will of others. The novel ultimately reveals the irony of Fosco's claim that "modern chemists" are "the most harmless of mankind" since his experiments repeatedly demonstrate the susceptibility of the human body to control by chemical substances (624).[7] This darker tone persists throughout late-Victorian depictions of chemistry, suggesting a fear that, once chemists harnessed the power of nature, they would turn their full attention to the human body—as indeed they would with the pharmaceutical industry and chemical warfare.

My analysis of perceptions of chemistry in nineteenth-century Britain, indicates that, between the 1810s and the 1860s—when British popular fiction featured modern chemistry with greater prevalence —there was a perceptible shift in the public conception of chemistry from a heroic science to one associated with corruption.[8] Negative images of chemistry do appear in early-nineteenth-century literature from William Godwin's *St. Leon* (1799) to Bulwer-Lytton's *Zanoni* (1842); however, these are works of historical fiction that situate alchemy in the past and are more concerned with moral questions than

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[7] The highlight of Count Fosco's work as a chemist is "a means of petrifying the body after death, so as to preserve it, as hard as marble, to the end of time" (243). Because this would have required him to work with corpses and perhaps even with body-snatchers, it only emphasises the morally ambiguous, and potentially criminal, aspects of chemical practice. Collins's novels almost always place chemistry in the hands of criminals (only *Jezebel's Daughter* offers a small glimpse of positive chemical practice), which both indicates the existence of negative associations in society and perpetuates those associations as a result of Collins's popularity.

[8] I have isolated six British texts published prior to 1860 that feature chemistry or (al)chemists: Shelley's "The Mortal Immortal" (1833), Elizabeth Barrett's "A True Dream" (1833), Robert Browning's *Paracelsus* (1835) and "The Laboratory" (1844), Bulwer-Lytton's *Zanoni* (1842) and *The Haunted Man* by Charles Dickens (1848). The 1860s see chemistry's increasing use in sensation fiction, but the greatest number of narratives featuring chemistry—at least eighteen novels and short stories—appear between 1880 and 1900 with the rise of detective fiction and scientific romances.

with chemistry itself (Schummer 122-123). Shelley's *Frankenstein* significantly alters this pattern because, as Joachim Schummer argues, the novel "transfer[s] the fate of the obsessed mad alchemists to the fate of science" (121). Moreover, Shelley implicates chemistry as a science that offers too much power, inspiring fantasies of god-like authority over both humans and nature (Ketterer, "Frankenstein's" 67; Page 88; Shelley 75). In this light, Trevor H. Levere presents a suspiciously idealised image when he asserts that Romantic chemists "always worked for the good of mankind" (196). Levere states that, during this period, chemistry "seemed to provide an unparalleled avenue into the mysteries of Nature" and offered proof that, while "Nature was still mysterious ... she was also beneficent and useful, thanks to the labors of the chemist" (190, 193). Nevertheless, even Levere's idealised characterisation of Romantic chemistry inadvertently highlights the delicate balance between use and abuse in the practice of chemistry. He states that, in order to make Nature "beneficent and useful," chemists sought to "revea[l] and exploi[t] the consequences of laws of Nature," which ultimately "yielded supreme power and riches to Britain" (193, 196). In evoking both the exploitation of nature and "supreme power" of Britain's colonial exploitation, Levere draws attention to chemistry's potential for abuse. Although Levere maintains that Romantic practitioners did not upset this balance, Sandy Feinstein notes that, by the 1890s, their Victorian descendants exploited chemistry for "commercial development, misappropriation, and individual abuses" (98). Consequently, chemistry, which had possessed a seemingly "boundless" potential at the beginning of the century, transformed over the Victorian period into "a commodity that could be used for good or ill, by medical doctors or mountebanks, professors or entrepreneurs" (98). A high degree of

uncertainty thus came to shroud the practice of chemistry so that, rather than illuminating the mysteries of nature, the science itself became a mystery.

The evolution of chemical study during the nineteenth century caused the science to appear increasingly occult—in the sense of sequestered or esoteric knowledge—to those outside of the profession, compromising the accessibility of chemical knowledge for a non-specialist audience (Feinstein 106; Schummer 100). Even today, to those uneducated in chemical practice, its facts and theories appear to be hidden in what Beer calls "the language of formulae and theorems" that seal "knowledge in secret codes to which the uninitiated are debarred access" (*Open* 322).[9] Beer argues that "science—and particularly perhaps chemistry—is understood not only as *unheimlich*, uncanny, but as *heimlig*, humdrum and homely, caught into the ordinary process of living" in which even "the body [is] a cauldron of chemical activity" (322). Chemistry is thus a "Jekyll and Hyde" science that is caught between its professional uses in medicine or industry and its illicit uses in criminal activity or occult rites. This doubleness inspires suspicion of chemistry and its practitioners, which authors of fantastical and speculative fiction exploit by associating chemistry with, for instance, physical or psychological instability, criminality, and degeneration. Such suspicion arises even in twentieth and twenty-first century representations of chemistry: particularly in science fiction and fantasy, but also in the rhetoric surrounding pharmaceuticals, chemical weapons, radioactivity, or environmentally-harmful substances.[10] Popular fiction may exaggerate public distrust of

[9] Rauch describes how Romantic intellectuals instead promoted the open dissemination of scientific knowledge (234, 244). See also Russell 214.

[10] Labinger refers to the negative themes in twentieth-century representations of chemistry as "chemophobic" in their focus on the disastrous environmental consequences of the chemical industry and gas warfare (55). Although Labinger devalues the

chemistry by featuring monsters and madmen, but at the same time, it reveals the extent to which chemistry's progress—across its past, present, and future—gave Victorians cause for concern and, in many cases, alarm. In these texts, Victorian authors attempt to work through their uncertainties regarding the practice of chemistry, but in doing so, they intensify their anxieties by bringing the nightmare to life in the most horrifying ways. Yet the Victorians do not express so much a fear of the science itself as of its uses, its consequences, and its management of knowledge.

3. Isolating the Elements

The texts I examine in this dissertation reflect—and in turn influence—the collision of history, progress, and speculation in the period's discourse on chemistry. The Victorian period simultaneously experienced the rise of chemistry as a leading scientific profession and an increased interest in occult practices, which increasingly utilised the materials, language, and, as in the case of William Crookes, the practitioners of chemistry.[11] Thus, even while contemporary chemists strove for progress, occultists performed mystic rites that involved ancient forms of chemistry, including alchemy. This revival of alchemy in turn influenced turn-of-the-century science so that in 1901 chemist Frederick Soddy would refer to the findings of his atomic experiments as "transmutation" while his colleague Ernest Rutherford would call his final book *The Newer Alchemy* (Howorth 84; Morrisson *Modern* 4-5, 10). The nineteenth-century British public was thus

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significance of chemistry in nineteenth-century literature, he offers a more comprehensive overview of twentieth-century literary depictions of chemistry.

[11] Examples of the inclusion of chemical language and theory in occultist writings include Annie Besant's "Occult Chemistry" (1895) and H. P. Blavatsky's "Alchemy in the Nineteenth Century" (1889). See also the final portion of Chapter One.

exposed to the new language and discoveries of chemistry, debates regarding the place of alchemy in the history of chemistry, reports of poisoners and charlatans, and tales of monstrous experiments that diverged only slightly from contemporaneous scientific theories. As this lengthy list indicates, Victorian Britain was bombarded with an abundance of often-conflicting stories about chemistry: its origins, its evolution, its uses—both illicit and professional—and its relationship to the occult. From these stories emerges a profusion of terms whose meanings blur under the larger categories of science and the occult, and in many cases, even these categories overlap in such areas as pseudo-science or occult science. The word "occult" can even be used to describe scientific practice, which is essentially a study of esoteric knowledge that can "force the *invisible* to become visible" (Blavatsky, *Isis* 340), not in terms of immaterial spirits, but rather in matter. Thus, the "boundary" between science and the occult to which I refer in this dissertation was constructed by Victorian scientists and occultists who sought to distinguish material science from the metaphysical, or spiritual, practices of the occult. The texts I examine explore, challenge, and attempt to negotiate this boundary as they come to terms with both a complicated history of chemistry and the science's equally complicated future.

The boundary between science and the occult is most apparent in debates between scientific materialists (sometimes known as naturalists) and occult groups such as the Theosophical Society. Janet Oppenheim explains that "materialism was widely perceived as the archvillain of the age" (60) because, as Alex Own adds, it "refused to accept the reality of things of the spirit," such as the human soul, in favour of "the idea of solid, indestructible particles of matter" (38). The occult revival generally opposed the tenets of

materialism, but the revival was itself divided into at least three, often rival, systems of belief: spiritualism, occultism, and mysticism. Although Owen states that the latter two terms are "often used synonymously" in the nineteenth century, even by their adherents, because both ultimately seek "a mystical union with the 'occult' cosmic mind or soul" (22), it is still important to distinguish their practices. Owen defines occultism as "the study of (or search for) a hidden or veiled reality and the arcane secrets of existence" that "in general allied itself with the idea of scientific validation" (22, 8). In the glossary of *Isis Unveiled*, Theosophist Helena Petrovna Blavatsky adds that "occultism embraces the whole range of psychological, physiological, cosmical, physical, and spiritual phenomena" (xxxvii), which signifies the interdisciplinary nature of occultism. Meanwhile, mysticism concentrates on what Owen calls the "immediate experience of and oneness with a variously conceived divinity, an experience that could be received as a divine gift regardless of training or preparation" (22). Thus, while nineteenth-century occultism was regarded by its practitioners as a science because of its practical study of ritual magic (36), mysticism was more concerned with the spiritual aspects of the occult. For example, Stevenson's Dr. Jekyll uses the phrase "mystic and transcendental" to describe his study of the human soul (Stevenson 76). Consequently, both systems of belief offer different interpretations of alchemy as either a means of achieving spiritual purification or of producing scientific wonders, and these differences had a profound influence on the ways in which nineteenth-century authors characterised alchemy.

In its most popular definition, alchemy is an early scientific study that aims to manipulate matter in two particularly extreme ways: the first by transmuting elements through artificial means and the second by developing a universal cure for all ailments,

including death. References to alchemy from the medieval period to today continue to evoke the stereotypical image of the alchemist in his cluttered laboratory who transmutes lead into gold or harnesses the power of the philosopher's stone to create the Elixir of Life (Morrisson, *Modern* 4; Reed 1, 28). However, as John Read notes, the schemes of "mercenary gold-makers were nothing more than a debasement of the real alchemy," which was more closely related to religion, philosophy, and psychology, and "concerned alike with the formation of inanimate substances and the still more formidable mysteries of life" (1, 2). In this way, alchemy is a complex blend of the scientific/material and mystical beliefs that, as historians of science have discovered, cannot easily be unravelled to satisfy the demands of post-Enlightenment materialist ideology (Călian 171-172). By the nineteenth century, alchemy had come to threaten modern science with its emphasis on seclusion and the concealment of knowledge, as well as, most damning to the materialists of the day, its inclusion of mystical practices (Feinstein 107; Morrisson, *Modern* 5; Rauch 235). Scientists of the period, particularly Thomas Thomson, William Whewell, and Samuel Brown, worked to construct a history of chemistry that suppressed associations between chemistry—a rational, practical science—and the occult—the supposedly irrational interest in the supernatural and unknown. At the same time, the occult revival emphasised the mystical aspects of chemistry in order to (re)establish alchemy, both paradoxically as a legitimate scientific practice that reconciled the scientific with the spiritual, and as a purely spiritual practice of self-transmutation (A. Butler 100, 129; Morrisson, *Modern* 37-39). Caught between the two movements of scientific materialism and the occult revival, histories of chemistry, and indeed almost all writing on chemistry from the period, reflected the depth of discomfort and uncertainty

that emerged from challenges to the supposed binaries of science/occult or material/spiritual inevitably made by any reference to alchemy. What results is a collection of texts that directly engages with these oppositions, at times to reinforce them while at other times destabilising them, in order to question the definitions of "science," "magic," and the fragile boundary between them.

Perhaps because of the confused role that alchemy plays during the nineteenth century, both it and chemistry are absent from major criticism on Victorian science and literature, including that of Gillian Beer, Tess Cosslett, and George Levine. Alchemy is also absent from studies of marginal sciences by Sherrie Lynne Lyons and Sylvia Pamboukian, despite their interest in mesmerism, medical quackery, and phrenology. The rare critical texts that examine literary depictions of the history of chemistry focus on medieval and early modern alchemy because, as John Read claims, "the true alchemist has figured little in literature" since Ben Jonson's *The Alchemist* (28). Although he lists Sir Walter Scott's *The Antiquary* (1816) and Arthur Conan Doyle's *Micah Clarke* (1888) as rare examples of alchemy in nineteenth-century literature, in fact neither text engages closely with either alchemy or chemistry (28). In this way, Read overlooks nineteenth-century reinterpretations of alchemy despite their engagement with the philosophical aspects of alchemy that Read claims are too frequently overlooked by critics (1, 2). More recently, Mark Morrisson argues that, in the nineteenth century, "alchemy continued to appear in literature," particularly with renewed interest in the subject by occultists and historians of science, but, Morrisson adds, "was often cordoned off into the realm of the occult, rather than the scientific" ("Alchemy"19, 20). Like the scholars of *Frankenstein* who debate the relationship between Victor's early reading of the alchemists and his

university education in chemistry,[12] Morrisson's study demonstrates a continued adherence to the binary of chemistry *versus* alchemy—a binary that limits scholars' capacity to fully perceive the significance of alchemy in the nineteenth century and to the history of chemistry.

Meanwhile, Sandy Feinstein's study of chemistry in *Dracula* offers a more constructive approach that takes into account the complex relatonship between chemistry and alchemy. She asserts that the novel "alludes to the mysteries of alchemy while offering demonstrations of the facts of chemistry then understood," which, in the case of *Dracula*, pertain to chloral hydrate (97). Although she states that the novel "contrasts the spiritual world to the rational materialist world" (97), especially in the distinctive scientific practices of Van Helsing and Seward, Feinstein emphasises how its depictions of changes of state—of Seward's chemicals and Dracula's body—also recall the association between "the rational new science" of chemistry and "the forebear that developed its techniques ... without negating the spiritual in the process" (102). Feinstein argues that the novel "demonstrates the importance of balance" between the scientific and spiritual, and she offers the example of Van Helsing's warning to Seward "of the limitations in trusting science alone" (107). In this way, Feinstein indicates how a focus on the purely material aspects of science, and more specifically of chemistry, would lead to attempts to "separat[e] the unconscious from the physical," as occurs in *Jekyll and Hyde*; it would furthermore reject belief in those supposedly mythical or otherworldly phenomena that might, at any time, be (re)discovered by science, including alchemy

[12] For arguments in favour of alchemy's influence on Victor's scientific creation, see Ketterer, "Alchemy" 396 and "Frankenstein's" 67, as well as Rauch 234. For arguments that Victor wholly rejects alchemy, see Page 87-88 and Vasbinder 60.

(107). Feinstein's emphasis on balance rather than opposition is crucial to characterising the relationship between chemistry and the occult because the practice of alchemy involves combining the material with the spiritual; indeed, it was only during the Enlightenment that intellectuals came to reject and abandon the spiritual elements of the science (Cãlian 178; B. Moran 184-185). Yet while Feinstein's article would appear to signal a growing interest in chemistry and alchemy in nineteenth-century literature, and, moreover, a more positive characterisation of these subjects, it inexplicably remains an anomaly in Victorian studies.

My dissertation employs Feinstein's study as a framework for my own approach to a wider range of popular fiction, from the occult fantasies of Bulwer-Lytton to *Dracula*'s contemporary *The Beetle*. At the same time, my analysis of these texts builds on Martin Willis's claim in *Mesmerists, Monsters, and Machines* that there is an increasing divide between nineteenth-century studies and studies of science fiction. In his examination of Shelley, Poe, and Wells, Willis contextualizes "science fiction within the scientific culture of its own period" because, as he claims, studies of the use of science in nineteenth-century science fiction are "extremely rare" (17, 1). Although this is too strong a claim in light of major studies of science in nineteenth-century popular fiction by Linda Dryden, Kelly Hurley, and Anne Stiles, Willis is correct in pointing out the significant gap between science fiction and nineteenth-century studies, particularly in each field's approach to the scientific content of the fictional texts.[13] However, unlike

[13] Science fiction critics Paul K. Alkon and Darko Suvin gloss over the works of science fiction published in British in the decades between Mary Shelley and H. G. Wells; only Adam Roberts attends to the relationship between speculative literature and its historical context by examining how the contemporaneous theories of evolution and entropy informed, and in turn were informed by, fiction of the period.

Willis, I navigate more specifically the boundary between scientific possibility and the supernatural by incorporating authors like Bulwer-Lytton, Stevenson, and Marsh, whose texts may fall into the gap between the Gothic and science fiction, yet are no less engaged with the scientific milieu of their time. My dissertation seeks to illustrate how these texts reflect a stage in the development of science/speculative fiction as it breaks away from the Gothic that coincides with the movement of chemistry toward nuclear science, the modern alchemy.

The novels I examine engage with contemporaneous scientific developments and theories at the same time that they capitalise on the dual nature of chemistry as both *heimlig* and *unheimlich* (Beer, *Open* 322) by combining real-world science with the horror and uncanniness traditionally associated with the Gothic. Consequently, these texts are caught between science and fantasy, and thus tend to be omitted from science fiction studies, especially those influenced by Darko Suvin. In his catalogue of Victorian science fiction, Suvin rejects any text whose scientific content adheres more closely to what he calls the "misshapen subgenre" of science fantasy, rather than to his definition of what is scientifically plausible (91). However, Suvin's notion of plausibility is based in the science of the twentieth century, and it thus overlooks the science of the nineteenth century, which frequently inspired speculation that led to tangents or dead-end theories. For instance, mesmerism, phrenology, and other such pseudo-sciences were regarded as legitimate studies at various periods during the nineteenth century because their theories were supported by seemingly reliable scientific evidence (Gilmour 139-141; M. Willis, *Mesmerists* 7). Thus, when Bulwer-Lytton depicts mesmerism in *A Strange Story*, he treats it as scientifically plausible because, in certain intellectual circles in the 1860s, it

was regarded as such. In light of this nebulous space between "science" and "pseudo-science," in my own examination of texts as science or speculative fiction, I base their scientific plausibility on the established knowledge and theories of the year(s) in which the text was written.

Victorian science fiction also defies modern genre classification because, however much it engages with contemporary science, it is, as Brian Aldiss contends, "born from the Gothic mode [and] ... hardly free of it now" (18), just as the science these texts depict cannot escape its own origins in alchemy. These texts dismantle the binaries between the scientific and the fantastical, and thus create the conditions under which popular fiction transforms into science fiction as a genre distinct from fantasy and the Gothic.[14] Just as the Gothic novels of Matthew Lewis and Ann Radcliffe draw on anxieties of corrupt religious institutions and barbarous histories, later nineteenth-century texts shift their critique to the institution of science, which, even by the end of the century, had not yet escaped close association with its origins in dark laboratories of alchemists (Morrisson, *Modern* 5; Schummer 109). David Ketterer states that, for a text "to be persuasively categorized as sf, it is only necessary that the scientific elements predominate over the metaphysical" and supernatural ("Conversion" 69-70). This definition of science fiction remains ambiguous, particularly in regard to texts like *A Strange Story* and *The Beetle* that hover between cutting-edge science and extraordinary supernatural content. Thus, rather than explicitly classifying these nineteenth-century texts as either "science fiction" or "occult/science fantasy," as has been the practice of scholars like Darko Suvin, I regard these texts to be deliberately ambiguous because they probe the boundaries

[14] See Brantlinger, "Gothic" 40, 41.

between the speculative and the supernatural within a culture of science that is itself divided between technological progress and its ancient, occult past.

This ambiguity is crucial because multiple aspects of these texts elude classification, from the fantastical creatures that haunt their pages to the actual narrative itself, which is frequently contradictory, fragmented, or non-linear. Chemistry and alchemy are themselves shrouded in ambiguity in the language and symbols their practitioners employ, and, as in the case of alchemy, in the blurring of the spiritual and the scientific in its practice (Feinstein 107). The texts that exist in this nebulous space are simultaneously science fiction *and* Gothic, which leads Donald Lawler to introduce the term "gothic SF": a "conjunction of gothic, fantastic, and SF" that creates "a symbolic mode for expressing the impact that science was beginning to produce on the human imagination" at the beginning of the nineteenth century (248). Meanwhile, Kelly Hurley regards the conflation of science and the supernatural as unique to the *fin de siècle* Gothic, which "consistently blurs the boundary between natural and supernatural phenomena, hesitating between scientific and occultist accountings of inexplicable events" while remaining distinct from science fiction (16). She stresses how these texts demonstrate a "reconfiguration of scientific discourse" because "the *fin-de-siècle* Gothic stands in ambivalent relation to the contemporary sciences, which on the one hand it demonizes, and on the other cites as sources whose prestige and authority lend credence to its own sensational plot" (18); this results in narratives where "science is gothicized, and gothicity is rendered scientifically plausible" (20). Although these texts blur science and the supernatural in a way that reflects the ambiguity that pervades *fin de siècle* culture, there is no ready explanation for such outliers as the 1862 *A Strange Story*;

consequently, I expand Hurley's limits of the *fin de siècle* Gothic to encompass a longer temporal range. Within the texts of this period, authors use these ambiguities to question the progress of science, and perhaps more significantly, to question whether chemistry, has entirely divided itself from its ambiguous, occult origins.

In Chapter One, I examine how Victorian writers, including chemist Thomas Thomson, literary critic George Henry Lewes, and theosophist Helena Petrovna Blavatsky, describe the origins of chemistry, be it in the medieval laboratories of alchemists or the temples of ancient Egypt. I focus on when and where these writers situate chemistry's origins, the way in which they characterise these origins, and the connections they make between chemistry and the occult, magic, or alchemy. From these histories emerge widely varying, often conflicting narratives of chemistry's history that are heavily influenced by Victorian discourse on race, gender, and definitions of "legitimate" science. The ways in which these writers construct the history of chemistry not only have a direct impact on popular Victorian representations of the science, but also on twenty-first century histories of chemistry by George-Florin Cãlian, William Newman, and Lawrence Principe. The fact that recent scholars continue to debate the relationship between chemistry and alchemy suggests that the binaries of science and the occult still shape modern definitions and expectations of chemistry.

Chapters Two and Three consider the ways in which Bulwer-Lytton's *A Strange Story* and Stevenson's *Strange Case of Dr. Jekyll and Mr. Hyde* respectively portray the use of modern chemistry to achieve the classical aims of alchemy: the Elixir of Life and the transmutation of matter. In both texts, the authors depict a Victorian chemistry infiltrated by alchemical and occultist practices as a means of validating the study of

transcendental or supernatural subjects, particularly the human soul. The drive of the alchemist-figures in these texts to validate a science of the supernatural reflects the ambitious work of spiritualists, theosophists, and occultists throughout the late nineteenth century, which led to the establishment of such groups as the Society for Psychical Research.[15] *A Strange Story* and *Jekyll and Hyde* fictionalise the work of these groups by depicting experiments that challenge the ambiguous distinction between science and the supernatural, which in turn threatens the legitimacy of chemistry as a materialist science and the potential course of its progress. However, even as these texts warn of the dangers of such experiments, they suggest that alchemy and the occult can—if used judiciously—offer Victorian chemists the means to expand their knowledge of both the material and spiritual worlds, and thus take the practice of chemistry to new heights.

Chapter Two examines how Bulwer-Lytton employs references to major Romantic and early-Victorian science texts in *A Strange Story* in order to revive the early-nineteenth century vitalist debates within the context of more recent studies of organic chemistry and the source of life in plants, animals, and—most significant to Bulwer-Lytton—humans. The novel's collection of citations and footnotes make reference to the work of Humphry Davy, Justus Liebig, and the Bridgewater Treatises, with a particular focus on the debates that raged throughout the 1800s and 1810s regarding vitalism: the study of the source of life. The novel builds from these theories to construct a philosophy of science that embraces alchemy and spiritual beliefs, and that also takes into account the significance of the soul in vitalist study; however, the novel's conclusion indicates that this ideal science can only exist outside of what it regards as the

[15] See A. Butler 100; Gomel 194-95; Oppenheim 330.

narrow parameters of Victorian scientific materialism. Overall, the novel treats alchemy, not as a historical mistake, but as a science deserving of serious consideration which, it speculates, can become as relevant to present and future scientific study as oxygen and magnetism were to Romantic-era vitalists.

Stevenson takes a less optimistic view of the future of chemistry and occult science in *Jekyll and Hyde* to suggest that, in order for chemistry to effectively progress into the twentieth century, it can neither reject strict materialist ideology nor deny the wondrous, if dangerous, potential of studies in the "mystic and transcendental" (Stevenson 78). In Chapter Three, I highlight the significance of Jekyll's practice of chemistry in order to demonstrate how his potion responds to two aspects of Victorian chemistry that, in the 1880s, raised grave concerns regarding the application of chemistry. Both sets of concerns relate to phosphorous, the one named ingredient in Jekyll's potion (73). The first is the match-industry's use of phosphorous and its disfiguring effects, which oddly mirror Hyde's indescribable deformities. The second is the popular belief during the period that phosphorous was the by-product of an alchemist's search for the philosopher's stone. It is central to my argument that Jekyll's use of that particular element in conjunction with the special white salt makes his experiment explicitly alchemical in nature. I compare Jekyll's theories and nineteenth-century alchemical writings to demonstrate that, even as Jekyll struggles with his dual identity as modern scientist and atavistic hedonist, chemistry too is haunted by its atavistic double alchemy. Consequently, the relationship of Jekyll and Hyde functions as a metaphor for the practice of chemistry at the *fin de siècle*—a practice divided between materialist progress and occultists' revival of chemistry's dark past.

The second part of my literary analysis turns to three examples of *fin de siècle* sensationalist fiction, George Griffith's *Olga Romanoff*, T. Mullet Ellis's *Zalma*, and Richard Marsh's *The Beetle*. In these texts, the labels of witch, poisoner, and magician are applied to modern chemists whose production of chemical weapons make them ambiguous, if not monstrous, figures in Victorian society. Although these texts do not explicitly refer to alchemy, they depict ways in which chemistry's ambiguous history negatively influences society's perception of chemists, ultimately revealing that chemistry simply cannot escape the shadow of its origins. The haunting nature of chemistry's past becomes explicit in all three novels with the appearance of a *revenant*: a spectre in a mirror, a conscious re-enactment of a historical figure's fate, and an ancient mystical being, respectively. In each case, this representative of the past desires revenge for the authority and knowledge appropriated by Western male scientists. These texts thus figure the ways in which a repressed, dismissed history—particularly of female and Eastern practitioners—imperils the future of society, and in so doing, they critique the present state of chemistry at the *fin de siècle*. The depiction of chemistry in each novel suggests that the future of chemistry will be as tainted as its past because Victorian practitioners continue to sequester their laboratories, restrict the proliferation of knowledge, and strive for the questionable goals of the alchemists, which are driven by desire for power rather than the benefit of the greater good.

Chapter Four examines the alternative history of chemistry for female practitioners, a history excluded from all contemporaneous literature on the subject. Griffith's and Ellis's depictions of women chemists reflect the roles of Victorian women of science employed as laboratory assistants, and both novels work through societal

anxieties surrounding the presence of women in the male-dominated space of the laboratory, including the psychological effects of vivisection and authority on the "weaker" sex. Unlike their male counterparts in fiction, who are aligned with alchemists, women chemists are labelled as witches and poisoners by their respective societies. These labels function to exclude, degrade, and ultimately erase these female characters' roles as scientists by reducing their genius as the work of magic and madness. Griffith's and Ellis's narrators draw attention to the problematic nature of these labels, their inaccuracy, and the negative impact they have on the women chemists. Indeed, neither text contains magic—thereby nullifying the use of "witch"—and the eponymous characters constantly demonstrate their scientific genius, easily improving the designs of male researchers. At the same time, both authors critique the research itself, which comprises aerial warships, nuclear ray guns, and biochemical weapons, thereby revealing that it is the direction of chemical practice, and not the woman of science, that poses the greatest threat to society.

In Chapter Five, my discussion of *The Beetle* continues my exploration of this notion of chemistry as a dangerous science, capable of cataclysmic destruction. I demonstrate how *The Beetle* calls attention to the problematic nature of an inventor's experiments by displaying them alongside the occult powers of the ancient Egyptian being who infiltrates both the laboratory and London, the heart of the British Empire. During this encounter, the repressed aspects of chemistry's history—its origins in the Middle East and in the occult—literally returns to haunt Victorian chemistry in the form of the Beetle, and in so doing, the novel critiques the respectability of Western science and the true nature of scientific progress at the *fin de siècle*. In its dismantling of binaries central to British Victorian ideology, the novel questions where "magic" ends and

"science" begins, as well as the questionable boundaries between "legitimate" and "illegitimate" science. In this way, *The Beetle* responds to the increasingly narrowing gap between occult and scientific practices during this period, which is caught between by the futuristic technologies of x-rays and radiation, and the occultists' use of scientific methods to prove the existence of supernatural powers.[16] The novel challenges the place of chemistry in Victorian society by reinforcing perceptions of the science as the unstable, dangerous tool of morally-questionable scientists and, in this case, an equally ambiguous imperial government.

From the time of the publication of *The Beetle* in 1897, chemistry turned rapidly toward a future of industrial chemistry, chemical warfare, and also the development of nuclear science in response to major discoveries of the 1890s: x-rays, electrons, and the new radioactive elements that would transform science and technology in the twentieth century. In the Coda, I offer a glimpse of the future about which Victorian authors speculated, when alchemy's goals were finally realised in the first observed natural transmutation and the perceived medical benefits of radiation. In so doing, I examine how discourse surrounding the origins of chemistry had fundamentally altered by the turn of the century, when the once-refuted claims of the alchemists for wondrous cures and transformations became scientific realities.

[16] A prime example of how occultists appropriated scientific methods for their own uses is Bessant's "Occult Chemistry," which examines the chemical properties of ether. For an extended analysis of the links between radiochemistry, atomic theory, and the occult at the turn of the century, see Morrison's *Modern Alchemy*.

Chapter One: On the Origins of Chemistry in Victorian Histories of Science

> For Mike's sake, Soddy, don't call it *transmutation*. They'll have our heads off as alchemists.
>
> — Ernest Rutherford to Frederick Soddy, 1903

In an 1852 lecture to the Royal Institution, Michael Faraday proclaimed that "the time had passed" for scientists "to spurn the doctrines of the alchemists," including the mythical practice of transmutation and the production of the Elixir of Life (7). Twenty years prior, chemist Thomas Thomson had condemned alchemy as the "rude and disgraceful beginnings" of chemistry (2), but, by the 1850s, chemistry had entered a new epoch with the study of atomic structure that, according to Faraday, "goes far to vindicate many opinions of the alchemists" and in fact "shatters ... our absolute repudiation of the doctrine of transmutation" (7).[1] Faraday asserted that, after decades of defaming alchemy, Victorian "chemists now regard the idea of transmutation, not ... [as] essentially false, [but] as a vision of truth distorted" (7). This admission, particularly from the lips of the most eminent scientist in Britain, significantly alters how scholars today perceive the relationship between chemistry and alchemy in the Victorian period because it elides the distance that accounts of the history of chemistry have situated between the science and its origins in alchemy, mysticism, and the occult. Faraday's statement was, of course, not a complete reversal of previous rejections of alchemy; his lecture is still critical of alchemy's links to the occult—a view that would persist at the turn of the century, with alchemical rites likened to "dangerous superstitions" and "meaningless gibberish"

[1] Faraday specifies "the condition of *allotropism*," or "the quality which certain bodies possess of assuming two marked phases of chemical and physical existence" (7). For instance, diamonds and graphite are allotropes of carbon.

(Bolton 855; Legge 19).[2] Nonetheless, Faraday's statement marked a new direction for chemistry in the late-nineteenth century—one that encouraged chemists and historians of the period to re-examine their perceptions of the history of chemistry. Such a re-examination forced these writers to rationalise their conception of chemistry as a "modern science" with the long history of mysticism and magic that haunts its progress.

This chapter examines how Victorians characterised chemistry's origins beyond the realm of fiction in the nonfiction writings of three groups of writers: leading scientists such as Thomas Thomson and William Whewell; literary critics and journalists like George Henry Lewes and Geraldine Endsor Jewsbury; and writers involved in the occult revival such as Helena Blavatsky and Florence Farr. The texts I analyse comprise only a sample of a larger discourse on the history of chemistry that flourished in the Victorian period and expanded beyond scientists alone. Many of these texts are attached to authors or publications of renown—such as *Household Words* or the *Westminster Review*—and can indicate the prominence of this subject, not only within scientific discourse, but also in the popular press. The remaining texts are anonymous or obscure publications that are more notable for the relevance of their content to the overall argument of my dissertation, including documents from such occult organisations as the Order of the Golden Dawn that were privately published, but are no less revealing of Victorian attitudes toward the relationship between chemistry, alchemy, and Eastern mysticism. These texts emerge from disparate contexts, but their surprising similarities bring to light popularly accepted beliefs about chemistry that influence and are influenced by contemporaneous issues such

[2] Legge's use of "gibberish" is well-suited to his topic. "Gibberish" derives from a corruption of Geber, the Anglicised form of Jabir ibn Hayyan—a prominent Arab physician and chemist (*OED*).

as colonialism, the occult revival, and the professionalisation of scientific practice. Thus, while these texts are ostensibly concerned with chemistry's past, they reveal equally as much about the Victorians' conception of chemistry and its place in their society.

Throughout the nineteenth century, those writing about the history of chemistry struggled to address the contradiction between their definitions of "science" and the uneven development of chemistry from ancient times. Constructions of the history of chemistry from this period are instrumental in shaping how both the scientific community and the general public define chemistry as a legitimate material science, not only in their own century, but also in the next. However, literary studies of Victorian science-writing, including those by Gillian Beer, George Levine, and Anne Stiles, have thus far focused on theories of evolution, the work of science populists, and early forms of brain science. Victorian histories of science remain unexplored by literary scholars even though they offer a rich view of how the Victorians defined the parameters of the sciences and chose to recognise their histories. Conflicted as they are, these histories fail to create a stable narrative of chemistry's development, merely highlighting the arbitrary nature of narrating history—that is, "arbitrary" as in easily influenced by its author's biases, access to sources, and the quality of those sources. The result has been multiple versions of chemistry's origins influenced by various socio-political factors such as scientific materialism and colonialism, factors which skew how historians discuss topics that threaten Western authority—in particular alchemy's mystical elements and developments made by Eastern practitioners. The controversial nature of these topics led many chemists and historians to construct a history of chemistry that emphasised practical innovations and depreciates, or even omits, references to its employment in mystical contexts (Călian

170; Clericuzio 408). In these attempts to make chemistry appear respectable by Victorian standards, these histories of chemistry demonstrate fears that exposing chemistry's origins might compromise public perceptions of its practice by evoking associations with charlatanism, the mythical greed of gold-making (Principe 312), and alchemical practices in Middle East and Africa. Thus, even as these histories work to legitimise chemistry, they also call attention to the disreputable lineage of superstition and Otherness that scientists since the Enlightenment had attempted to purge from modern philosophies of science.

In this chapter, I develop the foundation for the remaining chapters by calling attention to prevalent patterns that appear in both fictional and non-fictional representations of chemistry and its history: in particular, the role of alchemy and its occult practices in chemistry's development, and the geographical location of chemistry's origins in the Middle East. I begin by analysing Victorian characterisations of alchemy in its traditional sense: that is, as the quest to discover the philosopher's stone, the transmutation of elements into gold, and the production of the Elixir of Life. In this portion of the chapter, I focus particularly on how historians navigate the nebulous space between alchemy's material and spiritual elements. The final section examines how colonialist ideology further complicates the division between the material and the spiritual in Victorian authors' treatment of chemistry's geographical origins in regions under colonial rule. The variance between those histories that situate chemistry's origins in the East—ancient Egypt or medieval Arabia—and those that limit its origins to the West—ancient Greece or medieval Europe—further demonstrates the degree to which Victorian writers were prepared to shape the history of chemistry to uphold Western

materialist authority over scientific knowledge. These histories raise significant questions, not only regarding the period's definitions of "science" and "chemistry," but also regarding what types of scientific knowledge are valued by Victorian men of science and the British public. This notion is especially significant for those texts that appeared in popular publications because the constructions of chemistry and its history they advanced shaped the overall public perception of chemistry. By characterising alchemy as illegitimate, fantastical, or mysterious, these texts instilled the concerns with chemistry's place in society that inspired authors of fiction to depict chemistry as a science haunted by a monstrous, even demonic, past.

2. On Historiography

The nineteenth century experienced an explosion of writings about science, not only as a result of major scientific discoveries, but also because writers of the period began, as Thomson states in 1830, to "feel a desire to be acquainted with the origin of progress of such a science" as chemistry (2). This sentiment was repeated in 1864 by chemist W. K. Sullivan, who stated that it was "a fitting moment" to trace the history of chemistry because the science was "just now emerging from [the] strife of opposing hypotheses" that "have prepared the way for the advent of new theory," even, Sullivan later adds, "a great dynamical theory of the universe" (433, 475). The history of chemistry particularly intrigued nineteenth-century chemists because the science had progressed to a stage, both temporally and technologically, at which it could analyse its past—in particular alchemy and its theories (Weyer 65). Twentieth-century science historian Jost Weyer explains that, while the eighteenth century was not yet "far enough

removed in time to deal critically with alchemy as a historical phenomenon" (65), by the 1830s, scientific discourse had been shaped by Enlightenment philosophies that "made reason the measure of all things, including the past," so that "all previous periods were enveloped in 'darkness' and 'superstition'" (66).[3] This stigmatization of the past only fuelled the Victorians' fascination with evolutionary metaphors, and thus science historians of the period traced what they viewed as the steady progress of chemistry away from ancient mysticism and toward a science that Thomson asserted was both dignified and useful to "the progress of society" (1, 2). In these histories, alchemy played the role of a corrupt or primitive ancestor, or, to use Thomas Thomson's word, a "nightmare" that chemistry must surmount to become a legitimate science (1). This evolutionary narrative followed what Robin Gilmour describes as a "neo-Lamarkian model" that, for the Victorians, "promised a secular redemption of the past" in which "previous adaptations"—in this case alchemy—"had not been blind but purposive" (245). In such a context, alchemy was merely a stepping stone on the path toward modern chemistry, or at worst as an offshoot of chemistry's evolution, like a species whose adaptations failed to survive the changing environment of the scientific revolution. Faraday's proposition disrupted this teleological narrative by suggesting that alchemy was neither a mistake nor mere superstition, but a means of illuminating the future of chemistry.

However, this apparent acceptance of alchemical theory as the basis of chemistry was limited to the practical aspects of alchemical practice: the physical transmutation of elements and the medicinal uses of an Elixir of Life. By rejecting alchemy's spiritual

[3] See Principe 305-306 for a more detailed example of how eighteenth-century chemists denigrated alchemy and sought to distinguish it from practical chemistry.

elements—its mythological foundation, religious symbolism, and ties to the occult—these histories relate the story of what Victorian writers believed chemistry should be, rather than the reality of its origins; these histories thus suffer from significant inaccuracies as a result of the bias of the writers. Victorian writers' rejection of alchemy's spiritual elements continues to shape how present-day science historians William R. Newman and Lawrence M. Principe construct the history of chemistry and its relationship to alchemy. Although Newman and Principe claim to be salvaging the reputation of alchemy within history of science studies, they place considerable blame on the nineteenth-century occult revival for its "ahistorical interpretations" of alchemy as a purely "spiritual practice" derived from "'ancient wisdom' narratives" (Newman and Principe 35; Principe 307, 309). With their assertion that nineteenth-century occultists imposed mystical symbolism on alchemical theory, Newman and Principe suggest that, prior to the nineteenth century, alchemy was a purely material science with few, if any, spiritual elements to either its theory or practice.

The division between material and spiritual alchemy is founded in the belief that the spiritual and scientific are fundamentally opposed. For instance, when Principe explains how nineteenth and early-twentieth century scholars characterised alchemy as "something removed from—indeed, *opposed to*—science" (308), he points as much to the division between chemistry and alchemy as to that between mysticism and materialism, both of which are products of post-Enlightenment ideology. Although he acknowledges that alchemy, like astronomy, is linked with theology and mythology in its "vision of a tightly connected cosmos of God, man, and nature," he does so by arguing that these links should not disqualify alchemy from serious consideration; they have,

indeed, been "considered extraneous" since the eighteenth century (311). In Principe's view, these spiritual elements contribute little to the development of chemistry, and he moreover implies that they threaten the legitimacy of scientific practice. He and Newman thus perpetuate the dichotomies between material and spiritual practices evinced by their nineteenth-century materialist forerunners Thomson and Whewell. The fact that over a century of scientific developments have not altered these negative perceptions of alchemy and its spiritual elements highlights the pervasive influence of nineteenth-century science histories on modern philosophies of science. Nineteenth-century writings on chemistry and alchemy warrant closer analysis to investigate the basis of these negative perceptions of alchemy, as well as Newman and Principe's defamatory characterisation of the occult revival's influence on modern definitions of alchemy—a characterisation that I argue is not only unnecessary, but inaccurate.

Indeed, with regard to their inaccuracy, both scholars have met with criticism from George-Florin Cãlian and Brian Vickers, who note the fallacy of a one-sided interpretation of alchemy and of an unjust condemnation of the occult revival for *introducing* spiritual elements to alchemy. Cãlian notes that the distinction between spiritual and material alchemy that Newman and Principe situate in the Victorian period already existed in medieval practice. He explains that, during the medieval period, alchemy possessed "a double character" because it sought both the production of gold and the attainment of metaphysical knowledge (178). Cãlian adds that Newman and Principe's reduction of alchemy to a purely material proto-chemistry fails to account for the ways in which early modern alchemists believed, firstly, in the close relationship between spirit and matter and, secondly, that laboratory research "without any spiritual

aim, remains profane and meaningless" (184, 185). Meanwhile, Vickers suggests that Newman and Principe, with their backgrounds in the natural sciences, find "that alchemy's spiritual and occult associations are embarrassing," and thus they "airbrush out any elements that seem to us less attractive" (130). Such an act of suppression, Vickers warns, is counterproductive, particularly in the case of alchemy, which is as much founded upon "a spiritual dimension" with "inbuilt patterns of hope, failure, and eventual success" as it is upon "technological aspects" (136). Both scholars seek an interpretation of alchemy that recognises the ways in which mysticism and the occult not only influenced, but were also foundational to the beliefs and laboratory practices of the alchemists well prior to the Victorian occult revival. As I discuss in Chapters Two and Three, such a call already existed in nineteenth-century popular fiction; both *A Strange Story* and *Jekyll and Hyde* demonstrate the disastrous effects of overtly material and spiritual interpretations of alchemy, and while these depictions are fantastical and exaggerated, they do emphasise the necessity for chemistry to advance with care for both the material and spiritual consequences of new technologies.

This more inclusionary interpretation of alchemy has recently been shared by Bruce T. Moran and Mark Morrisson, but because Moran examines alchemy during the scientific revolution and Morrisson concentrates on nuclear chemistry of the early-twentieth century, there remains a gap in the scholarship that encompasses the nineteenth century—the very period of dispute for Newman and Principe. Jost Weyer's earlier study does focus on characterisations of alchemy in nineteenth-century histories of science and similarly notes how historians of the period became increasingly sympathetic toward the "philosophical-religious aspects" of alchemy (75). Mostly, however, Weyer examines

German science histories with the exception of Thomas Thomson's *History of Chemistry*, thus suggesting that there is an absence of British science histories after 1830, or, at the very least, an absence of texts worthy of study, including periodical articles or popular histories. Weyer furthermore uses histories of chemistry to highlight historiographical trends in characterisations of alchemy, whereas Moran and Morrisson explore the *implications* of these characterisations beyond the scope of science history—in, for instance, popular culture or contemporary politics. In this chapter, I aim to fill these gaps in both Victorian and history of science studies in order to highlight the ways in which nineteenth-century British writings on the history of chemistry—rather than the occult revival alone—have shaped modern Western perceptions of chemistry, its relationship to alchemy, and the dichotomy between spiritual and material science.

3. Alchemy and Chemistry, 1830-1850

It may appear hyperbolic to refer to the history of chemistry as a nightmare, but, as I noted in the introduction to this dissertation, it is the very word that chemist Thomas Thomson employs in his *History of Chemistry* to emphasise the negative influence of alchemy on chemistry's development. By describing alchemy as the "trammels" that "hung upon" chemistry "like a nightmare," Thomson characterises alchemy as an antagonist that must be overcome before chemistry can establish itself as "a useful science" and "advanc[e] toward perfection at an accelerated rate" (1). Thomson aligns alchemy with the Gothic and thus with the medieval, which, in the 1830s, as Robin Gilmour notes, was a period that artists evoked "as a weapon against the mechanism, calculation, selfishness, and ugliness of the emerging industrial civilisation" (Gilmour 45,

47). However, in this case, Thomson regards the medieval period from the perspective of a materialist scientist and representative of "industrial civilisation," and so with his use of Gothic imagery, Thomson also associates medieval alchemical practice with all the "delusion and superstition" he sees as characteristic of that period (Thomson 1). Alchemy may have enabled its practitioners to "gradually [form] a collection of facts, which led ultimately to the establishment of scientific chemistry," but they are, in Thomson's opinion, "absurd pursuits" that detracted from the development of "true chemistry" (31, 48). By foregrounding the negative, "cramping and blunting" influence of alchemy on chemistry (1), Thomson sets a clear boundary between the material chemistry of industry and medicine and the Other of alchemy. In doing so, Thomson shields his science from what he views as its corrupt origins, which enables him to protect his own integrity—and that of all chemists—within the scientific institution.

Despite his denunciation of alchemy and its mystical practices, Thomson carefully navigates the nebulous space between acknowledging chemistry's vast progress from (and as a result of) its origins and the threat alchemy poses to its credibility. Thomson begins his *History* by describing the threat that alchemy poses to chemistry's "station among the physical sciences" because it functions as a reminder that chemistry "sprang originally from delusions and superstition, and was at its commencement exactly on a level with magic and astrology" (v, 1). By comparing chemistry's origins to fields that do not even qualify as pseudo-sciences, Thomson reveals his primary critique of alchemy: it is the antithesis of the logical, quantitative science that he seeks to construct with his history. He is concerned with shaping the public image of chemistry to excuse and surmount what he calls its "rude and disgraceful" origins (i). To ensure chemistry's

respectable "station" alongside biology and mechanics, Thomson contrasts these origins against the advances chemists have made in their technology, theory, and philosophy. He particularly highlights chemistry's association with progress in a way that, though his history technically predates the Victorian era, reflects the Victorian belief that history has "a design and a purpose" that drives it onward—in this case, away from magic and mysticism toward technology and rationality (Gilmour 31). For Thomson, chemistry's origins cannot thus be "passed over in silence" (2) because they contribute to the contemporaneous notion that science and civilisation are constantly advancing and, furthermore, have done so in spite of the negative influence of mysticism and the occult. In this way, Thomson demonstrates the power of logical, rational science to overcome the alchemists' "absurd pursuits" and lead them to the study of "the true chemistry" (31). Thomson's history serves to construct chemistry as prime example of what scientific progress can achieve; the origins that may have functioned as chemistry's weakness instead become a sign of its strength.

Meanwhile, the scientist William Whewell, in his *History of the Inductive Sciences* (1837), adamantly rejects alchemy by physically isolating all discussion of it to his chapter on medieval mysticism. In so doing, Whewell entirely excludes alchemy from serious consideration as a scientific study and suggests that it holds no place in the history of chemistry. Whewell calls alchemy a "pretended science" that fails to adhere to principles of "sensible connexion and causation" because it "reduces" the external world to "spiritual and supersensual relations and dependencies," and thus values magical rather than practical explanations of nature (231, 215). He adds that alchemy concentrates on "vague notions" and employs a language of metaphors to describe its methods, which, in

Whewell's view, is too qualitative an approach to be regarded as scientific (232). Alchemy does not adhere to the materialist vision of science that Whewell seeks to construct in his history, and he thus denies that "Alchemy was the mother of Chemistry" or that modern chemistry would not be possible without alchemy's influence (232). He rather asserts that, during the Medieval period, alchemy only achieved popularity because "men's minds were so far enfeebled and degraded" that "the mystical pursuits" which offered "some dim and disfigured images of truth were sought with avidity" (233). Like Thomson, Whewell aligns alchemy with magic and astrology, but he additionally rejects any authority alchemy may have held as a historical science rather than risk any challenge to his strict philosophy of science. With this rejection, Whewell reveals how vehemently a materialist can work to distinguish science—which he and Thomson align with "truth," or the quantitative acquisition of data—from the uncertainties of spiritual practices. Whewell's history is extreme in its rejection of alchemy in comparison to other materialists of the period, and it comes as little surprise that its arguments are echoed by fictional materialists like Fenwick of *A Strange Story*, Lanyon of *Jekyll and Hyde*, and Atherton of *The Beetle*—all of whom are forced to confront the limitations of their belief in a wholly material universe. The way in which Whewell doctors history to support his philosophy of science calls into question the authority of professional science by bringing to light the insularity of its leading figures—individuals liable to overlook any evidence of the supernatural simply because it threatens their worldview.

The strength of both Thomson and Whewell's denunciation of alchemy—which significantly intensifies between the two histories—indicates their concerns, not only regarding the spiritual practices of historical alchemists, but the potentially lasting

influence of such practices on modern practitioners. The chemist Samuel Brown more explicitly addresses these concerns in his 1849 lecture on "Alchemy and the Alchemists" by asserting that alchemy must remain distinct from nineteenth-century chemistry because alchemists "are no longer with their age; they are behind it" (178). Brown does not deny that alchemy once "had its genuine scientific function to perform, and its distinct scientific value in the history of chemistry" (139), but he stresses that modern attempts to revive the work of medieval alchemists "can do no one useful thing" except "compile mystical trash into books" and inspire the establishment of "secret associations, Rosicrucian fraternities, and what not" (178). Brown draws from evolutionary discourse to compare this "multitude of weaklings" to "a race of sturdy, positive chemists ... living to some useful purpose, and finding out all sorts of new chemical substances in preparation for the unpretending logic of a better day" (179). Well-prior to the degeneration theories of the 1890s, Brown indicates that the revival of alchemy is detrimental to the science as a whole; not only does such a revival draw attention to chemistry's mystical origins, but as a "degenerated" study only practised by quacks and mystics, alchemy also threatens to undermine centuries of scientific progress (177). Brown ultimately argues that alchemical study can no longer be useful to society because it returns to ancient sources and beliefs, rather than advancing toward the creation of new knowledge and technologies. Therefore, Brown reveals that it is necessary for early-Victorian scientists to relegate alchemy to chemistry's distant past in order to ensure that the science continues to progress free of the "trammels" that, with the renewed practice of alchemy, continue to haunt, and thus threaten, its future.

Brown's lecture explicitly reacts against the occult revival—a movement that

evinced a dangerous tendency to combine magic and mysticism with scientific theories and methods in such pseudo-scientific studies as mesmerism and psychical research (A. Butler 100; Oppenheim 330). As early as 1839, an article from the Tory periodical *Fraser's Magazine* highlighted the very intersections of alchemical mysticism and material chemistry that the above scientists sought to repress. The author, under the pseudonym of "An Alchemist," defines alchemy as "the science which treats 'of the secretest laws of chemistry, the essences of material natures, and the composition or decomposition of physical substances'" (446). Though this definition pertains to the material aspects of chemistry, the Alchemist draws his history from occult sources "that even the scientific world is not familiar with" (446), which results in an alternative history of chemistry that makes no distinction between the material and spiritual practices of alchemy. The Alchemist argues that the "*hermetic* or *philosophical fire*" of ancient practitioners "was *expressly called electricity,*" which, he adds, "will appear paradoxical to those that imagine the name and nature of electricity to be mere modern discoveries" (447, emphasis original). Such an argument overturns the evolutionary metaphors of Thomson and Brown in its contention that alchemists "anticipated the discoveries of our own age" and that modern chemistry is recovering, rather than producing, knowledge (447). By emphasising the significant role that alchemy has played and continues to play in chemistry, the Alchemist challenges the belief of such scientists as Thomson and Whewell in chemistry's linear development. According to this Alchemist, chemistry's origins in alchemy and the occult should be neither a threat nor an embarrassment to modern practitioners; rather, they are the key to chemistry's future achievements—in particular, the transmutation of metals.

A conflicting reinterpretation of alchemy's relationship to chemistry occurs in *A Suggestive Inquiry into the Hermetic Mystery* (1850) by Mary Ann Atwood, who appropriates alchemy as a purely spiritual practice because "no modern art or chemistry, notwithstanding all its surreptitious claims, has anything to do with Alchemy" (135). Although she concedes that they share some "borrowed terms," she stresses that chemistry and alchemy have "no real relation, either of matter, method, or practical result" because "modern art drives out ... the very nature which the ancients prized," and as a result, their experiences and methods are "superficial and essentially atheistic" (135). By rejecting alchemy's influence on modern chemistry, she reacts against scientific materialism to characterise alchemy, both past and present, as a science in which "Man ... is the true laboratory ... his life the subject ... and Self-Knowledge to be the root of all Alchemical tradition" (153). She explains that alchemy raises the alchemist to a higher state of being, so that transmutation occurs to the soul, or self, rather than to natural elements—such an interpretation only further divorces alchemy from material laboratory practice (154-55; Morrisson, *Modern* 36-37). The extreme nature of Atwood's characterisation of alchemy parallels that of Whewell in its attempts to deny any correspondence between chemistry and alchemy, and the rapid popularisation of Atwood's spiritual alchemy by occultists is, as Cãlian states, "even more harmful" than Whewell's—and, by extension, Newman and Principe's—generalisation of historical alchemy (Cãlian 189; Morrisson, *Modern* 57). Yet the desire to elevate either the material or the spiritual, one above the other was already an established practice in histories of chemistry. In an intellectual community largely opposed to any revival of alchemical theories and practices in the name of linear progress, Atwood's assertions react to those

made by scientists and enable her to carve out a new field reserved for those elements. For the next forty to fifty years, the tensions between material and spiritual interpretations of alchemy dominate discourse on the history of chemistry, and only appear to increase as the century reaches its end. The very existence of such tensions, no longer easily dismissed, is the true nightmare that haunts the development of chemistry during the remainder of the century.

4. Later Nineteenth-Century Characterisations of Alchemy

Faraday's 1852 lecture was indicative of gradually changing perspectives of alchemy in light of the discoveries of new elements, developments in early atomic theory, and the popular images of alchemy in fantastical fiction such as Mary Shelley's "The Mortal Immortal" and Bulwer-Lytton's *Zanoni.* However, the lecture also marked a significant turning point in Victorian discourse on alchemy by indicating that, despite its spiritual associations, alchemy could be drawn into the sphere of materialist science to incorporate transmutation into nineteenth-century studies of molecular structure and early atomic theory. This mid-century curiosity regarding the possibilities offered by a material practice of alchemy forces a reconsideration of Morrisson's contention that "the revival of interest in alchemy beginning in the late nineteenth century provided a trope that contributed to the early portrayal and reception of the science of radioactivity" (*Modern* 99). He specifically highlights the 1880s as a particularly influential period, and while, as Morrisson notes, that decade saw the publication of numerous translations of historical alchemists' writings and the establishment of occultists groups, like the Order of the Golden Dawn, that included alchemy among their practices (100), Faraday's lecture, as

well as the articles from 1850s and '60s periodicals I examine below, reveal a prominent discourse on alchemy that was not only well-established by the 1880s, but that also took place outside of occultist circles. These discussions of alchemy at mid-century construct a more complex image of how Victorians understood alchemy, not merely as a long-outdated version of chemistry or an occult practice, but as a science worthy of re-evaluation in light of newly (re)acquired knowledge of elements and their composition. Such a re-evaluation precipitates a fracturing of the division between alchemy and chemistry constructed by the natural philosophers of the Enlightenment, which, in turn, opens up chemistry to the more ambitious and fantastical possibilities that, not long before, had been dismissed by scientists.

In the 1850s and 60s, popular periodicals became a significant platform for discussions of chemistry's history, which enabled critics and other intellectuals to explore Faraday's comments on alchemy for a non-specialist audience. Unlike the works of science historians, which were written primarily for other scientists, these articles not only expanded chemical discourse beyond the institution—thus enabling other marginalised figures, particularly women, to enter the conversation—they also had a greater influence on public perceptions of chemistry. This is particularly the case for articles on the history of chemistry that appeared in such prominent literary journals as the *Westminster Review* and *Cornhill Magazine*. The popularity of these journals does not ensure that the articles on chemistry were widely read, but their presence in such prominent venues certainly suggests a certain degree of interest in the history of chemistry and, more specifically, its links to alchemy. However, it is important to remember that these articles were not written by scientists, but by journalists, authors of

fiction, and people of letters unlikely to possess the formal science training of, for example, Thomson or Whewell. Their articles are less of interest for their scientific content than for their distinct narratives of the history of chemistry, which were influenced by the politics, ruling ideologies, and social movements of the period. These articles are thus infused with bias and inaccuracies in their representation of the history of chemistry, and, combined with their powers to shape the British public's understanding of chemistry, such subjectivity at once promotes chemistry's reputation as *the* science of progress and, on the other hand, fuels concerns regarding chemistry's legitimacy as a science, its relationship to occultism, and its dangerous capabilities.

The 1856 essay "Alchemy and Alchemists" by George Henry Lewes combines a positive perspective on alchemy with the principles of the "Law of Progress" that were fundamental to the *Westminster Review* at the time Lewes's essay appeared (Eliot 4). In the same vein as Faraday, Lewes argues that the alchemists' "lives were not in vain" because their "labours have been the legacy on which our present science is based," though he is careful to specify that this only applies to a certain class of alchemists—those who possessed a "noble faith" in their studies "and the self-abnegation it inspired" (154).[4] Lewes warns readers not to confuse these alchemists with the charlatans and mystics who "brought indelible disgrace upon the very name of the science under which they shielded themselves" because the good alchemists "founded their efforts on experiment ... and by this they ... accumulated a vast store of facts relating to re-agents, and molecular changes generally" because "the true historical position of Alchemy [is] as

[4] These alchemists in fact embody many of the qualities of ideal Victorian scientists as self-abnegating and wholly devoted to their studies without the personal greed associated with the quests to produce gold and attain eternal life (Levine, *Dying* 3-4).

a scientific investigation" (155). While Lewes calls the alchemists' ambitions "daring" (161), he neither dismisses nor demeans them because they were, from his perspective, legitimate scientific practitioners; he instead critiques "the general belief that Alchemy was nothing but one huge error" that "has deterred men from studying its history with the patience it deserves" and has thus, Lewes suggests, resulted in a failure to "judge it correctly" (154, 159). It is only with Victorian advances in knowledge and equipment that "modern organic chemistry has... approached somewhat nearer to the old alchemical philosophy," which serves "to connect by one more link the daring hypotheses of the Alchemists with the verified results of modern chemistry" (161). With this, Lewes indicates that Victorian chemists can make a positive use of their history to augment their research and thus further the course of scientific progress.

Nevertheless, however much Lewes advocates for a greater acceptance of the ancient alchemists, he still only discusses alchemy with only the slightest reference to its mystical or occult elements. Lewes characterises the quest for the philosopher's stone as an "absurdity" even as he argues that the transmutation of metals "has latterly, by all the best chemists, ceased to be regarded as chimerical" (159, 155), which appears to follow from Faraday's contention that "the belief in occult causes" of phenomena had experienced a "final extinction" with the Early Modern alchemist Paracelsus (9). In other words, if one aspect of alchemy can be safely relegated to the past, it is the spiritual element—the belief in magic, the ability to master death and create life. For Lewes, this element creates a bloated ambition that could not be satisfied with the alchemists' inferior knowledge and materials (157), which, Louisa Ann Merivale adds, resulted in "the hopeless gyrations of the baffled science, ever circling back to its first beginning, and

making no advance in its gains and experiences" (725). In a *Cornhill Magazine* essay from 1869, Merivale, like Lewes, limits her detailed history of alchemy to its material developments and discoveries. She situates gold-making as the defining feature of alchemical practice and the means by which "resulted the inestimable service rendered by alchemy to true science,—the establishment of the principles of chemical analysis" (715). Note the reappearance of Thomson's notion of a "true chemistry," or in this case a "true science," which, despite Merivale's celebration of the alchemists' discoveries, again suggests that alchemy is not itself "true" or legitimate scientific knowledge, but rather only a path toward it. Thus, Lewes and Merivale both demonstrate that their regard for alchemists is for their practical achievements, particularly those discoveries that benefit the progress of Victorian science. Ultimately, their arguments reveal that the only way for Victorians to reconceptualise alchemy as both meaningful and useful in the context of Victorian progress is to cleanse it of its "absurd" elements—that is, its mystical symbolism, its occult practices, and its belief in supernatural phenomena.

Despite the positive, if restricted, characterisations of alchemy in popular periodicals, negative perceptions of alchemy and the occult among scientists persisted throughout the Victorian period, carrying into public lectures on both sides of the Atlantic. Not only do these popular lectures demonstrate a public as well as academic interest in alchemy, but they also emphasise the sharp division scientists attempted to maintain between scientific materialism and studies of the supernatural. An 1880 lecture to the New York Academy of Sciences again raises the significance of alchemy's influence on modern chemistry, but lecturer H. Carrington Bolton also explains that "in ancient times chemical science existed side by side with the superstitions of alchemy"

("Alchemy and Chemistry" 2). Bolton's use of "superstition," followed by his claim that "some experimenters threw off the trifling deceptions surrounding the art and devoted themselves to the legitimate pursuit of chemistry," demonstrates his negative view of alchemy's association with the mystical. In this way, alchemy is only "legitimate" when its focus is on the chemical, and thus material aspects of its practice; alchemy's transcendental elements are of no practical use to modern science. Similar sentiments emerge in a series of lectures for children, in which Professor Dewar, a Fellow of the Royal Society, traces the history of chemistry "leading up from the bizarre, and striking to matters of no less interest than utility" ("Alchemy" 31 Dec 1883). Dewar relegates alchemical experiments to an educational amusement for children to showcase scientific wonders, focussing entirely on the alchemists' practical discoveries so that alchemy's mystical elements are entirely relegated to the ancient Egyptians and Greeks. While these lectures demonstrate alchemy's significance in the history of chemistry, they also reveal how "baseless was the fancy" of the transmutation of metals, which is, according to Dewar, "the delusion of the alchemists" ("Alchemy" 10 Jan 1884). Both Bolton and Dewar thus evince how alchemy has, by the 1880s, been accepted by scientists as the precursor to modern chemistry, but only because of the practical developments it has contributed to the field. Its "delusions" and "baseless fancies" have no place in scientific progress and must be ascribed to the "superstition" of the past and the "trifling deceptions" of charlatans.

As with Brown's earlier lectures that denounced the occult elements of historical alchemy, these *fin de siècle* lectures react against the period's increased interest in spiritualism, Theosophy, and occult groups such as the Order of the Golden Dawn.

Authors associated with these groups more ambitiously expanded upon the potential of nineteenth-century science to accomplish alchemy's goals, including the decomposition of elements, the transmutation of metals, and even the creation of a philosopher's stone. Articles debating the relationship of chemistry to alchemy—and in particular the occult—appeared in such periodicals as *Science* and with greater rapidity in specialist occult journals or pamphlets. For instance, prominent figures in the movement like Helena Petrovna Blavatsky, Annie Besant, and Arthur Edward Waite engaged with alchemy's relationship to chemistry primarily as a means of establishing the occult sciences as authoritative fields of scientific study with valid methods of explaining both physical and spiritual phenomena; and as Mark Morrisson contends, such discussions ultimately set the groundwork for "radioactive 'transmutation'" and the public's reaction to that discovery in the early 1900s (Morrisson, *Modern* 43). However, overall, discourse on the history of chemistry had shifted its focus from narrating that history to describing alchemical practices and beliefs—the occult side of alchemy that Lewes and Merivale had chosen to overlook. For chemist R. C. Kedzie, one must first carefully examine "the hopes and aspirations of these hermits of science" before determining "whether we find in scientific thought, the same as in matter, a tendency to move in recurring cycles," even if it requires a re-examination of a period that found "no difficulty in the belief in the restless power of occult forces" (113). As Kedzie notes, the alchemists' "fantastic imaginings" resulted from a flawed theory of matter that Victorian chemists had the means to not only revise, but develop as a hypothesis of atomic structure that "challenges scientific thought" (117). Kedzie's lecture reflects another shift in the scientific institution's acknowledgement of alchemy: that the material practices of alchemy can

influence the progress of chemistry, especially in questions regarding matter.[5] By the 1890s, chemical study had reached a stage in its development where it was able to confront the supernatural aspects of alchemy, particularly transformations of matter. Characterisations of alchemy as erroneous, misled, or fantastical would persist into the twentieth century as a result of decades of condemnation, but the division between material and spiritual interpretations of alchemy remained ambiguous. In 1901, this division was at last breached when Ernest Rutherford and Frederick Soddy observed that thorium transformed into an inert gas in a process officially called radioactive decay, or what Soddy, to Rutherford's chagrin, called transmutation.[6]

5. Chemistry's Eastern Origins: Egypt and the Middle East

Even while navigating the relationship between alchemy and chemistry, nineteenth-century historians of science and populist science writers also engaged with anxieties that the Egyptian civilisation—its art, its feats of engineering, its religion, and its science—was produced by Africans, not by Europeans. As a result, the claim that Egypt or the Middle East was the origin of a major field of science like chemistry became particularly contentious, despite its ubiquity in histories of science, public lectures, and

[5] In "Alchemy in the 19th Century" (1889), Blavatsky similarly notes that the alchemists possessed "a *most profound knowledge of matter*," of which "even the materialists themselves confess a complete ignorance" because they continue to deny the existence of "real matter or *substance*," ie. "the presence of a spirit and a soul" (6, 5).

[6] See also Howorth 83-84. Rutherford and Soddy published their findings two years later in *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science* 5.29 (May 1903): 576-591, and this publication, as Morrisson argues, contributed to a major shift in the discourse surrounding alchemy, its plausibility, and its potential uses (*Modern* 6).

popular periodicals. This was, after all, a period when the Middle East, and the East in general, was simultaneously denigrated in Orientalist discourse as "debased, unclean, mystic, and bloody" and recognised as a source of knowledge, even a cradle of civilisation (Marsh 297).[7] These contradictions result in histories of chemistry that struggle to present the Middle East as the origin of chemistry since that would also require the acknowledgement of the occult practices employed alongside chemical study, such as the quest for the Elixir of Life. Historians feared that in recognising the geographical and cultural origins of a major science, they would be challenging the boundary between science and magic that had been forged by a post-Enlightenment ideology, and would thus threaten the authority of chemistry as a rational science (A. Butler 100; Owen 38-39). As a result, at least three different versions of the history of chemistry emerge during the period: those that incorporate, minimize, or outright dismiss chemistry's roots in alchemy and mystical practices in their representation of ancient Egypt and its accomplishments in chemistry. The implications of locating chemistry's origins in this way resonated throughout the century, influencing the public image of chemistry as a pseudo-magical study that appeared too-heavily influenced by an Eastern and occult Other. Such a characterisation of chemistry in turn inspired the distrust of the science that pervaded representations of chemistry in popular fiction of the period.

This struggle to characterise the origins of chemistry and contend with its association with Egyptian mysticism is perhaps most evident in Thomson's *History of*

[7] See also Luckhurst *Mummy's* 158; Said 206. In *The Beetle*, this list of traits is explicitly associated with the "idolatrous sect" to which the Beetle belongs, but Hurley demonstrates that it equally applies to how the Victorians viewed the Orient as a whole (Marsh 297, Hurley 128).

Chemistry, wherein he makes a clear distinction between popular beliefs about chemistry and the reality of its history. Thomson explains that "the most generally-received opinion" situates chemistry's origins in Egypt, "sometimes called *Chemia*," and that "the honour of its invention has been unanimously conferred upon Hermes Trismegistus" (9). This is the same mythical being who theosophists and occultists, including members of the Order of the Golden Dawn, would claim as their ancient source, but Thomson discards this myth, stating that it "bear[s] all the marks of a fifteenth-century forgery" (Owen 58; Thomson 13). By labelling the basis of popular opinion a "forgery," Thomson separates chemistry from myth and mysticism to focus on its earliest practical applications in metallurgy and medicine. Yet despite this attempt to divide chemistry from alchemy, he still argues in favour of Egyptian science. The ancient Egyptians were, according to Thomson, "much further advanced ... than the Greeks in their knowledge" of metals and metal-work, and he also attributes to this civilisation significant developments in dyeing fabrics and brewing beer (64, 93, 96). By focussing on these practical applications of chemical knowledge, Thomson deflects attention away from the Egyptians' work in alchemy, making no further reference to Egyptian mythology or mysticism, thus suggesting that those practices are entirely unrelated to that of chemistry.

This deflection continues when Thomson turns to Arab practitioners of chemistry in the medieval period, whose discoveries of mineral acids, the properties of metals, and distillation leads Thomson to regard them as "the people to whom scientific chemistry owes its origin" (110). By "scientific chemistry," Thomson refers to the techniques and methodology that he and his contemporaries continue to employ, and he adds that the Arabs applied "the chemical processes" of alchemy "to the preparation of medicines, and

thus opened a new and most copious source of investigation" (116). Thomson cannot ignore the slippage between chemistry and alchemy at this point in his history, and here he, perhaps inadvertently, indicates the influence of alchemy on the evolution of chemical study. This also occurs when he discusses the chemist Jabir ibn Hayyan (known to British writers at the time as Geber), whose writings, Thomson argues, comprise "the first book of Chemistry that ever was published" and reveal that Jabir was "acquainted" with a "vast number of facts ... which have generally been supposed to have been discovered long after his time" (iii). While Thomson states that Jabir is entitled "with some justice to the appellation of the father and founder of chemistry," he also apologises for the way in which Jabir "satisfied himself with accounting for phenomena by occult causes, as was the universal custom of the Arabians" (132). For Thomson, Jabir's writings on the philosopher's stone demonstrate "a practice quite inconsistent with real scientific progress," and he concludes that "notwithstanding the experimental merit of Jabir, his spirit of philosophy did not much exceed that of his countrymen" (132). Regardless of his evident biases against alchemy and the Arabs' "spirit of philosophy," Thomson clearly asserts that chemistry originated in the Middle East and thus developed alongside, rather than wholly distinct from, alchemy and mysticism. Thomson may work to divide chemistry and alchemy, but his history overall reveals the ways in which those boundaries have been blurred since chemistry's inception and, furthermore, that modern (Western) chemistry relies on principles and processes developed for alchemy by alchemists of Egyptian and Arabian origin.

The influence of these Eastern developments becomes more problematic for William Whewell, who entirely excludes the possibility of the East claiming any

superiority over Western intellect and industry. Just as he rejects the influence of alchemy on modern chemistry, Whewell passes over the ancient Egyptians in favour of the Greeks because, as he claims, the Egyptians "had no theory, and felt no want of theory" in regard to scientific phenomena (22). He offers the example of the flooding of the Nile, which the Egyptians, he argues, rationalised through myth and mysticism in contrast to the Greeks who developed a theory based on observation and logic. Thus, Whewell separates "the active and acute intellect of Greece," from which all Western philosophy derives, and "the African and Asiatic nations," who never "drew so strong a line between a fabulous legend and a reason rendered" (25). Not only does Whewell posit that African and Asian peoples fail to possess the curiosity and intellect of the Greeks, but also that people of these regions are incapable of distinguishing between fantasy—the mythical, magical, or supernatural—and "reason" borne from logical explanations for observed phenomena. The only way that Whewell can construct his history of an "inductive" science based in reason and empiricism is to exclude anything that threatens his post-Enlightenment ideals; however, this threat conveniently encompasses all Eastern civilisations and systems of belief while overlooking the mysticism and mythology that influenced the Greeks. Whewell advances a Eurocentric history of science that sharply divides what he views as Western logic and Eastern superstition, mysticism, and irrationality, thus carefully reinforcing not only a boundary between science and magic, but also one between West and East.

Whewell carries this division into his dismissal of the scientific developments made by medieval Arab physicians because their practice also fails to adhere to his ideal of the tenets of Western scientific method. In his discussion of the history of chemistry,

he explains that

> the formation and realization of the notions of *analysis* and of *affinity*, were important steps in chemical science, which, as I shall hereafter endeavour to show, it remained for the chemists of Europe to make at a much later period. If the Arabians had done this, they might with justice have been called the authors of the science of chemistry; but no doctrines adduced from their works which give them any title to this eminent distinction. (256)

Even if presented with evidence that the Arabs had made significant advancements in the science, Whewell just "might" regard them as the "authors" of chemistry. He thus denies the Arabs the authority of producing knowledge, be it in chemistry or in "botany, anatomy, zoology, optics, [and] acoustics," the advancements of which were, following the Greeks, "left for the Europeans of the sixteenth and seventeenth centuries" to develop further (257). Whewell claims that the Arabs "followed their Greek leaders" in their studies of science and the natural world, thereby demonstrating his disregard for any independent developments of Arab physicians and suggesting that they were only capable of repeating what had already been achieved by the Greeks (258). He characterises Eastern practitioners as subservient "pupils" to the Western "masters," adhering to a hierarchy in which Europeans will always be the superior creators, technicians, and innovators (259). The only reason Whewell offers for this dismissal is that the Arabs "were completely devoured by the worst habits of the stationary period,—Mysticism and Commentation," and were thus incapable of producing new and useful knowledge (258). Whewell uses the intersection between the East and mysticism as a means to universally

reject any developments in science made outside of the West, and also the extreme narrowness with which he defines science as that wholly divorced from any mystical or occult influence. Whewell's exclusion of Middle Eastern influences is curious in comparison with Thomson's more specialised history of chemistry, but it is not extraordinary; it echoes the literal excision of the Arab alchemist from Bulwer-Lytton's *A Strange Story*, whose work is stolen, appropriated, and questioned by Western practitioners, stripping him of his science, his authority, and his life.

Unlike Whewell, Thomson reserves a full chapter to expound the developments of Arab physicians and chemists, noting that, in some cases, these individuals possessed a superior degree of knowledge in comparison to their European contemporaries. For instance, in addition to Geber, Thomson describes the work of the physician Avicenna, who, "next to Aristotle and Galen," had the highest reputation "of all medical practitioners" until Paracelsus (Thomson 133). Thomson thus equates an Arab with the leading philosophers and experimenters of the West, ultimately demonstrating that Arab physicians possess a considerable degree of authority. Although Thomson disagrees with the way in which they blend the mystical with the practical, he demonstrates how their methods of analysis and experimentation, still employed in nineteenth-century laboratories, contributed to the evolution of modern science. Meanwhile, Whewell actively writes Arab physicians out of his history, employing the same rhetoric as those who sought to exclude women from scientific study, as I discuss in Chapter Four. He claims that "there is no Arabian name which any one has thought of interposing between Archimedes the ancient, and Steveinus and Galileo the moderns"—a claim that Thomson shows to be false (259). This results in two opposing accounts of the history of chemistry

that define the field and classify its developments based as much on personal bias as on post-Enlightenment ideology. In the process of constructing this history, Whewell and Brown reveal a need to affirm the authority of Western philosophy, knowledge, and materialism in the face of threats from an Eastern Other.

Ultimately, it is Thomson's rather than Whewell's history that later writers adopted regardless of the growing tensions between Britain and the Middle East, and between scientific materialists and occultists, late-century histories of chemistry are more accepting of Middle Eastern and occult influences. C. Carrington Bolton asserts in an 1880 lecture that "the first written records of alchemy proceed from Arabic sources" and that "the Arabians ... laid the foundation of chemistry" ("Alchemy and Chemistry" 2). Like Thomson, Bolton emphasises the significance of Arab practitioners like "Gaba" (Geber), who was "followed by many of his own race" who likewise "became eminent in chemistry" (2). Similarly, in the 1884 series of Royal Society lectures, Professor Dewar explains that the ancient Egyptians "were acquainted with many chemical facts as phenomena as long ago as about B.C. 2000, as could be proved by their extant monuments" and "the walls of their tombs" ("Alchemy" 10). Dewar links the history of chemistry to Egyptian mythology, explaining that "Thoth ... was the tutelary god of the science, and the writings conned by the alchemist were styled in honour of him the Hermetic books" (10). For Dewar, the mythical texts remain central to the nineteenth-century understanding of the history of chemistry even though in 1830 Thomson had characterised these Hermetic books as forgeries. Despite his characterisation of alchemy as a delusion, by referencing Egyptian mythology in this way, Dewar roots chemistry in its most mystical aspects—those that, at the time, were equally central to the Order of the

Golden Dawn. These lectures demonstrate a narrowing divide between science and the occult at the end of the nineteenth century of which Victorian audiences were well-aware, and which they would explicitly link with Egypt and the Middle East.

While later science historians draw from Thomson's more inclusive history, the popular press was more divided in its characterisation of Middle Eastern science. In the 1850 article "Alchemy and Gunpowder," journalist Dudley Costello frames chemistry within imperialist discourse so that he elevates British innovations while devaluing those of the East. He contends that Arab physicians prevented chemistry from evolving beyond superstition and impossibility because "an Eastern imagination, ever prone to heighten the effects of nature, was not slow to ascribe a preternatural force to this medicine" (135). This process results in "the doctrine of transmutation," which "entangled the feet of science in mazes, from which escape was only effected, after the lapse of centuries of misdirected efforts" (135, 136). By highlighting the negative influence of Middle Eastern practitioners on chemistry's development, Costello suggests, like Whewell, that chemistry did not fully emerge as a science until practised by Europeans. More specifically, he credits Germany and England with the development of chemistry as a science, explaining that "two men … stand first ... in literary and scientific knowledge," Albertus Magnus and Roger Bacon (136). Costello places a particular emphasis on the Englishman Bacon's invention of gunpowder, for which he appears to draw from his experience serving with the army in North America and the West Indies in the 1820s, and, by extension, the imperialist ideology upheld by the British army.[8] Costello's

[8] As Edward Said notes, "nearly every nineteenth-century writer ... was extraordinarily well-aware of the fact of empire" and "had definite views on race and imperialism" (14).

revisions to the history of chemistry attempt to improve the science's public image by distancing it from its Eastern, mystical origins and re-inscribing it as both a practical, Western science. More importantly, Costello characterises chemistry as a point of English national pride that has made possible significant developments employed by the British military and, more generally, by the colonial enterprise. At the same time that Costello devalues Eastern knowledge—and in fact appropriates it—he celebrates the development of the weapons that had, in recent years, been used to physically subjugate the populations of India, China, and Afghanistan.[9] Such a biased reconstruction of history reveals how, outside of scientific discourse, the narrative of chemistry's origins can be significantly altered to reflect a writer's political agenda—in this case, one that supports both nationalist and colonial activities.

With the occult revival emerges a different narrative of the history of chemistry that not only produces a more integrated discussion of chemistry, alchemy, and magic, but that also gives full credit to Middle Eastern civilisations for the development of chemistry as a modern science. In "Specimens of the Alchemists" (1855) the novelist Geraldine Endsor Jewsbury stresses the impact of Arab practitioners on later European alchemists. Although she initially characterises the Arabs as "a swarm of locusts" who destroyed the library at Alexandria, she later explains that they "gave" chemistry "the shape and dignity of a science" because they took "the great step which separates ancient science from modern research" with their development of distillation, filtration, and modern nomenclature (457, 458). Jewsbury builds from Thomson's history, calling the

[9] Britain had been involved in the First Opium War and the first Anglo-Afghan War from 1839 to 1842. The Indian Mutiny would occur seven years following this article's publication.

tablet of Hermes Trismegistus "if not a pious, at least a scientific, fraud" (457). However, her article ultimately highlights the magical potential of science, stating how, for instance, alchemical texts "speak their unknown tongue with so much grave and earnest emphasis that it is difficult not to believe they are pointing out the road to a mysterious, unknown world, full of strange beauty—if one only could understand their directions!" (457). She shifts between an objective, exacting register and one that describes science as "mysterious," "unknown," and "full of strange beauty" —all decidedly subjective terms that link science with the mystical and ambiguous. Similarly, she asserts that modern chemistry is "indebted" to the "dreams" of the alchemists "for many valuable realities," but she adds that these realities are "little, if at all, inferior to the red powder" of the philosopher's stone (459). This history of chemistry hovers between the scientific and the mystical, demonstrating how both these aspects of Middle Eastern *al-chemia*[10] have been equally significant to the development of chemistry while also suggesting that the continued integration of science and mysticism would lead to further achievements in chemistry.

In an 1887 article from the American journal *The Open Court*,[11] Georgia Louise

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[10] *Chemia* derives from the ancient Greek χημεία, or *khumeía*, which refers to the transmutation of gold or silver, and may refer to the ancient name for Egypt: *Kēme* or *Kmt*, "the black land" (OED). The Arabic prefix *al-*, or "the," initially remained attached in European translations, but it was later used to distinguish alchemy—literally "the science of transmutation"—from *chymistry* in the eighteenth century (Newman and Principe 38-39; OED).

[11] *The Open Court* declares itself a journal "devoted to the work of establishing ethics and religion upon a scientific basis." Leonard's article is more esoteric than the periodical's other submissions, which focus primarily on contemporary science, religion, and ethics, with little related to spiritualism or the occult. The complete lack of response to Leonard's article in later issues suggests that "the occult sciences of Ancient Egypt"

Leonard reads the history of science through an explicitly occultist lens, eliding all boundaries between science and magic. She immediately positions herself in opposition to "scientists, historians, archaeologists, even Egyptologists [who] ignore all mention of the occult, or speak of it only with derision" even though, in her mind, all the major sciences the Egyptians studied "bore an occult aspect," particularly chemistry and alchemy (470, 472, 497). Leonard explains that the ancient Egyptian priest or magician "was the scientist of his time" in a quest for "the attainment of wisdom, and command over the hidden powers of nature" (472). To the ancients, at least in Leonard's view, magic was what Victorians would call science, and vice versa. However, she also describes the ancient Egyptians as "an Aryan off-shoot from some primeval race whose history is lost in the night of time, and that *from that race* they inherited their knowledge of the arts and the occult forces of nature" (472, emphasis mine). This claim distinguishes the ancient Egyptians from African or Semitic peoples, including modern Egyptians under British colonial rule, who were frequently stereotyped as "backward and indolent," or as examples of racial degeneracy (Brantlinger 161; Bulfin 426). This article highlights the effect of these stereotypes on the occult revival's appropriation of Egyptian culture in Leonard's claim that the ancient Egyptians were "imported in pre-historic times ... from abroad," or, as her use of "Aryan" suggests, from Indo-European origins. She explains that this point is "proper" to make in order to show "that the claim of this people to a high antiquity and an exact and elaborate science is not preposterous" (472). Leonard assumes that her readers would not believe the African or Semitic races capable of producing a

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were of lesser interest to the periodical's readers than the more contentious topics of evolution and psychology.

"highly civilised nation" of "power and grandeur," and so she hastens to reposition Egyptian culture and scientific innovation away from the colonised Other to more respectably European origins (471). Leonard affirms colonial ideology and the racist foundations of nineteenth-century physical anthropology by placing the knowledge and authority of "an exact and elaborate science" in purely Caucasian hands. In doing so, she maintains the hierarchies of race necessary for both the Western colonial enterprise and the authority of Western science.

Leonard's discussion of the ancient Egyptian "occult sciences" is characteristic of texts associated with the occult revival, many of which appropriate Egyptian mythology, culture, and magical practices with little or no regard for the state of nineteenth-century Egypt and its people. Occultists, most notably those involved in the Order of the Golden Dawn, frequently structured their "magical language and symbolism" around the rituals of Egyptian religion and mythology (A. Butler 62, 96; Owen 58). The so-called "secret chiefs" of the Order were believed by lower members to be "alchemists whose practices were part of an unbroken hermetic tradition going back to ancient Egypt," yet as Dennis Denisoff notes, there are no records that indicate whether or not these secret chiefs were living individuals or spiritual entities (4). Although writers like Thomson and Jewsbury had emphatically exposed the "emerald tablet" of Hermes Trismegistus as a fraud, nineteenth century occultists continued to believe that "we may begin the Hermetic story from Hermes ... Egypt's great and far-reputed adeptist king," whose books, the *Corpus Hermeticum*, apparently "promised illimitable supernatural powers, ultimately over life and death"(Atwood 5; Luckhurst, *Mummy's* 213). Victorian occultists became "largely invested in recovering the lost wisdom and supposedly immense supernatural powers of

the ancient Egyptian priests" because they, as Luckhurst states, "regarded Ancient Egypt as the seat of a lost lore of fabulous magical powers," foremost among which were alchemical and other forms of pseudo-scientific knowledge (213). In order to rediscover this "lost wisdom" and "magical powers," occultists drew from the "archaeological and textual advances in the field of Egyptology" that made ancient texts like *The Book of the Dead*, translated in 1895 by Wallis Budge, accessible to a wider audience, including occultists themselves (A. Butler 98; Hebblethwaite xix; Luckhurst 232). Consequently, the British colonialist ideology that shaped Victorian Egyptology also influenced occultists' interpretations and appropriation of ancient Egyptian culture, leading them to exclude from their concepts of Egyptian knowledge and power the dark-skinned, mixed-race Egyptian of the nineteenth century—the very type of Egyptian embodied by characters in popular fiction, most notably Richard Marsh's Beetle.

Two texts from the occult revival that perhaps best showcase these problematic aspects of occultists' re-interpretation and appropriation of ancient Egyptian science are Blavatsky's *Isis Unveiled* (1877) and Florence Farr's *Egyptian Magic* (1896). Both authors, the latter of whom would become a Chief Adept of the Order of the Golden Dawn in 1897, regard ancient Egypt as a major source of mystical knowledge, and Blavatsky, by attaching such a title as *Isis Unveiled* to her work, further suggests that she has the power to "unveil" this knowledge, including the scientific innovations of the ancient Egyptians, to her readers. Blavatsky argues that "Egypt is the birthplace and the cradle of chemistry," and she goes on to describe Egyptian innovations in science and technology, particularly the production of dyes and medicines (541).[12] In "Alchemy in

[12] In "Alchemy in the Nineteenth Century," Blavatsky, claiming new evidence, instead ascribes the origins of alchemy to ancient China (8), and Arthur Edward Waite later

the Nineteenth Century," Blavatsky, claiming new evidence, instead ascribes the origins of alchemy to ancient China (8), and Arthur Edward Waite later furthers this argument in his "What is Alchemy?" essays (1894-1895).[7] However, she also contends that "what Egypt taught to others she certainly did not acquire by the international exchange of ideas and discoveries with her Semitic neighbours" because Egypt had "created wonders" while "proudly secluding herself within her enchanted domain" (515). While Blavatsky does not attempt to characterise the Egyptians as Aryans, she still divorces Egypt from African and Arab influences, calling it an "enchanted domain" and a "fair queen of the desert," this latter phrase suggesting a "fair," or white civilisation (515). Thus, ancient Egypt becomes akin to the African civilisations of Haggard's adventure novels, where lost knowledge and magical powers thrive among the "fair," only to be "wiped out by waves of savages" or "racial degeneration" (*Isis* 515; Brantlinger 161, 166). This act of isolating and idealising ancient Egypt significantly influences how later authors like Haggard and Farr characterise the civilisation, its advanced study of science, and its integrated practice of science and magic.

Thus, in a similar manner as Blavatsky, Farr characterises ancient Egypt as a fantastical civilisation where priests studied hypnotism and "Spiritual Alchemy" with the ultimate goal of gaining "supremacy over the Elements" (Farr). Such a goal may be far-reaching, requiring a level of hubris matched only by the mad scientists of fiction, yet at the same time it mirrors science's—and particularly chemistry's—goals of measuring, classifying, and to a degree controlling, the natural world and its elements. Farr argues that magic was, "among the Egyptians regarded with a veneration hardly accorded to the

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furthers this argument in his "What is Alchemy?" essays (1894-1895).

highest Philosophy in modern times," the practice of which required "hard training" and "cleans[ing] from the stains of material illusions," not unlike the university-trained, self-abnegating nineteenth-century scientist (Farr). Thus, in the manner of Leonard, Farr regards the magic of the ancient Egyptians as synonymous with science, highlighting a close relationship between science and the occult that, she suggests, can persist into the nineteenth century with the revival of ancient rites and practices. To emphasise this alignment of science and magic, Farr employs the language of nineteenth-century science in her description of "the principles of Egyptian Magic," making reference to its "formula," and even its "evolution" to ultimately argue that Egyptian magic offers "a thoroughly scientific satisfaction" because it stresses "precise practical details" over "vague theories" (Farr). At the same time, Farr frames her discussion of Eastern mysticism in Western scientific rhetoric so that, while she describes a "Spiritual Alchemy, or the Transmutation from human Force to Divine Potency," she betrays the need for these practices to be regarded as legitimate, no different from the precision and practicality of modern chemistry.

Unlike Blavatsky and Leonard, Farr makes no reference to the race or evolutionary source of the ancient Egyptians and their knowledge, but her focus on the *ancient* mythology and rites of Egypt is still divorced from the contemporaneous state of that region. For Farr, Egyptian knowledge and power exist entirely in the past, as demonstrated by her consistent use of the past tense in reference to Egypt, and thus she considers this knowledge to be ripe for revival by Western occultists. Alison Butler explains that Farr "imposed what little she garnered from reading the *Book of the Dead*, several other nineteenth-century texts on Egyptian civilization, and some Graeco-

Egyptian papyri, upon an already existent framework, established through her membership in the Golden Dawn" (96). Arguably, *Egyptian Magic* has little to do with Egypt because it appropriates a fragmented history of the colony to bolster Farr's own systems of belief and advance historically-legitimised mystical beliefs. In this way, Farr, like both Leonard and Blavatsky before her, work to portray Egypt as a civilisation of grandeur, infinite knowledge, and mystical belief; however, this vision is incomplete—an act of cherry-picking they employ to validate modern reinterpretations of Eastern culture, philosophy, and religion.

Although Blavatsky and Farr examine ancient Egyptian science in a context well beyond the purview of nineteenth-century science historians, their characterisations of the Middle East draw from the uncertainties regarding the production of scientific knowledge that appear throughout nineteenth-century histories of chemistry. From Thomson onward, writers debated questions of who produces such knowledge, why it is produced, and how it can be adapted as a means of either furthering Victorian ideals of progress or making alchemy palatable to a Victorian audience. The history of chemistry offers discomfiting realities for Victorian authors, so that even those who openly acknowledge the alchemists' accomplishments narrate their histories in a politically-charged manner: whether it be it to diminish the influence of mysticism and the occult on modern science, or to blatantly overlook the complexities of Egyptian politics and demographics. Furthermore, there arises the question of who controls this history and can employ it to influence how the wider public perceives chemistry and alchemy. Ultimately, these histories reveal that scientists are not necessarily the most trustworthy of historians and are as capable of bias and inaccuracy as any of the authors included in this chapter,

despite the period's idealisation of the scientist as self-abnegating and objective (Levine, *Dying* 3). The history of chemistry in the Victorian period is controlled by Western authors working from minimal primary evidence to define "chemistry" and "alchemy" within the parameters of colonialist, materialist, or occultist beliefs. The instability of the history of chemistry echoes that of the science itself, which only exacerbated the concerns of scientists and the public alike that chemistry was, despite—and perhaps because of—its ubiquity, a science of questionable reputation, as threatening as it was fascinating.

These histories of chemistry set the foundation for the fiction that I examine in the next four chapters by setting forth the tools—the language and philosophies—that shape how Victorian writers discussed the origins of chemistry in scientific, popular, and occultist contexts. Even though these contexts increasingly blur as the century came to its end, the tensions between material and spiritual interpretations of chemistry remained and indeed continue to do so in the scholarship of Newman and Principe as a result of the same concerns expressed by Thomson and Whewell regarding chemistry's legitimacy *in spite of* its alchemical origins. Yet, significantly for my study, despite these tensions, alchemy did, to a large degree, become subsumed into mainstream professional chemistry and scientific discourse so that even Rutherford, who in 1901 expressed concern with being labelled an alchemist, accepted the label for his research in his 1937 book *The Newer Alchemy* (Morrisson Modern 4-5, 10). Rutherford's eventual application of the term alchemy to his research indicates a wider acceptance of alchemy, transmutation, and the new forms of "magic" suddenly available to scientists. With this acceptance came the vindication that Faraday had hypothesised fifty years before: alchemy, at least in its

material ability to transmute elements and produce miracle elixirs, was feasible. This may appear to exclude the spiritual aspects of alchemy, but if not for the occultists' beliefs in transformative matter and extraordinary energies that, until technology finally caught up, could neither be observed nor measured, the discoveries of scientists like Rutherford and Soddy may not have been possible.

Chapter Two: The "Border-land Between Natural Science and Imaginative Speculation": Bulwer-Lytton's *A Strange Story*

> It was very different, when the masters of the science sought immortality and power; such views, although futile, were grand: but now the scene was changed. The ambition of the inquirer seemed to limit itself to the annihilation of those visions on which my interest in science was chiefly founded. I was required to exchange chimeras of boundless grandeur for realities of little worth.
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> – Mary Shelley, *Frankenstein* (1818)

Victor Frankenstein's lament over the transforming philosophy of science in the early-nineteenth century resurfaces in Edward Bulwer-Lytton's 1862 novel *A Strange Story*, which similarly critiques the increasing divide between post-Enlightenment materialist chemistry and the mystical beliefs of the alchemists. In both novels, this divide calls attention to the tensions surrounding studies of the vital force: that spark of life that distinguishes organic from inorganic matter. Frankenstein's use of electricity to reinvigorate dead flesh realises just one of many sources of the vital principle put forward by Romantic-era natural philosophers, including oxygen, blood, magnetism, and an unquantifiable spiritual essence (Allard 5; Budge 48; Lawrence 222). Four decades later, Bulwer-Lytton revisited the vitalist debates, but, unlike Shelley, he sought to justify spiritualist and occultist arguments regarding the legitimacy of alchemy and the existence of the immortal soul. *A Strange Story* challenges definitions of science and the supernatural by aggressively re-examining vitalist theories and presenting alchemy as a viable alternative to those theories. The novel characterises alchemy as the means of marrying the speculations, language, and discoveries of Victorian science with spirituality and belief in the supernatural. Significantly, the novel neither relegates alchemy to history nor characterises it as an occult science only grudgingly validated by

professional scientists. Instead, *A Strange Stor*y depicts alchemy as a science of the present that can serve as a catalyst, rather than a threat, to wondrous potentialities that materialist science refuses to acknowledge, including the Elixir of Life and scientific proof of the soul's existence.

However, *A Strange Story* contains two major complications that call into question the novel's depictions of chemistry, alchemy, and the possibility of a shared future for both practices: its reliance on the language of materialist science and the ultimate inability of its protagonist to reconcile faith and science. By framing its discussions of vitalism and the occult within the discourse of materialist science, *A Strange Story* acknowledges science's ultimate authority over knowledge, including those fields that by the 1860s leading men of science like Faraday, Huxley, and Tyndall had either relegated to the margins as pseudo-sciences or rejected as spiritualist irrationality (Franklin 127; Owen 37-38). The novel thus inadvertently suggests that all discourse regarding natural and supernatural phenomena must take place in the language of science in order to be regarded as legitimate. Consequently, while previous studies of Bulwer-Lytton's work emphasise his antagonism toward scientific materialism (Fradin 5, 7; Wolff 311), my analysis highlights the novel's often contradictory engagement with nineteenth-century science—in particular chemistry, which has its own controversial associations with alchemy and magic. Bulwer-Lytton may personally disagree with the materialist ideology that characterises the mind as a purely mechanical entity and rejects the soul's existence, but his novel cannot wholly reject scientific authority, just as his narrator, Allen Fenwick, cannot escape the occult, and even spiritual, foundations of his own science. The novel's inability to successfully reconcile its scientific and supernatural

elements despite Bulwer-Lytton's struggle to do so, as J. Jeffrey Franklin has argued, "rationalize spiritualism to science, [and] science to spiritualism" (135) results in an ambiguous conclusion in which Fenwick rejects both science and the occult in favour of Christian spirituality. Such a conclusion suggests that science and faith cannot be reconciled—that, despite centuries during which alchemists applied metaphysical knowledge to their experiments, nineteenth-century science had become too godless and soulless for any possible reconciliation of material and spiritual research (Cãlian 178, 179). In this way, *A Strange Story* presents a bleak picture for the future of chemistry: one that offers a taste of the wondrous potentialities that could transform scientists' understanding of life, only to reveal that such a future is ultimately nullified by the materialist rejection of the soul.

Although *A Strange Story* seems the least likely of all the texts in this dissertation to be classified as science fiction, the novel's designation as an "occult fantasy" or "supernatural novel" by later critics does not exclude it from being speculative within the context of mid-Victorian science.[1] The novel's presentation of potential sources of the vital principle extrapolates from major nineteenth-century scientific theories: Romantic studies of electricity, Victorian psychical research, and brain science championed by scientists across the spectrum of the material-spiritual debate. The sheer number of potential sources had, in 1816, inspired physician William Lawrence to compare the quest for the vital source to "a vain chase after fool's gold" because his colleagues had advanced so many theories that the vital principle was "like a camel, or like a whale, or like what you please" (Lawrence 169; Oakes 65). For Lawrence, the multiplicity of sources and the uncertainty it reflected required too much unsupported speculation and

[1] see Brown 162; Fradin 2; Page 126.

was, by extension, unscientific. Yet, in *A Strange Story*, this uncertainty is key because it opens up possibility for the otherworldly—that is, a source that cannot be reduced to the material or mechanical, be it occultist, alchemical, or Christian. Thus, while the events of *A Strange Story* are fantastical, the theory in which Bulwer-Lytton grounds the novel emerges from the gap in scientific knowledge that existed just as the study of atoms and matter—the building blocks of the universe—began to take shape.

This discussion of *A Strange Story* offers multiple avenues in which to explore the novel's engagement with science, but my analysis focuses on its depictions of chemistry and alchemy. Bulwer-Lytton's characterisation of these sciences within the novel draws attention to mid-Victorian attitudes toward chemistry—at the time a rapidly progressing science—its history, and its tenuous relationship to the occult revival. *A Strange Story* bridges the significant gap between Shelley's *Frankenstein* and Stevenson's *Jekyll and Hyde*, during which depictions of chemistry in literature occurred but rarely, such as in poems by both Brownings or in short fiction by American author Nathaniel Hawthorne.[2] Like both *Frankenstein* and *Jekyll and Hyde*, *A Strange Story* navigates the space between the scientific and the mystical in its depiction of a scientist who, willingly or unwillingly, hovers between rational materialist science and the alluring, and infinitely more powerful, study of mysticism. These three texts draw from chemistry's historical foundations in alchemy to dismantle the boundaries between the scientific and the supernatural, and thus question the limits of scientific possibility—that intersection where the "magic" of alchemy's occult knowledge makes the transition into quantifiable

[2] Elizabeth Barrett Browning, "A True Dream" (1833); Robert Browning, "The Laboratory" (1844); Hawthorne, "The Birth-Mark" (1843) and "Rappaccini's Daughter" (1844). Although these texts depict the use of poisons, potions, and specific substances such as vitriol, their engagement with chemical science itself is limited. Nonetheless, they draw attention to contemporaneous perceptions of chemistry—none of them positive.

chemical facts accepted by professional scientists.

Bulwer-Lytton expands on nineteenth-century tensions between science and the supernatural in order to emphasise the intersections between chemistry and alchemy that are only indirectly alluded to in *Frankenstein* and *Jekyll and Hyde*. In *A Strange Story*, chemistry and alchemy are depicted as being equally concerned with the vital source and the reinvigoration of the physical body; hence the characters' interest in such miraculous remedies as the Elixir of Life. *A Strange Story* largely builds its alchemical theory from the work of seventeenth-century physician Jan Baptiste van Helmont, who, like the novel's alchemists, combined mysticism with chemistry in search of the vital principle (B. Moran 89, 91). Nevertheless, the novel brings van Helmont's research into the nineteenth century with Fenwick, who regards van Helmont's theories as "wild fallacies" (Bulwer-Lytton, *Strange* 103) even as he studies the modernised version of those theories: organic chemistry. This subfield of chemistry, which examines living organisms and investigates questions such as the source of life, emerged in the early-nineteenth century during the so-called vitalist debates that dominated Romantic scientific discourse. These decades' old scientific debates haunt the novel, just as alchemy and the occult haunt Fenwick's career: The novel uses its characters as mouthpieces for each facet of the debate by substantiating their discussions with footnotes and quotations from major scientific figures, including Sir Humphry Davy, Justus Liebig, and even Isaac Newton. With these carefully selected references, the novel constructs its own history of chemistry that embraces alchemy and spirituality while rejecting the materialist ideology that, for Bulwer-Lytton as much as Shelley's Victor Frankenstein, "exchange[d] chimeras of

boundless grandeur for realities of little worth" (Shelley 75).[3] In revisiting this discourse regarding the source of life, *A Strange Story* highlights that, despite Victorian innovations in organic chemistry—including the very reinvigoration theory that Fenwick initially proposes in his research—the vital principle remained unknown. This failure, as the novel presents it, suggests that the answer lies not in Fenwick's chemistry, but in the alchemy of occultists and Arabian physicians, who take both the material and the spiritual into account in their practice. Such an indication is timely at a time when material chemical innovations and industrialisation were making chemistry the "most practically-relevant science" of the nineteenth century (Donnelly, "Representations" 195); even Faraday's 1852 lecture on the possibility of transmutation entirely excluded the spiritual aspects of alchemical practice. *A Strange Story* responds to this domination of chemistry by materialist beliefs by warning against a future ruled by a godless, soulless science, the very future depicted in the 1890's texts *Olga Romanoff*, *Zalma*, and *The Beetle*.

2. Bulwer-Lytton's *A Strange Story*: Contexts and Criticism

A Strange Story is the memoir of a physician, Fenwick, who acquires a medical practice in the prosperous town of L—. His rival is Dr. Lloyd, whom Fenwick, a staunch materialist, regards as a lesser physician because of Lloyd's spiritualist beliefs. After a heated pamphlet debate, Fenwick destroys Lloyd's reputation, and on his deathbed, Lloyd curses Fenwick's narrow-minded worldview. This scene foreshadows the novel's main conflict between materialism and spirituality, and from this point of the novel onwards,

[3] Ultimately, even Victor proves to be a materialist in his production of his Creature because he forgets that his creation will possess a soul, and will thus require both physical care and emotional support. Victor's understanding of alchemy and vitalism is, I would argue, comparable to that of Bulwer-Lytton's Margrave. See Introduction.

Fenwick is repeatedly haunted by reminders, not only of the cruelty of his dismissal of Dr. Lloyd's spiritualism, but also of the history of his own science—a history that, as the novel reveals, comprises alchemical cures, occult rites, and a belief in the soul's existence—elements that he must acknowledge in order to redeem himself. Fenwick is offered two paths toward that redemption: Lilian, a delicate woman with mediumistic powers, and Margrave, a soulless youth who tries to convince Fenwick to share in his quest to create the Elixir of Life. Fenwick falls in love with and marries Lilian, but Margrave plagues them, using his mesmeric powers to place Lilian in a catatonic state. Fenwick takes Lilian to the Australian frontier, but eventually Margrave finds them, and, now terminally ill, lures Fenwick into assisting with the occult ritual that produces the Elixir. During the ritual, angry spirits devour rather than replenish Margrave's life, and Fenwick wanders home, unwilling to believe what he witnessed. On his return, he discovers that Lilian is miraculously healed, which validates his newfound Christian faith and his abandonment of the materialist ideologies that, he now realises, blinded him to the power of the human soul.[4] Fenwick's redemption requires his repudiation of both materialism and science, with the implication that all science is irrevocably linked with a material conceptions of the universe. The novel thus reaffirms the division between the material and the spiritual, offering no means of reconciling the two systems of belief. Rather, the novel emphasises Fenwick's acknowledgement of the soul and the peace he experiences when he abandons all efforts, be they scientific or occultist, to penetrate the secrets of the universe.

[4] The novel specifically grounds its discourse on the soul in Christian dogma, and there is an extended scene in which Fenwick's mentor Faber advises him to "burn your book—Accept This BOOK instead; Read and Pray" before placing a Bible in Fenwick's hand (251).

This summary only touches upon the novel's depictions of alchemy, its practices, and practitioners because, while characters discuss alchemical theory, highlight its scientific aspects, and speculate as to its uses in the nineteenth century, it ultimately remains a mysterious, occult practice that can only be employed by the spiritually worthy. The actual practice of alchemy only appears in the stories that Fenwick hears about Margrave's past, which are heavily mediated by Fenwick—a sceptic and materialist—who does not actually witness any practice of alchemy other than Margrave's failed attempt at the novel's conclusion.[5] Although the novel makes it clear that Fenwick is a specialist in chemistry, it is less clear regarding Margrave, who mingles aspects of mysticism and occultism with his use of mesmerism and black magic. However, the novel does indicate that Margrave is not an alchemist. He partakes of the Elixir of Life and possesses some knowledge of basic alchemical methods, but he proves incapable of alchemical practice, and must request another to produce the Elixir for him or steal it for himself. Prior to the novel's events, Margrave was known as Louis Grayle, an English exile who travelled the East, learning magic. At the age of sixty, ill and with an extreme fear of death, he begged the alchemist Haroun of Aleppo to give him the Elixir of Life, and when Haroun refused, Grayle had him killed and stole the Elixir. The murder is discovered by another Englishman, Sir Philip Derval, a student of Haroun who then pursues Grayle, only to find that his quarry has transformed into the youthful Margrave. It is from Derval's written account that Fenwick learns of this history, but he

[5] As Fenwick relates one of these stories, he draws attention to his mediation when he explains that he must summarise one dialogue between Margrave, the occultist Derval, and the alchemist Haroun because it was "recorded ... in words which I cannot trust my memory to repeat in detail" (189). Rather, he describes "the effect it produced on my own mind" (189), and thus the whole discussion between experts in alchemy and the occult is lost.

is unable to repeat it faithfully because Margrave, using his magic, ensures its destruction before Fenwick finishes reading it. Derval himself is murdered by Margrave before he can share the mysteries of his alchemy with Fenwick, and thus, after his death, Fenwick can only explain that the casket in which Derval kept his alchemical potions "contained secrets" (165). The ways in which the novel shroud alchemy in secrecy, occludes its narrative representation, and limits its practice to a chosen few—from whom Fenwick and Margrave are ultimately excluded—poses challenges for analysis, and perhaps explains why the subject has eluded scholarly study.

Critical studies of this strange story are rare, and so despite the novel's illustrious serial publication in *All the Year Round*, it has remained a marginal text in Victorian studies (Brown 158; Page 126). Critics such as Gavin Budge and J. Jeffrey Franklin have analysed how the novel's engagement with the occult draws from major nineteenth-century scientific developments, including electricity, physiology, and brain science. This focus, however, is on mesmerism and spiritualism, and not on the areas of the occult which I examine. Budge does examine science and vitalism, but only in relation to mesmerism; he links the physical and mental energies of the novel's central characters with their vitality, or possession of vital force, to argue that "mesmeric qualities or attributes function as a kind of synecdoche for genius in both novels, because Bulwer-Lytton understands both genius and mesmerism as manifestations of the vital principle" (48). Such a link may explain Fenwick's ability to prevail against the spirits that destroy the soulless Margrave, but it overlooks the variety of possible sources of vitality that Bulwer-Lytton presents in addition to electricity and magnetism, including nutrients, a gaseous substance, and alchemy. Mesmerism plays a significant role within the novel, but

its influence on the novel's discussion of the vital principle is not as all-encompassing as Budge suggests.

Similarly, Franklin situates the novel's scientific aspects within the context of nineteenth-century mesmerism and spiritualism, and as such his references to the novel's depiction of chemistry focus on "science" and "scientific authority" only in the general sense. He argues that, for Bulwer-Lytton, "spiritualism was too vital *not to have* a scientific basis, while science, too important to ignore, *had to be made* to underwrite spiritual phenomena" (136, italics original), and his discussion places particular emphasis on Bulwer-Lytton's personal struggles "to resolve the paradox of materialist spiritualism and spiritual materialism" (135). Franklin, like earlier twentieth-century critics of Bulwer-Lytton's work, founds his argument in the author's biography, personal remarks, and the earlier novel *Zanoni* (1842); his emphasis on Bulwer-Lytton's significance in literary history and nineteenth-century occult history tends to limit his analysis of *A Strange Story* (139). Furthermore, Franklin asserts that the novel "giv[es] neither Spirit nor science the upper hand" in "the debate between spiritualism and science in which thousands of Victorians were engaged" so that, ultimately, the novel evinces the "range of contradictions that Bulwer-Lytton, and the many for whom he spoke, was struggling to resolve" (136). Again, the author rather than the novel remains the focus of Franklin's discussion of *A Strange Story* so that any reference to chemistry and alchemy are framed within the context of Bulwer-Lytton's antagonism toward materialism and what Franklin perceives to be Bulwer-Lytton's attempts to rationalise spiritualist beliefs. Weighting the reading of the novel through Bulwer-Lytton's biography and personal opinions occludes some of the more nuanced aspects of the text itself, particularly its presentation of both

materialist science and the equally-flawed beliefs of spiritualists, mesmerists, and occultists.

Meanwhile, contemporaneous reviews of *A Strange Story* offer initial reactions to the novel's engagement with the science of its time, or at least, according to some Victorian reviewers, its attempts to do so. For example, *The Athenaeum* is particularly critical of the novel's "witchdance" between magic and science in which "Magic and Modern Life will hardly be brought together by this exposition of their theory of action and reaction" (221). In contrast, however, the *Daily News*, while no less critical (or sarcastic) about the novel's depiction of science, offers a far more detailed discussion of the actual depiction of science in the novel, thereby revealing the aspects of this depiction that would have been of interest to contemporary readers. The reviewer notes the inescapable divide between novels and scientific texts, stating that "it required the genius of Sir Edward Bulwer Lytton to dress up and adorn the exploded theories of Condillac, Van Helmont, and Descartes, so as to make them readable by the novel devourer" (2); overall, the review both criticises the novel's depiction of "mental physiology" as "wholly inconsistent" with recent discourse on the subject and finds the novel "disfigured by the scientific disquisitions" of its characters (2). Despite this sarcastic tone, the reviewer draws attention to the novel's potential as a speculative text that builds from, not science, but pseudo-science, stating that, in the novel, "Sir Edward spied an opening into the forbidden territory [that region of the marvellous which was peopled by ghosts and other spiritual beings] through the recent *soi-disant* discoveries in electro-biology, mesmerism, and clairvoyance, and spirit-rapping"" (2). The reviewer is sceptical of these "*soi-disant* discoveries," but overall recognises that the novel treats these discoveries as

scientific and employs them as a means to enter that "forbidden territory" of the supernatural—a process which mirrors that of H. G. Wells in his speculations for *The Time Machine* (1895) and *War of the Worlds* (1898).[6]

A more serious consideration of *A Strange Story*'s depiction of science appears in an 1862 article from the *Times*, in which the anonymous author argues that, however fantastical alchemy's quest for the Elixir of Life, it profoundly influenced medical research throughout the nineteenth century. The author explains that the novel is "built on the presumption that there does exist, if it could but be discovered, a secret for prolonging life to an indefinite extent,—a secret which in all ages has been recognized and occasionally mastered by the votaries of occult science" (7). The novel, founded on such a "presumption," thus functions as a "what if" narrative that takes a hypothesis, in this case the discovery of the vital source, and explores the possibilities offered by that hypothesis. *A Strange Story* thus functions as a speculative text based on spiritualist and occultist theories, which are not, as the *Times* author notes, beyond the realm of scientific possibility. This author cannot reject the validity of alchemy because "as Sir Humphry

[6] In the preface to the 1933 edition of his scientific romances, Wells claims that "by the end of the last century it had become difficult to squeeze even a monetary belief out of magic any longer. It occurred to me that instead of the usual interview with the devil or a magician, an ingenious use of scientific patter might with advantage be substituted. ... I simply brought the fetish stuff up to date, and made it as near actual theory as possible" (viii). For Wells, realistic scientific details simply became the new means by which authors could venture into the otherworldly, which, in the case of *War of the Worlds* and Bulwer-Lytton's one acknowledged work of science fiction, *The Coming Race* (1871), literally pertain to other worlds. These texts are arguably more fantastical than *A Strange Story*, yet their exchange of demons and magic for aliens and science significantly alters their reception by, if not Victorian readers, then certainty by science fiction scholars (see Suvin 93-94). Reviews of *A Strange Story* offer an example of the shift that Wells identifies between readers' acceptance of what he calls the "jiggery-pokery magic" used by Frankenstein and their demands for more scientifically-grounded narratives. *The Anthenaeum* review in particular demonstrates the growing skepticism of readers toward the supernatural in fiction even when it is supported by scientific explanations.

Davy said there was nothing necessarily incredible in the transmutation of metals, so it may be held, perhaps, that there is nothing absolutely impossible in the detection and preservation of the Principle of Life" because "as far as credible evidence goes, no approach to this wonderful discovery has ever really been made" (7). Indeed, this possibility returned to popularity at the turn of the century when chemist Sir William Ramsay asserted that radium had a positive effect on vitality and was perhaps even the Philosopher's Stone (Morrisson 63, 118). However, the *Times* article explains that contemporary science takes "a widely different view of the vital secret" than Bulwer-Lytton's alchemists, seeking not "to prolong the prescribed term of our days," but to rather bring "the natural lease of life within reach of all" (7). The author views the quest for the Elixir of Life as little benefit to society, but this article nonetheless demonstrates how the novel's particular combination of alchemy and chemistry inspired discussions about the state of present and future science. In this way, the depiction of chemistry and alchemy in *A Strange Story* contributes to the gradual development of speculative fiction in the quiet years between Mary Shelley and its resurgence in the 1870s, when chemistry was at the height of its popularity and open to limitless potential.

3. The Secrets of Life and Death: Nineteenth-Century Vitalism

The depiction of chemistry in *A Strange Story* responds to similar tensions as demonstrated in the histories I examined in the previous chapter regarding the influence of Eastern and occult practices on the science's development. In the novel, these tensions not only manifest in the conflict between Fenwick's chemistry and the practices of occultist characters, but also in the contradictions that exist within Fenwick's research.

By his own admission, Fenwick adheres to materialist beliefs, yet, in his research, he seeks the same results as those ostensibly produced by the Elixir of Life: the rejuvenation of vitality. Moreover, Fenwick explains that one of his previous studies, "'The Vital Principle; its Waste and Supply' ... contained the results of certain experiments, then new in chemistry" (83). This study and the subject of his *magnum opus*, "an Inquiry into Organic Life" (84), situates his research in the field of organic chemistry, and Fenwick argues that the principles of the field's leading researcher, Justus Liebig, regarding "the replenishment of an exhausted soil" can be applied to "the re-invigoration of the human system" (83). Fenwick frames this hypothesis within the context of nutrition, but when he adds that this process might entail "supplying that special pabulum or energy in which the individual organism is constitutionally deficient" (83), his reference to a "special energy" indicates that his hypothesis also allows for a scientific re-interpretation of the Elixir of Life. However, it is not until later in the novel that Fenwick realises that his hypothesis corresponds with that of the alchemists, to whom, he exclaims, "we owe ... nearly all the grand hints of our chemical science," and who could not have been "wholly drivellers and idiots" as he once believed (369). Fenwick thus questions "why, after all, should there not be in Nature one primary essence ... in which is stored the specific nutriment of life" that produces a "potent medicament" offering "glorious vitality" and "radiant youth" (368). Although Fenwick's language becomes more hyperbolic with such phrases as "primary essence" and "glorious vitality," the core of his hypothesis has not changed: the human body can be reinvigorated with a chemical substance. The novel thus posits that distinctions between organic chemistry and the alchemist's quest for rejuvenation exist entirely in the minds of materialist scientists who refuse to recognise the legitimacy of

ancient alchemical knowledge.

With this collision of chemistry and alchemy, *A Strange Story* indicates that alchemy is not atavistic, but rather can answer prevalent questions in mid-nineteenth century science—in particular those pertaining to the vital principle. In this way, the novel does not so much depict a monstrous return of the past as a revival of lost knowledge that, in light of developments in chemistry in Bulwer-Lytton's time, could once again enter professional chemical practice. Such knowledge is represented in the novel by the Arab alchemist, Haroun of Aleppo, whose research emerges from an entirely different theoretical framework from that of Fenwick, yet both seek bodily restoration through chemical means. According to his student Derval, Haroun had "discovered the great Principle of Animal Life," and other than in cases "that the great organs were not irreparably destroyed, there was no disease that he could not cure," including old age (186). Derval stresses that, despite the seemingly fantastical scope of Haroun's science, it "was based on the same theory as that espoused by the best professional practitioner of medicine" (186).[7] Indeed, Haroun's research is underpinned by the same theory that Fenwick explores in his expansion of Liebig's theory: while Fenwick pursues "the re-invigoration of the human system" (83), Haroun has discovered the "reinvigorating and recruiting of the principle of life" (186). What differs between Haroun's alchemy and Fenwick's organic chemistry, apart from the evolution of language to describe scientific processes, is that Haroun also takes into account the souls of his patients; rather than merely healing the physical body, his Elixir "tempts ... the undue prolongation of [the] soul in the prison of flesh" (192). Haroun thus indicates that the Elixir threatens the

[7] Such a comparison between a questionable practitioner—in this case an Arab and an alchemist—and a "professional" also appears in *Olga Romanoff* and *Zalma*. See Chapter Four.

relationship between the soul and body by unnaturally extending the body's lifespan and forcing it to "retain" the soul, which consequently "repines, becomes inert, or dejected"—the very complaint from which Haroun, who has reportedly used the Elixir "thrice," suffers (186). In this way, Haroun, unlike Fenwick, notes the harmful psychological side-effect of manipulating the body's limits; such foresight, in combination with the success of his medical practice, situates Haroun in sharp contrast with Fenwick's image of alchemists as "drivellers and idiots" (369)—and, furthermore, with Fenwick himself, who frequently sets aside his research, willfully denies any evidence that contradicts his views, and never actually puts his theory into practice.[8] The grand theory of vitality that Fenwick proposes is ultimately unoriginal, which demonstrates his disregard not only for the history of his science, but also the breadth of knowledge alchemy can offer the modern chemist.

This blurring of alchemy and organic chemistry within the novel—and indeed, the basis of Fenwick's research—derives from Romantic vitalist theories, which emerged in response to Enlightenment developments in chemistry and medicine surrounding the study of organic life. Eighteenth-century chemists focussed their research primarily on inorganic or mineral applications, resulting in the discovery of numerous metals, isomerism, allotropy, and the affinities of particular elements like the halogens that would be key in developing the periodic table (Levere 198). However, around the turn of the century, surgeons and natural philosophers began to question whether organic and inorganic matter were distinct and were subject to the same chemical laws; such

[8] The question arises as to whether Fenwick is simply a poor scientist, a trait that is coincidentally shared among all of the chemists I examine in this dissertation. The genius and talent of these chemists appears to doom them to failure and disaster, but whether such a fate is a commentary on genius or a specific denunciation of chemistry is unclear.

questions led to two extreme views: that "life was distinguished by organization that chemistry could not explain"—that is, an immaterial essence or entity—and that "organic and inorganic chemical phenomena were identical, and were both mechanical" (Levere 199-200). Vitalists such as Humphry Davy and John Abernethy contended "that life could not be adequately accounted for by mechanical physics alone" and that the vital principle must be superadded—an external force not inherently part of matter—and directly linked with the soul (Caldwell 25-26). Whether they viewed this force as electricity, magnetism, or a supernatural entity, these vitalists highlighted the immateriality of a vital source that science had not yet the power to observe, measure, and thus define with any degree of certainty. This uncertainty raised concerns among Romantic natural philosophers because the hypothesis of a "transcendent" vital source threatened the legitimacy of the still-burgeoning fields of chemistry and medicine by blurring the parameters of scientific study, spirituality, and the supernatural (Allard 5; R. Mitchell 89). With the question of the vital principle, scientific discourse had extended too far into the unknown, which, in fiction, inspired *Frankenstein*, but in the scientific community, instigated further conflict between post-Enlightenment materialists and those who still sought to reconcile science and spirituality. One question at the centre of this debate regarded the relationship of the vital force to the human soul: that entity which significantly distinguished humankind from other organic life forms. To reduce the soul to a mechanical cog in the body devalued the superiority of humankind in the universe, yet to accept the existence of a supernatural force attached to the body, for such scientists as William Lawrence, undermined a science based in rationality and careful physical observation. Either way, the debates questioned the authority of both spiritual and

scientific institutions, creating a rift between many materialists and vitalists that further isolated chemistry from its alchemical associations and created the basis for later tensions between science and the occult revival.

The complexities of the vitalist debates throughout the nineteenth century begin to account for the contradictions within *A Strange Story* and its depictions of both chemistry and the occult. However polarised these debates appear, it is problematic to label one side as "vitalist" and the other "materialist" because vitalism covered a wide range of theoretical positions as many individuals, including Humphry Davy, struggled to reconcile spirituality with scientific discoveries that moved toward an increasingly material vital source.[9] Janis McLaren Caldwell explains that, at the time, "the conservative press caricatured the debate as a duel between transcendentalist religion and materialist science" (27), and Robert Mitchell adds that subsequent historical accounts have increased the polarisation so that the vitalist debates appear "decoded as battles for control over social and political institutions" (10). Such accounts of the debates are inspired by the conflict between surgeon John Abernethy, who "explicitly linked his brand of vitalism to support of the British crown and encouraged the political persecution of advocates of alternative 'materialist' philosophies of life," and his outspoken

[9] Allard 5; Caldwell 26-27; R. Mitchell 10, 89. For example, Sharon Ruston notes how Coleridge, though an adherent to vitalism, critiqued both Abernethy and Lawrence: the former for allowing his religious and moral beliefs to blind him from the possibility that the vital force was "some kind of imponderable fluid analogous (if not identical) to electricity," and the latter for representing a position "associated with French materialism and atheism" (116). At the same time, Caldwell argues that "both Abernethy and Lawrence considered science a separate sphere, or ... a different text than that of religion, and she adds that "Lawrence, though not personally religious, resorted to a typical natural theological defense of his inquiries" and "eschewed an 'unwise mixing' of the 'two books' of science and religion (27). Thus, even accounts of the vitalist debates disagree, which emphasises the need to re-evaluate polarised views of science and spirituality that prevail in both scholarly discourse and public opinion.

opponent, William Lawrence, whose theories, Abernethy claimed, were "detrimental to society" because they seemed to echo "the 'materialist' philosophy promoted by *philosophes* living in Britain's recent military rival, France" (R. Mitchell 10, 89). Critics, both contemporaneous and modern, have thus situated Abernethy on one pole of the vitalist debate as a proponent of "transcendent vitalism" and Lawrence on the opposite as a representative of "materialist vitalism" (Caldwell 27). However, Mitchell warns that vitalism should be regarded as more than "an emotional outlet for cultural anxieties" because it is not necessarily connected to any particular political ideology and was, at times, linked to both conservative and radical writings (R. Mitchell 89, 11). These contradictions only became more prevalent during the Victorian period, when the occult revival was simultaneously a radical movement that threatened social and scientific authority, and a means for "a more moderate majority" to reconcile "the new scientific methodology with religious ideals and aspirations" (A. Butler 100). It is precisely at this turning point that *A Strange Story* presents an unexpectedly complex navigation of science and the occult, which positions its characters across a spectrum that attempts to break down the binary opposition between materialism and transcendental vitalists.

By the 1860s, the tables had turned on the conservative vitalist theories put forward by Abernethy and his supporters, whose belief in the existence of the soul and the 'superadded' nature of the vital force was inherited, not by Victorian scientists, but rather spiritualists and occultists. Yet these marginalised sects of society transgressed social barriers and indeed actively worked to dismantle the divisions between science and the supernatural that Romantic vitalists had sought to uphold. Although the materialism of Lawrence was initially regarded by the Royal Institute and Royal College of Surgeons

as a revolutionary threat that would destabilise political and religious hierarchies, in the Victorian period, materialism, while no less threatening to religious belief, became a tenet of the scientific institution (Gilmour 135; Ruston 74). To a large degree, the difference between Romantic and Victorian discourses on vitalism reflects an ideological shift between each era's views of science, spirituality, and progress. Tess Cosslett explains how this shift is already reflected in *Frankenstein* in the characters of Victor's two professors at Inglostadt: Waldeman, who with "his grand vision of the scientist's 'almost unlimited powers over Nature,'" represents a "vision that would appeal to the Romantic age," and "the repulsive, restrictive" Krempe, who "obviously represents the dark underside of this vision" and "is transformed by the Victorians into their image of the scientist-as-hero" (6-7). Cosslett argues that this shift occurs because "the Victorian image of science was mostly non-Promethean" and thus was not concerned with "man's scientific power ruling Nature, but rather [with] Nature's scientific laws ruling man" (7). In this way, to characters like Frankenstein and Bulwer-Lytton's Margrave, Victorian science is "a dreary and limiting reductionism" while for Krempe and Fenwick it seeks "a unified explanation of all phenomena" within the bounds of natural laws "to which man can adjust and attune his thought and action" (7-8). This view of Victorian materialist science suggests that its practitioners do not seek wholesale control over Nature, but rather to understand the universe and its processes by setting aside supernatural speculations in favour of rational hypotheses and reproducible observations. By gesturing back to Romantic discourses of vitalism, Bulwer-Lytton grasps at the authority once accorded those positions within the debate that instead supported spiritual essences, magnetism, and electricity as reputable sources of life.

In *A Strange Story*, the vitalist debates come to life in the dialogues between Fenwick and Margrave, who advance opposing theories regarding the vital principle and its relationship to the soul. Fenwick presents a materialist perspective that seeks to debunk "the existence of the soul as a third principle of being equally distinct from mind and body" because, unlike the mind, which Fenwick regards as part of the body's mechanism, the soul remains "hidden out of the ken of the anatomist" and can neither be described, measured, or located (15). Such a perspective, and indeed much of Fenwick's intolerant tone, mirrors the arguments of Justus Liebig and William Lawrence, who, though writing thirty years apart, express a similar impatience with the persistence of vitalist theories in the face of what they regarded as incontrovertible evidence against the existence of a superadded vital force.

The novel draws explicitly links Fenwick's theories to Liebig's studies of organic chemistry, including *Animal Chemistry* (1842), in which Liebig posits that life is a consistently *material* process in both vegetable and animal organisms. He states that, while "consciousness and intellect may be absent in animals as they are in living vegetables, ... all the vital chemical processes go on precisely in the same way in man and in the lower animals" (6). Liebig's language allows for the existence of a soul by distinguishing the "consciousness and intellect" of humans, but he quickly rejects this possibility as a "fancy" of physiologists who had been "carried away by imagination" because they lacked "a clear conception of the process of development and nutrition" (6). To emphasise his exclusion of the soul and other supernatural elements from his study, Liebig adds, "what has the soul, what have consciousness and intellect to do with the development of the human foetus, or the foetus in a fowl's egg? not more, surely, than

with the development of the seeds of a plant" (6-7). Fenwick employs a similar rhetorical structure when he claims that "the mind" is a function of "bodily organization," just "as the music of the harpsichord is the result of the instrumental mechanism" (Bulwer-Lytton, *Strange* 14), which characterises him as a mechanist and aligns him with Victorian technology and progress. Liebig, however, despite his sharp critique of so-called fanciful notions regarding the soul, does not exclude the soul from scientific study because "natural science has fixed limits which cannot be passed," and a science that has not yet determined "what light, electricity, and magnetism are in their essence" cannot expect to detect the force behind human intellect (7). While Fenwick is openly "intolerant to ... opposite doctrines" (Bulwer-Lytton, *Strange* 15), Liebig is receptive to new discoveries that may supplant his theories, even those that may locate the human consciousness, intellect, or soul.[10] The tolerance of Fenwick's champion calls attention to Fenwick's extreme position and thereby reveals his ultimate failure as a scientist: his inability to adapt to new and other knowledge.

The novel makes no reference to Fenwick's other major influence: the Romantic-era physician William Lawrence, whose infamous critiques of vitalist theories lay the foundation for Fenwick's strict materialist belief. In the *Introduction to Comparative*

[10] Benton notes that Liebig's discussions of the vital principle are inconsistent, largely because his views on the subject altered over the course of his career (33). Thus, while Liebig was not a "chemical vitalist," he still held "a vitalist position in physiology" and used the "vital force" within his theory of organic chemistry in order to "alter the strength and direction of the chemical force, and so counteract the disruptive effect of light, heat, and the rest" on the formation of living organisms (34). Whereas previous vitalists had posited "light, heat, and the rest" as possible vital sources, Liebig regards them as "extraneous disruptive influences," or environmental factors, that affect, but do not actually instigate, the development of new life (34). Liebig's complex engagement with vitalism demonstrates the extent to which Romantic conceptions of the vital principle influenced later scientists, the futility of polarising the debates, and, furthermore, the spectrum of positions within materialist ideology.

Anatomy and Physiology (1816), Lawrence states that "in the science of physiology we proceed on the observation of facts," and, as such, "we do not profess to explain *how* the living forces ... exert their agency," despite the work of those who "wish to draw aside the veil from nature, to display the very essence of the vital properties" (165).[11] These other practitioners, among whom Lawrence includes Van Helmont—Margrave's chosen authority on the vital principle—claim that the body contains "an invisible matter or principle by which it is put in motion" (166); conversely, Lawrence argues that, if a vital force is necessary for animals, then it should be equally necessary for "vegetables," and, moreover, "why should we not adopt the same plan with physical properties, and account for gravitation or chemical affinity" by the existence of an external, unobservable force (168-169). Just as gravity and magnetism can be accounted for scientifically, so too, Lawrence explains, can the functions of animal life; a supernatural power is unnecessary. He concludes that the "hypothesis or fiction of a subtle invisible matter, animating the visible textures of animal bodies, ... is only an example of that propensity in the human mind, which has led men at all times to account for those phenomena, of which the causes are not obvious, by the mysterious aid of higher and imaginary beings" (174). Lawrence is equally critical of those who posit that electricity, magnetism, and galvanic

[11] According to Marilyn Butler, Lawrence employed in his 1816 lectures "an offensive tone of superiority in the demand that the Life question should be left to the real professionals. In this case that meant excluding chemists" such as Humphry Davy, who had been "recruited" by Abernethy" to support the theory that electricity was the vital principle (306). Lawrence elevates physiology as the ideal science for studying life because, he argues, organic bodies possess "their own peculiar phenomena" that "present no analogy to those which are treated in chemistry, mechanics, and other physical sciences," and thus such notions as "chemical affinity" and electricity "can only serve to perpetuate false notions in physiology" (Lawrence 161). The division Lawrence desired between chemistry and physiology clearly does not take hold, as evidenced by the work of Liebig and his contemporary Johannes Müller, who "based his vitalism in physiology on a form of chemical vitalism" (Benton 32).

forces "correspond perfectly" with life, and he mockingly asks "whether the organs are to be regarded as Leyden jars, magnetic needles, or batteries" because "there is no resemblance, no analogy between electricity and life" (169, 170). These theories that seek "the existence of an independent living principle, superadded to the structure of animal bodies," be it electricity or a soul, are, in Lawrence's opinion, "completely ungrounded" in the face of "the strongest and most numerous proofs" offered by "comparative anatomy" regarding "the dependence of function on structure"—in other words, on the material body, not an external force, so that every bodily function corresponds with a particular organ (172). Lawrence's insistence on the materiality of vitality, in addition to his sarcastic, mocking tone towards his opponents, closely mirror Fenwick's statements on the mind as "the result of bodily organization" and the soul's lack of anatomical presence (Bulwer-Lytton, *Strange* 15), and both Lawrence and Fenwick employ rhetorical questions as a means to undermine opposing perspectives by attacking the weaknesses in their logic. The similarities between Lawrence and Fenwick cannot be a coincidence, yet the absence of direct references to Lawrence in the novel suggests that, however much Bulwer-Lytton links Fenwick with this openly materialist position, he does not want to provide the historical evidence of that position for his readers. Instead, he controls the image of "materialism" by linking directly to Liebig, a more ambiguous figure in the vitalist debates, which leaves Lawrence in the "cold obstruction amongst the rubbish of past ages" that he ascribed to Van Helmont and Hippocrates (166). In this way, the novel works to physically eradicate certain forms of materialism from its pages even as it depicts the events that drive Fenwick to abandon his materialist beliefs.

Fenwick is set in contrast to the erudite, but chaotic Margrave, who explores the

limits of possibility with theories that combine cutting-edge scientific discoveries with ancient occult practices. Although Derval also employs such a combination in his practice, the novel places particular emphasis on both Margrave's explanations of and Fenwick's reactions to these theories. When Margrave refers to the "vital principle" and the potential of "recruiting that principle" for medical use, Fenwick responds with disdain, calling it "the old illusion of the mediaeval empirics" despite his own use of the term in the title of his most well-known paper (104, 83). What triggers Fenwick's prejudice is that Margrave refers to the vital principle as a "secret" to be discovered, and that Margrave emphasises his evocation of the mystical and occult by explaining that he bases his understanding of the vital principle on Van Helmont, one of those very "mediaeval empirics" Fenwick criticises (104). Margrave claims that "the principle of life must be certainly ascribed to a gas," and the Editor supports this with a footnote reference to Liebig's *Organic Chemistry* which contains that exact phrasing to demonstrate, the Editor explains, "that there are views entertained by speculative reasoners of our day which, according to Liebig, would lead to the inference at which Margrave so boldly arrives" (104-105n).[12] This statement links Margrave's theory to the past, present, and future of chemistry while, conversely, Fenwick, has "defined ... and meted the limits of

[12] In *Organic Chemistry*, Liebig explains that, because many contagions are airborne, other practitioners claimed that life must be attributed to a gas. However, Bulwer-Lytton fails to adds that Liebig calls such a hypothesis one of the "figurative expressions" that "are the foes of all inquiries into the mysteries of nature" and are, in fact, "deceitful" (363). Liebig, meanwhile, argues that contagions are the "result of a particular influence dependent on chemical forces, and in no way connected with the vital principle" (364)—a reminder that Liebig wrote prior to the emergence of bacteriology.

Meanwhile in *Animal Chemistry*, Liebig notes that the vital force is driven by "external influences," including air, moisture, and impregnation, all of which function to instigate the production of cells (1), yet many nineteenth-century vitalists seemed more concerned with isolating a single source, perhaps to either proving the existence of a divine force or controlling the means of creating life.

natural laws, and "clamped and soldered dogma to dogma" (85) so that he neither makes allowance for the reconsideration of past theories or revolutionary new discoveries. The novel thus challenges Fenwick's dismissal of historical theory by highlighting the narrow limits in which he conducts his research, including the slippery distinction between alchemy and Victorian chemistry that Fenwick is determined to defend. Yet, ironically, it is Margrave who has neither past nor future: in his desperation to attain eternal youth, he murdered for the Elixir to avoid devoting himself to the "repentance" Haroun offered him (192), and the Elixir both suppresses all memory of his past and transforms him into the very type of soulless, mechanistic human that Fenwick describes in his research (viii, 248). Although, in comparison to Margrave, Fenwick appears merely naive and misguided, his narrow-mindedness destroys both Dr. Lloyd and Derval, which results, if indirectly, in their deaths and the loss of their occult knowledge. It is for this erasure of history, in addition to his failure to believe in the soul, that Fenwick must repent and earn his redemption by being cured of his materialist beliefs—or face the soulless, depraved existence of Margrave.

As the novel progresses toward Fenwick's repentance, Margrave's theory alters to present a wholly alchemical means of restoring the vital force so that he no longer requires "the subtlest skill of the chemist" as he first hypothesised (405). Instead, "the process by which the elixir is extracted from the material which hoards its essence," some unnamed substance that occurs "only where the chemistry of earth ore of man produces gold," requires the "service [of] beings that dwell in the earth, and the air, and the deep"—that is, spirits evoked in an occult rite (373, 405, 414). Margrave thus locates the "principle of life" in a rare element, and indeed his terminology is jumbled throughout his

explanations, so that he refers to the vital principle, vitality, and nutriment in relation to the element without any clear indication of what the principle might actually be.[13] The lack of specificity in regard to this proposed vital principle incidentally maintains the allure of the occult—a term which derives from the Latin verb to conceal—and so frustrates Fenwick that he dismisses all that he witnesses at Margrave's rite as "trivial" in comparison "to the vast interests involved in the clear recognition of the Soul and Hereafter" (432); his experience may at last enable his belief in the soul, but the presence of spirits, demons, and magic far exceed his threshold of possibility, and he thus convinces himself that "the weird rite had no magic result" (434). Alchemy holds the secret of the vital principle, but that secret remains hidden from the Victorian scientist, particularly one like Fenwick, who struggles to believe in even the soul's existence until strained beyond his limits. Indeed, the process of employing the vital principle lies entirely outside of the limits of science, in "that realm of nature which is closed to philosophy and open to magic" (413), which, while not out of reach, requires a vigorous spiritual belief that, the novel implies, only alchemists possess.

Ultimately, the novel criticises both sides of the vitalist debates, particularly the extreme positions of the materialist Fenwick's denial of the existence of his soul and the occultist Margrave's destruction of his soul in a selfish quest for immortality. In this way, Bulwer-Lytton takes up again from *Frankenstein*—a novel which, as Melinda Cooper explains, offers "a critical reflection on the scientific approach to monstrosity" that

[13] Benton notes that Liebig "was opposed to those who misused the term 'vis vitae' to refer to an 'incomprehensible, indefinable something' and thereby obstructed scientific understanding" (35). The novel purposely obfuscates the alchemical process by both dividing the description between three scenes and employing vague language and convoluted syntax.

examines the ethics of science so that Shelley neither condemns "the scientific manipulation of life" nor endorses the "progressivist optimism" of materialism (89).[14] Although *A Strange Story* demonstrates a bias in favour of vitalism, earlier critics' contention that Bulwer-Lytton was a "vitalist" who "mounted his attack" on "the prevailing scientific materialism of the age" once again reduces the vitalist debate to the binary of the material versus the spiritual, when those involved with the debate frequently believed in any combination of the above (Fradin 5; Haynes 90). Not only does *A Strange Story* warn against the creation of so stark a binary, but, despite Bulwer-Lytton's own interest in the occult and his disagreement with contemporary scientific discourse, the novel is unable to entirely reject the validity and authority of materialist science. *A Strange Story* in fact relies on materialist ideology in order to further its claims of the reality of occult phenomena. Roslynn Haynes argues that Bulwer-Lytton employs language "that mimicked those of the very science he was condemning," (90), but mimicry alone does not account for his extensive use of footnotes and direct citations of scientific texts as a means to substantiate spiritualist and occultist concepts, including the possibility of transmutation. The novel does not seek the supremacy of magical belief over that of science, but it does condemn the limitations of materialist chemistry and its refusal to accept the possibility (much less the reality) of a spiritual world.

4. At the "True Border-land" and Beyond

Fenwick positions the studies of Derval at "a true border-land between natural

[14] See also Caldwell 27-28. Most discussions of Romantic vitalism use the example of *Frankenstein* because that novel realises the proposal that electricity is the vital principle. Furthermore, the Shelleys were acquainted with Lawrence, and were thus familiar with the particulars of the debate (Oakes 65-66; Rauch 251).

science and imaginative speculation" for the alchemist's ability to combine vigorous experimental and analytical practice with belief in the supernatural (184). Even as *A Strange Story* mingles chemistry and alchemy, it similarly integrates science-writing into the novel with the inclusion of footnotes, citations, and other references that function as a means of providing background and scientifically validating the novel's speculations. In the novel's preface, which was added to the volume edition, Bulwer-Lytton—or more specifically, his persona as the "Writer" who "construct[s]" the story (vii, vi)—explains that the novel incorporates "Romance" and "Philosophy" in order to demonstrate how both, despite their differences, "take their origin in the Principle of Wonder" and share common goals (v-vi). Yet, he adds, such a demonstration is only possible if "the wonders he narrates are of a kind to excite the curiosity of the age he addresses" (vii), and here Bulwer-Lytton's contempt for materialism and the "spiritual malady of [the] age" becomes apparent (Brown 181n74). He argues that it is necessary for the Writer to "borrow from science some elements of interest for Romance" because "the faculty of *Causation* is very markedly developed" so that "people, now-a-days, do not delight in the Marvellous according to the old childlike spirit," but rather "ask, 'How do you account for it?'" (vii). For Bulwer-Lytton, even—perhaps especially—tales of the supernatural require substantiation in order to satisfy a readership increasingly familiar, thanks to scientific populists, with major discoveries that elucidated the natural universe and left little room for belief in the otherworldly. As a result of this perceived need, the novel launches into that "border-land between natural science and imaginative speculation" (184), where scientific theories and concepts are employed in an attempt to account for mesmerism, the soul, and the Elixir of Life—both to offer scientific validation and to

expose the limitations of those theories. These references ground the novel in scientific discourse even as they work to destabilise that discourse and open it to newer, wider possibilities.

These textual intrusions give portions of the novel "the character of a tract" (L. Mitchell 136), but even as this academic style attempts to lend the narrative scientific authority, the insertion of extratextual references into the body of the text significantly disrupts both the narrative and its appearance on the page.[15] They are not Fenwick's references, but are added by Bulwer-Lytton, in his role as "editor" of Fenwick's story,[16] in order to elaborate on characters' allusions to, for instance, Liebig's *Organic Chemistry*, four of the Bridgewater Treatises,[17] and Isaac Newton's writings on alchemy. The footnotes emphasise the degree to which the editor manipulates the narrative, including a belated notice that "perhaps I should observe, that here and elsewhere ... it has generally been thought better to substitute the words of the author quoted" in the

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[15] Not all of the footnotes are citations: one in Chapter XXXIX highlights the discrepancies between two characters' narratives of events, which calls attention to the presence of an external editor seeking to guide readers' interpretations and, in this case, discredit a female character's authority because she "tells her story as a woman generally does" (187n)—that is, erroneously in regard to questions of law and science. Such comment reveals the ease with which male writers can dismiss women's intellect and authority, which I discuss in Chapter Four.

[16] *A Strange Story* possesses three authorial figures: Fenwick the narrator, an editor who presents the narrative as true, and the "Writer" who, in the Preface, undermines the editor by describing the story as a Romance with an allegorical structure.

[17] Thomas Chalmers's *The Adaptation of External Nature to the Moral and Intellectual Constitution of Man* (1833), John Kidd's *On the Adaptation of External Nature to the Physical Condition of Man* (1833), William Whewell's *On Astronomy and General Physics* (1833), and Peter Mark Roget's *Animal and Vegetable Physiology Considered with Reference to Natural Theology* (1834). Although I focus on those footnotes that influence the novel's depiction of chemistry, the majority of texts Bulwer-Lytton cites are from the 1830s and 40s, which does call into question the scientific basis of *A Strange Story*. Certainly the sceptical Athenaeum reviewer suggests that the novel's engagement with science is dubious.

place of "the mere outline or purport of the quotation which memory afforded to the interloculator" (369n). In this way, science texts literally invade the novel by replacing the dialogue of characters. On the one hand, this ensures that the scientific content is accurate and direct from the source; on the other, however, it causes characters to merely parrot the words of the day's leading scientists, which serves not only to deny the characters their own voices, but furthermore reveals another disruption of the text—one that collapses the boundary between fiction and non-fiction. These physical incursions of scientific discourse into the realm of fiction mirror the violent clashes between science and the occult that occur throughout the novel. It thus comes as little surprise that many of these footnotes pertain to alchemy, the vital principle, and magic because these topics present the greatest threat to the materialist science Fenwick upholds. Even as they disrupt the narrative to lay the foundation for the ways in which the novel seeks to both validate alchemy as a science and situate it within vitalist discourse, these footnotes also mark significant instances when spirituality and the occult weaken Fenwick's resolve by confronting him with alternative ways of knowing and, ultimately, the fallacy of his belief in a purely mechanical world.

Those footnotes that specifically pertain to chemistry and alchemy demonstrate how the novel takes Fenwick from the quantitative certainties of materialism into the unknown; they inject doubt into his narrative and force a shift toward speculation. The longest of these textual disturbances, found in Chapter LXXV, is composed of two back-to-back footnotes that fill nearly half a page of the serial edition, all for the purpose of answering Fenwick's questions while he considers the possibility that the Elixir of Life can be—and has been—produced. After hearing of Margrave's incredible quest to obtain

the Elixir of Life, Fenwick questions the certainty of materialist belief that such an invigorating substance and the occult practices that create it are impossible. He looks back to the examples of Descartes and Newton, whose research had controversially included alchemy,[18] to ask,

> did Newton himself, in the ripest growth of his matchless intellect, hold the creed of the alchemists in scorn? Had he not given to one object of their research, in the transmutation of metals, his days and his nights? Is there proof that he ever convinced himself that the research was the dream, which we, who are not Newtons, call it? And that other great sage, inferior only to Newton—the calculating doubt-weightier Descartes—had he not believed in the yet nobler hope for the alchemists—believed in some occult nostrum or process by which human life could attain to the age of the Patriarchs? (380-381)

The final two questions receive footnotes: the first makes reference to an 1861 review of Brewster's biography of Newton and a collection of Newton's lectures from the *Quarterly Review*, and the second refers to Descartes's research on the possible existence of an Elixir of Life. In these footnotes, the editor appears as though summoned by

[18] See Cãlian 186; Principe 308. Principe specifically blames nineteenth-century writers like Sir David Brewster for excluding Newton's practice of alchemy from biographies in order to characterise the eighteenth-century physicist as "the very model of the modern scientist" (308). Instead, Bulwer-Lytton's reference reveals that nineteenth-century recognition of Newton's alchemy did in fact exist. What Bulwer-Lytton does *not* include, is that its author, George W. Hemming, adds that the "fruitless researches" of alchemy "did not altogether displace the nobler objects of Newton's ambition" because "they were carried on with the greatest vigour during the period of his residence at Cambridge, where he matured his chief discoveries" (426-27). Newton's ability to study alchemy at the same time as he made major discoveries in chemistry and physics would make him an ideal model for a blended practice of science and the occult—which at once explains Brewster's attempt to suppress the material and Bulwer-Lytton's promotion of Hemming's review.

Fenwick's plea for "proof" that prominent Enlightenment figures Newton and Descartes surely could *not* have taken occult lore seriously. Fenwick's desperation demonstrates that the frequent intrusion of supernatural phenomena into his life has shaken his materialist worldview and forced him, like Newton and Descartes before him, to regard alchemy, not as a "dream," but as a potentially legitimate, if unreliable science.

However, the editor responds ambiguously to this plea by highlighting the absence of alchemy's success *thus far*. When Fenwick asks for "proof" that Newton doubted the success of his alchemical research, the editor quotes from the *Quarterly Review* to emphasise the unlikelihood of possessing such proof: "what theories he [Newton] formed, what experiments he tried ... will never be known" because Newton was not a man—like Kepler—to detail to the world all the hopes and disappointments, all the crude and mystical fancies, which mixed themselves up with his career of philosophy" (380-381n). Although the reference discusses Newton's persistent study of alchemy despite his lack of evident success, it emphasises that very lack of success by assuming that Newton failed wholly based on the absence of published reports of success. Similarly, the second footnote quotes from a late letter of Descartes, who explains that, after years of study, "*instead of finding the means to preserve life*" by discovering the Elixir, he "*found another good, more easy and more sure, which is—not to fear death*" (382n, italics original). The pessimism in these references only compounds the degree of uncertainty they inspire as both Fenwick and the readers are literally led into the unknown, where they must rely on faith, "mystery," and the realm of the "unreal" rather than the definable "properties," "limits," and "logic" of Fenwick's science (85). The way in which both footnotes emphasise the failure, rather than successes, of Newton and

Descartes's study of alchemy at once foreshadows Margrave's failure to create the Elixir, Fenwick's growing doubts about materialism, and thirdly, I argue, the necessity of continuing to pursue alchemy in the nineteenth century, when developments in science and technology might enable scientists to succeed where Newton and Descartes failed.[19]

With these references to what the *Daily News* reviewer called the "exploded"—that is, supposedly refuted—theories of historical investigators (2), the novel persists in the belief that alchemy's success remains within the grasp of, if not mid-Victorian scientists, then certainly their future counterparts. This space for the novel to explore the possibilities offered by speculation becomes a significant step in Fenwick's redemption from misguided materialist beliefs. In the paragraph just prior to Fenwick's series of questions, he bitterly exclaims, "recognised science! Recognised ignorance! The science of to-day is the ignorance of to-morrow!" because "every year some bold guess lights up a truth to which, but the year before, the schoolmen of science were as blinded as moles" (380). Fenwick acknowledges the limitations of "recognised science" to claim with complete certainty the validity, or in this case the error, of a particular theory because new discoveries are constantly being made and thus scientific theory must constantly adapt to the new acquisitions of knowledge. Thus, by leading Fenwick to such a repudiation of his science's absolute authority, the novel emphasises the necessity for scientists to maintain an open mind to all manner of possibilities, even those seeming impossibilities proposed by alchemy.

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[19] Bulwer-Lytton presents a similar argument in *Zanoni*, in which the narrator, while discussing the potential viability of alchemy, questions whether, if "Man cannot contradict the Laws of Nature," then "are all the laws of Nature yet discovered?" (138n; vol. 1). The narrator thus claims that the absence of alchemy's success is not necessarily proof of its failure; it may instead indicate a significant gap in scientists' knowledge of the natural world.

Although Fenwick has not taken alchemy seriously until this moment, his real-life colleagues had in what, as I noted in the previous chapter, by the 1860s amounted to a prevalent discourse in both scientific and popular media. For instance, Michael Faraday states in his 1852 lecture to the Royal Institution that "within the last few years a series of manifestations has been noticed which goes far to vindicate many opinions of the alchemists" and thus "shatters the opinion on which our absolute repudiation of the doctrine of transmutation was based" (7). He adds that these discoveries make it unjust for his colleagues "to stigmatise by so harsh a term as insanity that belief in an elixir which should be capable of extending the life of man," because, based on the knowledge and theories of ancient practitioners, "it does not seem a flight of imagination beyond the confines of sanity, although fanciful, ... to assume" its possibility (6). Like Fenwick, Faraday draws attention to the gaps in "recognised science" that have made the wonders of alchemy only appear to be "beyond the confines of sanity" to the scientific community. Both the fictional and the real-life scientist suggest that this community is willfully blinded to the viability of alchemy as a result of those prejudices that developed during the Enlightenment.[20] Faraday explains that alchemy is particularly castigated by his colleagues in comparison to other questionable theories, including "many a recent medical hypothesis [which] has rested on a basis far less seemingly rational" than those alchemists proposed regarding the properties of gold and its relationship to the human body (6). He thus likens scientists' stubborn resistance to alchemy to the wilder theories of the alchemists themselves because both emerge from the same desire to shape "isolated fragments of truth ... into a fondly-thought temple of perfection" (6). Such a

[20] See B. Moran 184-185, Principe "Alchemy" 306.

process of shaping the history of chemistry to fit the "fondly-thought temple" of scientific materialism characterised the histories of Thomas Thomson, William Whewell, and Samuel Brown; here, Faraday indicates that his colleagues' theory of alchemy as a fraudulent practice can no longer be supported by recent scientific discoveries and is indeed not only problematic, but also unscientific. Fenwick's commentary on the ignorance of present-day science toward new possibilities may be harsh and bombastic, but it situates the novel within the larger discourse on alchemy's potential in which Faraday and other such intellectuals as George Henry Lewes were engaging just prior to the novel's composition.

Yet despite the correspondences between Faraday and Fenwick's statements, and the novel's detailed citations, *A Strange Story* makes no reference to Faraday's lecture. Instead, the novel offers another example of a nineteenth-century professional scientist who noted the possible viability of alchemy—specifically transmutation—when Margrave reminds Fenwick how Romantic chemist Humphry Davy had "allowed" that "the transmutation of metals ... might be possible, but ... not ... worth the cost of the process" (405).[21] Margrave evokes Davy's name to reassure Fenwick that his hypothesis regarding alchemy and the vital force—apparently a by-product of mining and purifying gold—is credible because Margrave already knows that Fenwick regards Davy as an

[21] References to Davy's remarks appear in multiple Victorian writings on alchemy, including an 1891 article in *Science* and Bulwer-Lytton's *Zanoni*. They each specifically draw from *Amenities of Literature* (1841) by Isaac D'Israeli, who explains that "Davy assured me that making gold might be no impossible thing, though, publicly divulged, a very useless discovery" that "may be reserved for the future researches in science to trace" (312n). Although Davy briefly mentions alchemy in his *Elements of Chemical Philosophy* (1812), he does not repeat his alleged statement to D'Israeli, but calls alchemy both a "delusion" practised by "low impostors" and the study that inspired "the heroic or fabulous ages of chemistry" (6, 7). This, however, did not prevent other Victorian writers like Bulwer-Lytton from capitalising on D'Israeli's anecdote.

authority in his own reference to Davy's study of "the pabulum of life" (134). Davy's popularity throughout the nineteenth-century as a leading scientist makes him a convenient figure to cite as an authority on scientific subjects; however, in the larger framework of the novel, this citation also raises questions regarding the text's engagement with the science of its time. To argue that Margrave is simply ignorant of Faraday and the most recent scientific advances does not seem credible because the novel itself makes reference to Margrave's extensive scientific knowledge, including knowledge of Faraday: Fenwick observes early in their relationship how Margrave would, "in one sentence ... [show] that he had mastered some late discovery by Faraday or Liebig" while "in the next sentence he was talking the wild fallacies of Cardan or Van Helmont" (103). Margrave's discussion of Liebig's *Organic Chemistry* and his reference to Davy's remarks on alchemy date his "modern" knowledge of chemistry to the early 1840s; however, while the novel's events supposedly take place prior to Faraday's 1852 lecture, it was still possible for Bulwer-Lytton, in his roles as Editor and Writer, to cite Faraday or, indeed, any of the other contemporaneous sources I cited in the previous chapter, including the articles in popular periodicals such as the *Westminster Review* and the *Cornhill*. Certainly Bulwer-Lytton's reference to the 1861 *Quarterly Review* article on Newton demonstrates his own familiarity with scientific discourse and his willingness to include citations to texts that post-dated the novel's events. The questions then become why this omission exists and what it signifies within Bulwer-Lytton's overall scheme for the novel—what he calls "the purpose which pervades this work" (viii), which specifically pertains to the conflict between materialist and spiritualist systems of belief.

I argue that the answer to this curious omission of not only Faraday, but also

William Lawrence, lies first in their well-publicised positions as staunch materialists, and, second, in Bulwer-Lytton's reluctance to prominently feature their arguments in a novel that ultimately seeks to dismantle materialist beliefs in favour of a more spiritual worldview. For instance, Faraday presents a materialist conception of alchemy as a purely material process, and he praises Paracelsus as the practitioner with whom "universal belief in occult agencies may be said to have ceased," resulting in the "demarcation ... between chemists and alchemists (9, 12). Although Davy's suggestion that alchemy might be possible, if inefficient and costly, focuses on the material process of transmutation, Davy himself, as Christopher Lawrence notes, "remained committed to unity in nature and to powers rather than matter as the fundamental agency of order and change" (222). It unsurprisingly follows that Davy was also a vitalist who believed that "the mere organization of matter could not give rise to life" so that the "living body was the instrument of some more fundamental, perhaps undiscoverable, hidden power" (223)—that hidden power Bulwer-Lytton, like Philip Derval within the novel, argued was the soul (Bulwer-Lytton, *Strange* 143-144). Even Liebig, who provides the foundation of Fenwick's research, allows for alternative possibilities in his discussions of the vital principle, which include a superadded force and electricity (Benton 20). To expand Fenwick's real-life inspirations beyond Liebig would threaten the novel's arguments against materialism by creating an imbalance that would favour such authoritative voices as Faraday's over the long-refuted theories of Van Helmont. The novel thus immerses Fenwick, and, by extension, readers, in occultist practices and historical scientific theories, going out of its way to link these with developments in organic chemistry in order to validate a science that embraces the spiritual, rather than the material. In this

way, like the histories of chemistry in Chapter One, the novel constructs its own lineage of discourse on vitality and chemistry that challenges the dominant materialist narratives that shaped what the novel regards as an inaccurate vision of chemistry.

By the novel's conclusion, materialism becomes fully excised from the novel when Fenwick denounces his research, and indeed all of science, following Margrave's death. While it initially appears that Fenwick and Margrave are diametrically opposed, the novel reveals that they both seek to control the natural processes of creation and life. Margrave only requests Fenwick's assistance after noting the similarities between Fenwick's practice of organic chemistry and the theoretical basis of the Elixir of Life, both of which apply "ample nourishment" to "restore the impaired equilibrium" of health (104). Margrave encourages a seamless integration of alchemy and chemistry, but ultimately, his understanding and employment of alchemy is purely material; he never discusses the soul, and indeed he cannot because, as Haroun explained to Derval, he is an example of one "who could preserve in perfection the sensual part of man, with such mind or reason as may be independent of the spiritual essence; but whom soul itself has quitted" (186). As soulless as Fenwick is faithless, Margrave is no more worthy of the secret knowledge of alchemy than Fenwick. Consequently, neither is capable of possessing the means of rejuvenating life because of their belief in material universes: one solely magical, the other scientific. The alchemical knowledge Haroun and Derval appears to prove successful, but this knowledge is sacrificed to Margrave's desperate greed and Fenwick's stubborn disbelief. In this way, materialism functions as a destructive force within the novel, not only in that it eradicates ancient knowledge and alternative systems of belief, but also in that it, in the end, consumes itself. This cycle of

destruction halts production of new knowledge, discoveries, and speculations, which ultimately results in a highly pessimistic outlook on the future of nineteenth-century chemistry, should it remain under the authority of the Fenwicks of the profession: that a science that erases the spiritual from its practice—indeed from its very system of belief—should not exist at all.

Such a conclusion suggests that faith and science cannot be reconciled, and perhaps can *never be* reconciled. Indeed, it is a conflicted conclusion, not only because alchemists had seamlessly integrated faith and science into their practice for millennia, but also because, as I explore in Chapter Three, nineteenth-century occultists, spiritualists, and Theosophists continued to actively combine science and the spiritual by challenging the boundary between material science and supernatural phenomena. Questions regarding the soul continued to haunt the occult revival in opposition to scientific materialism and its perceived movement toward the mechanisation of human consciousness (Block 221; Caldwell 26). While, in *A Strange Story*, Bulwer-Lytton ultimately conflates science and materialism, later figures like Helena Blavatsky protested not against science itself, but rather against the limitations materialists imposed upon scientific study because, as Blavatsky asserts in *Isis Unveiled*, those limitations caused all speculation to "come to a full stop at the Borderland of the unknown" (341). Beyond this Borderland, occultists could establish that supernatural phenomena obeyed the same laws of physics that organised the natural universe, which would thus make those phenomena, including the soul, valid objects of scientific study (Ferguson 878; Gomel 194-95). Blavatsky calls this practice a "science of a soul" that can delve "far deeper than our modern philosophy ever dreamed possible" and teach its practitioners

"how to force the invisible to become visible," perhaps even, as Stevenson's Dr. Jekyll attempts to discover, the soul itself (340). Bulwer-Lytton warns against this scientification of the soul in the conclusion of *A Strange Story* because, while such a science brings faith and science together, it cannot necessarily reconcile them and, indeed, the work of these "naturalistic spiritualists" might result in an increased loss of belief in the soul as a supernatural, spiritual entity (Ferguson 891). Proof of the soul's existence cannot, within the framework of *A Strange Story*, exist because one must simply believe that it does exist, and, in doing so, one must, like Fenwick, stop forcing the universe—and thus God—to reveal its/His secrets. Later Victorian authors, including Stevenson and Oscar Wilde, offer a similar warning with literary depictions of souls forced into a state of visibility, be it by way of chemical substance in the tradition—if not the spiritual devotion—of the alchemists, as in *Dr. Jekyll and Mr. Hyde*, or in art, as in *The Picture of Dorian Gray*. In the hands of chemists, like Stevenson's Jekyll, who continue Fenwick's abandoned research, the soul becomes a quantifiable object of scientific enquiry—visible, even tangible—but in doing so, the soul also transforms into the *fin de siècle* descendant of Margrave: the creation of a soulless, selfish science.

Chapter Three: Studies in the "Mystic and Transcendental": Phosphorus and Spiritual Alchemy in Stevenson's *Strange Case*

> We have actually touched the border-land where matter and force seem to merge into one another, the shadowy realm between known and unknown, which for me has always had peculiar temptations. I venture to think that the greatest scientific problems of the future will find their solution in this border-land, and even beyond; here, it seems to me, lie ultimate realities, subtle, far-reaching, wonderful.
>
> Sir William Crookes, "On Radiant Matter II" (1879)

The 1886 *Times* review of *Strange Case of Dr. Jekyll and Mr. Hyde* describes scientist Henry Jekyll's experiment, in which a chemical potion transforms him into his alter-ego Hyde, as "the science of problematical futurity" ("Strange" 13). The reviewer situates Stevenson's novella at the limits of scientific possibility during a period when scientists were still "groping by doubtful lights on the dim limits of boundless investigation" and possibly "on the brink of a new revelation" (13). Even while the reviewer calls the novella "fantastically speculative" and Jekyll's experiment a "wonderful and supernatural problem," he also sees it as accounting "for everything upon strictly scientific grounds," which recognises the novella's ambiguous position between the scientific and the fantastical (13). This review emphasises the ambiguity of Stevenson's depiction of science to remind readers that the fantastical events are not improbable, but speculative in nature. Such a reading of Jekyll and Hyde invites a closer examination of the science behind Jekyll's experiment, which combines chemistry with what he calls "transcendental medicine," or his means of scientifically manipulating the soul (Stevenson 76). By navigating this nebulous space between science and the supernatural, matter and spirit, *Jekyll and Hyde* calls attention to chemistry's relationship to alchemy and the occult in order to critique the practices (and so-called progress) of

late-Victorian chemistry.

In this chapter, I foreground Jekyll's practice of science, which comprises both his physical practice of chemistry and the theory on which he founds his experiment. In focusing on the science of *Jekyll and Hyde,* I build upon Martin Willis's argument that nineteenth-century science fiction "contributed immeasurably to our understanding of scientific culture" and also "aim[ed] to reveal the powerful influence" that such subjects as laboratory science, spiritualism, and natural history "had on the creation of science fiction" (3). Willis inexplicably omits *Jekyll and Hyde* from his study, and in this chapter, I work to rectify that omission by examining the science of Jekyll's experiment, not in regard to its evolutionary context, but rather the actual science that makes the experiment possible: chemistry. Following Willis's model, I expose *Jekyll and Hyde* "to the specific scientific histories that were so important in [its] making" (2), which include nineteenth-century articles and reports on chemistry, as well as occultist reinterpretations of alchemy by such authors as Mary Ann Atwood, Florence Farr, and Arthur Edward Waite. In setting the novella within this context, I argue that it not only explores the duality of its protagonist, but also that of chemistry: a science that is, throughout the nineteenth century, trapped between its professional practice and its occult double alchemy.

Just as Jekyll at first embraces, then struggles to repress the atavistic, corrupt Other that threatens his respectability, nineteenth-century chemistry shares an equally tempestuous relationship with its ancestor alchemy—a practice that combines practical chemistry with mystical rites.[1] Jekyll's research is a study of "the mystic and transcendental" that results in human transmutation whereby he seeks the gold of pure

[1] Elana Gomel calls occultism "the Mr. Hyde to science's Dr. Jekyll," but, here, I reduce the broader categories of "occultism" and "science" to alchemy and chemistry (196).

goodness, entirely separate from his baser self (Stevenson 78). The novella thus explicitly links his fictional scientist with the work of contemporaneous occultists and their studies of alchemy and the science of the soul. In the years leading up to the publication of *Jekyll and Hyde*, spiritualists, occultists, and theosophists increasingly blended the scientific and the supernatural, to the chagrin of the scientific institutions headed by the likes of Faraday, Huxley, and Tyndall (A. Butler ix; Owen 38). In much the same way that Jekyll's attempts at repression fail as Hyde grows stronger, real-life scientists' attempts to dismiss alchemy's influence on the development of chemistry increasingly backfired as chemists, physicists, and psychologists became involved in groups like the Society for Psychical Research and the Order of the Golden Dawn (Oppenheim 330-31; Owen 70). For instance, while in 1830 Thomas Thomson stated that "accounting for phenomena by occult causes" is "a practice quite inconsistent with real scientific progress" (132), in 1879 the chemist and spiritualist investigator Sir William Crookes claimed that "the shadow realm between known and unknown ... has always had peculiar temptations" (167). Though not universally accepted by all chemists, this shift demonstrates how occultist ideology infiltrated Victorian science and began to challenge the barriers between the scientific and the supernatural, physics and psychical research, and chemistry and alchemy in a way that at once threatened and fostered progress.

The novella reflects these tensions within the scientific community in the fractured relationship between the occult scientist Jekyll and his materialist colleague Lanyon, which becomes a means for Stevenson to interrogate Victorian notions of progress. Rather than demonstrate the superiority of occultist over scientist, or vice versa, the paired first-person narratives of Jekyll and Lanyon resolve ambiguously in all but one

regard: both the occultist and the materialist perish. Their deaths come as a direct result of the extremism of their beliefs because, while Jekyll takes his research too far into the unknown, Lanyon rejects the possibility of exploring beyond the parameters of material science. As a result, both scientists compromise progress: Jekyll by forcing it too far beyond his physical and spiritual capability, and Lanyon by dismissing the creativity and speculation necessary to instigate it. Similarly, the novella's depiction of nineteenth-century chemistry's relationship with alchemy offers no definitive conclusion; the novella thus emphasises the difficult position in which contemporary chemistry is caught. On the one hand, this relationship compromises chemistry's ability to transcend its so-called illegitimate roots and "walk steadfastly and securely on [its] upward path" of progress as a legitimate, respectable science (Stevenson 79). At the same time, a blended practice of chemistry and occult science suggests a means of using material science to investigate subjects such as the redistribution of matter, the chemical formulae of good or evil, and the composition of the human soul. Ultimately, the novella reveals that, if chemistry is to progress at the turn of the century, it should investigate an effective means of navigating the nebulous space between science and the supernatural—between what is known and what might be—because neither pure materialism nor pure transcendentalism proves capable of harnessing the full potential of chemistry. Just as Jekyll cannot exist without Hyde, chemistry cannot exist without the practices of alchemy and occult science that made its progress possible.

2. The Divided Science of *Jekyll and Hyde*

That Jekyll happens to practice chemistry is far from arbitrary; the choice of this

particular science contributes to the novella's central themes of duality, the challenging of boundaries, and the dangerous potential of science at the *fin de siècle*. Chemistry is not the only science of transformations: biology, the more popular science of the nineteenth century, particularly in the form of evolutionary theory and physiology, can equally "provide compelling metaphors for transformation" (Beer 323). However, the transformations in chemistry are marked by rapid, uncontrollable, or even violent changes of state, much like those that Jekyll experiences, rather than the slow march of progress that characterises biological evolution. Furthermore, as Gillian Beer explains, chemistry is, more so than its fellow sciences, based in a "language of formulae and theorems [that] seals knowledge in secret codes to which the uninitiated are debarred access," creating a barrier between scientists and the "uninitiated" in which the "laboratory is figured as fortress, or even as Bluebeard's castle," an occult, or hidden, space "of unaccountable power" (322). Hidden within laboratories, chemistry becomes a literally occult science so that it is both "*heimlig*, humdrum and homely, caught into the ordinary process of living" and "*unheimlich* … occult, sequestered, yet invasive, changing the world before that change can be measured or controlled" (322). Although Beer uses *Frankenstein* as the literary model of the uncanny and occult aspects of science, her argument is equally applicable to *Jekyll and Hyde* because the novella, like chemistry, is caught between the familiar and the uncanny: the banal lives of its characters versus a seemingly-impossible, perhaps even magical, experiment. Examining the novella's depiction of chemistry renders a means of reconciling its scientific and supernatural elements, both of which are of equal significance to Jekyll's research and are thus equally necessary to understand the divided nature not only of Jekyll's practice of

chemistry, but also of the culture of science at the *fin de siècle*.

Despite the shift in Victorian studies toward interdisciplinary work in science and its history, critics have neither specifically analysed the use of chemistry in the novella, nor have they expressed interest in Jekyll's description of his research as "transcendental medicine" (Stevenson 77). However, there have been recent studies that begin to approach these subjects, including the work of Michael Davis, who notes how Stevenson employs "the language of chemistry" in descriptions of characters' emotional states; he situates these metaphors of transformation and fluidity in relation to the nineteenth-century idea of "mental chemistry," which compares "the operations of the mind" with "chemical processes" (208, 217). While Davis emphasises the significance of chemistry within the narrative, he regards it only as a metaphor for the psychological aspects of Jekyll's experiment and its results, not as the physical science Jekyll practices. Similarly, in a study of the supernatural aspects of Jekyll's experiments, Sara Clayson compares Jekyll's theories to those of Alfred Russell Wallace, who combined the scientific and the spiritual in his own version of evolutionary theory in order "to superimpose a theory of the body over a theory of the soul" (62-63). While this comparison takes into account the dual nature of Jekyll's experiments, directly aligning them with the *fin de siècle* spiritualist movement, Clayson applies spiritualist and evolutionist meanings to all of Jekyll's science. In this way, even the impure salt that enables Jekyll's initial success becomes little more than "an interesting Darwinian twist" as a result of "a chance mutation" which allows Hyde to defeat Jekyll in a survival of the fittest (65). Clayson may characterise Jekyll's transformations as a solely spiritual event in which Jekyll acts as medium to the "spirit materialisation" of Hyde, but her reading of the text, like that of

Davis, concentrates on the novella's reflection of Victorian evolutionary theory, but neglects to explore how it engages with other sciences, including chemistry and its associations with the occult. These critics gesture toward the centrality of chemistry to the narrative and the ways in which Stevenson engages with contemporaneous science, but they leave a gap in scholarship on the novella, its depictions of Victorian science, and its place within the history of science fiction.

When Jekyll refers to his specialisation in 'the mystic and transcendental,' he makes no explicit reference to alchemy, and throughout the novella, no other character applies the term to Jekyll's research. However, critics themselves have described Jekyll's science as a form of alchemy, often with a negative connotation that posits alchemy as dark art that detracts from the scientific verisimilitude of the text. For instance, Linda Dryden calls Jekyll's laboratory in the old dissecting rooms the space 'where Jekyll practises his diabolic alchemy' (*Modern* 104). By associating Jekyll's science with the 'diabolic,' Dryden emphasizes the divide between the supposedly respectable science that Jekyll is expected to practice and his preferred work, which is not only connected with mysticism, but also 'immorality' (104). Meanwhile, Lawler states that Jekyll's experiments, particularly his use of chemistry, 'may seem more like alchemy than pharmacology or chemistry' because Stevenson provides no clear explanation of how Jekyll makes his transformation possible, furthermore suggesting that, if Jekyll was indeed practising alchemy, he would use spells rather than chemicals to achieve his transformation (250). These scholars thus neglect both alchemy's significant role in the history of science and its relationship to the Victorian occult. More importantly, such a limited perception of alchemy inhibits readings of Stevenson's depiction of Jekyll's

chemistry. The frequency of both spiritual and alchemical references in the text, however implicit, and their overall significance within the narrative situate the novella within nineteenth-century occultist discourse, in particular the belief that alchemy is not merely the process of transmuting metals, but also a means of transmuting 'man's nature from the profane and carnal to the divine' (Morrison 36). It is thus crucial to read Jekyll's theories and experiment within the context of the occult revival, not only to demonstrate how the 'fantastical' elements of the novella are entangled in its depiction of material science, but also to better perceive Jekyll's conception of the soul as a product of Victorian concerns about spirituality in an increasingly material universe.

The absence of criticism on chemistry and alchemy in *Jekyll and Hyde* is notable, but not extraordinary considering the absence of criticism on representations of chemistry in Victorian literature; however, the explicit dismissal of Jekyll's material science by some scholars reveals their confusion, even frustration, regarding Stevenson's ambiguous portrayal of Jekyll's experiment. Perhaps the harshest dismissal is that of Darko Suvin, who claims that Stevenson is "cheating" by using a "chemical concoction" that can neither be reproduced nor controlled. Suvin regards the novella's use of science as particularly problematic because Hyde begins to return "without any chemical stimulus," thus shifting the narrative into allegory whereby "science is used for a partial justification" of the transformation (94). For Suvin, the novella's depiction of science is incomplete, lacking in detail and logical explanation, which implies that Jekyll's practice of chemistry is of little consequence to the narrative; the potion could be replaced by any magic spell or gimmick without disrupting the allegory. Similarly, Jennifer Beauvais argues that "the science of Jekyll and Hyde ends" with "the laboratory potion" that brings

Jekyll's dual nature to life because "the reader spends more time within the characters' parlors, halls, dining rooms, private offices, and bedchambers" (186-87). In such a reading, the potion merely functions as a plot device while the novella's setting in domestic, rather than scientific, spaces "leave[s] the science fiction genre behind" and ultimately "contradict[s] its basis as an exploration of the moral issues affiliated with the progress of science at the *fin de siècle*" (187). Beauvais suggests that science fiction is only possible within the space of the laboratory, which overlooks both the significance of laboratory in the *fin de siècle* Gothic as a site of unknown horror and the issues central to the progress of contemporary science that the novella explores: scientific overreaching, the influence of psychical research on professional scientists, and the fragile boundary between science and the supernatural. Instead, both Suvin and Beauvais approach the text with twentieth-and twenty-first-century assumptions about science fiction and how much scientific content is necessary for critics to deem a text worthy of serious consideration.

Meanwhile, Dryden, Lawler, and Stiles argue that the novella falls into the category of science fiction, but of these, only Lawler notes the significant role that Jekyll's practice of chemistry plays in the novella's depiction of Victorian science.[2] Lawler bases his classification of the novella as science fiction on the way in which Stevenson "makes it clear that the trick is done with chemicals" despite the overall absence of detail in his descriptions of Jekyll's experiment (250). Like the *Times* reviewer, Lawler emphasises the practical, rather than supernatural, nature of Jekyll's experiments, adding that Jekyll's use "of chemicals rather than spells was critical because the substances remove the logic of the story from the realm of the fantastic into the

[2] See Dryden, "Gothic" 101; Stiles, "Jekyll" 152-153.

scientific" (250). What for Suvin is "a partial justification" is for Lawler a means of lending verisimilitude to an otherwise improbable event, but at the same time, he suggests that Jekyll's chemistry is a practical science antithetical to the "spells" that would shift the novella completely into "the realm of the fantastic" (250). In this way, Lawler suggests that, as long as the novella's scientific elements remain distinct from its supernatural potential, its engagement with science is worthy of serious scholarly consideration. Thus, the problem for scholars is that Stevenson does not distinguish clearly enough between the scientific and fantastical elements, which creates what Suvin calls an "unclear oscillation between science and fantasy" that characterises the text as "an early example of 'science fantasy'" (94). Yet this very oscillation between science and fantasy is a crucial aspect of *fin de siècle* popular fiction, including *The Beetle*, *The Great God Pan*, and *The Invisible Man*; like *Jekyll and Hyde*, these novels feature scientists who achieve fantastical results that challenge the limits of possibility in ways that appear supernatural despite their use of modern scientific methods. The prevalence of such narratives at the *fin de siècle* indicates that it is necessary for scholars to re-evaluate the definitions of "science fiction" and "scientific content" to reflect a culture of science that was itself oscillating between scientific materialism and the transcendental beliefs of theosophists and occultists. These tensions only increase in the case of chemistry—a science that, because of its association to alchemy, was caught between material practice and its frequent incorporation into occult experiments.

In reading *Jekyll and Hyde* alongside contemporaneous writings on chemistry and the occult, it is necessary to view the novel as engaging with, rather than merely reflecting, the discourse of its time. The challenge of navigating the question of influence

and the "common assumptions that literature merely *reflects* developments in science" has been a concern for Jill L. Matus and Richard Dury in their studies of psychological texts that may have influenced or were influenced by Stevenson's novella (Matus 162). Matus stresses that both the novella and psychological texts of the period "are drawing on a developing discourse of multiple or hidden selves and the relationship among the diverse parts" (163). I make the same consideration when including articles about alchemy and the occult that appeared after Stevenson published *Jekyll and Hyde*, or even after Stevenson's death. All of these texts emerge from the same cultural milieu and are inspired by the same, or at least similar, developments in science and systems of belief. At the same time, Stevenson enters into this discourse with a familiarity with spiritualist practices because, for a brief period in 1873, he served as secretary to the Psychological Society of Edinburgh (Dury 239). Richard Dury explains that, because of this, Stevenson would have been exposed to spiritualist theories regarding "the same phenomena of apparent changes in consciousness and personality in hypnotic and mediatic trances and in somnambulist states [just] as were more scientific psychologists" (239). Clayson adds that Stevenson was "a self-proclaimed 'Spookist'" who "recognised the significance of Spiritualism to notions of a divided self" (51). While Stevenson's involvement in spiritualism does not presuppose an involvement in the occult, Alison Butler points out that there is considerable overlap between the two, both in their theoretical foundations and their membership (107, 167). It is thus reasonable to suggest that Stevenson was not only familiar with occult theories and practices, but that he actively engages with them as a means of highlighting the doubled nature of scientific practice and the impossibility that the two sides—the material and the spiritual—can reconcile.

As Elaine Showalter notes, nearly every aspect of the novella "seems divided or split" (109), and this persistent duality is reflected in both Jekyll's practice of science and, moreover, the scientific culture of the *fin de siècle*. *Jekyll and Hyde* juxtaposes scientific verisimilitude with the fantastical transmutation of a human body in an experiment that defies any boundaries between science and the occult, just as Jekyll's transformation blurs the distinction between respectability and monstrosity dictated by Victorian mores. Jekyll is foremost a professional chemist and member of the Royal Society, but at the same time, his studies "lead wholly toward the mystic and the transcendental," a claim which explicitly associates his research with the nineteenth-century Theosophical and occultist movements (Stevenson 76, 77). Jekyll is not merely a scientist consumed by his inner demon, nor is he merely a scientific overreacher who loses control of his monstrous creation; he is also one of the "men and women across Britain" who, Alison Butler notes, believed "that ancient wisdom passed down over the centuries through cabalistic, Hermetic, alchemical, and occult sources held the key for individuals to gain access to their divine beings" and "evolve into their 'true selves'" (1). Butler argues that such a "belief in magic" came to fruition at the same time as "scientific naturalism" as a response to the larger "growing disillusionment with Christianity and from advancement in scientific methodology" (99). This shared disillusionment did not prevent conflict between scientific materialists and occult-sympathisers, just as a shared body exacerbates the struggle between Jekyll and Hyde (100; Owen 38). Despite these tensions, many middle-class professionals, including scientists, "straddled the realms of science and the occult with little difficulty" so that "medical doctors donned ceremonial dress and wielded wands in magical ritual; [and] ... actors and poets gathered together to

transmute evil into good" (ix, 1).[3] Like the members of these groups, Jekyll desires to bring to life the "lower elements" of the soul, which is "none the less natural to me," and he employs modern chemistry to divide his two selves and relieve himself of "the curse of mankind" (Stevenson 80, 79). Jekyll's experiment tests the nature of the human soul and its relationship to the body, highlighting the conflict between scientific materialism, which gave little account to the composition and purpose of the soul, and late-nineteenth century Theosophy and occultism, which in part sought to scientifically validate the existence of spirits and the soul (Gomel 202; Morrisson 68). In his transformation, Jekyll reconciles material chemistry with spiritual belief, if only temporarily, and, in so doing, he at once brings to life the theories of his real-life contemporaries and influences future studies in occult science.

Jekyll and Hyde critiques the sharp divide between scientific materialism, represented in the novella by Dr. Lanyon, and the radical occultist ideas that underlie Jekyll's practice of "transcendental medicine"—that is, relating to mysticism, the occult, or the study of the soul. The novella establishes the contrast between these characters and the ideologies they represent early in the narrative with Lanyon's assertion that Jekyll's work is "too fanciful" and nothing more than "unscientific balderdash" (Stevenson 38). Lanyon embodies a strict materialist ideology, much like Fenwick in *A Strange Story*, in his dismissal of his "flighty colleague," whom he would rather regard as suffering from "a case of cerebral disease" than as a rational scientist equal to himself (73). Such a response to Jekyll's research differs little from those expressed by opponents to the study of occult phenomena by professional scientists. One such opponent was physiologist

[3] See also Oppenheim 29, 330; Owen 37.

William Benjamin Carpenter, who, throughout the 1870s, criticised Sir William Crookes's involvement in psychical research as a waste of the chemist's time and, furthermore, detrimental to his mental faculties (Oppenheim 352). For Carpenter, it is incomprehensible that any scientist would pursue such a "thoroughly unscientific course" (Carpenter 251), and like Lanyon, he questions the sanity of his colleague by claiming that Crookes's "mental constitution" must possess a "curious 'duality'" to inspire practice of both physical and psychic experiments (256; Oppenheim 352).[4] The difficulty for Carpenter and his materialist views is that Crookes merges scientific speculation with spiritualist practices: both so vastly divergent in Carpenter's mind—one disciplined and cultivated, the other "irrational" and duplicitous—that he cannot reconcile them except as a sign of mental instability (Carpenter 256). For Carpenter, the boundary between the scientific and the spiritual should never be crossed, even when, as in the case of Crookes's experiments in Radiant Energy, such a revolutionary study results in a more advanced understanding of light, energy, and matter. The danger in Carpenter's and Lanyon's brand of orthodox materialism lies in its scorn for spiritual or occult science because their rejection of certain discoveries for arbitrary reasons is itself unscientific, and it can lead scientists to overlook findings capable of transforming science, medicine, or industry—for better or, in Stevenson's *Strange Case*, for worse.

Although the text's first reference to Jekyll is marked by the string of letters that

[4] Although Crookes at the time mocked Carpenter's suggestion, he remains more notable in history as a potential dupe of spiritualists despite his role as president of the Royal Society, his discovery of the element thallium, and his experiments with light and matter (Brock xv; Oppenheim 340, 352). The similarities between his divided science and that of Jekyll warrant further analysis; Crookes may indeed be a source of Stevenson's depiction of Jekyll.

label him as a distinguished member of the scientific community,[5] Jekyll's assertion that his studies "lead wholly towards the mystic and the transcendental" aligns him with members of the spiritualist and occultist movements (Stevenson 78).[6] However, unlike the members of the Society for Psychical Research, who "concurred that psychic phenomena deserved earnest scientific inquiry" in order to "provoke new insights into the workings of the universe" (Oppenheim 330), Jekyll takes too radical a position against "the most narrow and material views" of materialism (Stevenson 76). Hyde proudly claims the superiority of Jekyll's research over that of Lanyon, who has "denied the virtue of transcendental medicine" in his narrow-mindedness (76). One may question whether Jekyll shares his double's views, but as Sara Clayson argues, they "are indistinguishable from Jekyll's own" and actually function to emphasize Jekyll's earlier statement to Utterson regarding that "ignorant, blatant pedant" who disagrees with Jekyll's "scientific heresies" (Clayson 55; Stevenson 44). Clayson notes that Jekyll and Hyde deride, even mock "the dominance of materialist science," and as such they echo the arguments of occultists and spiritualist who sought "to provide empirical evidence to support their claims" of supernatural phenomena (Clayson 56). However, Jekyll appears to seek more than mere validation of his research, and while in the guise of Hyde, he also claims that his mystical science offers him access to "a new province of knowledge and new avenues to fame and power" (Stevenson 76). This new province of knowledge

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[5] According to the novella, Jekyll is a Doctor of Medicine (M.D.), Doctor of Civil Laws (D. C. L.), Doctor of Laws (L. L. D.), and a Fellow of the Royal Society (F. R. S.), among other, unnamed honours (Stevenson 37).

[6] Lightman lists Charles Darwin, Herbert Spenser, Francis Galton, Henry Maudsley, John Tyndall, and E. Ray Lankester among the "ranks of scientific naturalists" (Lightman). Also see Oppenheim 327-330.

pertains to the soul and the spiritual realm that Jekyll, with his potion, is able to manipulate, if only for a short time; it is also the knowledge that kills Lanyon once he witnesses the results of Jekyll's "unscientific balderdash" (38). Jekyll's experiment extends too far beyond the limits of materialist science for Lanyon to accept, and it is, in fact, so horrifying that Lanyon cannot countenance continued existence in a universe where such a transformation is possible. Lanyon and Jekyll's exaggerated versions of a materialist and occult scientist demonstrate how such extreme attitudes toward the boundaries of scientific research are what, in fact, inhibit progress. In the novella, this inhibition becomes literalised in both the failure and deaths of both scientists; this fatal conclusion suggests that it is the extremism of belief, rather than the belief itself, that Stevenson critiques.

The argument that the novella neither denounces scientific study nor occult practices may be difficult to make in light of Jekyll's claims regarding the superiority of his research, particularly its ability to offer him knowledge, fame, and power. Such claims call into question the objectives of his study of the mystic and transcendental, and thus also the validity of such research. This research, like that of Victor Frankenstein and the Invisible Man, ultimately only benefits the scientist and his personal desires, and it is for this reason that scholars like Roslynn Haynes and Christopher P. Toumey situate Jekyll in the role of the mad scientist. For Haynes and Toumey, the novella is reduced to a warning against scientific overreaching and the attempts of "contemporary science ... to subdue and improve upon nature," while Jekyll becomes no more than a mad scientist who loses control of his creation (Haynes 147). The problem with such a reading, as Allen MacDuffie explains, is that it characterises science as a capital-S system that

represents “a general cultural phenomenon that, most seem to agree, is indicted for overreaching, for presuming to master nature” by “a prevailing atmosphere of *fin de siècle* pessimism” (1, 2). This pessimism toward science does not, in fact, overwhelm Stevenson’s narrative because he neither condemns scientific research nor implicates it directly in Jekyll’s downfall. Even Jekyll acknowledges that “had I approached my discovery in a more noble spirit, had I risked the experiment while under the empire of generosity or pious aspirations, all must have been otherwise, and ... I [would have] come forth an angel instead of a fiend” (Stevenson 82). This confession emphasises how “the drug had no discriminating action; it was neither diabolical nor divine” and demonstrates that the true fault lies in Jekyll the hypocrite, whose “evil” nature is “swift to seize the occasion” (82). The novella’s depiction of chemistry neither critiques chemistry nor, more generally, an overly-ambitious and materialist science; instead, it examines the competing ideologies that influence the practice of science at the *fin de siècle*, revealing how neither, when practised to an extreme, can provide an effective understanding of science, nature, and the self. During a period when the chemical and indeed the scientific profession was still establishing its standards, *Jekyll and Hyde* highlights the two opposing influences with which the profession had yet to sufficiently contend: repressive conservativism and radical speculation.

3. Phosphorous and the “Particular Salt”

Jekyll’s use of chemistry hinges on his special potion and the salt that initially makes his experiment a success and later makes him unable to reproduce its results. The text’s references to the ingredients and production of this potion are minimal, both

because many such references appear in descriptions made by Utterson and Poole, neither of whom has any scientific training, and because Jekyll refuses to provide details regarding the procedure of his experiment. In his confession, Jekyll only refers to two material elements of his experiment: that there are "certain agents I found to have the power to shake and to pluck back that fleshly vestment," and the "particular salt which I knew, from my experiments, to be the last ingredient required" (79, 80). Once in possession of these materials, he explains that he "compounded the elements, watched them boil and smoke together in the glass, and when the ebullition had subsided," the potion was meant to change colour (80, 92). This description of his materials and procedure offers no exact element names, and in this way Jekyll's decision to not describe his potion in detail reflects Frankenstein's adamant refusal to relate his knowledge of creation in Shelley's novel. However, while Frankenstein both attempts to protect his audience from his monstrous work and prevent others from improving it, Jekyll's choice to "not enter deeply into the scientific branch of my confession" is fuelled by shame over the failure of the theory in which he had invested so much of his energy and faith (Shelley 80-81; Stevenson 79). Jekyll records the results of his experiment in the style of a scientific report, but he concludes that his "discoveries were incomplete" as the result of a flawed hypothesis and his own moral failings (80). Yet he later contradicts this by claiming that it was "that unknown impurity" of the salt which skewed his results, a claim which places the onus on the materials of his experiment (92). That this change in emphasis only occurs at the end of his confession, when he is at his weakest, no longer capable of resistance, suggests that his desire to withhold the details of his experiment is more complicated than the excuses he offers. For the purposes of his chapter, I focus on

the significance of that salt and the potion's material properties, and the way in which the novella uses these details to link Jekyll's research with the Victorian chemical industry, a major discovery in the history of chemistry, and the alchemical practices of the nineteenth-century occultists.

Despite Jekyll's refusal to discuss the details of his experiment, Lanyon provides insight into Jekyll's research that reveals these very details, including a primary ingredient of the potion. His entry into this occult space is of particular significance because he is the most qualified individual to examine Jekyll's experiments, whereas Utterson sees only "tables laden with chemical apparatus" (50). At this point, Jekyll has neither destroyed his notes nor his assembled materials, and thus Lanyon's observations offer a crucial, if not wholly objective, view of Jekyll's work-in-progress. Upon entering the laboratory, Lanyon discovers small packages of powders "of Jekyll's private manufacture" as well as the notebook containing "a series of dates" with Jekyll's observations, though these, Lanyon finds, reveal "little that was definite" about the nature of the experiment (Stevenson 73). More importantly, Lanyon notes the main ingredients of the potion, which include "a crystalline salt of a white colour" and a vial that "might have been about half-full of a blood-red liquor, which was highly pungent ... and seemed to me to contain phosphorus and some volatile ether" (73). While Lanyon expresses some uncertainty regarding his observation, the "highly pungent" scent supports his theory because, in an 1852 article from *Household Words*, Henry Morley reports of "the peculiar, garlicky, phosphoric odour" in a match-making factory, and garlic is a particularly prominent scent (154). Indeed, Lanyon's uncertainty is inconsequential because he names the element, thus drawing attention to it and the various associations it

evokes for his readers. Significant here are three such associations: phosphorus's power of illumination, its degenerative effects when ingested, and its discovery by an alchemist.

As an element that produces light, phosphorus contributes to the novella's focus on illuminating that which is hidden, from Utterson's attempts to shed light on Jekyll's secret to the prominence of light sources in the narrative. The novella repeatedly draws attention to the contrast between light and darkness, such as the bright fanlight above Jekyll's door while the rest of the house is, like Jekyll's errant soul, "plunged in darkness," and the way in which Hyde's dark crimes are illuminated by lamplight and moonlight (Dryden 90; Stevenson 42). Phosphorus complements these examples because, prior to the discoveries of uranium and radium in the 1890s, it was the most widely-known naturally-luminescent element; even after the 1890s, it remained sufficiently popular for Arthur Conan Doyle to feature it prominently it in *The Hound of the Baskervilles* (1902). Phosphorus was also employed by charlatan spiritualists to produce fake ectoplasm and spirits during séances throughout the 1870s and 80s ("Charge" 10). However, its chief use in nineteenth-century society was as the principle ingredient of matches produced after 1832, which offered a convenient source of light that did not require the use of flint and steel (Marx 2357). These "strike-anywhere" matches made it possible to ignite a flame "anywhere and under almost all conditions" instantaneously, be it within one's home or in the foggy streets where Hyde engages in unspeakable acts (2357). Because Jekyll's potion contains this light-emitting element, the potion functions as perhaps the most important of the novella's light sources, one that literally illuminates Jekyll's corrupt nature from the inside out. As his consumption of the phosphorus-laced potion increases, he is increasingly unable to conceal himself, as though the potion

illuminates him in the London streets and marks him for capture.

At the time that *Jekyll and Hyde* was published, its reference to phosphorus was linked with two predominant issues in medicine and industry: its use in medical treatments, particularly for mental disorders, and its highly poisonous nature. Since the eighteenth century, chemists had offered small doses of phosphorus to treat such conditions as depression, epilepsy, and migraines, and these prescriptions did not cease until the 1930s (Emsley 52). Despite these perceived medical benefits, phosphorus became notorious to the Victorians as a poison to the extent that, in 1883, *The Medical News* reported that the element was "taking high rank as a material for self-destruction" because it was easily procurable and two grains could kill within nine days of consumption ("Phosphorous Poisoning" 247). Accidental phosphorous poisoning frequently occurred in Victorian match factories, where workers were exposed to white phosphorus: the toxic volatile form of the element that was used in "strike-anywhere" matches until the end of the century (Marx 2356-57). Robert E. Marx explains that this exposure resulted in what was colloquially called "phossy jaw," a form of jaw necrosis that occurred when phosphorus molecules were orally ingested by the factory workers. This condition led to serious disfigurements to the face, first by inflammation of the gums and swelling of the cheeks, then in the death of the jawbone and the receding of skin from the infected area (Marx 2357). Some of those who suffered from this condition entered "a debilitated state from inability to take solid food" while others' jaws exuded a foul-smelling puss or necessitated amputation, which, in addition to the disfigurement, often made the patient a social outcast (Marx 2358; Emsley 101). Concerns regarding phosphorous poisoning in match factories appeared as early as the 1850s, but these they

reached a crisis point in the 1880s when the factory owners failed to respond despite the number of associated deaths. In 1883, a report on a coroner's inquest in *The Times* explicitly linked a match-worker's death to the polluted air in the factory ("Sir" 10), and, throughout the decade, workers at the Bryant and May match factory repeatedly went on strike, in part because the owners had concealed multiple cases among its workers (Emsley 110; Raw 91). In the 1880s, phosphorus is both a means to treat illness and a means to cause it. I argue that Stevenson deliberately employs an element whose uses are as divided as his eponymous character: as capable of curing Jekyll of his affliction as of further corrupting his body and mind.

Jekyll and Hyde emerges in the midst of this controversy, when the combination of a phosphorus-infused potion and its disfigured consumer are likely to have triggered associations between Hyde's condition and phossy jaw. Reading Hyde's appearance in the context of this medical phenomenon not only highlights the major role that chemistry plays within the narrative, but is also a form of physical degeneration that was, at the time of the novella's publication, haunting the London streets. The symptoms of phossy jaw mirror Hyde's uncanny appearance and erratic, apparently pained physical movements. Although previous studies examine these aspects of Hyde's character in relation to evolutionary theory, Hyde's "impression of deformity," "dreadful smile," and "husky, whispering, and somewhat broken voice" echo descriptions of the "grievous disfigurement" and physical disability experienced by sufferers of phossy jaw (Stevenson 41, 75; Morley 152). In one of the earliest British reports on phossy jaw, Henry Morley explains that one match-worker's "lower jaw is almost entirely wanting [and] at the side of her mouth are two or three large holes" while another "has now no teeth in his lower

jaw, of which a great part is destroyed" (153). In one case, Morley states that "the oval shape" of the factory worker's "face is destroyed" (153) so that her appearance completely transformed, making her unrecognisable from her previous self—a condition that would only further contribute to the psychological impact of phosphorous poisoning, which was already capable of producing a state of delirium ("Phosphorous Poisoning" 247). This is not to say that Hyde specifically suffers from jaw necrosis; indeed, Hyde's "ghastly" face contains only an "impression of deformity" rather than the severe disfigurements that marked the factory workers. However, the way in which the novella emphasises Hyde's jaw and mouth above all other facial features, in addition to his consumption of phosphorous and drastic transformations from apparent normalcy into monstrosity, evokes the spectre of these workers and their disease. Such a link functions to remind the novella's readers that real-life Hydes wander the back streets of London: disfigured outcasts from society who are, in reality, victims of a similar brand of greed, hypocrisy, and abuse of science to that which destroys Jekyll.

Thirdly, Stevenson's reference to phosphorus links Jekyll's potion to the history of chemistry, in particular its discovery by a seventeenth-century alchemist. Victorian readers were, to some degree, familiar with this historical event, as is, for instance, evident in an 1867 article from *Household Words*. In this article, author Walter Thornbury states that "it was an alchemist who discovered phosphorus" (349) in such an offhand way that it suggests, at least in the Victorian popular imagination, the discovery of phosphorus was inextricably connected with alchemy. The seventeenth-century alchemist Hennig Brand's discovery of the luminescent substance he called "cold fire" or "perpetual fire" fascinated his contemporaries, and they eventually developed a means to

reproduce his experiment by taking "calx of lead" and "digest[ing]" it with the salts "sal ammoniac, potassium carbonate, and old urine" to create "a good grade of phosphorus" (Weeks 302, 306). While other chemists were chiefly interested in phosphorus's material possibilities, Brand had sought a means to discover the philosopher's stone. Brand's accidental discovery was immortalised in Joseph Wright's 1771 painting "The Alchemist in Search of the Philosopher's Stone discovers Phosphorus and prays for the successful Conclusion of his Operation, as was the custom of the ancient Chymical Astrologers," the title of which emphasises the alchemical, rather than solely chemical, nature of the initial experiment to its late-eighteenth and nineteenth-century audiences (Read 89). Later historians of chemistry also note the alchemical nature of Brand's experiment, including Thomas Thomson, who, in his 1830 *History of Chemistry*, states that Brand was "attempting to extract from urine a liquid capable of converting silver into gold" (233); that is, a substance that would induce transmutation, otherwise known as the philosopher's stone.[7] This is not to say that Jekyll recreates Brand's experiment, but the way in which the novella draws from the historical association between phosphorus and alchemy opens up the possibility that what Jekyll attempts to create is a philosopher's stone of his own: an elixir of life capable of transmuting his body and thus enabling him, like Bulwer-Lytton's Margrave, to acquire a new life and identity.

That Jekyll's potion includes phosphorus merely links his experiment with alchemy, but the addition of the "particular salt" that enables his transformation is truly what launches the experiment into alchemical practice (Stevenson 80). The novella places significant emphasis on the salt as "the last ingredient required" to complete the potion,

[7] See Principe, *Secrets* 119.

for which Jekyll sends his servants "flying to all the wholesale chemists in town" (80, 63). Moreover, the reaction caused by the salt provides the most detailed description of chemistry within the text. Lanyon notes that Jekyll combines his "red tincture"— the phosphorous-infused potion—with "one of the powders," which causes the potion "to brighten in colour, to effervesce audibly, and to throw off small fumes of vapour. Suddenly, and at the same moment, the ebullition ceased and the compound changed to a dark purple, which faded again more slowly to a watery green" (76). According to Jekyll's confession, the change in colour from purple to green does not occur with the new supplies of salt he acquires, which thus reveals that this final stage of the reaction lends the potion its "efficiency" (92). That the reaction produces a "watery" green potion reflects the diluted—that is degenerate—body into which Jekyll transforms, and this language carries into Jekyll's own observations, in which he concludes that his "first supply" of the salt contained an "unknown impurity which lent efficacy to the draught" (92). These details suggest that the original supply of salt contained some other element or compound that Jekyll, despite his professional capacity as a chemist, was unable to detect. David Lawler takes particular issue with Jekyll's failure to understand the salt's impurity because "for such a research scientist as Jekyll, a test for the purity of his chemicals should have been the very first step" (253). Lawler furthermore asserts that Jekyll's "undoing" is due to "both molecular randomness, on the one hand, and the psychodynamics of the relationship between Jekyll and Hyde on the other," all of which is "played against the randomness and entropy of nature" (256). Similarly, Sara Clayson claims that the impure salt is a result of a Darwinian "chance mutation" (65), which again considers the potion, and the text as a whole, through an evolutionary lens. However,

these interpretations focus on the purely material properties of the salt whereas, within the context of alchemical theory, the salt takes on a metaphorical and highly spiritual value as a double for Jekyll's own "impure" body.

Jekyll's repetition of "impure" in his confession and letters to the chemists not only signifies an element or compound's degree of dilution, but also something that is debased or corrupt—his own unspeakable activities, or the neighbourhood in which he resides (Dryden 103). However, alchemical theory offers an additional interpretation of the term that reflects Jekyll's specialisation in mystic and transcendental studies: a field otherwise known to nineteenth-century occultists as "spiritual" chemistry or alchemy (Atwood xv; Farr). One such occultist explains in an 1839 *Fraser's Magazine* article that "nitre" or potassium nitrate, a white crystalized mineral much like Jekyll's salt, is one of the three elements necessary for creating the philosopher's stone, and thus also the renewing elixir of life (Alchemist 450). Meanwhile, in 1855, Geraldine Endsor Jewsbury contends that the philosopher's stone was "not ... a stone at all, but a powder; and, in some of the processes, a fluid—generally, the successful adepts represented it as a red powder with a faint smell" that is "easily recognis[able]" (458). This description shares multiple physical properties with Jekyll's potion—the red colour, the solid powder state, and the notable scent—which may be merely coincidental, but Jewsbury adds that this powder could "cure all diseases" and ultimately "change everything imperfect and unhealthy into what was pure and perfect" (459). The substance she describes is thus capable of transmuting the human body from an unhealthy, impure state into something "pure and perfect," which is the very type of experiment that Jekyll attempts to perform. Both the Alchemist and Jewsbury base their discussion of philosopher's stone on classic

alchemical theory, including the thirteenth-century English chemist Roger Bacon's assertion that the stone could only be produced by the purest of elements whereas "impure sulphur and mercury" formed "base metals" and "sulphur and mercury of ordinary purity produced gold" (Read 6). Meanwhile, the sixteenth-century alchemist Paracelsus advanced the theory of threefold matter, in which mercury represents the spirit, sulphur represents the soul, and salt represents the body, and in order to produce the philosopher's stone, the alchemist must use sulphur to unite the spirit and body, which "changes them into one essence" (Read 7, 10). Taken together, these theories form the background of Jekyll's experiment, in which he combines his impure body with the impure salt to form a "base," literally the baser version of himself, in the "less robust and less developed" Hyde (Stevenson 81). Like the salt, Jekyll harbours an "unknown impurity" that makes him "an incongruous compound of whose reformation and improvement I had already learned to despair" (82), and his use of the word "compound" only heightens the comparison. Therefore, Jekyll is at once the scientist performing the experiment, its subject, and, additionally, one of its materials, as significant to its results as the salt. By attempting to create his own elixir of life with impure substances, Jekyll produces its opposite, transforming everything that is "pure and perfect" into the degenerate that has always lurked within him.

With his version of the philosopher's stone, Jekyll attempts to transmute himself into "gold"—that is, into a more highly-evolved form whose purity would enable him to overcome the depravity within his soul. Initially, the experiment appears successful because Jekyll discovers in Hyde a "younger, lighter, [and] happier" body that offers "indescribably new and, from its very novelty, incredibly sweet" sensations (80). The

youth and novelty of the body suggests that Jekyll has discovered the Elixir of Life's gift of immortal youth—the very gift that Bulwer-Lytton's Margrave sought to the ends of the earth. However, unlike Margrave, Jekyll places greater emphasis on the spiritual aspects of the elixir and its ability to improve humankind by excising man's "unjust" nature so that his "just" nature could "walk steadfastly and securely on his upward path" (Stevenson 79). Jekyll's ideal potion, that which he set out to create, would transform a human into an angel, and indeed Jekyll recognizes that he may have "come forth an angel instead of a fiend" to embody "generosity" and "pious aspirations" (82. 79). The higher being that he sought to create takes on the form of "a soul boiling with causeless hatreds, and a body that seemed not strong enough to contain the raging energies of life" (91). Although Jekyll's body transforms into the degenerate Hyde, his soul evolves into a highly energetic state that can neither be contained within the human body nor exist within its control. Rather, Jekyll's corrupted soul takes command of his body to force subsequent transformations without the use of the potion and thus maintain the true form his soul—not, as he had hoped, as an "angel," but as the "fiend" Hyde. Indeed, the soul already holds precedence in the theoretical foundations of his experiment, in which he seeks spiritual, rather than physical, transformation: a means to reveal, purify, and release the soul from its material existence. Thus, in order to demonstrate Jekyll's practice of alchemy, I now turn from the physical potion to consider the spiritual aspects of the experiment, its theory, and its results. In making such a consideration, I situate Jekyll's experiment within the contemporaneous occultist practice of spiritual alchemy and, ultimately, within the context of Victorian concerns about the state of the soul and its place in the *fin de siècle* culture of science.

4. Studies in "the Mystic and Transcendental:" Jekyll's Spiritual Alchemy

The alchemical nature of Jekyll's experiments sets him alongside other scientists and intellectuals of the nineteenth century who investigated the possibility of transmutation, the relationship between the material and spiritual worlds, and the existence of the soul, all under the guise of scientific study.[8] Although he holds distinction as a professional chemist, Jekyll claims that his research leads "wholly toward the mystic and transcendental" and can be more specifically defined as "transcendental medicine" (78, 76). His repetition of "transcendental" stresses the preternatural or otherworldly nature of Jekyll's research, but Stevenson's particular combinations of "mystic and transcendental" and "transcendental" with a physical science recur in nineteenth-century intellectual discussions of alchemy and chemistry in periodicals to popular Gothic fiction. These phrases appear almost verbatim in the 1839 article on alchemy from *Fraser's Magazine*, in which the anonymous author describes the "occult sciences" of mythology, astrology, magic, and geomancy as "mystic and transcendental doctrines" and, moreover, he refers to alchemy as "transcendental chemistry" (Alchemist 446). Meanwhile, Annie Besant employs the similar phrase "occult chemistry" in 1895 to characterise her experiments on ether based on observations she made with her "astral vision" (Besant). The phrase appears yet again in Arthur Machen's 1894 novella *The Great God Pan*, in which Dr. Raymond explains that "I have devoted myself to transcendental medicine" before he, like Jekyll before him, scientifically manipulates a human soul (Machen 60). In each case, these scientists, fictional and non-fictional, seek to validate their scientific research of the spiritual world, which Machen's Dr. Raymond

[8] See A. Butler 99-100; Gomel 194-95; Morrisson, *Modern* 43; Oppenheim 330.

calls “the right path” (Machen 61). Robert Mighall suggests that the reappearance of “transcendental medicine” marks Machen’s character as an heir to Jekyll’s unique research (xxxvi-xxxv); however, variations such as “transcendental chemistry” and “occult chemistry” outside of these texts demonstrate how *fin de siècle* fiction was in fact reflecting the areas of research pursued by nineteenth-century occultists. The presence of these terms in both earlier and later occultist texts reveals how the novella draws from an established vocabulary of occult science for Jekyll’s description of his theory of the soul. The novella thus places Jekyll in the role of an occultist who, struggling against materialism’s rejection of the spiritual, turns to a science of the unknown that offers incredible knowledge beyond the power of empirical, rationalist methodology.

Jekyll’s theory is grounded in his own need to reject materiality, and he escapes into studies of the transcendental to counteract the “extraneous evil” that exposes him to “disgrace and penitence”—that is, to material pleasures (Stevenson 79). Jekyll begins his experiment with the belief “that man is not truly one, but truly two,” and while he recognises that he is “radically both” natures, he also hypothesises that “these elements” could be separated and “housed in separate identities” in order to relieve “the curse of mankind” (79). Scholars of the novella have interpreted Jekyll’s theory within the context of Victorian psychology and drug addiction, including Stiles, who argues that Jekyll’s assertion reflects contemporaneous theories about the divided brain and the way in which each hemisphere houses “a separate personality, indeed, a separate soul” (Stevenson 78-79; Stiles “Jekyll” 882).[9] However, to merely consider Jekyll’s discussion of the soul as part of an allegory limits readings of the novella by emphasizing the material—the

[9] See also Davis 218-19; Harrison 54; Wright 254, 261.

physical and mental causes of Jekyll's duality—over the way in which Stevenson engages with occultist writings on the nature of the soul. In the context of nineteenth-century occultism, Jekyll's language emphasises that his theory extends outside of the material—of the brain, addiction, or any form of physical embodiment. For Jekyll "the thorough and primitive duality of man" exists entirely within the soul, but he emphasises the significance of the soul to such an extent that he effectively erases the materiality of the body. Jekyll describes his final breakthrough, in which he "began to perceive ... the trembling immateriality, the mist-like transience, of this seemingly so solid body in which we walk attired" (79). Jekyll argues that the body is so insubstantial that he might "pluck back that fleshly vestment even as a wind might toss the curtains of a pavilion" (79). This metaphor echoes spiritualist discourse surrounding spirit materialisations of the 1870s, which "involved a spirit clothing itself with a material form derived from the medium's own body" (Gomel 206).[10] Like the spiritualists, Jekyll challenges the binary of body and spirit—the material and the spiritual—not only by demonstrating the fluidity between these states (Davis 211, 213), but also by attempting to excise his soul from material pleasures and, ultimately, the confines of his own body. The transformation Jekyll seeks to effect is thus purely spiritual in nature, which may superficially reflect the beliefs of contemporaneous occultists, but it is in fact as dangerous a position as

[10] For the purposes of this chapter, I focus on alchemical theories of the soul, but reading *Jekyll and Hyde* in the context of spiritualist discourse offers an alternative and equally-fascinating interpretation of Jekyll's theory. His retreat into Hyde enables him to transgress social boundaries in a similar way as mediums who employed their spirit controls to escape both social and earthly bonds. Jennifer Bann explains that the very presence of full-form materialisations "demonstrated a freedom from both mortal limitations and social restrictions" that frequently crossed class, gender, and even racial barriers, depending on the forms taken by the materialised spirits (682). See also Gomel 206-207; Oppenheim 20-1; Owen 216-218.

Lanyon's strict materialism.

Jekyll's hypothesis that the soul can be transformed and purified through a form of transmutation is largely based in the practice of spiritual alchemy, or spiritual chemistry advanced by Mary Ann Atwood in 1850. In *A Suggestive Inquiry into the Hermetic Mystery*, Atwood argues that alchemy was never intended to be a means of transmuting physical objects such as metals into gold because "Man is the true laboratory of the Hermetic Art, his life is the subject, the grand distillery, the thing distilling and the thing distilled" so that, ultimately, "Self-knowledge ... [is] at the root of all Alchemical tradition" (Atwood 153). This form of alchemy shifts the act of transmutation from metals to the alchemist's soul, thus enabling the alchemist to reach a higher state of being. The most striking similarity to Jekyll's theory occurs when Atwood, claiming to draw from medieval alchemist Cornelius Agrippa, states that "the soul of man, being estranged from the corporeal senses, adheres to a divine nature ... for when the mind is free, the reins of the body being loosed and going forth, as out of a close prison, it transcends the bonds of its members, and nothing hindering, being stirred up in its proper *essence*, comprehends all things" (139). However, during this process, "if the will incline downwards ... or evil agencies intervene, then ... the Spirit grows heavy and sinks into profound Hades" and, as in the case of Jekyll and Hyde, "the whole identity, being submerged together, would be converted to her [the Spirit's] life" (183). This Spirit (a term Atwood uses interchangeably with "soul") is, like Hyde, able to "ravage and devastate and take possession of the whole mind, destroying its active energies and converting them to herself" (183-184). Atwood explains that the spirit must be controlled by the mind because it "reflects its image as it is, whether good or evil," and,

consequently, a person requires a balance between mind and spirit—the rational and the spiritual—"for the discernment of good and evil, and the proper choice of life" (184). In this regard, what Jekyll overlooks in his theory is a balance between the material and the spiritual elements of his self—however one interprets what that "balance" should entail. Despite the way in which Atwood, in her overall argument, constructs alchemy as a purely spiritual practice, she ultimately advocates for a reconciliation, rather than further sundering, of the two. She states in her conclusion that, in philosophy, "the Spiritual[,] unable to prove itself absolutely, or the Material to disprove the other practically ... maintain on either side a negative, though relatively assured, ground ... But the Hermetic Science ... would include both in the ample compass of its experiment" so that "the external and internal worlds ... blend together in confluent harmony" (517-518). Jekyll's desire to sever, rather than reconcile, his spiritual and material natures indicates a flawed, or at best incomplete, understanding of "the mystic and transcendental" studies he claims to practice. Atwood describes the very process of spiritual alchemy that Jekyll attempts, but also, more importantly, by reading the novella alongside Atwood's text, I situate Jekyll's failure outside of his beliefs in mysticism and the occult. In this way, the novella is no more a critique of the occult revival than it is a critique of Victorian science; *Jekyll and Hyde* warns that the continued division of the material and the spiritual in science and philosophy is detrimental, even destructive, to the progress of science, the acquisition of knowledge, and most of all to the soul.

Although Atwood initially suppressed her own book out of concern that its secrets were too dangerous to be widely disseminated, her concept of spiritual alchemy gained popularity with occultists at the *fin de siècle*, and these later reinterpretations of Atwood's

concept further elucidate the contradictions and weaknesses of Jekyll's theory (Morrisson, "Alchemy" 21; Waite). For instance, Florence Farr explains in *Egyptian Magic* that, for the ancient Egyptians, "Spiritual Alchemy or the Transmutation from human Force to Divine Potency" was "the highest work of magic," but those practitioners, "who, ignorant and unpurified, performed these rites, became the habitation of an illusive and fatal force, ever dragging him down to the deep abysses of blind potency" (Farr). Farr stresses the significance of the alchemist's purity, which, if found insufficient, results in a degenerative state that is presumably inescapable and, from Farr's imagery of "deep abysses," hellish. Meanwhile, Arthur Edward Waite, in the series of "What is Alchemy?" essays from his periodical *Unknown World* (1894-1895), similarly argues that alchemy is a "philosophical experiment which far transcends any physical achievement" because it is "a spiritual experiment, and the achievement a spiritual achievement" (Waite). This process, constructed around chemical metaphors, sought "the purification, conversion, and transmutation of man" by "not only liberating the spirit from its normal material bonds, but guaranteeing the truth of its experiences in a higher order of subsistence" (Waite).[11] This liberation of the spirit has clear spiritualist and mesmerist connotations, and Waite explicitly discusses the significance of mesmerism as a means to explore the so-called "astral world" (Waite 2), but in the

[11] The liberation of the spirit from the physical body is a concept that emerges in medieval alchemical theory, notably *De Occulta*, in which Agrippa explains how the soul exists in three parts: *mente* or thought, *ratione* or reason, and *idolo*, "the animal soul, mortal and material"; this last is "the animal spirit [which] is not really a 'soul'" because it is wholly material, capable only of action (Roberts 40). My reading of the novella focuses on its relationship to nineteenth-century theories of alchemy, but the similarities between Jekyll's and Agrippa's discussion of the human soul also warrant further analysis. This would not only provide a clearer connection between Jekyll's experiments and alchemy, but it would also enable an investigation of the influence of the ancient alchemists on nineteenth-century writers.

context of *Jekyll and Hyde*, it equally refers to "the sea of liberty" that Jekyll discovers while inhabiting the body of Hyde (Stevenson 83). When Jekyll does "pluck back that fleshly vestment," the "fiend" that emerges is neither the product of alchemy nor of occult beliefs, but rather of a flawed subject, tainted by "concealed pleasures" and "a profound duplicity of life" (Stevenson 78-79). Jekyll's failure is a direct result of his hypocrisy, so that, rather than progress to "the highest consciousness," he becomes a degenerate, the embodiment of "the base in man" (Waite), and he thus reveals the evil nature that he has spent "nine tenths a life of effort, virtue, and control" attempting to suppress (Stevenson 81). Waite explains that only "the man who by proper study and contemplation, united to an appropriate interior attitude, with a corresponding conduct on the part of the exterior personality, attains a correct interpretation of Hermetic symbolism" can "be put in possession of the secret of divine reunion and ... be in a position to encompass the great work of the Mystics" (Waite). Meanwhile, Jekyll acknowledges that he fails to approach his experiment with "a more noble spirit ... under the empire of generous or pious aspirations," which leads to his incorrect "interpretation of Hermetic symbolism" and ultimate inversion of the alchemical transmutation: rather than transmute the base metal into gold, Jekyll strips away the "gold" of his respectable, professional facade only to reveal his base nature. The novella not only becomes a narrative of physical degeneration, but also of spiritual degeneration, in which a soul, already tainted by years of temptation and repression, slips further into corruption and an inescapable personal hell.

Nineteenth-century occultist theories engage with the period's larger discourse on evolution and degeneration, but they redefine these terms within a spiritual framework in

which the alchemist evolves by transcending the material universe. For instance, both Waite and Jekyll expand the notion of an "upward path," a central image of nineteenth-century ideals of progress, to include the human soul. The soul may not evolve to better suit its physical environment, as does the body, but it still, Waite argues, seeks to "follow the path upwards to the discovery of wisdom and the highest consciousness. There the soul knows herself as a whole, whereas now she is acquainted only with a part of her humanity; there ... she attains her desired end and participates in Deity" (Waite). Waite's language mirrors Jekyll's description of his experiment's ideal results, in which his evil side "might go his way" after successful dissociation, and his good nature, freed from remorse and disgrace, "could walk steadfastly and securely on his upward path, doing the good things in which he found his pleasure, and no longer exposed to disgrace and penitence" (Stevenson 79). For Waite, the soul's journey on this "upward path" is the highest possible goal of alchemical practice where the alchemist discovers "the Highest Unity and Conjunction with the Divine Nature" that opens "the narrow way of regeneration into life," and thus the mythical goal of eternal life (Waite). However, rather than achieving this higher state by employing the Elixir of Life, the alchemist does so with what Waite, and Atwood before him, call "self-knowledge" (Atwood 153; Waite). Once the alchemist knows himself and his soul, he reaches a stage in his "his spiritual development" that enables him to possess "a knowledge and control of physical forces which are not in the possession of ordinary humanity" (Waite). Jekyll believes that this development offers him access to "a new province of knowledge and new avenues to fame and power" (Stevenson 76), but again he strives for material gain—in this case, fame and its related means of power. Furthermore, Waite stresses the soul's harmony

once in its highest state by employing such terms as “unity” and “conjunction,” which differs significantly from Jekyll’s belief that the true “curse of mankind” is that the soul unites the “polar twins” of good and evil “bound together” in a constant struggle (Stevenson 79). In this way, Jekyll emphasises the disharmony of the soul, which, he argues, can only evolve into a higher state by severing its natures, making reconciliation impossible. In this inversion of spiritual alchemy, Jekyll treats his soul as a material substance, which results in a physical, rather than spiritual, transformation that reflects his obsession with the physical impurities of the salt—the symbol of his body—and his overwhelming physical desires. Jekyll thus undermines his theory and ensures his degeneration into a state of being ruled by the material that offers neither knowledge, fame, nor power—only fear, infamy, and, perhaps worst of all for Jekyll, ignorance of the true relationship between the body and the soul.

Although, Jekyll’s experiment demonstrates the validity of alchemical theory and the existence of the soul, it ultimate fails to reconcile his two selves, nor fully break down the boundary between them. This latter failure equally applies to the novella’s other sets of doubles, including chemistry and alchemy, and science fiction and fantasy, which are, like Jekyll and Hyde, “polar twins” that are “bound together” in a destructive quest for dominance over Jekyll’s soul, his experiment, and the narrative itself. Victorian chemistry similarly struggles between its practical uses in industry—which are capable of creating monsters—and its continuing associations with alchemy—which may signal either chemistry’s degeneration into a monstrous past or its progress into a brilliant future. The novella demonstrates that neither a science wholly based in the material nor one wholly based in the spiritual is capable of furthering the progress of scientific

knowledge and practice; there is only a bleak future marked by the materialist's horror at what his science cannot comprehend, and the mystic's defeat at the practical failures of his theory. By taking into account both the material and spiritual aspects of Jekyll's experiment, criticism of the novella can transcend popular interpretations, such as the tale of repression or psychological fragmentation—both of which tend to reduce the novella's fantastical elements to metaphor and Jekyll's theory to fancy. Instead, situating the novella alongside the work of nineteenth-century occultists like Atwood and Waite shifts Jekyll's studies of the mystic and transcendental from fantasy into scientific possibility. *Jekyll and Hyde* depicts the limits of speculation during a period when these alchemical theories were still believed to be within grasp, and when both occultists and scientists alike explored the ways in which modern scientific practice could be enhanced by occult theories, methods, and more open-minded speculations.

Chapter Four: "They Would Take Me for a Witch or a Poisoner": Women (Al)Chemists in *Olga Romanoff* and *Zalma*

> A Doctor she—her sole delight
> To order draughts as black as night,
> Powders, and pills, and lotions;
> Her very glance might cast a spell
> Transmuting Sherry and Moselle
> To chill and acrid potions.
>
> — Constance Naden, "The Lady Doctor"

The prevalence of male scientists in the nineteenth-century canon fails to reflect the significant increase in qualified women scientists throughout Britain and Europe by the *fin de siècle*. The apparent absence of women of science from popular fiction appears to draw from the arguments of leading men of science like Charles Darwin and Cesare Lombroso, who claimed that women were incapable of the intellectual vigour necessary to practice the physical sciences. However, two neglected works of speculative fiction, George Griffith's *Olga Romanoff* (1894) and T. Mullett Ellis's *Zalma* (1895), replace the stereotypical male "mad scientist" with female characters of equal genius who produces chemical substances that threaten political stability. Yet even in these speculative and fantastical narratives, women scientists are controversial figures who are both alienated from and villainized by their society, while their work in the laboratory is derided as unnatural or even criminal. *Olga Romanoff* and *Zalma* ultimately use their depictions of women chemists to question late-Victorian characterisations of women of science, the unstable boundary between legitimate and illegitimate science, and the threat of chemistry's potentially monstrous creations, regardless of its creator's gender identity.

The title characters of *Olga Romanoff* and *Zalma* are young women of Russian descent who employ their genius to practice science beyond the margins of respectable

scientific practice: Olga produces a potion that controls people's minds while Zalma grows mass bacterial cultures of anthrax for use as a biochemical weapon.[1] Like their male counterparts in fiction, Olga Romanoff and Zalma Pahlen possess overwhelming ambition, employing cutting-edge science to acquire extraordinary power, only to die violently as a result of their overreaching. However, these novels reveal that Olga and Zalma do not—and cannot—inhabit the role of scientist in the same way as their male contemporaries in fiction. The white, male, university-educated scientists of fiction from Victor Frankenstein to Henry Jekyll are criticised primarily on moral and ethical grounds, not because of their gender identity or ethnicity. Furthermore, while these fictional male chemists seek to overturn Natural law, Olga and Zalma work to subvert the man-made hierarchies that oppress them and, by extension, any woman working to become a professional scientist. In both novels, the narrators and supporting characters refuse to acknowledge the title characters as scientists; this, in spite of the fact that both women exhibit the same skills as a professional and display considerable genius in their ability to reproduce male scientists' inventions, including chemical weapons and designs for airships and submarines. The novels' depictions of these women and their practice of chemistry challenges the public image, not only of women scientists, but also of chemistry itself—a science that, at the *fin de siècle*, is both potentially beneficial and, more disturbingly, capable of mass destruction.

Although these novels are speculative, their depictions of chemistry and its practitioners are rooted in Victorian perceptions of medieval chemistry and its

[1] Only Olga practices pure chemistry, producing potions and poisons in her portable laboratory. Zalma studies bacteriology, but because she employs her bacterial cultures as poisons, I refer to her experiments as biochemical in nature. I also use both characters' first names to remain consistent with the texts themselves.

associations with alchemy, witchcraft, and charlatanism. Like *A Strange Story* and *Jekyll and Hyde*, *Olga Romanoff* and *Zalma* link modern chemistry with the ambiguous, mystical sciences of the past; however, rather than align the woman scientist with the alchemist, the narrators and supporting characters associate these women with witches and poisoners—derogatory labels that deny the legitimacy of Olga's and Zalma's scientific practice by ascribing their genius to supernatural forces and reducing their chemistry to poison. The futuristic societies of the novels characterise women scientists as illegitimate, deviant beings analogous to witches, whom the Victorians regarded as "wild and aberrant" women whose "supernatural powers permitted [them] to exercise [their] half-human, half-demonical, or monstrous inspiration, autonomy, and degeneracy" (Casteras 142). The Victorian image of the female poisoner is similarly "wild and aberrant" so that she is linked in popular texts, including newspapers and the novels of Wilkie Collins, to transgressive women, particularly Lucrezia Borgia (Pal-Lapinski 102). The fictional societies of these novels, like that of *fin de siècle* Britain, rely on such stereotypes because they possess no vocabulary to describe women scientists. Narrators and characters alike resort to approximations using the language they do possess—that of witches, sorceresses, and poisoners—to label the alien, threatening figure of the woman scientist; in so doing, these characters discredit Olga's and Zalma's practice of science by ascribing their aptitude to supernatural forces or criminality. At the same time, both novels draw attention to not only the skill with which these women practice science, but also the irrationality of the narrators and characters who view them, not as scientists and equals, but as witches and deviants. These novels thus interrogate Victorian characterisations of witches and female poisoners by challenging the world-view that

informs the use of such labels, which function to marginalise Olga and Zalma as illegitimate practitioners of science.

Both texts also depict a monstrous return of a repressed history, not only in Olga and Zalma's desire to avenge past injustices, but also in their revival of the seductive woman genius who wields power over life, death, and men's souls. Olga and Zalma employ modern scientific innovations to reclaim the knowledge and authority that had been appropriated by male scientists during the scientific revolution, and it is only in the process of reclaiming this power that these female characters are branded as monstrous and punished. These novels' depictions of women scientists are neither positive nor condemnatory, but they do offer a critique late-Victorian double standards for women. Olga and Zalma demonstrate their awareness that labels like witch and poisoner only function to characterise them as villains even as they view themselves as liberators fighting against an established hierarchy that forcibly excludes them and refuses to acknowledge their abilities. These novels in fact demonstrate the need for a new language to describe the woman scientist that is free from the constraints of negative historical stereotypes. Olga's and Zalma's inability to escape these constraints furthermore reflects Victorian chemistry's own inability to escape its history and its negative associations to magic and poison. Neither novel is able to offer a positive view of chemistry's future; each instead highlights its monstrous, destructive potential, revealing it, and not women scientists, to be the most significant threat to turn-of-the-century Britain.

2. Griffith, Ellis, and Late-Victorian Science Fiction

Despite the trend of rediscovering "lost" or neglected popular texts of the period,

neither *Olga Romanoff* nor *Zalma* appears Chris Willis' discussion of female villains in *fin de siècle* popular fiction and Patricia Murphy's and Katherine Swenson's studies of women and science in Victorian literature. Although this neglect is not surprising in the case of *Zalma*, which has been out of print since 1897, it is so for *Olga Romanoff*, which is not only accessible in reprints, but it also played a role in the development of speculative fiction in the 1890s, when its author's work was second only to that of H. G. Wells (Moskowitz, *Strange* 182; Stableford, *Scientific Romance* 48, 45). Both characters' roles as scientists are similarly overlooked in twentieth-century studies of science fiction, in particular Darko Suvin's seminal catalogue of science fiction. Suvin notes that Olga "drugs [the] hero and learns [the] secrets of airplanes and submarines," but in doing so, he characterises her as merely a poisoner and thief—the very roles that Olga's antagonists ascribe to her to deny her authority (57). Meanwhile, he describes Zalma as a "superbeautiful anarchist courtesan-conspiratrix" while her father is a "superscientist" despite the fact that Zalma's father largely exists to introduce Zalma to bacteriology and the anarchist movement (60).[1] Thus, while Suvin includes these texts in his catalogue, he emphasises their melodramatic plots, which has only further influenced the neglect of these novels by science fiction critics. More recently, Jess Nevins has re-examined these novels as early examples of "female mad scientists" in English literature; he notes that,

[1] That Suvin includes *Zalma* in his catalogue at all is surprising considering his strict definition of science fiction. However, although Suvin includes *Zalma* and excludes *Jekyll and Hyde* from his concept of science fiction, Victorian reviewers express considerable interest in the sciece of *Jekyll and Hyde*, but only briefly discuss that in *Zalma*. For Suvin, *Zalma* may be more scientifically possible than *Jekyll and Hyde*, but Victorian reviewers regarded Zalma's use of science "quite impossible" while nine years before, Jekyll's experiment was "the science of problematical futurity" (*Standard* 8; *Times* 13). This reveals the considerable differences between Victorian and twentieth-century definitions and expectations of speculative fiction.

during the period, female characters would frequently be excluded from "intellectually dangerous" roles such as women scientists because they posed too much of a threat to middle-class ideology (Nevins, "From").[2] While he neglects to take into account the prevalence of women doctors in late-Victorian fiction, Nevins situates *Olga Romanoff* and *Zalma* within their nineteenth-century context and highlights the significance of these characters, rather than just the technology they employ, as innovative in the genre.

In this chapter, I expand on Nevins's reading of the novels to further introduce them into critical discourse on science in Victorian literature and the role of women in nineteenth-century scientific practice. Both *Zalma* and *Olga Romanoff* offer insight into the public image of science, the (mis)uses of chemistry and biochemistry, and the influence of foreign scientists on that research in the 1890s. In their depictions of women scientists working at the edge of scientific possibility, these novels find an innovative means of examining the hierarchies and ideologies inherent within the new profession of science as it struggled to define itself, its science, and its members. I examine these novels as works of early science fiction by focussing on how Griffith and Ellis were involved in the process of genre development to argue how these two novels are significant texts in the history of science fiction for both their innovative depictions of women scientists and the science they practice.

Griffith's *Olga Romanoff* is the sequel to *The Angel of the Revolution*, in which a

[2] Nevins also argues that both novels reaction against the New Woman, but he contradicts this when he adds that Griffith and Ellis make their characters sympathetic by using a point of view that gives readers access to these characters' private thoughts, fears, and doubts. If these are intended to be negative portrayals of the New Woman, it remains uncertain why both authors provide their characters with tragic backstories of murdered fathers, failed romances, and abusive relationships that function to excuse much of their behaviour.

group of anarchists overthrow the despotic Romanoff rulers using airships and other advanced weaponry that distinguished Griffith as a pioneer of the genre.[4] These novels made him immediately popular, and, as Moskowitz argues, Griffith "remained the best-selling science fiction author in England" until the publication of *The War of the Worlds* in 1898 (Moskowitz, *Strange* 182).[5] I have chosen to examine the second of Griffith's novels because of its emphasis on chemistry, the associations its characters draw between chemistry and witchcraft, and its depiction of a female chemist, which is unique in both speculative and realist fiction of the period. Initial reviews describe *Olga Romanoff* as "a weird and wonderful book" that "displays great imagination; is written with uncommon power; and is absorbing from the first page to the last" ("Christmas" 2; *"Olga Romanoff"* 2). Other reviewers state that *Olga Romanoff* is "even more thrilling and more fascinating than its predecessor" and "the most finished" of Griffith's novels to date ("From the" 2; *"Olga Romanoff"* 2). It appears to have remained Griffith's "most finished" novel, making it a notable text for critics of 1890s popular and speculative fiction notable for its depictions of futuristic technology and its political commentary. Despite Sam Moskowitz's claim that Olga's uniqueness held "considerable sales appeal" for readers,

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[4] Both *Angel of the Revolution* and *Olga Romanoff* were first serialised in *Pearson's Weekly* before appearing in single-volume format from Tower Publishing, a company that specialised in speculative and future-war fiction. Griffith uses the form of vision of the future narratives, which rose to popularity after Richard Jefferies's *After London* (1885), to critique tyranny, democracy, and benevolent dictatorships, all of which fail to prevent anarchy before a comet destroys the planet's surface at the end of *Olga Romanoff*.

[5] Griffith was quickly overshadowed by Wells, but by the time of his death in 1906, his "casual deployment of as-yet-non-existent arms and armour" had been "rapidly standardised" by his contemporaries, including Wells (Stableford, "Science Fiction" 23). Wells later begrudgingly acknowledged his forerunner's pioneering depictions of airship technology, despite his belief that Griffith was an entertainer and did not take the genre seriously (Moskowitz, *Strange* 182).

which allegedly inspired Griffith to change the novel's title from *Syren of the Skies* (Introduction, i), initial reviewers oddly make little reference to Olga. They situate *Olga Romanoff* at the forefront of the new genre of "speculative fiction" in Britain, calling it "more elaborate" than Verne's fiction and "an entirely new departure in fiction" that "open[ed] up possibilities stupendous and appalling to contemplate" ("Christmas" 2; "*Olga Romanoff* by George Griffith." 7). Only *Reynolds's Newspaper* refers to Olga's practice of chemistry within the novel by pointing out Griffith's allusion to the Borgias—and thus also highlighting Olga's role as poisoner—before joining other reviewers in praising the air ships (2). Even in this reference, the reviewer neither comments on Olga's role as a scientist nor Griffith's depiction of chemistry, and it thus remains difficult to gauge how Victorian readers reacted to these subjects. The novel's popularity suggests that the "female mad scientist," as Nevins terms the character, was well-received by Victorian readers, but without any explicit reference to Olga's practice of science in reviews and other contemporaneous responses, it is impossible to support Moskowitz's claims, apart from the change in title, that the female mad scientist was indeed what attracted readers.

One sign that Victorian readers did respond to Griffith's depiction of a woman scientist is the existence of a copy-cat novel, T. Mullett Ellis's *Zalma*, which similarly features a young heroine of Russian descent who uses her scientific genius to strive for world domination. Little is known about Ellis except that he worked as an architect before publishing the speculative prose work *The Romance of a Star* in 1893, followed two years later by *Zalma* (Nevins "Zalma"; Stainton-Ellis). He stopped writing speculative fiction and turned to colonial adventures and psychological melodramas, so

his contribution to 1890s speculative fiction is at best marginal and, as in the case of *Zalma*, derivative.[5] However, unlike its predecessor, *Zalma* met with a mixed reception; it was labelled a "book of little merit" with its "preposterous mixture of fact and fiction" which "is impossible to take seriously" because of its sensationalist, often incomprehensible plot ("*Zalma*," *Academy* 545; "Four" 8). *Zalma* is indeed far from an ideal descendant of *Olga Romanoff* because its reliance on sensational plot elements detracts from *Zalma*'s depiction of speculative science, making it difficult to classify the novel as speculative fiction, or even as scientific fiction.

Nonetheless, *Zalma* closely engages with the science of its time in order to question the ethics of scientific practice, including vivisection, accessibility to professional laboratories, and the production of bacterial cultures. Reviewers ascribed the novel's too-explicit warning that "the power of Science" should be kept from "the ignorant, the debased, or even of the insane" to Ellis's didacticism and sensationalism rather than to a serious critique of the ambiguous nature of 1890s scientific practices and innovations (Ellis 393; "*Zalma*," *Glasgow* 7; "Four" 8).[6] Ellis's critique also highlights larger concerns about science and scientists that reflect the Victorian popular image of the "inhuman and amoral torturer, a dabbler in dark arts" that anti-vivisectionists used to influence public sympathies against immoral laboratory practices (M. Willis,

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[5] *Zalma* shares enough similarities with *Olga Romanoff* that suggest that Ellis sought to capitalise on the lucrative commercial appeal of Griffith's heroine. *Zalma* even alludes to Griffith's first novel when the anarchists hail Zalma as "The Angel of the Revolution," which suggests that Ellis is signalling his indebtedness to Griffith (Ellis 371).

[6] The reviewer for *The Standard* is particularly critical of Ellis's didacticism, calling it "a frequent interlarding of piety and criticism" which "will be exceedingly nauseous" to "the majority of readers" (8). This language is similar to that used in reviews for Wilkie Collins's *Heart and Science*, which similarly attempted to critique the ethics of late-Victorian scientific practice (see Farmer 7-8).

"Unmasking" 212). In this way, Ellis's novel is a tale of radical biochemistry and amoral science that uniquely features a woman as the "torturer" and "dabbler in dark arts" and that furthermore explores the repercussions of a woman scientist performing that role.

While Ellis's novel features a woman scientist "turned into a devil" by her experiments to critique dangerous scientific practices (Ellis 303), contemporaneous reviewers focussed on Zalma's role as sensational heroine.[7] One reviewer calls her "marvellously beautiful, marvellously clever, and marvellously wicked," while another adds that Zalma is "of more than doubtful morality and undoubted insanity" (Paperknife 1062; "*Zalma*," *Saturday* 480). The one positive review of the novel states that Zalma is "fitted to hold her own among the female demons of the world's history," but her "extraordinary intellectual ability and grasp of scientific theories" are merely part of "a theme for a stirring and absorbing narrative" (Allan 184). As with *Olga Romanoff,* these reviewers overlook the heroine's work as a scientist in order to highlight her social transgressions. In so doing, these reviewers suggest that either women scientists were already normalized in society or, more likely, that these reviewers were consciously emphasising the sensational elements in order to devalue these novels' potentially revolutionary content—that is, their depictions of women as political leaders and scientific geniuses.

3. The *Fin de Siècle* Woman Scientist

I now turn to the socio-political context that influences Griffith's and Ellis's

[7] Even the illustrated version of *Zalma* from 1897 diminishes the scientific content in favour of the sensational, including only one illustration that depicts Zalma's interaction with science, and even this image positions her as a spectator to another scientist's research.

depictions of women scientists, taking particular note of how these characters compare to other scientific women in Victorian literature. On the rare occasions that women scientists appear in nineteenth-century literature, they are predominately either the doctors of New Woman fiction or women on the margins of amateur science in such novels as Wilkie Collins's *Heart and Science* and Thomas Hardy's *Two on a Tower*. These two novels offer particularly troubling depictions of women of science, in which, Patricia Murphy explains, female characters' interest in science is depicted as "serendipitous and shallow, stemming not from an admirable dedication to the pursuit of knowledge but narrow selfishness" (80). These women are forcibly excluded from the male domain of science as a result of what Murphy calls "an obsessive fear that feminine intrusion necessarily brings corruption, contamination, and destruction" (87). The harsh punishments inflicted on the scientifically-minded women in these texts exemplify how late-Victorian fiction, particularly those texts by male authors, affirm a strict boundary between women and the practice of science. In crossing this boundary, a female character becomes a danger to society, a threat to social hierarchy, or even, as in the case of Olga and Zalma, as a villain capable of mass-destruction.[9]

This treatment of women scientists—and women who engage with science even in minor capacities—occurred while the Victorians, in their struggle to accept women as professional scientists, questioned their emotional stability, physical ability, and the potentially negative impact on women's empathy. Consequently, women were frequently excluded from "medicine and employments that required education," including scientific

[9] I specify male authors because, as Helen Merrick notes, authors like Mary Bradley Lane and Charlotte Perkins Gillman instead created feminist utopias that "feature imagined societies where women hold important roles in scientific research and education (754).

study, in both the "literal and literary space" (Swenson 3). Despite the prevalence of women in European laboratories as assistants and researchers, British women did not hold such positions until the 1880s, and not until the 1890s did British women chemists publish more than their European colleagues (Creese 19). Even then, many of these papers were still co-authored with male chemists, and women more frequently worked as laboratory assistants rather than in leadership roles or as independent researchers, whereas in Russia, women had worked as independent researchers since the 1870s (Creese and Creese 272; Creese 22). This context is likely to have influenced Griffith's and Ellis's depictions of women scientists of Russian descent whose engagement with science differ significantly from Aerian and British women.[10] That Olga and Zalma inherit or appropriate their research from male scientists, is similarly accounted for by the ways in which most women scientists in late-Victorian Britain were engaged in research groups or as laboratory assistants. In such a climate, it would be too revolutionary for Griffith and Ellis to *also* make their women scientists creators of original research—be it new chemicals or new life forms—despite the speculative and fantastical setting of these texts. Both novels therefore work within the limitations for women scientists that already existed within British society, and the novels explore these limitations under the guise of speculative fiction in order to question society's contradictory system of beliefs about scientific practice and the nature of genius.

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[10] While Olga is headstrong and ingenious, the two Aerian women in the novel are idealised Victorian women: patient, loyal, and while highly educated, they leave science and technology in the control of the Aerian men (97-99, 106). This contrast is more evident between Zalma, "the doctor's daughter, and a true woman of science," and the British anti-vivisectionists who find the male scientist's explanations incomprehensible, requesting that he "interpret it, please, to a common mind," thus revealing their deficient scientific education (301, 305).

One question that emerges from this history is why British and Russian scientific institutions differed so greatly in their treatment women who attempted to practice science. Overall, Russian women had better access to university-level courses in the sciences prior to the assassination of Tsar Alexander II in 1881, and some joined the Russian Chemical Society as early as 1870 (Creese 24, 20). When Russian university courses for women were discontinued, these women trained in Switzerland before returning to practice in Russian; even then they were able to attain senior positions in Russian institutes (22). The Russians and Swiss were evidently not influenced by the psychological and biological discourse of British, French, and Italian men of science who held to the "widespread assumption that women were arrested in their development" (Murphy 27). For example, Charles Darwin claimed that men possess "greater intellectual vigour and power of invention" while women have greater powers of intuition and imitation (Darwin 597, 605). Similarly, J. McGrigor Allan stated that "woman is utterly unable to compete with man" because her "physiological constitution" is unable to maintain a "purely intellectual direction" so that she "is content, in most instances, to let others think for her" (qtd. in Murphy 15). These arguments significantly influenced women's access to higher-education in Britain, rendering a university education in the physical sciences either out of reach or an informal exercise that resulted in no degree.

Consequently, universities and other British institutions ensured a continued dominance in scientific pursuits by men, a dominance that was already inherent in the profession's preferred label. Nineteenth-century practitioners of science called themselves "men of science" or "scientific men," both of which fail to create a space for women by specifically linking science with the masculine, thereby emphasising the belief

that only men were intellectually capable of practising science (DeWitt 10-11). This challenge to any women seeking to study science was exacerbated by the exclusion of women from the laboratory-based institutions "that were essential for valorizing scientific achievement and offering scientific employment" (Mussell 7). For instance, at Cambridge, "the chemistry laboratories were made coeducational" in the 1870s, but not only were the women students required to attend the lab sessions with chaperones, they were permitted to attend "against the wishes of the male lab staff," who created an atmosphere that "not infrequently flamed into hostility" against the women (Rayner-Canham and Rayner-Canham, *Chemistry* 223; *Women* 49). Moreover, Cambridge did not recognize those women as members of the university, and thus they could not secure the degrees necessary to obtain higher-ranking positions in their field (Mussell 15n2). The antagonism of British institutions toward women scientists reflected a culture that felt threatened by the class status, morality, and the ambiguous gender identity of the woman of science.

The institutional positions held by fictional male scientists like Henry Jekyll were as beyond the reach of women as was the distinction of genius, which in the Victorian period was "almost exclusively gendered as male" (Murphy 27). Although, like their male counterparts in fiction, Olga and Zalma are both scientists and geniuses, the characterisation of these female characters' genius as unusual and unnatural is substantiated by scientists of the period. For instance, Henry Campbell claimed that women geniuses do not exist, pointing to the absence of such individuals in history, because if there had been "a woman Shakespeare or Beethoven ... the world would have heard of her in spite of unfavouring external circumstances" (173). Meanwhile,

Lombroso made some allowance for the existence of women geniuses, but "the few who emerge have, on near examination, something virile about them," and so he concluded that "women of genius are men" (138). Such arguments indicate that the concepts of femininity and genius, as the Victorians defined them, were as incompatible those of as woman and science. Any woman of genius would be trapped between "the masculine realm of intellectuality" and "the feminine realm of emotionality," and thus could not "comfortably inhabit both" realms (Murphy 67). In this context, if a woman attempted to infiltrate the male-dominated realms of science and intellect, she would call into question, if not entirely elide, her claim to be regarded as female, effectively causing her to be "unsexed" (Swenson 88). According to Victorian men of science, the female genius is a hybrid of male and female who defies natural law, and who, by extension, potentially inhabits the realm of the monstrous.

It is thus not surprising that nineteenth-century literary depictions of women scientists link these characters with criminality, violence, and anarchy as a means of emphasising the apparent threat that women scientists pose to established social hierarchies. Although fictional male scientists like Stevenson's Jekyll are similarly associated with the criminal and monstrous, Jekyll becomes perceptibly monstrous as a result of his experiments whereas Olga and Zalma become monstrous simply in the act of practising science. Olga and Zalma do not need to create monsters because they—as both women scientists and geniuses—are themselves monstrous. In *Olga Romanoff*, Griffith's narrator and another female character describe Olga's genius as "evil," a term that sharply contrasts what the narrator calls the "splendid genius" of the protagonists, the

Aerians (256, 338, 322).[11] Meanwhile, Zalma's genius initially establishes her as "gifted and intellectual," winning her "a great Society reputation" as a poet, but once she turns to scientific pursuits, she becomes regarded as "some demoniacal temptress, gifted with evil power" (170, 403). In both cases, a woman genius, upon entering the so-called masculine realms of science and politics, becomes a thing of "evil" potentially driven by demonic powers. If scientific practice can transform male scientists like Jekyll from earnest researchers into inhuman murderers, then its impact on women scientists would, to extrapolate from the discourse of the period, pose a more significant threat to society, potentially leading to, as in *Olga Romanoff* and *Zalma*, catastrophic results.

Yet even while these novels emphasise the threat the woman genius presents to Victorian gender roles and masculine authority, neither text situates Olga's and Zalma's genius as the cause of her morally reprehensible actions; their genius is only dangerous because it gives them the power to react to external pressures by using the resources available to them, including the technology of the very men who have abused them. In *Olga Romanoff*, Olga is driven by "four generations of inherited hate and longing for revenge" against the Aerians who deposed her family from the Russian throne and killed her father (Griffith 56, 20-22). Meanwhile, Zalma's madness is a direct result of "the wrongs she has endured" at the hands of powerful men who have used her as a pawn in their political machinations, and not of her genius (393). In both novels, a corrupt ruling

[11] The female character who calls Olga "the evil genius of the world" is in many ways Olga's double: equally beautiful and intelligent, and also in love with the same man. However, Alma is idealised by the narrator and the Aerians as honourable, virtuous, and loyal, so that even Olga is "forced to admit that there could be no question of equality between this daughter of the air and herself" (Griffith 338-39). Yet Alma shows more respect for Olga than any other Aerian, both in acknowledging her genius and in using Olga's proper title of Tsarina in conversation.

class refuses to accept these women as autonomous individuals with extraordinary abilities, resulting not only in the ostracisation of these women, but also in the society's failure to perceive the means of its own destruction. By displacing most, if not all, of the blame onto an unyielding society, these novels raise the possibility that the woman genius could be beneficial to society, but only if society should choose to accept them and encourage their potential for the greater good; to do otherwise creates a monster that does all she can to destroy the society that has abused and denigrated her.

The monstrosity of the woman genius, whether inherent or socially precipitated, is not limited to Griffith's and Ellis's novels, but appears across multiple forms of Victorian media, thus indicating a wider cultural belief in the threat posed by the intellectual and thus unnatural woman. Susan P. Casteras notes that, in Victorian art, "the woman endowed with superior creativity typically found a visual equivalent in the witch or sorceress" who "personified a Romanticised notion of mad genius" that "many viewers probably deemed ... both pathological and frightening" (142). Such a "mad genius" might be exemplified by Margrave in *A Strange Story*, but women geniuses are "typically" portrayed as witches or sorceresses, which emphasises "the negative side of female sapientia or wisdom, namely, witchcraft" (145). Casteras explains that, rather than depict "positive feminine knowledge," Victorian paintings depict women who

> seem not entirely human, or at least soulless and often bestial ... sinister, isolated, romantic outcasts whose roles as anti-heroines are highly seditious in the context of normative Victorian womanhood. Defiant, unorthodox, and often ferocious as well as sexually active, they combine other unwomanly characteristics such as aggression and the infliction of

> pain with often beguiling beauty ... both admired and abhorred—perceived as coolly beautiful outside yet monstrous inside, morally ugly and unnaturally sadistic. In their hands miracles, wisdom, and healing become tainted as murderous. (145, 169)

This image of the woman genius is far from the "passive martyr or 'Angel of the House'" roles most often allotted to women in art; nor is she a healer or a woman of ancient knowledge, but rather a seductive, violent monster who specifically threatens male authority (170). Moreover this character exists in extremes—admired yet abhorred, beguiling yet sadistic, beautiful outwardly yet ugly within—emphasising her hybrid status between what Murphy calls the masculine and feminine realms. The Victorian witch-genius appears to assume supernatural powers as a result of her hybridity and Otherness; thus, in her incarnation as a woman scientist, she is a kind of revenant, representing the return of a past that Lombroso and Campbell would, in their denial of woman genius and intellect, attempt to repress. In Victorian art and literature, including *Olga Romanoff* and *Zalma*, this past is represented by such mythological and historical women as Circe and Lucrezia Borgia, whose power of "miracles, wisdom, and healing" had, over the course of the Renaissance and Enlightenment, been incorporated into science by male practitioners (169). At the same time, these practitioners reconstruct the woman of science as a criminal, monstrous Other who practices, not science, but magic.

This relationship between the woman scientist and the witches of myth and history also emerges in late-Victorian literature, not only in speculative fictions like *Olga Romanoff* and *Zalma*, but also in such texts as Constance Naden's 1881 poem "The Lady Doctor." The speaker of this poem states that the woman doctor finds her "sole delight /

To order draughts as black as night / Powders, and pills, and lotions," evoking the image of a witch at her cauldron rather than that of a scientific professional organizing her medicines (Naden 7-9). The speaker explicitly links the woman of science with witchcraft and alchemy, claiming that her "glance might cast a spell" and that she may even be capable of "transmuting Sherry and Moselle / To chill and acrid potions" (10-12). Such an association diminishes the woman scientist's education, intellect, and professional role as doctor, reflecting society's perception of her serious practice of science as unnatural and disturbing because she encroaches on the masculine realm of the laboratory: a clinical, isolated space that, in fiction, is as capable of producing monsters as it is medicines (Murphy 67, 188; Mussell 29). This perception also influences the speaker's claim that the lady doctor "seems a man in woman's clothes," her sex no longer clearly marked by her appearance or behaviour, transforming her into a hybrid body (Naden 65). Naden's poem depicts the conflicted choice faced by Victorian women who were unable to "comfortably inhabit" both the so-called masculine and feminine "realms" of intellect and emotion; the woman scientist of the period could either "engross" herself in "some busy, toilsome part" or be "bound by love's light chain," but never both (Murphy 67; Naden 74-76). At the same time, the woman scientist's choice to pursue that "busy, toilsome part" situated her in an ambiguous, potentially threatening role in the eyes of middle-class Victorian society.

Naden's comparison of a woman scientist to a witch notably occurs in a realistic context where the woman scientist's work is still interpreted by observers as sorcery despite the absence of any occult activities. That this interpretation takes place even outside of speculative or popular fiction emphasises the way that Victorian literature calls

attention to the complex relationship between modern chemistry and its history. Such a history should equally include positive types of early women chemists like hedge-witches and herb women; however, because nineteenth-century constructions of the history of chemistry reveal darker associations between chemistry and instability, criminality, and the occult, what instead emerges in literary and artistic representations of women chemists are characters influenced by these associations. Although it appears that, by portraying women chemists in a negative manner, Naden, *Olga Romanoff* and *Zalma* critique the women who practice chemistry, they more significantly critique chemistry and its institutional practice. Both novels reveal many of the same concerns about the purpose and use of chemistry in the modern world as *A Strange Story* and *Jekyll and Hyde,* from the intended benefits of an experiment to the potentially dangerous results of these radical experiments. While Bulwer-Lytton and Stevenson highlight chemistry's relationship to wild dreams of harnessing the vital force, Griffith and Ellis foreground chemistry's destructive powers, calling into question the legitimacy, not of the work of these women chemists, but of chemistry itself. If the products of chemical experiments have the potential to either benefit society or annihilate it—for example, the use of radium in both medicine and warfare—then how trustworthy are chemistry and its practitioners? Moreover, if a woman chemist's experiments, appropriated from male colleagues, are regarded as criminal or witchcraft, then can that equally imply that the work of those professional chemists also falls under those categories?

In this aspect of my analysis of *Olga Romanoff* and *Zalma*, I expand Kristine Swenson's argument that, "like Frankenstein's monster," literary characterisations of "the Nightingale nurse and New Women doctors were created from available cultural bodies"

to also include the woman scientist (3-4). While Swenson claims that the nurse and the New Woman doctor of Victorian literature have "assumed lives of their own which transcended and transformed their consecutive parts," fictional woman scientists fail to achieve "lives of their own" beyond the stereotypical figures of witch or poisoner (4). In *Olga Romanoff* and *Zalma*, these stereotypes gradually consume the characters so that they appear fated to re-enact histories of female practitioners of chemistry who have violated "the sanctity of the domestic sphere" and overthrown established gender hierarchies, resulting in anarchy alongside their tragic decline into madness and death (Price 206). Yet rather than use these characters to warn future women against pursuing science, Griffith and Ellis warn against society's negative treatment of women scientists; by characterising these women as monsters, the antagonists of both novels create the circumstances under which the woman scientist is driven to annihilate the society that oppresses her and, ultimately, also destroy herself.

4. Chemistry, Witchcraft, and Transgression

While literary depictions of the New Woman doctor and the Nightingale nurse have garnered close attention from critics like Murphy and Swenson, the woman scientist has proven too elusive for critics, and, similarly, the relationship between women and science and witchcraft remains unexplored. Such an absence may exist because texts that associate the woman scientist with witchcraft tend to be popular texts that have only recently begun to attract scholarly attention, including works of detective and speculative fiction. Murphy notes in her analysis of "The Lady Doctor" that the poem's subject is compared to a witch, but she does not elaborate beyond a vague reference to its negative

connotations with "unnatural" and "Medusan" (Murphy 67-68). Meanwhile, Chris Willis explains that "a specifically feminine form of power is linked to the occult to threaten the supremacy of a male-dominated status quo," and therefore that the "occult queen" of fiction, among whom she includes H. Rider Haggard's Ayesha, represents "a new incarnation of the archetypal witch of folklore" (64). However, Willis sets this "female power" of "instinct, spirituality, and the supernatural" in opposition to the "male power" of "science and logic" without considering the ambiguous, troubling space between the two in which Ayesha is both a supernatural being and "a great chemist" (Haggard 184n; C. Willis 65). Even studies of witchcraft in Victorian fiction, such as that by Maureen F. Moran, similarly situate magic and science on opposite sides of a binary rather than as closely related practices (143). The adherence to such a binary reveals a disconnect between studies of Victorian fiction and those of the Victorian occult, the latter of which do take into account women scientists of the period who, like Anna Kingsford, also engaged with the occult (A. Butler viii; Owen 40-41). Texts like *Olga Romanoff* and *Zalma* offer a means to bridge this divide between literary and occult studies, enabling a heightened understanding of Victorian perceptions of women scientists in both fact and fiction.

Despite this gap in the scholarship, critics have linked witchcraft and Otherness in Victorian literature. Thus, even in those narratives that contain little or no relationship to science, "witch-figures, whether overtly malevolent or dangerously attractive, are represented as racially Other" (M. Moran 145). In aligning such women with the so-called savage, degenerate races who, according to the Victorians, still practised black magic and other superstitious rites, texts like Kipling's *The Naulahka* and Haggard's *She*

and *King Solomon's Mines* characterise the science of Indian, African, or Egyptian women as "'native' medicine" to deny their knowledge of any legitimacy (Swenson 181). While Olga and Zalma are Russian rather than colonials, they are still characterized as a Slavic Other with "lustrous," "jet-black" hair and a foreign upbringing that sets them in sharp contrast with the novels' Anglo-Saxon characters, who use this visible difference to disparage the genius of both women (Griffith 333; Ellis 38). These women are decidedly not English, much like many prominent women scientists of the period who were, as Crease notes, Russian or Eastern European, including Marie Curie (19).[12] In this way, these texts construct a relationship between women of science, witchcraft, and criminality that reflects British anxieties regarding an uncontrollable Other in which the foreign woman scientist plays a similar role to Dracula: the Eastern invader whose supernatural powers threaten Victorian hierarchies and whose ability threatens Western dominance over technological innovations.

While Olga and Zalma are not supernatural beings and never practice witchcraft in the realization of their plans, they are still referred to as witches by their male antagonists as a means of limiting their authority as scientists and geniuses. If these antagonists can successfully ascribe Olga's and Zalma's powers to supernatural forces rather than to intellect and scientific prowess, then they can reaffirm the dominant ideology—upheld by Victorian men of science— that women are incapable of either genius or any advanced study of science. These characters do not need to practice witchcraft in the sense of casting spells and evoking spirits; their ethnic Otherness,

[12] Also note that Helena Blavatsky, the founder of the Theosophical Society, was Russian. Her fame in spiritualist and occultist circles, as well as her interest in modern science, may have also influenced Griffith's and Ellis's depictions of their title characters.

scientific aptitudes, and eccentric genius behaviour distinguish them as deviants who are, as a result, abused and alienated by their societies. By depicting uses of the label of witch against women scientists, *Olga Romanoff* and *Zalma* interrogate the confusion and derision with which male professionals regard the woman genius and scientist.

In *Olga Romanoff*, the division between the female chemist's experiments and the occult is more ambiguous because the novel's speculative elements are influenced by nineteenth-century occultism, in particular the mind-control potion that Olga produces in her laboratory. This potion places those who consume it "in a sort of hypnotic trance" that ensures Olga's power over their will as though she were a master hypnotist (Griffith 73). Olga's own explanation of the potion directly alludes to occultist discourse, framing it as "an elixir capable of dissolving the souls of men," and more specifically as "the Elixir of Death" in opposition to the Elixir of Life sought by alchemists (60). She also suggests with the word "dissolving" that it can alter the composition of the soul, perhaps in a similar manner as Jekyll's potion in *Jekyll and Hyde*. However, while the potion's ingredients are described only vaguely by the narrator—again like Jekyll's potion—Olga produces it using purely scientific means. The narrator follows Olga into the laboratory, painstakingly describing her process from her initial calculations—which she makes "three times over" (54)—to the series of chemical reactions she produces to finalise the experiment. Furthermore, Griffith adds a footnote in which he asserts that "such a poison as this is no figment of the imagination" before he provides a brief history of the potion (60n1). Griffith thus establishes that the potion is a real product of chemistry, thereby emphasizing the absence of any supernatural element of Olga's production of the potion, as well as Olga's natural talent as a laboratory scientist. The absence of witchcraft in

Olga's labours makes the narrator and male character's use of witch-related terminology sound incredulous, particularly when it becomes clear that these claims are founded in emotion and mistaken interpretation rather than reason.

The novel's male hero is adamant that Olga is a witch rather than a scientist, and his language has a significant influence on how the narrator and other characters characterise her. Alan Arnold, who, despite the novel's futuristic setting, embodies an ideal Victorian Anglo-Saxon masculinity, is especially furious that Olga would dare use her power against him; he describes Olga's potion as just one of the "the vile spells of the evilly beautiful Syren of the Skies, who had so fatally bewitched him" (143-44). Alan qualifies "the evilly beautiful" Olga's potion and wiles as "vile" in their power to "fatally bewitch" him, destroying his reputation as a high-ranking Aerian male so that he deems self-exile from his homeland necessary until he can have his revenge. His language expresses his reaction to his enslavement, revealing the depth of his anger and frustration at the way she has "robbed him of the highest attribute of his manhood by the Circe-spell that she had cast over him" (202). His anger and disregard for her abilities influence his references to Olga throughout the novel so that he only refers to her as a girl, witch/sorceress, or poisoner. His use of these terms and his refusal to call Olga either scientist or genius demonstrate his adherence to traditional gender roles and racial hierarchies that exclude Olga, a Russian female, from any position of authority.[13] In contrast, his wife Alma calls Olga a "genius," albeit it an "evil" one, while Alan's sister Isma reminds Alma that "you know too much about chemistry not to know that such horrible poisons have existed for centuries"; there is no suggestion that spells are

[13] In the novel, the Aerians are a distinct race that regard themselves as "the very chosen of the earth," superior in intellect, morality, and physical appearance (99).

involved in Olga's work, revealing that these women regard Olga's potion as a product of science, not magic (338, 106). The novel distinguishes between male and female responses to the woman scientist to underscore the specific threat that male characters perceive the woman scientist poses to them and their authority. In this way, *Olga Romanoff* calls into question the use of derogatory labels such as "witch," ascribing their use to a specifically-male attitude that rejects the genius of the woman scientist.

Olga also openly comments on the use of these labels and demonstrates her acute apprehension of how her male-dominated society will view her transgressive activities. While in her laboratory, Olga states that "if anyone could see me just now, I fancy they would take me rather for a witch or a poisoner of the fifteenth century than for a girl of the twenty-first" (54). She does not call herself a witch or poisoner; these are the opinions she imagines others would hold of her work in the laboratory. This implies that there are no women scientists in her world because the sight of her in the position of a scientist, standing over her apparatus with a phial of poison in her hand, would cause society to mistake her for a spirit of the past rather than a scientist of the present. There is thus no precedent for Olga in this fictional future; the Aerians regard her as an anomaly and conclude that her extraordinary powers must be magical. When Olga describes a prophetic dream[14] to Alan in order to impress him, he immediately asks "what are you? A sorceress, or– No, you cannot be an Aerian girl in disguise," once again demonstrating his inclination to assign any unexplained behaviour to a magical source (69). Olga critiques his response, stating that "as I cannot be the latter ... you must, I suppose, consider me the former," her phrasing signalling that it is not the label she would choose

[14] I do not regard the dream as a sign of occult powers because it appears to only function as a melodramatic form of foreshadowing, and so I have omitted it from this discussion.

for herself (70). Alan offers her only two options, and with the certainty that one is not possible, then she "must" be considered as the other, an option that casts her as a potentially monstrous Other. These options reflect the simplified binaries of Victorian gender roles, not only those that divide the male and female realms, but also those that distinguish women as either Angels of the House or witches. Although women like Olga—including Zalma and other women scientists of fact and fiction— fall outside of this binary, those who adhere to its rules still limit women scientists to those rigid categories.

The narrator also describes Olga as a supernatural being, thus complicating the novel's apparent critique of the label of witch. According to the narrator, Olga possess not only an "almost perfect physical loveliness," but also a "witching" voice while her eyes contain a "witching spell," all of which suggest that she uses witchcraft to seduce men into her power (32, 33, 155).[15] These three variations of "witch" ascribe her ingenuity to a supernatural source and make it appear that her appearance alone—rather than her intelligence and use of the mind-control potion—leads to her success at acquiring power. The narrator and male characters prove incapable of rationalising Olga's combination of scientific intellect and physical beauty, two traits that are, in Victorian ideology, diametrically opposed. For instance, Alan can only describe Olga as "beautiful beyond description, and evil beyond comprehension" because his language

[15] Olga's only interaction with another female fails to reveal whether she has the same effect on women. Alma recognises Olga's "almost perfect physical loveliness" as similar to "her own type," but the knowledge of Olga's crimes against humanity changes Alma's reaction from one of "wonder" to one of "unspeakable horror" (333). As Olga approaches her, Alma "shrank back as though to avoid contact with some unclean thing" while Olga's voice, with its "wonderful music sent a chill to Alma's heart" (336). However, it is possible that without the knowledge of Olga's crimes Alma might also find her beguiling.

fails to categorise and safely contain a being so far outside of his definitions of "woman," "scientist," and even "ruler." For Alan, what makes Olga "evil" are her genius, her scientific aptitude, and her manipulative powers because these attributes defy his understanding of gender roles, and he thus has no choice but to label her as a "witch" because, if she exists "beyond comprehension," she must be a supernatural being.

The narrator's framing of Olga's powers as supernatural conflicts with Olga's own views during the scene in which she first produces the potion because, while the narrator attempts to literally reveal Olga's inner monster, she sees only what society and history have made her. During the experiment a chemical reaction forms "a pale orange-coloured flame" that distorts Olga's reflection in a mirror so that, "for the first time in her life," the narrator claims, she sees

> herself as she really was. The weird, unearthly light of the flame changed the clear, pale olive of her skin into a sallow red, and cast what looked like a mist of vapour tinged with blood across the dark lustre of her dusky eyes. It seemed as though the light that she had called forth from the darkness had melted the beautiful mask which hid her inner self from the eyes of men, and revealed her naked soul incarnate in the evil shape that should have belonged to it. (55)

The narrator applies the chemical reaction to both the potion and Olga so that the "unearthly" light that she "called forth" is able to "melt" her mask of beauty and alter the colour of her skin and eyes, just as the potion's colour changes over the course of her experiment. The narrator highlights Olga's practice of science as unnatural, a form of pseudoscience capable of producing monsters, but Olga herself interprets the vision as

"what four generations of inherited hate and longing for revenge have made me" (56). The monster in the mirror, like the formulae of her potion, is an inheritance, a century's worth of "hate and longing for revenge" that finds its outlet in the last descendant of the Russian Tsar, who is herself named after that Tsar's only surviving child.[16] To add to this accumulation of history, Olga also muses that her transformed image is comparable to the "portrait of the lost soul of Lucrezia Borghia [*sic*]" (56), once again linking herself with the past so that she symbolises a literal return of a history marked by tyranny and transgression, be it that of fifteenth-century Italy under the Borgias or nineteenth-century Russia under the Romanoffs. Yet in both cases, Olga views the image as a reflection of her desires and the history that fuels them, fully understanding that any distortion of the image is a trick of "the light of that terrible flame" (56). It is the only the narrator who applies supernatural language to Olga's experiment and who constructs the image as a monstrous product of the experiment—Olga's own version of Hyde.

However, unlike Hyde, Olga never actually transforms; the image in the mirror is an illusion wholly dependent on interpretation. The narrator may construct the scene as a melodramatic revelation of Olga's monstrous soul, but Olga, beyond the initial shock of recognition, dismisses the image, exclaiming "Bah! that is enough of dreaming, when the time for doing is so near" (56). She sees it only as a dream, and more importantly, a waste of time, emphasising her lack of concern for it and, I would argue, for superstition and magic as a whole. If she does not actively resist when other characters refer to her as a witch or sorceress, it is because she is too occupied by her scientific labours and

[16] This refers to the events of Griffith's previous novel, *The Angel of the Revolution*, in which the Russian Tsar was overthrown by "The Terrorists" during a "Great Revolt" and exiled with his family to Siberia in a startling anticipation of the 1918 revolution (20-21).

political plans to engage in superstitious speculation. Significantly, while Olga can refute her personal connection to the supernatural, she cannot do the same for the chemistry she practices. Both Olga's and the narrator's interpretations of the image in the mirror inextricably and paradoxically link the modern chemical experiment with monstrosity, corruption, and the return of a repressed history. That the demonic vision appears at the same moment as the most violent chemical reaction of the experiment provides a literal demonstration of science's ability to illuminate that which is hidden, be it knowledge, the inner workings of nature, or in Olga's case the image of her soul. The novel's depiction of chemistry exposes, as it does in *Jekyll and Hyde*, the corruption and rage concealed behind Olga's mask of beauty and Jekyll's mask of respectability that have remained hidden, not only for their lifetimes, but for centuries, all the while growing stronger. In these texts, chemistry enables Olga and Jekyll to release the monsters of the past in the isolated space of the laboratory, and these monsters consequently shake the foundations of human identity. Therefore, *Olga Romanoff* depicts chemistry itself as monstrous: a science of fluidity and unpredictability that offers powers of transformation and destruction that can easily be abused by those, like Olga and Zalma, who are driven by hate and revenge.

Meanwhile, *Zalma* contains no actual supernatural activities, nor are any illusory monsters created during her experiments; the contrast between Zalma's obvious lack of magical powers and the male hero's belief in her use of witchcraft thus demonstrates the male hero's desperation to explain Zalma's powers by any means possible. On learning the details of Zalma's history, the Secret Service agent Charles St. Leger considers her to be "some demoniacal temptress, gifted with evil power," concluding that "by the dark

paths that men like Mesmer and Cagliostro trod, or that Lucrezia Borgia knew, she had obtained knowledge of devious and wicked subtleties by which she could ensnare the souls of men" (403). He associates her supposed powers with a dark, transgressive past that has been long hidden—literally occult, to draw from the term's Latin origins—and that specifically threatens male autonomy. It is important to note that St. Leger also refers to Zalma's father, a Russian physician and anarchist, in the same terms, so it is as much her Otherness as a foreigner that aligns her, at least in St. Leger's mind, with witchcraft, as it is her possession of genius. At the same time, St. Leger specifically refers to Zalma as a "temptress" who seeks to "ensnare the souls of men," which suggests that he believes Zalma would use her powers to control men and would not hesitate to use her sexuality to do so. Therefore, not only does St. Leger deny Zalma's genius any merit by claiming that it could have only been obtained through magic in a Faustian bargain, he also reduces her to the figure of the seductive, emasculating witch. He characterises Zalma as a purely sexual and supernatural being in his attempt to efface her connection to the realms of logic and genius; he is, like other men of science before him, unable to reconcile her performance of femininity with her aptitude for science.

For St. Leger, the most disturbing aspect of Zalma's power is that she appears to combine her practice of the dark arts with modern scientific innovations, and once again he works to contain her "female power" within the categories of "instinct, spirituality, and the supernatural" (C. Willis 65). St. Leger speculates that Zalma's science is rooted in magic and that she possesses "evil powers and malicious influences, acquired in the side roads of Science" as well as "a knowledge of those black arts which Mesmer and Allauyer [sic] had used for the damage and destruction of men" (403). He founds this

claim in his belief that "the deeds and modes of the astrologers and magicians were still practised— not, as in bygone days, in semi-ignorance and superstition, but with the increasing power that Science and exact knowledge has conferred upon these narrow bypaths of mysterious learning" (403). St. Leger thus alludes to the activities of groups like the Order of the Golden Dawn and the Theosophical Society, asserting that Zalma is an occultist, a belief shared by other upper-class characters who wonder "is her power Hypnotism?" (429). However, their, as well as St. Leger's, claims are debunked by the text itself because, just prior to these statements, the narrator includes a detailed description of Zalma's laboratory experiments that contains no reference to magic, spiritualism, or the occult. According to these characters of authority, Zalma's abilities are not the result of her intellect and determination, but of some type of dark, occult magic that she has inherited or resurrected from history. These speculations highlight the irrationality with which society responds to Zalma's genius and practice of science, and additionally reveal how such harmful assumptions about women scientists are rooted in superstition and fear. From this perspective, if Zalma practices science with a strange power over others, then she must be a witch; these characters possess no alternative vocabulary to describe her as a result of inhabiting a world wherein women can only exist within a limited set of tropes and figures, none of which includes science.

By labelling Olga and Zalma as witches, characters like Alan and St. Leger efface these women's practice of science by attributing it to the "black arts" or "witchery" rather than to a vigorous study of and exceptional aptitude for science. In highlighting these male characters' inability to accept the scientific prowess their female rivals, both novels draw attention to wider concerns regarding Victorian society's assumptions about the

woman scientist and genius—as well as to the nature of scientific authority, in particular what groups are permitted to possess and wield that authority. The lack of scientific foundation for the professional woman scientist—in both the worlds of the novels and late-Victorian Britain—requires characters like Alan and St. Leger to resort to the "available cultural bodies" of witch and poisoner to describe them (Swenson 4). Employing a label such as "witch" was thus not merely the result of drawing from historical precedent; it was also an expression of fear of what these women are capable of and how they choose to use their knowledge of chemistry.

5. Poisons, Power, and the Spectre of Lucrezia Borgia

Both novels demonstrate not only how chemistry is capable of revealing "evil incarnate," but also how complicit it is in the monstrous acts of practitioners who employ their chemical products as drugs or poisons. Chemistry provides Olga the means to produce a potion which enables her to control the minds of powerful individuals, just as it offers Zalma the knowledge to cultivate the anthrax spores she plans to scatter over major European cities. What makes chemistry a dangerous weapon is that its products can be as easily employed as either cures or poisons; this doubling reflects what Piya Pal-Lapinski calls the "the indeterminacy of poison, its ability to transform itself," which at the time "continually evaded and frustrated scientific categories" because the use of a chemical was as fluid as the product itself (95). The products of chemistry thus inspire concern in Victorian society because they are unpredictable substances that one can easily transform from a domestic helpmate to a murder weapon (95). Many poisonous substances were already commonly used in Victorian households to the degree that the presence of poison

"in the fabric of everyday life made it simultaneously insidious, attractive, and dangerous" for those who could not resist its temptation or who saw its use as a necessity (95). The substance may have been a readily available item like arsenic, the weapon of choice in famous Victorian poisoning cases such as that of Madeline Smith in 1857. Despite the 1851 Arsenic Act that required that all purchases of the substance be recorded, it was also an ingredient in cosmetics, green paint, and wallpaper, "often with enough potency for a deadly dose" (Price 204, 205). Arsenic, along with other poisons like strychnine, were in the possession of women across Britain and the Continent, not only enabling them to enhance their beauty and decorate their homes, but also to offer a dangerous power over life and death.

The everyday accessibility of poisons during the Victorian period generated what Sylvia Pamboukian calls "widespread fear of secret poisoning by women" and similar concerns "about women acting as amateur medical practitioners" that witnesses expressed for special reports including that for the Select Committee for the Sale of Poisons in 1857 (112-113). These concerns dismiss women's scientific knowledge by highlighting the perceived inability of women to safely use these substances and, more implicitly, their potential ability to use these poisons deliberately rather than accidentally. Poison pose a threat to Victorian gender roles and social hierarchies by creating an imbalance of power that the poisoner could use to her advantage, whether to remove unwanted individuals or avenge past wrongs.[17] Although fewer murders by poison were committed by women than men, the 1850s press expressed fears that "women would use

[17] Pamboukian notes that, aside from women, male doctors were the most likely to be charged or convinced in cases of poisoning (117-118), but there is no indication in the sources I consulted that female doctors or scientists were involved in such cases.

poison to gain control over their households" and thus the female poisoner was viewed by society as an outrage to "the sanctity of the domestic sphere" (Price 206, 203). Cheryl Blake Price suggests that, in characterising female poisoners as monstrous, corrupting figures, the Victorian press was reacting "against women's changing social and legal position" as a result of, for instance, the Matrimonial Causes Act of 1857 (206). If this is the case, then the revival of female poisoners in late-Victorian speculative fiction is a similar reaction to the increasing number of women scientists and their ability to both use and produce poisons that were potentially more potent or, worse, undetectable.

Just as the woman scientist is caught between the two "realms" of the domestic and scientific, the female poisoner is simultaneously associated with the domestic and the Other. Victorian ideology associated the use of poisons with the Other, Pal-Lapinski explains, because the Orient, "with its deviousness, 'femininity,' and tropical contagions ... was the ultimate source of the most beguiling and deadly poisoners" and thus "poison and poisoners were repeatedly figured in terms of the exotic" (95). She adds that Victorians were concerned that poisons could inscribe "the bodies of both poisoner and victim with a dangerous sense of hybridity" and allow "the poisoner powers of infiltration, invasion, and inscription" (96, 100). Poisons literally permitted the Other to infiltrate the English body and alter its composition, whether to cause serious illness, alter its physical appearance, or destroy life completely. Poison was thus a means of subduing a person's body and mind, effectively transforming victim into abject and Other. The double meaning of "poison," as Pamboukian observes, compounds this power by also signifying the "moral or social harm to the social body, perpetuated by the hated or the ostracised," including non-English ethnicities, those suffering from mental illness, and

women (99). Such individuals are, in Victorian anthropological discourse, as uncontrollable as poison, and thus characters like Olga and Zalma, who, for their respective societies, represent the Other: both female, both connected to the East through their Russian ancestry, both born into infamous families, and both predisposed to madness and genius. *Olga Romanoff* and *Zalma* thus employ the hyperbolic style of speculative and sensation fiction to explore the infiltration and poisoning of Britain by a menacing Other. In both novels, the act of poisoning is two-fold, reflecting the multivalent nature of poison so that Olga and Zalma not only employ material poisons, but also spread poisonous ideas that inspire rebellion against the ruling classes. Both authors demonstrate how the use of poison and, more generally, the misuse of scientific innovations by an irrepressible Other threaten to destabilise established social and political hierarchies by placing considerable power in what many Victorians would see as the "wrong" hands.

The ability to produce poisons requires a degree of scientific or medical knowledge that was out of reach for most Victorian women, and perhaps as a result, press reports or fictional portrayals of women scientists producing poisons are rare. However, women who use poisons are popular characters in literature of the period, particularly in sensation novels like Wilkie Collins's *Jezebel's Daughter*. In sensation fiction, female poisoners are transgressive characters who, having been ostracised by society, seek to attain upward social mobility and financial stability by administering poisons to those who stand in their way, or, in some cases, who threaten the women's already-fragile socio-economic position. These characters moreover possess such a limited knowledge of the chemistry behind their poisons that they can only administer pre-made poisons with

little or no understanding of their production or composition. For instance, there is a clear distinction between Collins's male poisoner Count Fosco of *The Woman in White*, "one of the first experimental chemists living" (*Woman* 243) and Madame Fontaine of *Jezebel's Daughter*, who is "perfectly ignorant of chemical science" and accidentally poisons herself despite her frequent use of poisons and their antidotes (*Jezebel's* 183). Characters like Madame Fontaine are ultimately punished, both for their transgression and their ignorance, most frequently with death by the very substance administered to others (Murphy 138-39). While Olga and Zalma are similarly punished for their transgressions, the female poisoner of sensation fiction fails to provide a model for these later women scientists, whose production of their own poisons gives them an added layer of agency over their actions—which, in the case of *Zalma*, enables her to actively choose the means of her own death.

Women who produce their own poisons more frequently appear in Victorian depictions of mythical and historical figures who are frequently aligned with both chemistry and witchcraft, in particular Circe and Lucrezia Borgia, both of whom are explicitly named in *Olga Romanoff* and *Zalma*. Pal-Lapinski argues that the roles of witch and poisoner share many similarities, and in her argument, she applies Helen Cixous and Catherine Clément's "theoretical paradigm of the Sorceress ... to the female poisoner," noting that "iconographically, the poisoner and the sorceress were often interchangeable" (114). These roles appear interchangeable because, like the witch, the poisoner is rooted in history, a character who simultaneously represents Otherness, criminality, and challenges gender roles and hierarchies. This model of the female poisoner is, unlike the "unsexed" New Woman doctor, more radical in her behaviour,

which proves troubling for male characters because this behaviour contrasts so sharply with the woman's striking beauty. Casteras illustrates this contrast in her analysis of Evelyn de Morgan's and Frederick Sandys's portraits of *Medea* and John William Waterhouse's *Circe Offering the Cup to Ulysses*. These paintings depict mythological witches, but, in each case, these women hold a vial or glass filled with poisons of their own creation in a way that suggests early forms of science rather than actual witchcraft (151, 160, 168). Nonetheless, these paintings conflate the roles of witch and poisoner to imagine the ultimate female transgressor in the eyes of Victorian society: sexually alluring, ruthless, determined in her pursuit of authority and advancement, and also an active producer of dangerous substances. No spells or magical items appear in these paintings, and there is nothing other than the subject's name to suggest that these women are witches rather than precursors to the Victorian female chemist. These paintings provide significant examples of the circumstantial link between women scientists, witchcraft, and poison, but they also betray concerns regarding the fragile boundary between chemistry, magic, and crime.

In addition to alluding to female poisoners of myth, *Olga Romanoff* and *Zalma* refer to historical female poisoners, the most notable of which is Lucrezia Borgia. Scholars describe her as a fascinating figure for the Victorians because "historiography often associated a desire for political power and unnatural sexual appetite with female poisoners," both of which were the Victorians associated with the myth, if not the real life, of Lucrezia Borgia (Pal-Lapinski 102). Her role as a poisoner, "essentially a transgressive one," was popularised by Victor Hugo's play *Lucrèce Borgia* and its operatic adaptation by Gaetano Donisetti, which were performed in Britain between the

1830s and 1880s (102). Randa Helfield adds that novels and news reports of the time regard both opera and play as "poisonous" to female viewers because Borgia's story could inspire women to use poisons without fear of detection (177-78). Neither Helfield nor Pal-Lapinski specify whether Victorian representations of Borgia depict her producing *and* administering poisons; however, in *Olga Romanoff* and *Zalma*, the allusions to Borgia are inextricably related to their protagonists' practice of science because they appear either during an experiment or a discussion of scientific theory. Borgia's influence guides the women scientists of both novels because, in the absence of popularly-known women who practice chemistry, Borgia offers "the power and a sense of agency" created by the female poisoner's "alliance with poison" as well as her knowledge of toxicology (Pal-Lapinski 103). Yet, as with the witch, the myth of Borgia as poisoner undermines the authority of these characters as scientists by emphasising their transgression and criminality rather than their intellectual and scientific abilities.

Olga Romanoff brings societal concerns regarding the female poisoner to life in the fantastical mind-control potion that enables Olga to invade the minds of her opponents and literally poison their minds with her will. Alan and the narrator refer to the potion as a "poison" or, more specifically a "will-poison," despite the fact that it has no physical impact on those who consume it (Griffith 95, 151). The potion transforms Olga's enemies into her allies, forcing Alan and his airship crew to join the Other they have long hated. The narrator claims that Olga's act of poisoning the Aerians causes "the general sense of peace and security in which men had lived for four generations" to shatter "at a stroke by the universal apprehension of the blow that all men felt to be inevitable," thus instigating the rise of anarchy around the world (77). Olga's use of the

potion, while limited to a small number of individuals, has world-wide consequences; the narrator explains society is not so much damaged by the poison as by "the state of constant anxiety and apprehension" of "not knowing how their invisible enemy would strike next" so that "men's minds" become "unhinged" as "the most extravagant opinions found acceptance" (80-81). The novel employs such hyperbolic language to exaggerate the impact of the threat of poisons and poisoners to such a large scale that they can only be resolved by the extermination of the human species.

Olga is fated to repeat the actions of both Circe and Lucrezia Borgia, which not only adds significant melodrama to an already fantastical narrative, but it also, and more importantly, reveals how she is confined by stereotypes, roles, and histories that ultimately consume her agency and her life. Alan compares her to "the Circe of old" who would "reduce him to an animal" with her "Circe-spell," just as Circle turned Odysseus's men into pigs and enslaved them on her island (169, 202). While Alan uses the allusion to characterise Olga as a witch and warn other men of the threat she poses to their authority, the allusion also reveals how Griffith has shifted the myth into the late-nineteenth century so that the sorceress and poisoner of Classical myth becomes a modern genius whose products are wholly based in science. Similarly, Borgia's influence haunts Olga so that, after she observes her demonic reflection in the mirror, she remarks that "I might have sat for the portrait of the lost soul of Lucrezia Borghia [sic]" (56) as though the very act of producing the mind-control potion conjures Borgia's spirit. Olga sees herself, not as Borgia, but a *representation* of Borgia; however, what she does not see is that this revenant takes the place of her reflection, just as its story takes over her own. Therefore, while Olga initially dismisses the spectre of Borgia as a distracting fancy, it controls her

actions so that she unconsciously re-enacts Borgia's story, or at least the fictionalised version with which Victorian readers would be familiar. This is most evident when, as the world faces apocalypse, Olga serves her Russian crew poisoned wine, rationalizing it as an act of self-preservation because she believes that, as the only woman among them, she would be "almost defenceless" against any who attempted to become her "master" (362). The scene is reminiscent of the final act of Hugo's play, in which Lucrezia administers poison at a banquet in revenge for past insults, and while Olga uses the poison to maintain her autonomy, her action still results in tragedy (Pal-Lapinski 102). As in the play, one of the poisoned men discovers Olga's crime and exacts retribution, leaving her to die in a fit of madness, her scientific and military accomplishments rendered meaningless when she resorts to the desperate act of poisoning. Olga is powerless to reclaim her story from that which has already been prescribed for women like her, and it is so powerful that, after the spectre appears, Olga never returns to the laboratory. If she produces more of either potion or poison, then these scenes take place off-stage, but the absence of these scenes reveal how effectively the spectre of Borgia—and the corrupt, atavistic past it symbolises—efface both her ability to control her own fate and her practice of chemistry.

This effacement is significant because, at the beginning of the novel, the narrator emphasises Olga's skill and confidence in the laboratory as she produces the mind-control potion. Once she has studied the chemical formulae "intently for several minutes," Olga makes "a series of calculations on another sheet of paper and compared the result carefully with some figures on the slip. She made them three times over before she was satisfied that they were absolutely correct" (54). It is only after she is satisfied

with her calculations that she measures her chemicals with "most scrupulous exactitude," and prepares the potions "with all the care and deliberation of a chemical analyst performing a delicate and important experiment" (54). Olga, who is seventeen with an unknown level of education, possesses skills equal to those of a professional chemist, capable of performing "a delicate and important experiment" with an obsessive degree of precision. It is, however, notable that the narrator fails to state that Olga works *like* a scientist, but that she only employs the same degree of care. Olga's practice is furthermore limited by her choice to follow a formulate she has inherited from her grandfather rather than produce an original substance. Nonetheless, the novel emphasises Olga's skill at reproducing another's research, which she does with repeated success, constructing airships, submarines, and weapons from the work of the Aerians, as well as that of her father (who was killed by the Aerians because of his attempt to create a rival airship design). In this way, Olga demonstrates that she is equal to the Aerians, reproducing and improving upon their technologies in a way that, in Griffith's own time, men of science did not want to consider possible, or at best highly improbable

The narrator may not question whether Olga is capable of performing the role of scientist, yet the text itself is ambivalent about Olga's experiment because what she produces is a historical potion. In a footnote, Griffith explains that the mind-control potion is neither the creation of Olga nor that of the Romanovs; rather it "has been known to Oriental adepts in poisoning for many centuries, and the Borghias [sic] were certainly familiar with it" (60-61). Griffith gives the potion an illustrious history linked to Otherness and transgression that corrupts Olga's laboratory practice so that there is a "cruel smile on her pretty lips" just before she states that anyone who saw her would

mistake her for "a witch or poisoner of the fifteenth century" (54). Although she performs the role of modern scientist, Olga cannot escape the overwhelming influence of history on her work. Therefore, there is no place in the novel for Olga as a modern scientist because every aspect of the fictional world—society, history, and even cosmic forces in the form of an apocalyptical comet—works against her, ultimately annihilating her in order to restore peace, prosperity, and conservative social hierarchies. Griffith's novel may take place in the twenty-first century, but it engages with the issues of the nineteenth, in which similar forces influenced society's dismissal of the woman scientist as anything but a monstrous Other. By emphasizing history's influence over Olga, the novel demonstrates the destructive threat that history and its prejudices pose to societal and scientific progress.

This characterisation of the late-Victorian woman scientist and her struggle against a long history of rejection, restriction, and transgression is equally applicable to *Zalma*: a knowledgeable, powerful, and enterprising woman who is "a true woman of science" and a political leader who is also inhumanly beautiful (Ellis 301, 244). However, as the narrator describes Zalma's study of "the whole science of bacteriology," he pauses to highlight the moral of his story: "an eternal warning of the power that Science has placed in the hands either of the ignorant, the debased, or even of the insane, and which, if not checked, must result in some grave disaster of mankind" (392, 393). For *Zalma*'s narrator, the lack of regulation in science is an even greater threat than even the woman scientist because dangerous substances are too easily accessible and easily reproducible by those who might use those substances to effect mass destruction. The destruction takes different forms—Zalma's use of anthrax to cause "widespread and universal death," and

her figurative poisoning of minds with socialist and anarchistic beliefs, resulting in the revolution with which the novel ends (390). Like Griffith, Ellis takes advantage of the genre of speculative fiction to elucidate his concerns regarding the dissemination of potentially dangerous scientific knowledge, highlighting the large-scale aftermath that could result from that knowledge falling into the wrong hands.

Perhaps because of its more heavy-handed moral, *Zalma* does not characterise its allusions to Borgia with the same haunting, even consuming, quality as that in *Olga Romanoff*; instead, Zalma's references to Borgia signal her eager acceptance of a power that she and women close to her are denied by their restrictive, patriarchal society.[18] During her tour of the bacteriologist Septimus Adern's laboratory, Zalma becomes "most seriously fascinated by the possibilities of life and death that their conversation suggest[s]," and she begins to speculate that Adern's bacterial cultures, which include the most infectious diseases known in the nineteenth century, could be transformed into murder weapons (Ellis 139). She immediately associates the potential of these cultures with Borgia, asking Adern whether "a very wicked person, like Lucretia Borgia, who is said to have poisoned her guests by the touch of a ring—could such a wicked woman—ur—communicate intentionally any of these diseases to some person she wanted to–to–to murder?" (139). Framing herself as a "wicked woman," Zalma links Borgia's reputed transgressions with her own desire to wield ultimate power. However, unlike Olga,

[18] *Zalma* depicts a sensationalized version of 1895 Britain in which the novel's female characters are jilted, kidnapped, sexually assaulted, abused, and neglected by men. Women in this society entirely lack political or social power, yet while the novel contains references to the Pioneer Club and social purity movement, it fails to mention the New Woman or the suffrage movement. A woman's lack of agency in this society instigates Zalma's quest for revenge, and the novel largely exonerates Zalma's madness because of "the wrongs she has endured" (393).

Zalma does not need to employ a potion used by Borgia; she discovers something that is "so much more dreadful, so much more terrible," than "clumsy" poison that offers "incalculable power ... over the lives of men ... [Y]ou could deal death to thousands, to tens of thousands" (Ellis 140, 147). With modern technology, Zalma expands the female poisoner's power to a universal scale so that "some person she wanted to murder" becomes "tens of thousands" as she comes to understand the full potential of the bacteria. Zalma fashions herself as a modern Borgia—a figure whose empowerment inspires Zalma—who employs nineteenth-century scientific innovations rather than traditional poisons. Because innovations in chemistry have made new types of poison available, the "wicked woman" must adapt herself to their use, be it in the form of a poisoned ring or by scattering "micro-organisms" from balloons (389). In the process of this adaptation, the poisoner of history and fiction also evolves into the equally transgressive and potentially more powerful figure of the woman scientist.

Zalma's reference to Borgia additionally functions to disguise her interest in science, enabling her to take advantage of Adern's prejudices against women in order to attain knowledge that he would likely not otherwise give, particularly to a rival scientist. Throughout this scene, Zalma performs the role of naive young woman for Adern's benefit, speaking "with pretended dread" as they walk among the bacterial cultures and later "forcing a laugh, the hollowness of which would have been noticeable by any listener whose mind was not preoccupied" (137, 141). Adern never suspects Zalma's motives, stating in jest that "if I did not know that you were your father's daughter and hereditarily of a scientific and, therefore, inquiring turn of mind, I should think you were meditating some dreadful crime" (142). Adern accepts her curiosity because she is a

doctor's daughter and thus somehow genetically disposed to intellectual pursuits; in this regard it is her father's genius that Adern respects, not her own, which he regards as merely an inheritance. Similarly, Adern places strict limits on who is capable of employing the bacterial cultures as poisons, stating that "'a doctor, a scientific doctor, even a G. P.,'—he spoke with some contempt, —'any analytical man, desirous of committing a murder, could certainly do so elaborately'" while anyone "without special knowledge" would be "more likely to commit *felo de se*" (139). Adern's claim reflects the increasing exclusivity and specialization of scientific practice; anyone lacking this "special" knowledge would, like the female poisoners of sensation fiction, instead kill themselves. He particularly excludes women, even those like Zalma who possess an "inquiring turn of mind," from those capable of safely handling the substances, a supposition that the narrator later refutes in his depiction of Zalma's successful production of enough anthrax bacteria to "kill every living creature on the planet" without causing harm to herself (421). The novel thus critiques the narrow-mindedness of the scientific institution through its representative Adern, who underestimates Zalma's genius and ability simply because she is a woman. This critique, in turn, enables the novel to illustrate the dangers of excluding and alienating those on the margins of science, who have the ability to revolutionise science and society as readily for good as for ill.

In setting herself alongside a female poisoner like Borgia, Zalma calls attention to the limitations for a woman scientist in her society because she can only discuss the potential of the bacterial cultures within the context of poison. In the world of this novel, the language of poison is one of the few available to her as a self-educated woman

outside of the institution of Science; the other language is that of the anti-vivisectionists, who are, according to Adern, "unscientific and inaccurate" in their rejection of science and its power (306). Zalma is herself an anti-vivisectionist, but she is far more concerned with the power of science than the anti-vivisectionist women who claim that "everything is already known that is worth knowing" (303). Unlike these women, who are as narrow-minded as Adern, Zalma is "always receptive of knowledge," and she thus discovers how to use science to overthrow a society that both rules women's lives and frequently abuses its power (137). She initially refers to poison as an "entrancing" fantasy that offers women the means to rectify the imbalance of power within their patriarchal society, stating that

> poisons are of course entrancing to women-folk. There is a something so terrible, at the same time so fascinating, about the idea that one can take away a life—the heart's action to cease, the dead to go under the sod; the grave to close over the mouth that spoke, the head that held one, the arm that ruled one, the life that injured one to lie there, lifeless. But how clumsy is any poison compared to this new power that bacteriology is conferring on mankind! (141)

Zalma describes poisoning as a personal crime in which one murders a specific individual who "held one ... ruled one," and "injured one," making it a crime of revenge, differing little from those supposedly committed by Borgia and other famous female poisoners. However, Zalma distances herself from "clumsy" poisons and, presumably, the personal revenge plots undertaken by historical and fictional poisoners to embrace the "new power" offered by modern science, which would enable whomever wielded it to

"exterminate a town, a nation, almost a race" (148). This "new power" is entirely in the hands of "some little round-shouldered spectacled man" of science who can destroy whole armies (146). By the end of the scene, Zalma discards the role of female poisoner in favour of the seemingly limitless power of the male scientist; yet, in shifting the act of poisoning from the personal to the global, the novel also implicates the scientist and the chemistry he practises as the greater threat to society.

Zalma is more successful than Olga at transcending the role of female poisoner because she adapts it to espouse the "precision" of modern science. She actively educates herself in science, acquiring a specialised language and new theoretical framework that encompasses bacteriology, germ theory, and vivisection, eventually leading Adern to accept her as "a true woman of science" (301). This label, however much it acknowledges Zalma's accomplishment, sets her in opposition to other women in the novel such as the anti-vivisectionists, who inform Adern that Zalma has become "a woman who has been turned into a devil by men like you—by work like yours" (303). This claim effectively isolates Zalma in a way that reflects Lombroso's characterisation of the "virile" and unnatural woman of genius, if not the reality of women's engagement with science (Lombroso 138). Although the narrator claims that his "story is indeed one of real life," its exclusion of women scientists is problematic because by 1895 women were increasingly working in British laboratories, predominately as assistants, but sometimes also as independent researchers (Ellis 19, Crease and Crease 266). Their absence from the novel emphasises the strict gender roles of the society that firmly aligns men with rational, professional science and women with sensibility and the private sphere. Zalma is the only female character in the novel who crosses this divide, entering

"the masculine realm of intellectuality" while still inhabiting "the feminine realm of emotionality" so that, unlike the woman doctor of New Woman fiction, she is, at least for a brief time, able to successfully exist within both realms (Murphy 67). However, while the novel presents this seemingly progressive characterisation, Zalma's transgression becomes merely a unnatural violation that enhances her Otherness and aligns her with the monstrous and degenerate, as represented by the roles of poisoner and witch.

Like *Olga Romanoff, Zalma* initially appears to emphasise the scientific skills of its title character, who, the narrator claims, works "with all the precision which Dr. Adern, now one of the most accomplished bacteriological experts of the day, was wont to exercise in his own celebrated clinical laboratory in Cavendish Square" (390). The narrator compares Zalma to the "celebrated" professional scientist Adern, which should work to elevate her and thus the work of women scientists by demonstrating how they are equally capable of performing with expert precision. However, the narrator contradicts this by adding that "she did not work as a scientist would do" because while she takes "an interest ... worthy of an advanced scientist ... her work, so far as it was necessary to her scheme, was of so simple a character that any medical student, or even a layman of average intelligence, could have mastered the subject in a few hours" (390, 391). The narrator may be able to accept her "precision" and "interest" as equivalent to that of a professional scientist, but he rejects her actual "work" because, as he claims, Zalma only "required one of the very simplest cultures possible in large quantities and to obtain it in her work was of the easiest" (391). Without taking into account the fact that Zalma has only recently educated herself in bacteriology and would thus not yet have attained a sufficient degree of expertise to attempt more complex experiments, the narrator, like

Adern earlier in the novel, dismisses Zalma's genius and ability, largely because she chooses not to develop her scientific education beyond what is "necessary to her scheme" of mass poisoning (392). Zalma thus undermines her own potential as a scientist because, despite her natural curiosity and abilities, she becomes wholly driven by her need to avenge her father's death and the "the wrongs she has endured" (393). Consequently, the results of her experiments serve no other purpose than for use as poisons, just as her role as a scientist has no other purpose than to produce those poisons without alteration or improvement to the experiment's design, materials, or results. Trapping herself within this limited role, Zalma is unable to maintain the precision and analysis necessary for her scientific labors, which results in the failure of her plans and, ultimately, the complete collapse of her role as woman scientist.

The novel further illustrates the dangers of scientific practice by emphasising what the narrator views as the corrupting—that is, poisoning—influence of modern science on Zalma's psyche. The narrator situates Zalma's laboratory in her boudoir, which blurs the boundary between the domestic and the scientific by creating a space in which she dresses herself "with more than usual care" and spends "hours in trimming, pointing, and polishing her finger-nails" before turning to "lean over one of the tubs in the new glass-house, in which she was cultivating the bacilli of anthrax" (390). The way in which Zalma's boudoir and laboratory inhabit the same space differs even from the living situations of Jekyll and Moreau because, while those characters live in close proximity to their laboratories, there is always a physical barrier between the domestic/real and the scientific/unknown. Zalma's hybrid space becomes monstrous to the middle-class Victorian eye because she delights as much in performing femininity as

in vivisection and preparing for mass murder (392). The novel thus depicts a literal corruption of the domestic by an unclean, brutal science to parallel both the corruption of Zalma by science, and the corruption of science by Zalma's madness for revenge.[19] Her experiments, particularly those including vivisection, dull "her beautiful instincts of gentleness, and chok[e] all those humane feelings which had flourished in her heart," eventually "influenc[ing] this loving soul to madness" (392). Terms like "beautiful instincts," "gentleness," and "loving," which draw from the popular image of the "Angel of the House," emphasise how the narrator believes that Zalma's practice of science has transformed her into a madwoman and a murderer. The narrator's language throughout this scene aligns science with brutal mechanization and violence so that it is capable of inspiring "cruelty and callousness" in Zalma, just as it causes the novel's male scientists to become "blunted," "indifferent" to the suffering of their subjects, and able to "delight in the pain of the subject" of their experiments (306). Yet in Zalma's case, this madness dulls and chokes not only her empathy, but also her scientific work so that it too becomes "clumsy," resulting in the failure of her plans and ultimately the failure of her role as scientist. Zalma may have been able to adapt the role of female poisoner to suit nineteenth-century innovations in poison, but she, like Olga, fails to transcend that role and undergoes a process of degeneration whereby her genius turns into madness and her modern laboratory is replaced with the tools of the Early Modern poisoner.

Ultimately, Zalma also returns to the role of the female poisoner so that she, like

[19] When Zalma is imagining the long-term consequences of her mass poisoning, she ends with the image of a world of chaos and destruction in which "Science itself would utterly fail" (393). Because she also admires the precision and methodology of science, it is unclear whether she particularly desires science to fail or why; however, the novel does suggest that Zalma's misuse of science and its power over nature corrupts science's potential to benefit society.

Lydia Gwilt of Collins's *Armadale*, commits suicide by poison, and in doing so, Zalma discards science in favour of a more sensational, tragic death. During this scene, the narrator makes no reference to anything scientific in nature even though he suggests that Zalma returns to her domestic laboratory, "the one room into which she admitted no one but herself" (438). The room itself has undergone a transformation since the failure of her plans, and it now contains mirrors, candles, and roses in addition to "a Venetian phial and a twisted glass" with "some curious blue powder" that is stored "in a jewelled and golden casket" (437). The substances from which she mixes the poison are not stored in beakers or vials, but in luxurious items like perfume bottles, one of which is notably Italian and is perhaps another reference to Borgia or, more generally, poisoners of the Italian Renaissance (Price 210). With these items, the narrator evokes the opulence, deception, and spontaneity of the historical poisoner, qualities in opposition to those valued by scientists according to the narrator: precision, cool rationality, and "the delight of knowing" (145). These were qualities that Zalma herself respected and adopted, but in the scene prior to her death she appears incoherent, hysterical, and "inebriated," signalling how she has abandoned the role, and thus also the language, of the scientist (380). By stripping Zalma of her former role as scientist, the novel re-inscribes her as a female poisoner, containing her monstrosity and instability within an established role that effaces her most dangerous qualities: her scientific ability and her genius. The novel ends with the chaos of the revolution Zalma initiated, but she can only observe it from her home, entirely removed from her positions of power as scientist and anarchist leader. Zalma becomes trapped within a conservative narrative wherein the female poisoner, like the witch, is punished for her transgressions with madness, failure, and death.

Zalma's conclusion suggests that, even though Zalma incites a revolution that breaks down the restrictive hierarchies of her society, there is still no place for her as a scientist or leader within this world of her creation. Zalma chooses to become a poisoner and carefully educates herself in order to achieve her goals, but even this agency prevents her escape from the traditional fates for women who appropriate authority for themselves. While, to a degree, the novel challenges the claims of contemporaneous men of science, it is unable to diverge from established roles for transgressive female characters to create a new, progressive role for Zalma to inhabit. The novel remains conservative in its depiction of a woman scientist, emphasising her instability before expelling her from the text, and so the woman scientist of speculative fiction fares no better than the fairy tale witch or the sensation novel poisoner. Yet this depiction of Zalma is complicated by the way that the novel highlights the larger threat that nineteenth-century science poses to society in the hands of men or women as a result of the over-specialization of its fields and the blindness of its practitioners to the horrible potential of their experiments. Chemistry in the novel has an equal potential to corrupt and cure, and so Ellis depicts all who practice it as morally ambiguous and myopic as a result of a culture of science that champions scientific materialism and specialization over empathy and benefit to society. The novel links the woman scientist and the poisoner in order to highlight the atavistic, corrupt past that relentlessly haunted nineteenth-century chemistry. In doing so, *Zalma* illustrates how chemistry's past is indistinguishable from its future: both seek similar goals, practise similar occulted experiments, and offer similar temptations to the ambitious and debased.

Neither Olga nor Zalma can shed the negative attributes of the corrupt, sexualised

witch or poisoner from whom the hero must escape and whom he must defeat: an enemy but never an equal. It appears that, despite the ways in which both novels challenge their period's concepts of the woman genius and scientist, they maintain too close a link between their characters and a vengeful, depraved history that consumes not only the woman scientist, but also the world she seeks to conquer. What stands between the women scientists in these novels and society's acknowledgement of their abilities is a long history of associating women of science and medicine with witchcraft, immorality, and illegitimacy. Nineteenth-century arguments that women cannot possess genius and lack the intellectual ability to practice science perpetuate these associations that reduce genius to magic and ambitious experimentation to a mad desire for power. The roles of witch and poisoner are inextricably linked within these texts, which use their complex depictions of women scientists, drawing from these negative historical stereotypes, to examine the anxieties that influence how Victorian society and scientific institutions characterise women who engage in scientific practice. These texts demonstrate that it is society and the scientific community that are trapped by their adherence to stereotypes, unable to see beyond the influence of tradition—more accurately, of nineteenth-century historiography—to acknowledge, comprehend, and label the woman of science. The history that fuels these characterizations of women scientists differs considerably from those which Bulwer-Lytton and Stevenson draw from for their depictions of male scientists: while the alchemist, though linked to the occult, was acknowledged by many nineteenth-century intellectuals as a forerunner of modern chemistry, the witch and the poisoner are entirely excluded from nineteenth-century histories of chemistry and from the debates surrounding the creation of a standardised history. *Olga Romanoff* and *Zalma*

call attention to the role of women in the history of science and examine both its strengths—the powerful abilities of female practitioners of science—and its weaknesses—the monstrous potential these women possess—even as the texts themselves revel in the vilification, and inevitable deaths, of women they both depict as unstable and destructive.

On a final note, it remains problematic that both novels also appear to undermine their characters' genius by limiting their creative abilities so that all their work is derived from that of male scientists. By not enabling Olga and Zalma to produce original creations, both authors ascribe to the belief "that women, like the 'lower' races, could never expect to match the intellectual or cultural achievements of men" or that, "in the domain of pure intellect it is doubtful if women have contributed one profound original idea of any permanent value" (Richards 121, Allan 230-31). Rather than design and construct her own fleet, Olga not only steals the Aerians' plans, but the designers themselves, "forcing them to employ their skill and knowledge in aiding her to build her aerial and submarine fleets," only to discard these human tools once the work is complete (Griffith 94, 75, 82). Similarly, Zalma flatters and manipulates a bacteriologist into sharing the details of his research, using his assumptions about the delicacy and imagination of women against him so that he reveals exactly how to cultivate anthrax without suspecting her motives until it is nearly too late (Ellis 145-48, 421). Both women employ scientific and technological advancements against the very men who created them, successfully overturning established socio-political hierarchies and leading Britain into a state of anarchy. In such a reading of the novels, Olga and Zalma, and presumably women scientists in general, are serious threats to Victorian patriarchal society; and in

this way, these novels fictionalize fears regarding the potential for women, foreigners, and scientists to seize control of powerful technological innovations to bring about that society's ruin.

However, this interpretation of both novels' treatment of women scientists does not take into account the social constraints that influence Olga's and Zalma's goals and ultimately distinguish them from their male contemporaries. Because both women reproduce items rather than develop their own research, their narratives differ from those of male scientists who are driven to create new or improved life forms. Fictional male scientists like Stevenson's Jekyll frame their research in "gendered metaphors that characterise science as a masculine enterprise that manipulates Nature and coerces *her* secrets out of *her*," which leads these characters to appropriate female reproductive functions and circumvent natural processes of reproduction (Lacy 57, emphasis original; Benziman 375). Unlike Jekyll and, as I examine in Chapter Five, Sydney Atherton of *The Beetle*, the woman scientist in fiction already potentially possesses the ability to create new life; however, Olga and Zalma do not attempt creation because their work is constrained by social, rather than natural, forces. Before either character can seek to attain power over the natural world, she is, due to the highly restrictive nature of her society, required to destroy the socio-political hierarchies that deny her power and dismiss her genius. Although they interrogate Victorian assumptions, both *Olga Romanoff* and *Zalma* fail to create a new space for these characters and so these women of science remain monstrous figures who disrupt the status quo and therefore must be destroyed. Only, in both cases, the woman scientist's destruction occurs alongside that of the society which labelled them as monsters. There is no way for the other characters to

re-establish the status quo, or escape the horrors of what the woman scientist has unleashed; they must instead rebuild society in a new world that was made possible by the labours of a woman scientist.

Olga's and Zalma's reliance on the work of male scientists additionally raises the question of whether, because male scientists were the initial creators of the mind-control potion and the bacterial cultures, they should also be compared to sorcerers or poisoners. If the answer is no, then both the narrators and antagonists reveal the system of double standards that prevents them from accepting women scientists. If the answer is yes, then these novels interrogate the credibility of any scientist, male or female, who produces dangerous substances or employs science as a means of control. Both novels examine how the scientist's gender, laboratory methods, and employment of the resulting products influence how others, particularly those in power, choose to legitimise or dismiss the scientific nature of these experiments. The depiction of chemistry in these novels questions the boundary between legitimate and illegitimate scientific practice, which is dependent on what authority figures choose to label as science, magic, or criminal activity, regardless of whether the practice is linked to the occult or criminality. By challenging this boundary, these novels critique the ambiguous nature of a science that is characterised by fluidity, instability, and potential monstrosity—a science in which potions can become poisons, bacterial cultures become biochemical weapons, and scientists can become witches and poisoners. These novels draw from an alternative history of science than those of Bulwer-Lytton and Stevenson—a history of witches, sorceresses, and women practitioners that had been relegated to myth and fairy tale. At the same time, *Olga Romanoff* and *Zalma* demonstrate the negative impact of historical

assumptions on both scientific practice and perceptions of chemistry in the late-nineteenth century: an influence, that Griffith and Ellis speculate, will continue well into the future.

Chapter Five: "I Will Pit My Magic Against Yours": Egyptian Science and Victorian Magic in Richard Marsh's *The Beetle*

> Eisenheim deliberately crossed boundaries and therefore disturbed the essence of things. In effect, Herr Uhl was accusing Eisenheim of shaking the foundations of the universe, of undermining reality, and in consequence of doing something far worse: subverting the Empire. For where would the Empire be, once the idea of boundaries became blurred and uncertain?
>
> Steven Millhauser, "Eisenheim the Illusionist"

In Richard Marsh's 1897 novel *The Beetle*, the eponymous creature confronts a scientist in his private laboratory on two occasions, revealing an unexpected side to each character: the upper-class inventor Sydney Atherton constructs a chemical weapon that makes him the potential murderer of thousands while the ancient priestess Beetle treats Atherton as an equal, then rescues him from his own weapon's poisonous gas. That these revelations occur in the chemist's laboratory characterise it as a space of radical transformation where the roles of "hero" and "monster" blur. The novel extends this ambiguity to the characters' respective roles as Western scientist and Eastern occultist from the moment Atherton asks the Beetle, "are you a magician?" and she responds, "You, Mr. Atherton,—are you also a magician?" (Marsh 104).[1] While Atherton uses "magician" with reference to the Beetle's mesmeric powers, the Beetle draws upon ancient Egyptian definitions of the magician as a natural philosopher, or as one late-Victorian occultist claims, "the scientist of his time" (Leonard 472). By calling Atherton a "magician," the Beetle characterises a government-employed inventor as her equal in

[1] In the novel, the Beetle frequently appears to shift between genders and it is only after Atherton observes the Beetle's transmogrification that he uses "she." However, because I largely focus on the Beetle's role as ancient Egyptian priestess, it is more convenient to consistently refer to her as "she," even when discussing portions of the narratives during which she appears in the guise of a male or ambiguous figure.

"the attainment of wisdom, and command over the hidden powers of nature" (472). Atherton and the Beetle respectively represent modern Western science and the ancient Eastern occult, but the affinity they share within the laboratory threatens to elide the distinction between them and thus also that of the values they represent. In comparing the work of a progressive scientist to that of an "Oriental" magician, the novel demonstrates that *fin de siècle* chemistry is potentially as unstable and dangerous as the Beetle's occult powers. In this chapter, I examine the ways in which Atherton's interactions with the Beetle destabilise the boundary between science and magic, and furthermore serve as a reminder of chemistry's origins in the Middle East, where, historically, it was both a practical science and mystical art. This doubleness inherent in ancient chemical practice threatens the legitimacy of nineteenth-century chemistry, which, as the novel suggests, had not yet shed its associations with alchemy and the occult.

The novel's depiction of chemistry reflects two major tensions regarding chemistry's progress at the *fin de siècle*: the alarming capabilities of chemical products and the advanced technology involved in their research, which, to non-scientists, might take on the appearance of magic. In the novel, these concerns are realised in Atherton's "Magic Vapour" (Marsh 137), the name of which evokes images of a magician's trick or a spiritualist's ectoplasm, not a gaseous weapon produced for the government. To those characters outside of the scientific profession, Atherton's practice of chemistry takes on the appearance of magic, inspiring his friends to call his laboratory a "wizard's cave" at "the threshold of the unknown" (154, 109). The novel thus plays on negative perceptions of chemistry influenced by three major aspects of the late-Victorian culture of science: rapid developments in chemical research, the closed—literally occult—nature of

laboratories, and the use of material chemistry by occultist groups. From the late-1870s, laboratories were increasingly privileged, enclosed spaces where men of science performed "investigations unfettered by social codes," and it appeared to a suspicious public that the laboratory walls "conceal[ed] activities that were not justified by their supposed ends" (Mussell, "Private" 14).[2] The professionalisation of science widened the gulf between scientists and the public, who lacked access to university laboratories or, as in *The Beetle*, the private laboratory of the government-funded inventor (M. Willis, "Unmasking" 213). Moreover, by the late-1890s, science and the occult had blurred as a result of seemingly impossible scientific discoveries, including x-rays in 1895 and radioactivity in 1896, both of which were embraced by spiritualists and occultists as evidence of supernatural forces at work (Morrison 5). I argue that the novel responds to these developments by highlighting chemistry's inextricable linkage with its own unstable history rooted in the East and the occult. At the same time, the novel looks forward to a future of continuing instability in which chemists become capable of controlling the fates of nations. In a society conflicted about the progress of technology and sciences such as chemistry, *The Beetle* questions chemistry's evolution from its roots in the temples of Egypt to its professionalisation in the laboratories of Victorian Britain. Such questions build from—and reinforce—a negative perception of chemistry which maintains that the science can potentially further destabilise, or even annihilate, the hierarchies central to British Victorian society.

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[2] In *Science, Time and Space in the Periodical Press*, Mussell distinguishes the chemical laboratory as a space of "ideological power" that functions as "the site of production and legitimization of chemical knowledge" because it is where "chemicals act and are then named"(128). This distinction is significant to *The Beetle* because the Beetle frustrates attempts to classify her species and name her. Atherton himself defies a stable classification system as he veers between the titles of inventor, chemist, and magician.

The ambiguous divide between science and magic in the novel is further complicated by the fact that both Atherton's science and the Beetle originate in Egypt. During the Victorian age, the Middle East, and Egypt in particular, was simultaneously admired as a great civilisation, feared as a site of colonial conflict, and derided as a wellspring of Eastern corruption—epidemiological, sexual, or otherwise (Brantlinger 181; Bulfin 430; Hurley 127). As I discussed in Chapter One, for a major science to have emerged from such a region—Eastern, colonial, feminized, and Other— compromises the legitimacy of that science in regard to the ideologies of both post-Enlightenment materialism and British colonialism. *The Beetle* reflects this controversy in its depiction of Atherton's practice of chemistry, which exists on the boundary between Western science and Eastern magic even prior to his encounter with the Beetle. The novel draws attention to this by noting Atherton's recognised expertise in Eastern superstitions and how his research takes on the appearance of magic; moreover, the ease with which Atherton accepts the label of "magician" further challenges his position as a professional, Victorian scientist. These details foreground the question of chemistry's legitimacy in the interactions between Atherton and the Beetle in order to challenge contemporary perceptions pertaining to a division between "legitimate" professional science and "illegitimate" occult practices. The novel's laboratory scenes destabilise Victorian definitions of science and the occult, coloniser and colonised. Ultimately, the novel interrogates both the progress of science and of British Empire at the *fin de siècle* and thus reveals that beneath the masks of scientific and imperial authority lies only another form of monster.

2. Western Science and the Eastern Occult in *The Beetle*

Despite the popularity of *The Beetle* among critics of the *fin de siècle* Gothic, its depictions of chemistry and the Victorian laboratory have been overlooked in favour of its engagement with gender, imperialism, and mesmerism.[3] While these subjects are indeed central to the novel as a whole, those scenes featuring chemistry are limited to the second of the novel's four overlapping narratives. In this sense, my argument inevitably focuses on only a small portion of *The Beetle*, but these crucial scenes encapsulate the instability that permeates the novel. The scenes in Atherton's laboratory feature moments of destabilisation and disruption that exemplify the novel's challenge to both authority and perception, in particular the Beetle's revelatory metamorphosis between her human and insect forms. This process of transformation is first observed within the laboratory, the one space in the novel where the Beetle has the least control over her surroundings, the people around her, and the narratives they relate about her. Atherton's laboratory literally sheds light on the Beetle, her polymorphism and her motives for attacking London, but it also, more generally, highlights the instability of the human characters, including, and perhaps especially, the laboratory's owner.

The narrative and conceptual instability of the novel extends to its genre, which shifts between Gothic horror, comedy of manners, and—in Atherton's narrative—scientific fiction. With this last term, I distinguish *The Beetle* from scientific romances

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[3] Wolfreys examines each of these topics in his introduction to his Broadview edition of the text. Hurley's early discussion of monstrosity, sexuality, and Orientalism continues to be foundational in studies of *The Beetle*, and later analyses by Allin, Bulfin, Halberstam, and Margree expand on these topics, particularly the intersections of gender and imperialism. Luckhurst has examined mesmerism and the Egyptian occult in the novel, but, as with the other critics, he does not address alchemy, chemistry, or the history of science in Egypt.

like *Olga Romanoff* because Marsh's novel does not speculate about future innovations or phenomena. Nevertheless, *The Beetle* is steeped in the scientific milieu of the late-1890s, from the protagonists' use of telegraphs and forensic science to its detailed descriptions of Atherton's research in chemical warfare, electricity, and, later, aeronautics. Yet despite the novel's fascination with the science of its time, it resists any glorification of scientific and technological advancement. Science in the novel does not function as a means of conquering ancient, Eastern irrationality and magic because science fails to capture and destroy the Beetle; she is only stopped by a *failure* of Victorian technology—the train crash. Furthermore, when science appears in the novel, it is in the form of a deadly chemical and an electrical generator, both of which are employed by Atherton as weapons. Atherton's use of science for violent and destructive purposes—to kill armies, vivisect a stray cat, and attack the Beetle—contradicts earlier Victorian associations of science with optimistic progress to reflect late-Victorian pessimism in regard to laboratory science, scientific practitioners, and, more generally, what Linda Dryden calls "the 'malaise' that seemed to typify the *fin de siècle*" (Dryden 32; Sparks 19). The pessimism of the novel's scientific narrative literally poisons the comedy of errors, nearly resulting in the death of Atherton and his friend Percy, and aligns science with the Gothic horror of the Beetle as an equal, if not greater threat to Victorian society.

The novel is disturbingly ambiguous in its depiction of a science that is violent, unstable, and, in the case of Atherton's practice, even illegitimate in its links to the East and the occult. Atherton not only claims to keep an "open" mind "towards what is called the supernatural," but he also he demonstrates a thorough knowledge of hypnotism, "ancient superstitions and extinct religions" (Marsh 176). The alacrity with which he

accepts the Beetle's label of "magician" emphasises the ambiguity of his scientific practice, which already exists at the margins of professional science (111). This, in turn, highlights what Wolfreys calls the novel's "oscillation between science and pseudo-science," which, he argues, is one way that the novel explores "sites of cultural contestation of disruption" and the transgression of social boundaries (15). Wolfreys's use of "oscillation" echoes Darko Suvin's argument that *Jekyll and Hyde* presents an "unclear oscillation between science and fantasy," which Suvin cites as the primary reason why the text cannot be classified as science fiction (94). This oscillation becomes a significant aspect of the *fin de siècle* Gothic mode, which, as Hurley explains, "consistently blurs the boundary between natural and supernatural phenomena, hesitating between scientific and occultist accountings of inexplicable events" (16). *The Beetle* exemplifies this definition, as does its closest contemporary *Dracula*, but while in the latter text "the scientific and occultist accountings" are safely divided between Seward and Van Helsing, in *The Beetle*, Atherton fulfills both roles. As the novel oscillates between science and pseudo-science, so does its representative of science: he is both an amateur who dabbles in hypnotism and superstitious beliefs and a government-employed scientist who creates a chemical weapon he names his "Magic Vapour." There is no single term to classify him and the "science" he practices; both cross multiple boundaries and shroud the novel's depiction of science in uncertainty. The novel may be outwardly concerned with finding a scientific means to label and subdue the Beetle, but it also reveals the hypocrisy of that impulse by critiquing a practice of science that is as ambiguous and unstable as the supernatural forces it seeks to control.

However, the novel's engagement with science is overshadowed by scholarly

interest in its supernatural and psychosexual elements as a work of Gothic horror. As Julian Wolfreys explains, "Marsh's beetle-human hybrid provides a powerfully exemplary grotesque embodiment of late-Victorian anxieties" so that the novel "gives face" to everything that is unstable in late imperial culture" (19).[4] With its fragmented narratives and failure to provide closure, *The Beetle* is perhaps the most unstable example of the *fin de siècle* Gothic, which typically showcases both the possibilities of Victorian science, particularly in the fields of Darwinian biology and chemistry, and the supernatural (Feinstein 96; Hurley 16-17). Although "instability" is a key term in criticism of the novel, scholars only link it peripherally with the tense relationship the novel builds between science and the occult. Kelly Hurley argues that this instability of narrative form corresponds with the Beetle's instability of species, sex, and sexuality that makes her an object of horror, largely because she confounds all attempts to scientifically classify her (Hurley 131). Meanwhile, Roger Luckhurst posits that the novel's unstable narrative makes texts like *The Beetle* and its contemporary *Dracula* "exemplary... of the fin de siècle *itself*" because they are "*trance texts* through and through" in that they are narrated by characters experiencing "somnambulic, mesmeric, and hypnotic states," that is, characters who are caught between quantitative reality and the world of fantasy ("Trance" 159, italics original). In this way, even the novel's form is destabilised by the "unclear oscillation between science and fantasy" that haunts the *fin de siècle* Gothic, but while the rational narrative of Champnell and the "hysterical" narratives of Holt and Lindon fit neatly into this structure, scholars have overlooked the ambiguities at the heart of Atherton's narrative (Margree 76; Wolfreys 19). Critics of the novel have

[4] See also Hurley 125; Luckhurst, "Trance" 171; and Margree 64.

predominately linked instability and fluidity to the supernatural incursions into the text; however, the novel's depictions of science, and more specifically of chemistry, offers fascinating insight into the relationship between science, literature, and popular culture at the *fin de siècle*.

More recently, Anna Maria Jones and Natasha Rebry more closely examine the novel's depiction of science and specifically draw attention to what Jones argues is the novel's other main source of horror: Atherton and his inventions.[5] Drawing from Victorian thermodynamics, Jones contends that Atherton is a more threatening character than the Beetle because while she is "one monster on a quest for personal vengeance," Atherton's "unpredictable energy and destructive potential" instead "hints at a much greater destruction in the future beyond the story's conclusion" (66, 73). Although Jones adds that "the scene [between Atherton and the Beetle] conflates 'Oriental' mesmerism, British science, and vengeance," she does not elaborate on how or why this conflation is significant. Natasha Rebry more directly points to the tensions between science and magic, explaining that Atherton holds "a somewhat ambiguous position between scientist and magician," and that "the distinction between the two is continuously challenged within the text," so that his scientific "magic" becomes "the most dangerous within the narrative," far exceeding the scope of the Beetle's powers (189). However, Rebry also asserts that the text's "repeated play" between the two magics emphasises "Atherton's dominance" because "in both cases magic is presented as a masculine force" that

[5] In an older study of the novel, Rhys Garnett highlights the complexities of Marsh's depiction of science. However, he initially argues that Atherton "is, before the novel's end, forced to recognise the limitations of his science in the face of Oriental 'magic'" (35), then later states that "science is shown to be adequate, in itself, to defeat the power of the Other" (46). Not only do these statements contradict one another, neither is substantiated by the text.

dominates, controls, and threatens annihilation (189, 190). While such a reading lends itself to the characterisation of science as a similarly masculine force, seeking to penetrate the secrets of nature, Rebry stops short of making this connection and thus, like Jones, does not implicate science and scientific progress per se as threats to society; rather, science functions as a tool for Atherton and the industrious masculine energy he represents. Leslie Allin takes this association between masculinity and science a step further to align Atherton's "disruptive qualities" with "the very 'Other' to which he is ostensibly opposed" and "with the East and its attendant threats" (122). Allin thus argues that the threat traditionally posed by "the foreign" now also emerges "from within male British bodies," so that both "Atherton and the Beetle are menaces associated with the East that reside in London" (123). However, while Allin makes reference to Atherton's "magic" and "sorcery" (122), her analysis leaves ample room to consider more closely Marsh's use of these terms in relation to Atherton and, more importantly, to his science. Therefore, rather than examine Atherton in relation to masculinity, I focus on his practice of chemistry, its power to intimidate the Beetle, and the way in which his chemistry easily slips between a powerful science of industry and a form of magic.

The novel contrasts the professional chemist Atherton with the Beetle, whose origins correspond with two significant aspects of chemistry's history namely its association with the occult and its origins in the Middle East as *al-chemia*, known to the Europeans as alchemy. The former is of particular relevance to *The Beetle*, which engages with major tenets of occultist groups such as the Order of the Golden Dawn, whose members claimed to practice Egyptian magic, Eastern philosophy, and alchemy (Denisoff 6-7; Owen 58). The parallels I draw between the figure of the Beetle and

chemistry's Egyptian origins build on Wolfreys's reading of the Beetle as an uncanny being who functions as the "representative of a long-vanished culture … [as] that which is neither dead nor alive, but which returns and hovers between either condition" (24). The Beetle thus functions as a revenant—a monstrous return of a repressed past—who, as Wolfreys explains, invades Britain in revenge "for the 'barbaric' English defilement of ancient Egypt's sacred locations" that occurred "as a result of colonial and imperial intrusion," acting as a reminder of British, not Egyptian, monstrosity (25). However, I argue that the Beetle additionally marks the return of an ancient, monstrous history when science and magic were synonymous and when knowledge and authority were situated in the Middle East and Africa.

The Beetle's origins in the Middle East, her emergence as a representative of a repressed past, and her association with chemistry all intersect in her physical form; she is a fluid being, capable of shifting between sexes, sexualities, and species. However, in these changes of state she remains consistently Other, physically marked by her ethnicity and religious beliefs so that no character who encounters her cannot help drawing attention to these attributes. The question that arises from what Ailise Bulfin calls the "overdetermined assertions of [the Beetle's] Egyptian-Arabian ethnicity" is why Marsh places so much emphasis on the Beetle's connection to Egyptian, Arab, and Sudanese culture when all other aspects of her characterization remain vague or unstable (430).[6]

[6] The critical consensus is that Marsh's references to both Egypt and Arabia signify his characters' (and also likely his own) adherence to nineteenth-century Orientalist and racist conceptions of Middle Eastern culture (Hurley 127-28; Luckhurst *Mummy's* 173; Wolfreys 22). For Judith Halberstam, the consistency of the Beetle's "foreign aspect" is in fact the cause of her unstable gender, sexuality, and species so that "the Beetle's Egyptian heritage produces her horrendous masculinity and her sexual depravity" (102). Such a reading lends itself to both Wolfreys's assertion that Marsh's depiction of the Egyptian Other focuses primarily on Egypt's "idolatrous and sensuous religion," and

Bulfin argues that the Beetle's "Egyptian ethnicity remains constant throughout the text," a reading that might initially appear too limited because other characters refer to the Beetle as "the Arab" in a more general sense (430). Holt and Atherton's belief that the Beetle's "blubber" lips and prematurely aged face reveal "a streak of negro blood" similarly seem to refute Bulfin's claim; however, the Beetle is also dressed in a "grimy-looking" burnoose "of the Arab of the Soudan" and her temple is located outside of Dongola, linking her with the Sudan and, by extension, the ancient land of Nubia (Marsh 53, 140, 103, 320). The Nubians, who appear in ancient Egyptian art with darker skin and larger lips, had been colonized by ancient Egypt and still reside in the Sudan—a region of particular interest to the British at the time of *The Beetle's* publication, one year prior to the re-establishment of Anglo-Egyptian rule there (Haynes; Wolfreys 22). The knowledge that the ancient Nubians had turned on their conquerors and ruled Egypt for ninety years would have only fuelled British anxieties of foreign invasion and reverse colonisation. Thus, by specifically locating the Beetle's origins in the Sudan, the novel evokes a history that could be repeated, resulting in the reverse colonisation of Britain by the once-colonial Other.

Fin de siècle fiction frequently depicts a threat of reverse colonisation from Africa and the East using monstrous creatures and women in possession of occult powers that are not only capable of entering Britain, but also of conquering it. In these narratives, as Stephen Arata argues, "what has been represented as the 'civilized' world is on the point of being overrun by 'primitive' forces ... in each case a fearful reversal occurs: the colonizer finds himself in the position of the colonized, the exploiter is the exploited, the

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Brantlinger's claim that Marsh's Egypt is "a source of evil ... diabolical magic [and] terror" (Brantlinger 181; Wolfreys 22).

victimizer victimized" (108). The horrors of reverse colonisation are two-fold in the three most prominent examples of African reverse colonization, *The Beetle*, H. Rider Haggard's *She* (1887), and Bram Stoker's *The Jewel of Seven Stars* (1903), because the beings who threaten to conquer Britain are not only of Egypto-Arab descent, but they are also female; their invasion of Britain thus reverses both the violence of colonialism and the subjection of women. However, the Beetle differs significantly from the queenly Ayesha and Tera of Haggard and Stoker's novels because, of the three characters, she is the only one to possess dark skin and a racially African appearance. Brantlinger notes that Ayesha's rule over the Armahagger, "the spawn of racial degeneration" reveals how, in Haggard's text, "only a white race—or, perhaps only *the* white race—can create a civilization" equivalent to Kôr and, by extension, ancient Egypt (166). In this way, despite her Eastern Otherness, Ayesha's whiteness, according to Victorian notions of race and authority, still represent the grand civilisation, scientific innovation, and nobility of an idealised, whitewashed ancient Egypt. On the other hand, the Beetle's emphatic lack of white skin serves as a disturbing reminder to Victorian Britons, who admired and appropriated ancient Egyptian culture, that the Egyptian civilisation—its art, its feats of engineering, its religion, and its science—was produced by Africans, not Europeans. While Brantlinger, Hurley, and Wolfreys all assert that *The Beetle* does not celebrate the ancient Egyptian civilisation (Brantlinger 181; Hurley 127; Wolfreys 22), I extend this reading of the novel to suggest that Marsh's apparent lack of appreciation for "Egypt's former grandeur" in fact expresses fears *of* that civilisation, specifically an African/ Eastern civilisation of empire-builders, advanced engineers, and scientists—including practitioners of astrology, metallurgy, and chemistry.

The Beetle's presence in London reflects concerns that the Middle East will return to reclaim the knowledge and authority that had been appropriated by the West for scientific practice and occultist rites. This act of reclamation does not occur in the East, but on British soil, and specifically within the homes of British citizens; this enables the Beetle to invade the heart of the very Empire that colonised her civilisation. My analysis of the novel focuses on the Beetle's infiltration of Atherton's laboratory, where she transforms from a being of nameless horror into an individual who bargains, reasons, and ultimately becomes another "victim of modern science" at Atherton's hand (Marsh 139). The uncanniness of the Beetle takes on a different form in the laboratory, even apart from her transmutations between human and scarab. Here in the laboratory, she reveals herself to be Atherton's antecedent and equal, forcing him to reconsider the nature of his "magic," that is, of his practice of chemistry. Victorian fiction literalises the anxieties of contemporary histories of science and even occultist texts—in particular, the fear that the East would rise to reclaim authority from those who would employ its discoveries yet also attempt to repress, or outright deny, their origins. At the heart of this fear, especially in regard to chemistry, is the idea that knowledge derived from Eastern and mystical sources would prove too unstable and threatening, not only to the British people, but to the supremacy of Western, materialist ideology. Thus, it is perhaps not surprising that the Beetle and her fictional contemporaries threaten to invade Britain, the very nation that colonised their homeland and appropriated both their practical and mystical knowledge.

As I outlined in Chapter One, nineteenth-century histories of science demonstrate how authors of the period, particularly scientists, struggled to acknowledge the ancient Egyptians' extensive scientific knowledge and, furthermore, the Egyptians' combined

practice of science and mysticism. Even those historians who chose to accept the Middle Eastern origins of chemistry worked to draw attention away from the ways in which early forms of the science were closely linked with religious rites and the unquestioned belief in such mythical objects as the philosopher's stone. For instance, in his *History of Chemistry*, Thomas Thomson notes that the ancient Egyptians were "much further advanced ... than the Greeks in their knowledge" of metals and dyes (64, 93); however, he is only able to do so after carefully distancing these practical applications from alchemy and the myth of Hermes Trismegistus (9). As late as 1891, in a history of chemistry translated from the German, Ernst von Meyer argues that "the Egyptians stand out from among the earlier civilised nations as having usefully applied their knowledge of chemical processes" so that both the Greeks and Romans owe "most of their knowledge of chemical facts" to the Egyptians (10, 1). To von Meyer, knowledge is significantly based in "facts" and "processes," which reveals that he, like Thomson, cannot associate chemistry's origins with anything less than a rational, quantitative science that satisfies nineteenth-century scientists' adherence to the ideal of a purely material science divorced from the mystical and occult associations claimed by occultists (Luckhurst, *Mummy's* 213). In this way, these science historians accept only the aspects of chemistry's history that support the image of chemistry they seek to construct for the Victorian public: a stable, respectable science devoted to industry, medicine, and solely practical research.

More extreme responses to ancient Egyptian science also emerge during the Victorian period as a direct result of colonialist ideology regarding the ability of non-Western civilisations to develop any form of science or assert any authority over the

production of knowledge. In the 1837 *History of the Inductive Sciences*, William Whewell dismisses claims that either the ancient Egyptians or the medieval Arabs influenced the development of chemistry. He argues that the Egyptians "had no theory, and felt no want of theory" because "the African and Asiatic nations" never "drew so strong a line between a fabulous legend and a reason rendered" (22, 25). The ancient Egyptians, among other Eastern civilisations, are, to Whewell, incapable of the inductive logic central to his conception of science—a post-Enlightenment study that not only values quantitative facts, but also distinguishes itself from "fabulous legend." Regarding the chemistry of the medieval Arabs, Whewell reveals that his rejection of Middle Eastern science is as heavily influenced by race as it is by his strict materialist views. These Arab practitioners, he argues, merely "followed their Greek leaders" in their studies of science while developments in the major physical sciences, including chemistry, were "left for the Europeans of the sixteenth and seventeenth centuries" to initiate (257, 258). Whewell thus positions Arab chemists in a subordinate role regardless of Thomson's in-depth discussion of developments made by those very practitioners in his earlier history. He furthermore creates a Eurocentric history of chemistry—and indeed of all the physical sciences—that erases the developments of Middle Eastern practitioners, including the very laboratory practices and materials still employed by Victorian scientists. Both the Arabs and the ancient Egyptians are, in Whewell's view, tainted by their Otherness, their race, and, perhaps most disturbingly for a scientific materialist, their integration of "fabulous legend," including, as in the case of the Arabs, the belief in the philosopher's stone, into their practices of science and medicine.

Equally problematic are the assertions by nineteenth-century occultists that the

vast knowledge of the ancient Egyptians could not have possibly been the product of African or Eastern civilisations. In *Isis Unveiled*, H. P. Blavatsky asserts that "what Egypt taught to others she certainly did not acquire by the international exchange of ideas and discoveries with her Semitic neighbours" because Egypt had "created wonders" while "proudly *secluding* herself within her enchanted domain" from the rest of Africa and the Middle East (515). Georgia Louise Leonard even more explicitly situates the true source of Egyptian knowledge in "an Aryan off-shoot from some primeval race whose history is lost in the night of time" (472). With this, Blavatsky and Leonard Westernise ancient Egypt for much the same reason as Haggard depicts Ayesha as white-skinned: to emphasise the supremacy of Western, or at the very least Aryan, knowledge of both the material and spiritual worlds. They recreate ancient Egypt as an isolated magical world, much like one of Haggard's lost civilisations, which thus divorces the Egypt of ancient history from its present state as a British colony—its peoples no more relevant to these occultists than the Armahagger are to the plot of *She*. The results of this careful separation are most visible in the writings of Florence Farr, High Adept of the Order of the Golden Dawn, whose *Egyptian Magic* describes the ancient Egyptian rite of spiritual alchemy for the benefit of modern occultists. In doing so, Farr assumes the authority to adopt the Egyptians' magic spells and mythological narratives for use in her Order's practices and, additionally, the plays she loosely based on Egyptian tales (Luckhurst, *Mummy's* 224). Ultimately, Farr, like Blavatsky and Leonard, creates the image of an idealised civilisation of physical beauty that values a belief in the spiritual world, but that carefully excludes the dark-skinned, mixed-race Egyptian of the nineteenth century. That this is the very type of Egyptian embodied by the Beetle indicates that the novel

interrogates the cultural assumptions which created the vast discrepancy between the fantasy of ancient Egypt and the realities of the nineteenth-century colony.

The Beetle reacts against the idealisation of the ancient civilisation to reveal the horrors of its peoples, their religion, and the science they developed. The body of the Beetle merges the mystical Egypt of history with its modern, supposedly degenerate progeny when she shifts between the "grimy" Arab man, the beautiful Egyptian maiden, and the divine scarab—the Egyptian symbol of resurrection (Marsh 130; Budge 38). When the Beetle returns to reclaim the Englishman who escaped her, she is also reclaiming authority over her knowledge, her religion, and her civilisation, all of which have been lost in some way to the West. The Beetle thus personifies Egypt, both ancient and modern, beautiful and monstrous, infiltrating London to enact her revenge on those who employ ancient Egyptian discoveries and attempt to repress, or outright deny, their origins. In this way, the novel functions as a commentary on what Denisoff calls "the act of writing history itself" with its chaotic narrative structure, its characters' reliance on hearsay, and, as I argue here, its depiction of Middle Eastern science and magic (6). Although there is no evidence that Marsh read these scientific and occultist texts, his engagement with chemistry, the occult, and Egypt in the novel reflects, at the very least, the cultural assumptions that influenced, and were in turn influenced by, these texts.[7] The Beetle is a fictional reminder of all the aspects of ancient Egypt and the Middle East that have been omitted from history, and her physical instability reflects the many distinct

[7] Denisoff notes that Marsh incorporates "elements of the Order that were already in popular circulation" even though he did not appear to be a member himself (7). The novel itself was also used by occultist Kenneth Grant for the New Isis Lodge's "ritual practices" because he "believed Marsh's novel had the only known literary reference to the Children of Isis" (7).

rulers of the region—Egyptian, Nubian, Arab, French, and British—over a period that spans millennia.[8] This long, complex history was as disturbing as it was fascinating to the Victorians, who attempted to simplify it by repressing what they viewed as its monstrous elements, such as its conflation of science and magic. However, in *The Beetle,* those monstrosities literally come to life to challenge the British idea of "Egypt" and, for Atherton, his understanding of what constitutes "science" and "magic."

3. Alchemy, Monstrosity, and Gender in the *Fin de Siècle* Imperial Gothic

A second significant aspect of the Beetle's role as a return of a repressed past pertains to the Beetle's affinity with *fin de siècle* female occultists and the monstrous females of the Imperial Gothic—among whom I situate the Beetle in her role as Priestess of Isis. These women, both real and fictional, blur the lines between science and magic in their study of the occult and material science, including chemistry. Note, for instance, how, of the authors I have discussed who openly discuss the intersections of science and the occult in the Middle East, most, if not all, are women—most notably Helena Blavastky and Florence Farr. Their male contemporaries A. E. Waite and Wynn Westcott conversely minimise the significance of chemistry's origins in the Middle East, as though the relationship between science, the occult, and the Middle East is incidental.[9] As one who practices "the debased, unclean, mystic, and bloody rites" of the Children of Isis, the Beetle fictionalises concerns regarding female occultists' work to reclaim authority and knowledge of the natural world through their study of occultism, which at the time

[8] See Kontou and Willburn 5.

[9] See Waite, "What is Alchemy?" *The Unknown World* 1.2 (Sept 1894) and 1.3 (Act 1894); Westcott, "Alchemy" *The Flying Rolls of the Golden Dawn*.

"represented itself as a learned science" (Marsh 297; Owen 90). Female occultists used this alternative form of science in reaction to the restrictive ideology that typically excluded them from the knowledge and authority offered by professional scientific practice and other positions of power. While the Theosophical Society and the Golden Dawn welcomed female members, including Blavatsky, Farr, Anna Kingsford, and Annie Besant, female leadership resulted in "gender antagonism" because some members "deeply resented female authority," or as one male member called it, a "petticoat government" (Owen 91). The Beetle can be read as a monstrous portrayal of these women who posed a threat to Victorian hierarchies in their roles as spiritual leaders, as well as their knowledge of both magical and scientific practices.[10] This portrait is most evident in the similarities between Blavatsky, who was "famed for her blazing, mesmeric eyes," and the Beetle's abnormally-large, "devil's" eyes, which contain "an especial degree" of "the mesmeric quality" (Luckhurst, *Mummy's* 214; Marsh 240, 105). In both cases, this "mesmeric" gaze renders one capable of controlling peoples' minds and, by extension, capable of subverting gender or, in the Beetle's case, racial hierarchies; mesmerism was, for Victorian occultists, a major example of an ancient Egyptian occult practice that offered the powers once wielded by the priests and priestesses of that civilisation. By linking their engagement with science and the occult with ancient Egypt, specifically the goddess Isis, these female occultists created the circumstances under which this ancient past of powerful goddesses and woman-kings could return and

[10] While Blavatsky and Farr discuss science in their writings, two other prominent female occultists actually practised physical science. Anna Kingsford, who became president of the Theosophical Society in 1883, was one of the first women in Britain to obtain a medical degree. Annie Besant wrote a series of articles on "Occult Chemistry" that sought to provide scientific validation of "astral vision" by experimenting with ether and gaseous elements.

overthrow the power structures of British Victorian society.[11]

Fin de siècle fiction responds to the transgressive female occultist, the relationship between science and the occult, and Victorian Egyptomania with depictions of Arab-Egyptian women who are alluring in their beauty, if horrifying in their power; yet in works of Egyptian Gothic fiction like *The Beetle*, *She* and *The Jewel of Seven Stars*, this power remains beyond the control of Victorian male professionals. Marsh's Beetle, Haggard's Ayesha, and Stoker's Queen Tera possess knowledge of magical and scientific practices that not only threaten patriarchal and colonial hierarchies, but also a scientific establishment that has worked to exclude both women and the occult. As in *Olga Romanoff* and *Zalma*, male protagonists in these texts react to these monstrous females with horror or disdain, rejecting the validity of both their authority and their practice of chemistry. For example, the narrator of *She*, Horace Holly, notes that "Ayesha was a great chemist, indeed chemistry appears to have been her only amusement and occupation. She had one of the caves fitted up as a laboratory, and although her appliances were necessarily rude, the results that she attained were ... sufficiently surprising" (184n). While Holly calls Ayesha a "great" chemist, he regards her work as merely an "amusement" that has "surprising" results, the latter of which suggests accidental outcomes, not logical methods. Holly cannot take Ayesha seriously as a scientist; at best he regards her as an amateur, and at worst he calls her a witch who, like Olga and Zalma, can be vilified and easily dismissed by the novels' male protagonists.

[11] The female pharaoh Hatshepsut, was of particular interest to Farr and Stoker as a woman who assumed ultimate powers as a political and spiritual leader. However, following her death, Hatshepsut's name and image were excised from monuments by her nephew, and this denial of her existence exemplifies the extreme reactions of patriarchy against women who threaten male authority (Hebblethwaite xxii-xxiii; Luckhurst, *Mummy's* 224).

Even in Stoker's novel, in which male professionals acknowledge that the ancient queen specialises in atomic energy, they still seek to appropriate her knowledge and control her powers, thereby reducing her to a vessel of ancient wisdom that would be emptied into British hands (Morrisson 26; Stoker 212).[12] In each case, knowledge and power remain in the hands of an Other in defiance of those representatives of British science who strive to classify and control all aspects, material and magical, of the natural world. Despite their apparent deaths at the end of each novel, these female characters retain their secrets, allowing such knowledge to be lost rather than relinquish it to their colonial rulers.

Of these three examples of the Egyptian Gothic, *The Beetle* would appear to be that which least engages with the history of chemistry because, unlike Ayesha and Queen Tera, the Beetle does not physically practice nor explicitly discuss chemistry; however, the manner in which the Beetle interacts with Atherton's "magic" does bring to light intersections between chemistry, magic, and the Middle East in the novel. This difference has led to a critical devaluation of *The Beetle*'s engagement with science and the occult, particularly in comparison to Stoker's *Jewel of Seven Stars*, which depicts a more obvious collaboration between modern science and ancient occultism whereby Egyptian magical practices are based in x-rays and other forms of radiation (Byron 56; Luckhurst, "Trance" 163; Morrison 26).[13] Meanwhile, Luckhurst suggests that, in *The Beetle*, the

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[12] In Stoker's novel, the archaeologist Trelawney, seeking to resurrect Tera for her "knowledge of lost arts, lost learning, lost sciences," exclaims "what is a woman's life in the scale with what we hope for!" (212). With this, Trelawney reveals his disregard for human, particularly female, life in the face of acquiring power over the natural processes of life and death. Luckhurst also suggests that the unwrapping of the queen's mummy aligns the acquisition of this knowledge with voyeurism and violence against the female body (*Mummy's* 174).

[13] In *Ayesha: The Return of She* (1904), Haggard also links his occult character's magic to the recent discoveries of radium and atomic transmutation so that Ayesha's magic is no

meeting of science and the occult is little more than "a generically 'comic' colonial encounter in which the native's primitive superstition is exploited by the westerner" (160, 162). Luckhurst does not specify whether he bases this interpretation on *The Beetle's* absence of a rational explanation for the Beetle's powers or because he views the novel as pitting science, *against* the occult with little or no blurring of the boundary between them. In reducing the novel's interaction between science and the occult to a "comic" encounter, Luckhurst overlooks the subtleties of the scenes in Atherton's laboratory, where the conflict is not that of "science" versus "magic," but rather of one form of magic against another when Atherton is forced to reassess both the chemistry he uses as a weapon and the magic the Beetle displays in his laboratory.

While Stoker and Haggard replace ancient magic with science, validating occult powers with a rational explanation so that "magic" merely signifies problems modern science has not yet solved, Marsh reverses the equation to characterise science *as* magic. Where his contemporaries seek to reconstruct the occult as quantitative and *known*, Marsh revels in the unknown. He refuses to provide closure and rational explanations of the novel's supernatural elements, which thus allows the monstrous past to continue haunting his Western characters. At the same time, the novel highlights science's affinity with the Beetle's powers in its most violent, threatening qualities as a tool for murder and torture, its unpredictability, and its reliance on secrecy and trickery. In such an alignment of a nineteenth-century science and ancient magic, which for Haggard and Stoker, results in the legitimization of that magic, *The Beetle* returns chemistry to its disreputable roots

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longer an unknown entity, but a practice of science lost for millennia. While this would seem to legitimise her magic in the eyes of modern science, Morrisson argues that it "only reveal[s] the ability of an even more advanced science to harness them [Ayesha's powers]" (Morrisson 27).

as a science of fantastical transformations and quests for power over life and death. The novel thus raises major concerns regarding the aims and practices of *fin de siècle* science, which he presents as an equal, if not potentially greater, threat to Victorian society.

4. Invading the "Wizard's Cave:" Chemistry as Magic

This process of challenges the boundary between science and magic also influences *The Beetle's* depiction of the relationship between chemistry and the occult by altering the dynamic between the text's representative of contemporary science—Sydney Atherton—and its supernatural, or irrational, elements. While the novel offers an overall negative depiction of the occult as a practice of "debased, unclean, mystic, and bloody rites," it also echoes the foundational tenets of nineteenth-century occultism. In so doing, *The Beetle* responds to growing concerns at the *fin de siècle* that "imperialism, scientific materialism, and other institutions of control and containment were failing to fulfill their mandate" (Marsh 297; Denisoff 6).[14] In the novel, neither materialism nor imperialism is capable of containing the occult being. The ease with which the Beetle thwarts these systems demonstrates their fundamental limitations, particularly in regard to their rejection of, or at least scepticism toward, the supernatural and Eastern authority of scientific practices. The Beetle attacks major foundations of British Victorian society, revealing the dark underside of representatives of the government, the scientific institution, and the ruling classes with her assault on an MP and his fiancée, her ability to baffle the legal and technological powers of detectives, and her infiltration into a

[14] See also A. Butler 99-100 and Morrisson 20.

chemist's laboratory.[15] Yet in this last, the Beetle's "attack" differs significantly because, rather than destroy her Western male usurper Atherton, she seeks his assistance in her quest for revenge. In a marked departure from her treatment of Holt, Lessingham, and Marjorie Lindon, the Beetle does not physically threaten Atherton, but rather regards him as an ally and equal. To the Beetle, Atherton both shares her hatred for Lessingham and is a fellow "magician" who possesses an extraordinary power over nature and other beings (Marsh 104-105). By treating Atherton as an equal, the Beetle as assuredly shatters the foundations of Atherton's scientific belief as she does the minds of Holt and Lindon so that Atherton has no choice but to acknowledge the affinity between his science and the Beetle's magic. Even when he does so, Atherton's "magic" still fails to classify, contain, or destroy the Beetle; her civilisation's integrated practice of science and magic remains beyond the comprehension of even the most radical representative of Victorian progress. The Beetle thus challenges how Victorians measure their "progress" in comparison to the incredible achievements of ancient non-Western civilisations.

Even beyond Atherton's interactions with the Beetle, the novel depicts him as a scientist uncomfortably caught between science and the supernatural. Initially, Atherton takes up the role of the Victorian materialist, like William Whewell, by denying the authority of the East and the occult, particularly in the creation of scientific knowledge. While he explains that his "attitude towards what is called the supernatural is an open

[15] See Margree 78-79. Moreover, the Beetle drives Lessingham to both "feminine hysterics" and murderous rages, leading him to strangle the Beetle in her guise as the Woman of Songs, then to later shake Atherton "as if he had been a rat" and fling him to the floor (Marsh 294, 245, 253). The Beetle's presence releases the violent potential of these upper-class gentlemen, a development that rests uneasily alongside the novel's romantic subplots, not only by challenging Lessingham and Atherton's roles as heroes, but also calling into question whether these specimens of the British gentleman will be respectable (or respectful) husbands.

one" and he is known for his interest in "ancient superstitions and extinct religions," his discussion of those subjects still requires a "scientific certainty" (Marsh 111). His need to situate subjects within a scientific framework not only limits his knowledge of the known and real, but it also emphasises his belief in the superior authority of Victorian science. Similarly, he claims an immunity to hypnotism because "the sensitive something which is found in the hypnotic subject happens, in me, to be wholly absent," and he is, as Jones notes, the only character capable of resisting the Beetle's mesmeric powers (Jones 76; Marsh 105). In his view, hypnotism is only capable of influencing "the weak and foolish," a designation which does not include "a man of my sort," whose adherence to reason should protect him from the weaknesses of the "foolish" and emotional (105, 144). However, his in-depth knowledge of hypnotism and his self-professed "open" attitude to the supernatural also work to align him with real-life chemist William Crookes, whose investigations of spiritualism led to later interest in Theosophy and admittance to the Order of the Golden Dawn (Morrisson 39; Owen 70).[16] The novel compounds Atherton's links to the occult by raising the possibility that Atherton is also a hypnotist. Marjorie Lindon claims that Atherton has "extraordinary eyes" and that she has "heard it said that he possesses the hypnotic power to an unusual degree, and that, if he chose to exercise it, he might become a danger to society" (194). Even if she is joking, Marjorie's statement implicitly aligns Atherton with the Beetle, who also possesses

[16] Oppenheim adds that Crookes, who, she argues, was very likely duped by spiritualist Florence Cook, "would scarcely be the first scientist whose self-confidence led to self-deception and whose technical expertise gave him a false sense of security" (342). This commentary applies equally well to Atherton's reactions throughout the laboratory scenes; however, rather than being misled into believing the truth of the Beetle's powers, Atherton is misled by disbelief, his confidence and expertise making him too sure of material science's superiority.

"extraordinary" eyes, as multiple characters report, and who uses her "hypnotic power" in just the way that Marjorie fears (Marsh 138, 288). That Atherton has both hypnotic abilities and a knowledge of occult practices serves to question his legitimacy as a Western scientist and supposed materialist; consequently, his practice of chemistry also becomes suspect, ambiguously caught, like that of Crookes, between practical and psychical research. In this way, if the Beetle, as an ancient occultist, is "the scientist of [her] time," then the reverse applies to Atherton, who thus becomes the magician of *his* time (Leonard 472). More disturbingly, this shared physical attribute and its dangerous potential creates a strong affinity between Atherton and the Beetle, revealing them both to be magicians, capable of controlling nature, life and death, and the minds of those around them.

Atherton's links to the occult both heighten his comparison to the Beetle and further erode the boundaries between science and magic, East and West, that initially appear to divide this scientist from the Oriental magician who infiltrates his laboratory. The novel draws subtle links between Atherton and the East, including at least two occasions when Atherton employs Anglo-Indian slang like "first chop" and "mouthful and a peg" (Marsh 99, 102). Wolfreys notes in his annotations to the novel that these "fleeting references" allude to the novel's "principle narrative concerning the Beetle's desire for vengeance," but he overlooks the concentration of these references in Atherton's narrative (98n2). Atherton's use of these terms in everyday speech suggest that he shares some close connection, whether through birth or someone who lived there, to India—incidentally a major site of Theosophical study (Owen 30-31). At the very least, the Anglo-Indian references in *The Beetle* function to distinguish Atherton from the

other upper-class characters as one who has not merely visited the East, but who has accepted, even unconsciously, the infiltration of Eastern-derived language, culture, and beliefs into his daily life and, more importantly, his practice of chemistry. Yet while the Beetle exists on the margins of London society, lurking in an abandoned suburban development, a string of boarding houses, and a third-class carriage, Atherton—with his compromising links to the East and the occult—is welcomed in ballrooms, the homes of the wealthy, and even Parliamen. Atherton is linked to the Beetle in a number of subtle ways, but their essential differences lies in their appearance. Ultimately, then, what the novel asks is which character poses the greater threat to society: the visible Other, or the popular inventor, equally capable of wielding a teacup and a chemical weapon? Atherton may have "some quality as of sunshine in his handsome face," according to the traumatised Holt (Marsh 83), but his perceived hypnotic power, his links to the East, and his unstable behaviour in the laboratory call into question whether this face disguises an immoral scientist, vivisectionist, and threatening Other.[17] It is he, not the Beetle, who holds some measure of control over the weapons the British military employs against other nations, colonial and otherwise; the Beetle may represent a monstrous past, but Atherton represents an equally monstrous and ambiguous future. By characterising Atherton in such a complex, contradictory manner, the novel shatters the barriers between

[17] A similar description appears in Wells's *Island of Doctor Moreau*, in which the narrator Prendick states that Moreau possesses a "serenity, the touch almost of beauty that resulted from his set tranquillity and his magnificent build" so that Moreau "might have passed muster among a hundred other comfortable old gentlemen" (131). Moreau's calm demeanor and respectable face is at odds with the violent nature of his research and the brutality with which he treats his creations. This manner of shrouding human monstrosity in "beauty" and "sunshine" recurs with Bulwer-Lytton's Margrave, Ellis's Zalma, and Griffith's Olga, all of whom share an extraordinary physical beauty that masks their immorality and madness.

scientist and occultist, as well as those between human and supernatural being, and British and Other, on which Victorian social hierarchies were founded. Ultimately, the novel reveals how these classification systems were comprised of empty signifiers—mere constructs that crumble under scrutiny and undermine both imperial and scientific authority.

The ambiguity surrounding Atherton and his practice of chemistry is also openly acknowledged by his non-scientist friends, who draw attention to Atherton's duality as a magician and a scientist; such views of chemical research reflect real-life tensions at the *fin de siècle* regarding a popular image of chemistry that still associated the science with sorcery and charlatanism (Beer 321; Willis 212). In the novel, Atherton's laboratory is literally an occult space—that is, secluded and private—where "it is [his] rule to take no one," yet his fellow characters treat it as anything but a "fortress, or ... Bluebeard's castle" when they burst through its door with an almost comic frequency, vocal in their recognition of what Gillian Beer calls the laboratory's "unaccountable power" (Marsh 157; Beer 322). Dora Grayling, a potential investor in Atherton's inventions, calls the laboratory a "wizard's cave," drawing attention to its seclusion and the unknown, almost magical, nature of the research undertaken there (154). Meanwhile, Marjorie Lindon more vaguely states that the laboratory is "uncanny" and Lessingham notes that "I never enter a place like this ... without feeling that I am crossing the threshold of the unknown" (Marsh 162, 109). This latter phrase suggests that the laboratory door is similar to the boundary between the material world and the world of spirits, like that found in Bulwer-Lytton's *Zanoni*, which is guarded by "the terrible Dweller of the Threshold" (2: 51).[18]

[18] The descriptions of the Beetle are strikingly similar to those of Bulwer-Lytton's Dweller of the Threshold in *Zanoni*, including the large glowing eyes, veiled female

For those outside of the scientific profession, Atherton's laboratory possesses a disturbing and otherwordly aspect that they associate with fantasy or unknown horror. The laboratory thereby evokes much the same response as "that uncanny house" where the Beetle lives—another English domestic space transformed by its occupant into a place of horror—and the Beetle's temple, where human sacrifices are "subjected to every variety of outrage," much like vivisected animals (60, 244).[19] The mingled fascination and horror these characters experience upon entering Atherton's laboratory suggest what Beer calls the "social fantasy" of "the sealed laboratory"; as Beer explains, this fantasy raises such questions as "What goes on there? Do we wish to know? Are we responsible for it? Or is the knowledge generated there the responsibility—and the property—of those who produce it?" which echo late-Victorian concerns regarding the regulation of laboratories and laboratory practices (Beer 321; Willis 209). In the novel, Marsh invites readers and other characters into the otherwise off-limits laboratory to freely discuss these questions so that Atherton is forced to re-examine the ethics of his practice, particularly his use of animals as test subjects for his Magic Vapour (Marsh 155-56). More importantly for the purposes of my argument, the references to the uncanniness of his laboratory lead him to confront the links between his research and the supernatural—links that, as a modern chemist, he has inherited from centuries of cultural assumptions that vilify chemistry.

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form, and insect-like mien (2: 69-70). A comparison between these two occult fantasy novels would be an area of interest for future research.

[19] The laboratory's horrors include Atherton's practice of vivisection, the accident that nearly kills Percy Woodville, and another that nearly kills Atherton himself. The amateur laboratory is unstable, both in its unclear division from the domestic sphere and its lack of professional regulation, and Marsh exaggerates this by characterising Atherton as a mad scientist, further challenging his position as the novel's hero. See Jones 77-78 and Willis 209-210.

The otherworldliness of Atherton's laboratory arises to a degree from the ignorance of these non-scientist characters, pointing to the increasing divide between specialised scientists and the public (even an upper-class, well-educated public), who proves as superstitious as the Eastern Other they fear and despise. However, these characters are also not misguided in regarding Atherton's laboratory with mingled horror and awe, the consequence of a long, conflicted history during which chemistry was at once a religious and practical science, as much associated with medicine as it was with gold-making and magic. Atherton, as an heir to this history, does not stray far from it in his practice in the eyes of outsiders; Lessingham explains in awe that the laboratory is "where a man is matching himself with nature, to wrest from her her secrets" (Marsh 109). This statement alludes to a Romantic, or more specifically Frankensteinian, vision of "man's scientific power ruling Nature" that contradicts the Victorian materialist's vision of "Nature's scientific laws ruling man" (Cosslett 7). Therefore, while Lessingham appears to express this sentiment in the abstract, his words mirror Atherton's desire to control "the life and death of nations" and ultimately play God. By linking Atherton to this desire for control—a sort of ultimate authority over nature, and perhaps all things—the novel reveals the corruption at the heart of Atherton's practice of science, and perhaps any use of science to create weapons of mass destruction rather than products that actually benefit society.

These characters' observations of chemistry-in-practice cater to the distrust of chemistry that is prominent in nineteenth-century fiction from Shelley to Wells, and *The Beetle* perpetuates, and to a degree justifies, that distrust in its depiction of Atherton and his research as brutal and destructive. Phrases like "wizard's cave" and "threshold of the

unknown" draw attention to the most damning facet of the history of chemistry, the practice of black magic and sorcery, and in so doing, the novel implies that Atherton's practice has not truly evolved from ancient and medieval magic. In the public imagination, the mystery and horror that surround the occult space where scientists practice their art continue to link nineteenth-century science with the crypts, workshops, and temples of history where "debased, unclean, mystic, and bloody" rites might occur alongside scientific discoveries, including such places as the Beetle's Temple of Isis (Marsh 297; M. Willis 212). Atherton's laboratory and other characters' perceptions of it function as reminders of a history of science suppressed by English scientists and historians; what appears in fiction as a sensationalised portrait of scientific practice is rooted in historical reality and, as Marsh postulates, also in Victorian reality.

These lingering reminders of the darker aspects of chemistry's history also extend to Atherton's own understanding of his science and, more importantly, its roots; he fails to recognise that his science has evolved from the ancient Egyptian practice of magic employed by the Beetle. When Atherton and the Beetle first encounter one another, they are faced with the unfamiliar that the other represents—ancient magic and modern science—and their first reaction is an attempt to classify one another, as I noted in the introduction to this chapter. The Beetle, in regarding Atherton as "*also* a magician," signals her acceptance of the label and Atherton as her equal (104). Atherton glibly dismisses the Beetle's use of "magician," assuming that she has "an evident lack of comprehension" of the gas mask he wears, which "covered ears and head and everything, something like a diver's helmet" (102). The mask makes him appear insect-like with its glass eyes and a smooth, shell-like head that, unbeknownst to him, mirrors the Beetle's

scarabaeus form and probably heightens the Beetle's perception of their affinity. Even once he has explained his use of the mask, Atherton continues to doubt the Beetle's understanding based on her apparent Eastern, and what he regards as her atavistic, origins (104). Yet the only real lack of comprehension is Atherton's own; his repeated misinterpretation of the Beetle's identity is based on a racist, colonialist perspective that is problematic for one who is regarded as "a specialist on questions of ancient superstitions and extinct religions," and who claims to believe that "the extinct civilisations knew more on some subjects than we do" (111, 176). Although Kelly Hurley goes so far as to call Atherton an "amateur Orientalist" because of his knowledge of Egyptian mythology and the Cult of Isis, Atherton in fact too readily dismisses the Beetle's claim that she is "of the children of Isis" (Hurley 138; Marsh 106). He proclaims, "this is London, not some dog-hole in the desert" in an attempt to distance Britain, and by extension himself, from all that the Beetle represents (Marsh 106).[20] Furthermore, in the scene that follows, he fails to connect Lessingham's questions regarding the "worshippers of Isis" with the Beetle's self-identification as one, revealing his indifference to her claim and more importantly to her voice (Hurley 130; Marsh 111). When faced with an apparent representative of contemporary Egypt, Atherton reflects the prejudices of nineteenth-century popular discourses on chemistry and the occult, which sought, if not to reject Middle Eastern claims to scientific authority, then to carefully distinguish modern Western science from ancient practitioners, most often on racial

[20] The Beetle replies to Atherton's statement with "Do I not know?" which suggests that she may in fact understand the differences (and similarities) between London and the "dog-hole" of her temple, as well as her frustration with Atherton's obtuseness (106). However, without additional context (such as the Beetle's own narrative), her meaning is too vague to be certain.

grounds.[21] At this point, Atherton's classifications operate in binaries that carefully separate science from the occult, Western and Eastern, modern and ancient; this causes him to misread not only the Beetle, but also himself and his science.

When Atherton calls the Beetle a "magician" and "charlatan," he strips the Beetle of legitimacy by setting her alongside stage magicians, illusionists, mesmerists, and charlatans, utterly unconnected to the professional, authoritative, Western science he aspires to practice. In response to the Beetle's claim that he is "also a magician," Atherton seeks to subordinate the Beetle's magic to his science, striking out any potential affinity between them; however, each time, the Beetle both evades his attempts to label her and forces Atherton to take a more aggressive stance in order to defend his authority, both scientific and racial. When Atherton states "I see you are a mesmerist," the Beetle rejects his label by replying, "I am nothing,—a shadow," thereby defining herself, quite literally, as occult, and thus beyond the scope of his science (105). Atherton counters by defining himself with greater specificity as "a scientist," and in doing so, he neglects the complex history that links "scientist" with "magician," an error that, as American occultist Georgia Louise Leonard points out, was common by the nineteenth century because "Magic ... has been so long degraded from its ancient meaning" of "the attainment of wisdom, and command over the hidden powers of nature" (472). Leonard asserts that this definition of magic, drawn from its ancient Egyptian usage, is equivalent

[21] I isolate the histories of chemistry that appeared in popular periodicals because Atherton's treatment of the Beetle and references to Egypt reflect the colonialist ideology of Dudley Costello and Georgia Louise Leonard rather than the more open regard for Egyptian and Arab achievements of Thomson and von Meyer. This suggests that Marsh drew from these popular characterisations of ancient Egypt and the Arabs, which in turn explains why his depiction differs so significantly from that of Stoker, who, in *The Jewel of Seven Stars*, appears to take inspiration from von Meyer in his discussions of ancient chemistry.

to modern definitions of science because the magician is "one versed in the secret knowledge, and an initiate into the arcane mysteries" so that "*he was the scientist of his time*" (472, italics original). This argument is not limited to Leonard; Farr's description of the ancient King-Priests and the "thoroughly scientific" principles of Egyptian magic similarly, if less explicitly, equates scientist, magician, and priest(ess) as part of a larger movement of occultists and Theosophists who "spoke of themselves as 'scientists' ... engaged in the true science—a thorough and open-minded investigation of the mysteries of the universe" (Farr; Owen 36). For these real-life occultists, the merging of scientist and magician offered a means of reclaiming power from sceptical materialists; however, the Beetle's use of "magician" also functions as a startling reminder of the way in which a *fin de siècle* scientist would appear to someone from the past. Atherton already has a problem with contemporaries regarding his research as magical, but this is only compounded when the Beetle views his research; to the Beetle, there is no other word than "magic" to describe Atherton's science. Therefore, Atherton's attempt at insult backfires because, in identifying himself as a scientist, he also identifies as magician, and in doing so, he inadvertently aligns himself with the very trickery and charlatanism he ascribes to the Beetle's magic. As his narrative progresses, Atherton increasingly uses his scientific tools as magic tricks and the novel pries the mask of objectivity and professionalism from Victorian science; it thus reveals, at its heart, the same instability, violence, and theatricality embraced by both the magicians of the Victorian stage and the priests of ancient Egypt.

During his second encounter with the Beetle, Atherton's understanding of his practice of chemistry drastically shifts from scepticism to a disconcerting acceptance, not

merely of its magical potential, but of its magical *reality*. This is not to say that Atherton comes to espouse mysticism or occultism; rather he exposes himself as a conjurer who lacks genuine knowledge of the natural world. After the Beetle's near successful attempt to hypnotise him, Atherton, in a rage, "endeavour[s] to do something which should make me equal to this gentleman of many talents" (145). His fury provokes him to use the power of modern science—an electrical machine—to "burn" the Beetle "to ashes," thus proving that he is "equal" to her and her "many talents" (145). Soon Atherton also seeks to prove himself superior, rather than merely equal, to the Eastern occultist in order to assert both his own dominance and that of Western science.[22] Any remaining claim Atherton has to professionalism and objectivity vanishes when he employs electricity and chemistry as little more than magician's props, essentially performing tricks to manipulate the Beetle. The sparks and electric bolts from Atherton's machine make the Beetle shake "with terror" and beg for mercy, a reaction that Atherton disturbingly finds "amusing" (145).[23] From this point, he loses all pretext of maintaining the division between science and magic with his claim that, while the Beetle may regard herself "to be something of a magician ... it happens, unfortunately for you, that I can do a bit in that line myself" (145). He quickly revises this claim of having only "a bit in that line," adding that "perhaps I'm a trifle better at the game than you are" because, as he reminds

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[22] This creates a strange reversal of *Jekyll and Hyde*, in which Hyde claims that his "transcendental medicine" is superior to Lanyon's "most narrow and material views" (Stevenson 76). In *The Beetle*, the materialist Atherton exhibits the same wild, unstable behaviour as Jekyll/Hyde while the Beetle cowers in fear.

[23] Atherton again misses the significance of the Beetle's behaviour. In Egyptian mythology, the god Set, an antagonist of Isis, is the god of violence, disorder, and storms. The electricity from the machine would have the appearance of lightning, and so the Beetle may regard Atherton as an agent of Set, or at the very least one capable of god-like powers.

the Beetle, the laboratory is his space—a "stronghold, which contains magic enough to make a show of a hundred thousand such as you" (145). Any possible distinction between science and magic collapses at this point because Atherton directly refers to chemistry, its tools, and its products as a "magic" spectacle that he keeps hidden away in his "stronghold" of a laboratory. There is no sign in the narration that Atherton is joking or expressing sarcasm; his anger toward the Beetle evokes an honest recognition that his science and his role as scientist are little more than a "game" or "show" at which he plays to impress friends, investors, and unsuspecting intruders. The climax of his magic "show" highlights the theatricality and violence of chemistry with a chemical reaction of phosphorous-bromide with air that results in a small explosion of flames and "blinding vapour" (145).[24] This trick so terrifies the Beetle that she transforms into a scarab, which Atherton takes for another "trick" or possibly "something new in scientific marvels," for the first time recognising the Beetle as a fellow scientist who "could give me as much instruction in the qualities of unknown forces as I could h[er]" (146). Although he still approaches the idea of magic with the materialist's scepticism by associating it with trickery and illusion, Atherton raises the question of where "trick" ends and "scientific marvel" begins. His concepts of science and magic blur, becoming unknowable and unstable, grounded in violent transformations, explosions, and penetrations. The magical reality of science is that its power is a mystery, capable of being used, even to a degree controlled, but always on the verge of chaos.

Throughout the remainder of this scene, Atherton uses "magic" in the place of

[24] This reaction is not accurate; Marsh makes it unrealistically dramatic. Phosphorous Tribromide reacts violently with water and only produces fumes when reacting with air ("Phosphorus Tribromide").

"science" even though the two so-called spells he uses against the Beetle—the electrical machine and a chemical reaction of phosphorus-bromide with the air—are purely scientific in nature. The more he interacts with the Beetle, the more Atherton accepts that his practice of science, first asking with hesitation whether he should "again … use my—magic" before he at last declares, "I will pit my magic against yours" (146, 149). With this final recognition that he is as much a magician as the Beetle , Atherton reinforces his earlier statement that he could learn as much from the Beetle as she from him; they are locked in a battle of equals. Even the Beetle's mesmeric powers and physical transmutation are not treated as fantasy, but as very real, tangible occurrences. Despite Atherton's disclaimer that he cannot swear that what he observed was more than a "performance," he still admits that "the mere possibility" of its reality "opens vistas which the sane mind fears to contemplate" (149, 150). The transformation, like that of Jekyll and Hyde, exists within the realm of possibility, accomplished by an ancient science yet unknown to Victorian practitioners and it exists, moreover, under the control of the East, not the West. By setting Atherton's realistic chemical reaction alongside the Beetle's magical change of state—that is, of species—the novel not only re-envisions science as magic, but also magic as science. As a result, *The Beetle* highlights how every scientific innovation will appear magical to the untutored eye. Atherton's research is, to his friends, at "the threshold of the unknown," but the Beetle's transformation offers another threshold that puts Atherton's chemistry into perspective as dramatic, superficial, and beneficial only to the government. The Beetle's ancient, Eastern science demonstrates a more complex knowledge of matter and energy that will continue to remain beyond the grasp of an imperialist-driven system of Western materialism,

particularly when it is controlled by such representatives as Atherton. In his narrowness, he continues to regard his "magic" as distinct from that of the Beetle—something that he can "pit" against her Eastern powers to assert the dominance of Western science. Yet as Atherton appears to devolve throughout the scene in his increasing brutality and trickery, the Beetle evolves into a skilled manipulator of atoms and bodies. This reversal situates Atherton in the role of modern magician and the Beetle in that of ancient scientist, thereby challenging hierarchies of authority in both science and society. If the binaries of West versus East and science versus magic can no longer be upheld, then what authority do scientific institutions and the British ruling class truly possess?

In the aftermath of this altercation, the slippage between science and magic persists, forcing Atherton to reflect upon his newfound understanding of chemistry, his practice, and Western scientific authority. When Dora Grayling calls Atherton's laboratory a "wizard's cave," Atherton says nothing to contradict her because at this point he recognises that he and the Beetle "had played together a game of bluff,—a game at which civilisation was once more proved to be a failure" (Marsh 154). On the one hand, the Beetle's transformation exceeded Atherton's efforts to "pit my magic against yours" (149). He is consequently haunted by "the strange figure of that Nameless Thing" who evades all classification and renders him incapable of "retain[ing] the normal attitude of a scientific observer" because he cannot comprehend her "trick" of physical transmutation within the framework of Western—and thus logical—scientific reasoning (154). Natasha Rebry argues that "the repeated play between his [Atherton's] 'magic' and the 'magic' of the Beetle" functions to emphasise "Atherton's dominance" as the only character able to resist the Beetle's mesmeric gaze and reduce her to a paroxysm of terror (189). Rebry

refers to Atherton's "magic" as "a masculine force ... which can overwhelm and overpower others either through psychic domination or the threat of mass annihilation," thus emphasising Atherton's penchant for violence on both a small and large scale (190). This reading, however, overlooks the notion that Atherton's "magic" is one and the same with Victorian chemistry and electricity. Thus, while Atherton's masculinity may well be, as Rebry and Jones contend, a dangerous, unstable energy, such a claim nevertheless overlooks how Atherton channels his "abundance of masculine energy" through his practice of science, a practice which enables him to "overwhelm and overpower others," particularly via the "mass annihilation" of his Magic Vapour, which, like the Beetle herself, kills one and seriously injures another (190; Jones 79). The novel implicates Atherton as a violent individual unsuited to his profession, but it equally, if not more so, implicates the science that enables him to wield extraordinary power and build his monstrous inventions. Civilisation is "once more proved to be a failure" because the Beetle reveals the theatricality and violence that rest just beneath the surface of Atherton's practice. Not only does this undermine his role as an enlightened scientific materialist, it also calls attention to the wider threat posed by his research and its use as a flashy, if deadly, tool for empire-building.

The problem with Atherton's practice of chemistry is that his interest lies not in its ability to heal or create, but in its potential to destroy. By focusing on the negative, rather than positive, uses of chemistry, the novel positions its chemist as an ambivalent figure representing science at the *fin de siècle*: both hero and villain, Atherton is a harbinger of progress and destruction. While in the drawing rooms of London society, Atherton plays the comic role of romantic foil, in the laboratory he transforms into a mad

scientist who gleefully pursues what he calls "the chase of splendid murder" (Marsh 107).[25] He furthermore shamelessly hypothesises how his Magic Vapour could cause "a hundred thousand men,—quite possibly more!—[to] drop down dead, as if smitten by the lightning of the skies" (Marsh 137). Atherton may be drunk when he claims that his Vapour can kill "hundred thousand men," but he is sober when he calls his research "the chase of splendid murder" and when he proposes to test his weapon on animals in South America (118). The novel includes these multiple dramatic exclamations in Atherton's narration to emphasise his instability: not only does Atherton appear to have a disturbing predilection for murder on a large scale, but he demonstrates a grievous disregard for the real consequences of his research.[26] His failure to take these consequences seriously leads to the drunken exhibition of his experiment in which he kills a cat—which Atherton uses in the place of Paul Lessingham—to test the Vapour and the accident that nearly kills Atherton's friend Percy (136-37). This scene proves that Atherton is not merely boasting, because he has indeed created a powerful gaseous poison, but it additionally shows how he treats his creation "carelessly," which he himself admits (137). Although Atherton is, with his drunkenness and clumsiness, almost a parody of the mad scientist, his narrative contains an underlying note of warning because it is never clear whether Atherton is jokingly referring to his weapon, choosing to distance himself from its horrific power, or

[25] See Hurley for her use of "comic" (136). Jones critiques Hurley's use of the term to emphasise the disturbing nature of Atherton's use of animal test subjects within the context of the anti-vivisectionist movement (78).

[26] Perhaps the only moment when Atherton approaches this understanding is when Lessingham asks him "how long is this race to continue between attack and defence," to which Atherton replies "until the sun grows cold" (Marsh 109). Atherton's narration all but disappears at this point, suggesting that he is deliberately omitting from his narrative his true feelings on the subject. See also Jones 76-77.

whether he truly cannot grasp immensity of its power, even when it nearly kills him. In these scenes, Atherton reveals that his research is little more than a game to him—something he can impulsively use against Lessingham and the Beetle out of revenge, not as a tool for progress. As an emotional, uncontrollable chemist, Atherton is an unstable character and an extraordinarily dangerous scientist. The novel significantly includes no alternative scientist character to offer a positive view of chemical research; instead, the novel's only representative of *fin de siècle* chemistry and, by extension, science, undermines idealised visions of Victorian progress and innovation.

At the heart of Atherton's instability is his practice of chemistry, which at once reflects and enables Atherton's unpredictable behaviour. When the Beetle first enters the laboratory, Atherton has before him a collection of poisonous gases, what he calls "the finest destructive agents you could wish to light upon," including "carbon-monoxide, chlorine-trioxide, mercuricoxide, conine, potassimide, potassium-carboxide, [and] cyanogens," the latter of which is more commonly known as cyanide (102). The Magic Vapour comprises some combination of these gases and provides the means to commit what Atherton calls "legalised murder" (102). The use of "legalised" here sets Atherton's Vapour apart from the chemical weapons of Olga Romanoff and Zalma because it reminds readers that Atherton's work is government-sanctioned and therefore legitimate. Atherton is male, upper-class, and ostensibly British; Olga and Zalma, on the other hand, are revolutionaries, marginalised as Eastern, female, and Other; their work is disparaged and rejected by the scientific authorities of their worlds. Atherton is no less a poisoner than Olga and Zalma, but he belongs to a system that protects his interests; his work as an inventor for the government ensures that he is never labelled as poisoner or magician

even while he openly accepts those labels, and, to a degree, shamelessly revels in their power.

The character of Atherton presents a startling change from the other pseudo-alchemists I have examined in this dissertation—Margrave, Jekyll, Olga, and Zalma—all of whom work on the margins of or against the dominant system of materialist, institutionalised science.[27] Despite his connections to the East and the occult, Atherton escapes punishment for his transgressions simply because he is working for, not against, those in power. He represents a very different future for chemistry, one that is no less monstrous yet has become inextricably integrated into the system; Atherton is a dangerous figure, but the government that sanctions, purchases, and benefits from his research and his weapons is placing its entire nation, and all others, at risk of annihilation. *The Beetle* thus demonstrates how Victorian science—its practices, ideology, objectives, and authority—is actually a corrupt force that poses an even greater threat to society than the unstable inventor who controls the fates of nations in a tiny pellet of gas. And both easily overshadow the threat of the Beetle.

The novel's depiction of chemistry becomes even more damning when placed in the context of the politics and military efforts of the late-nineteenth and early-twentieth centuries. The qualities of Atherton's Magic Vapour, from its ingredients to its effect on organic bodies, are comparable to the chlorine and mustard gases that would, less than two decades after *The Beetle*'s publication, be employed during the First World War (Jones 79; Marsh 102). There is, of course, a potential to read too much into the novel's

[27] The same applies to other mad scientists or chemists like Frankenstein, Wells's Moreau, and Griffin the Invisible Man, who openly defy the rules and hierarchies of institutionalised science and are ultimately punished for their transgression.

depiction of the Magic Vapour because twenty-first century readers have the benefit of hindsight, but as Jones argues, the novel does indicate that *fin de siècle* "Victorians were very aware of the gothic terrors haunting their energetic endeavors," especially those surrounding the extraordinary, if unnerving developments in science and medicine made during the 1890s (80). Jones rightly points to the novel's emphasis on the real danger inherent in Atherton's chemical experiments; the Vapour is intended for use outside of the laboratory by no less than the British government, and at the time of the novel's publication, British military conflict was primarily based in Africa, quelling rebellions in the Sudan and Egypt while, in the Transvaal, tensions were mounting between the British and the Boers. Like Dudley Costello, who appropriates chemistry as a uniquely English science optimised for the production of weapons, Atherton takes pride in using his invention "on behalf of [his] native land" to further oppress the very peoples whose ancestors first developed the science that made such weapons possible (Marsh 135). Although Atherton stubbornly overlooks the Eastern and occult origins of his chemical research, the novel's contemporary readers were exposed to these origins in both academic and popular mediums, fuelled by public interest in the progress of science, Egyptology, and the scientific potential of magical study. In this context, the altercation between Victorian science and Egyptian magic—or, alternatively, Victorian magic and Egyptian science—at the heart of *The Beetle* reduces these larger political concerns to a conflict between two representatives, rather than valorise the heroic British scientist, however, the novel tears away the mask of the civilised, rational West to reveal the mirror image of the chaotic, irrational East. The novel's depiction of the East is excessively negative, but so is its depiction of the West, which has appropriated the

knowledge and power of Eastern civilisations only to employ it to satisfy the egotism and greed of the Empire. By the end of the nineteenth century, chemistry had gained, if anything, a more terrifying reputation as a corrupt(ing) science of poison, sorcery, and charlatanism. Once chemistry rested in the hands of the government rather than a single, vengeful opportunist, it ascended to its twentieth-century role as a political tool of immense power, capable of levelling armies and, later, entire cities.

In examining *The Beetle's* fusion of science and magic, I come full-circle by returning to a text in which a sceptical materialist is coerced by representatives of the occult to acknowledge the existence of supernatural powers and re-evaluate the limitations of their Western materialist beliefs. Like *A Strange Story*, *The Beetle* uses the slippage between ancient magic and modern science to draw attention to the fragility of Victorian belief in the superiority of Western materialism. However, the differences between the two novels reveal the degree to which, during those thirty-seven years, chemical and occult research had blurred and, furthermore, pessimistic attitudes toward scientific progress had overwhelmed *fin de siècle* depictions of chemistry. While Bulwer's Fenwick is concerned with the Vital Principle, Atherton is concerned with mass murder, and is thus more comparable to the corrupt occultist Margrave in his lack of ethical considerations and the ease with which he murders animals that annoy him. More importantly, while *A Strange Story* concludes with the scientist's spiritual awakening to the existence of the soul, *The Beetle* contains no such redemption, offering no certainty regarding the supernatural being's destruction or any discernable change in the scientist's beliefs. Although the rapid events of *The Beetle* prevent readers from witnessing Atherton's reflection on his encounters with the Beetle, the novel's concluding narrator

explains that Atherton "continues his career of an inventor" following the events of the novel, but this narrator adds that Atherton has shifted "his investigations into the subject of aerial flight," and away, seemingly completely, from his previous study of chemistry (Marsh 321). This abandonment of chemistry for the purely mechanical science of aeronautics suggests that the Beetle's role as the return of a repressed past is successful; she reclaims the authority and knowledge of the Middle East, leaving the Western scientist to transfer his research to a science of engines and steel. While aeronautics is no less disturbing in its prospects than chemistry, it is safely removed from close links to both the East and the occult, and thus from the disruptive forces that exposed the true nature of both himself and his study of chemistry.

Even more disturbing than its blurring of science and magic, *The Beetle* brings to light the absence of any real boundary between the energetic progress of Victorian chemistry and the mystical, Eastern history it had, as part of the Victorian imperial enterprise, attempted to efface The novel's clash between Western and Eastern systems of belief emphatically fails to depict the triumph of nineteenth-century industry and ingenuity over the atavistic and superstitious beliefs of the ancient East. Even though the Beetle is stopped by the train crash, the novel offers no suggestion that Atherton's "magic" has any lasting detrimental effect on her abilities; indeed, she commits her most desperate acts of abduction, assault, and murder after Atherton's attack, as though spurred on by his violence. Furthermore, while in *A Strange Story and Jekyll and Hyde*, Bulwer-Lytton and Stevenson illustrate how chemistry and the occult can work collectively in fantastical and horrifying ways, Marsh goes one step further to equate the professional, rationalist scientist with the uncontrollable, occult Other. Atherton fills the

roles of Fenwick and Margrave, or Lanyon and Jekyll, and the fact that he ends the novel not only unpunished, but rewarded with marriage and funds for future research fulfills the bleak predictions of Bulwer-Lytton. Atherton represents a chemistry without a soul: a chemistry of warfare and murder that recognises no boundaries and that would, during the World Wars, be as often deployed against Britain as it would against her so-called enemies.

Coda: Transcending Magic: Alchemy and Chemistry Beyond the *Fin de Siècle*

> From the secrets of chemistry he passed into the spectral labyrinth of magic; and he who could be sceptical as to the power of the gods, was certainly superstitious as to the power of man.
> – Bulwer-Lytton, *The Last Days of Pompeii* (1834)

The novels I examine in this dissertation were published during a crucial period for both the development of speculative fiction and chemistry when innovations in the science expanded the limits of scientific possibility and encroached upon both the realms of speculative fiction and the supernatural. The discovery of natural atomic transmutation in 1901 and artificially induced transmutation in 1919 necessitated an alteration in perceptions of alchemy from the "nightmare" that Thomas Thomson claimed in 1830 was capable of "exposing [chemistry] to the scorn and contempt of the enlightened part of mankind" to a valid aspect of twentieth-century atomic theory (Thomson 1; Trenn 53, 54). The fantastical nature of atomic transmutation, and indeed of any phenomena related to radiation, took on the appearance of magic, and it is thus not a surprise that both scientists and the public described these new discoveries in the familiar, if long-derided, register, of alchemy. In the resulting explosion of interest in transmutation, miracle elixirs, and gold-making, early twentieth-century chemical discourse absorbed material alchemy into its language and practice (Morrisson, "Alchemy" 24-25; Trenn 54). This "New Alchemy," as journalist F. Legge argued in 1903, replaced "the magician's wand" with "the electroscope" and exchanged "mystical for rational methods" that are "diametrically opposed to those of the old" (19). Although Legge, like Thomson, scorns alchemy's associations to the occult, his treatment of these associations reduces the "nightmare" of the 1830s to "meaningless gibberish" and magic wands. Yet, even as

Legge's comments indicate that the nightmare of chemistry's origins might have at last been put to rest, they also more dangerously suggest that the runes and wands of alchemy are merely being replaced by new formulae and tools that performed the same function. Legge may be "quite sure" that "the new alchemists" have evolved a new practice "diametrically opposed" to ancient alchemy, but his certainty in the progress of science is undermined by his use of the old labels of alchemy and alchemist (19). If this direction of chemistry was truly "new," then why did scientists not develop an equally new language devoid of reference to alchemy, or, for that matter, to any aspect of chemistry's origins? The lingering spectre of alchemy in chemical discourse until World War II calls attention to the persistent influence of chemistry's past, not only on the physical practice of chemistry, but also—and more importantly—on the public perception of chemistry.

Alchemical theory offered a language to describe the extraordinary energy and transformations of matter observed in radioactive elements, phenomena that included luminescence, ray emissions, and a substance's transformation between isotopes or, in cases like thorium, between elements. This language would eventually evolve into the field of nuclear physics, but, during the 1920s and 30s, alchemy remained entrenched in chemical theory and practice, not only from the efforts of the popular press, but also scientists themselves, many of whose textbooks included "modern alchemy" in their titles (Morrisson, *Modern* 5). Terms like "transmutation" and the "Philosopher's Stone" became so normalised in popular discourse that groundbreaking discoveries, in particular Ernest Rutherford's successful artificial transmutation of nitrogen, failed to astonish either the public or the scientific community. According to Thaddeus J. Trenn, Rutherford's experiment was "warmly applauded for also having finally given

convincing experimental evidence for transmutation"; however, Trenn adds, "by 1919 such evidence was no more unexpected than the rising sun at dawn" because the scientific community and the public had only been waiting for verification of a hypothesis they were already certain was true (54). This normalisation of alchemy significantly contrasts with the violent rejections of alchemy by, for example, Whewell and Brown, yet it is also a direct descendant of Faraday's assertion that innovations in chemistry had gone "far to vindicate many opinions of the alchemists" in that it only pertains to the material aspects of alchemical practice (Faraday 7). Although Morrisson argues that "landmarks of atomic science occurred alongside an efflorescence of occultism that ascribed deep significance to questions about the nature of matter and energy," the spiritual elements of alchemy were conspicuously absent from a scientific discourse that was largely focussed on transmutation and unresponsive to occultist experiments with chemistry (*Modern* 5, 92). The ability to ascribe material scientific causes to seemingly supernatural phenomena encouraged a continued division between material and spiritual alchemy that resulted in, at either extreme, Carl Jung's study of alchemical symbolism in *Psychology and Alchemy* (1944) and science historians Newman's and Principe's claim that alchemy had no connection to the spiritual prior to the nineteenth century (35).[1] The apparent acceptance of alchemy by institutional chemistry only perpetuated the marginalisation of the occult and the otherworldly from professional practice. In this failure to reconcile science and spirituality, the early twentieth century brought to life the very future that Bulwer-Lytton feared in the conclusion of *A Strange Story*: the product of a soulless, selfish science as capable of creating life as destroying it.

[1] See also Călian 170-172.

The practice of a purely material form of alchemy opened new avenues of speculation to turn-of-the-century authors seeking to capitalise on the new chemistry and its potential; consequently, the source of "nightmare" shifted from a monstrous history toward an equally, if not more, monstrous future. *Olga Romanoff, Zalma,* and *The Beetle* already demonstrate how this shift emerged in the 1890s with their depiction of chemical weapons, ray-guns, and aerial warfare alongside mind-control potions and occult creatures. However, this shift is perhaps best exemplified by Wells's *The Invisible Man*, which dispenses with the historical allusions and supernatural incursions that were characteristic of the depictions of chemistry in each of the texts I examined in this dissertation. Wells's chemists are not haunted by the origins of their science in alchemy, the occult, or the East, but by the chaotic future that the Invisible Man threatens. The text thus offers a troubling vision of chemistry at the turn of the twentieth century, when the boundaries and contrasts crucial to the other texts in this dissertation appear no longer necessary to establish. Wells' novella offers an example of how *fin de siècle* chemistry, with its new understanding of atomic structure and rapidly expanding periodic table, inspired authors to focus on the horrors of future, rather than historical, chemistry.[2] Ultimately, the only real "spectre" of *The Invisible Man* is the Invisible Man himself: a creature of chemistry who becomes monstrous as a result of his megalomania, his alienation from institutional science, and the ignorant fear of a society incapable of rationalising extraordinary discoveries regardless of their scientific basis. Yet the

[2] Texts like Stoker's *The Jewel of Seven Stars* continued to feature monstrous revivals of chemistry's origins, but, as Morrisson notes, Stoker's novel also "bring[s] the ancient science into line with cutting edge modern atomic science" so that the seemingly magical powers of Queen Tera are in fact based in atomic energy and radiation (*Modern* 27). Whether narratives like *Jewel* reduce magic to science or elevate science to the limitless potential of magic—or vice versa—would be a fascinating avenue for future study.

eponymous character struggles against a language that persistently aligns the limits of science with the supernatural, and, when he first devises his invisibility potion, he exclaims, "to do such a thing would be to transcend magic" (79, 92). Thus, while *The Beetle* suggested that chemistry was its own form of magic and its practitioners the new magicians, *The Invisible Man* goes one step further by characterising Griffin's science as so advanced that its results are not indistinguishable from, but *greater than*, magic.

Griffin's word choice marks a significant point in the development of what twentieth-century critics have defined as "science fiction" because it highlights the monstrous potential of chemistry to offer its practitioners a god-like control over nature without recourse to supernatural means. Indeed, the science behind Griffin's invisibility can be fully explained with theoretical optics and the chemical composition of blood, unlike the deliberately mystifying descriptions of Margrave's and Jekyll's occult experiments. But, as in *Zalma* and *The Beetle*, the horror lies in the real-world science that informs Wells's depiction of chemistry and, consequently, brings the realm of speculation ever closer to reality. It is this horror that lingers beyond the conclusions of the 1890s narratives I have examined: Olga and Zalma leave their worlds in states of anarchy, Atherton continues to design war machines, and in *The Invisible Man*, Griffin lives on in his notebooks, in which he recorded "the subtle secret of invisibility and a dozen other strange secrets" (150). Wells leaves these "strange secrets" as unknowns that, in their very refusal of classification, evoke horror because they might result in the same devastation as Griffin's invisibility; they might produce more monsters or find other means of emphasising the uncomfortable proximity of science and magic. Certainly Griffin's real-life contemporaries uncovered numerous "strange secrets" that challenged

nineteenth-century theories of matter and light, or that repeatedly demanded new models of atomic structure, like J. J. Thomson's discovery of the electron, also published in 1897, or Rutherford's studies of radiation and ray emanations (Morrisson, *Modern* 6; Trenn 56). Nevertheless, the optimism surrounding the miracles of "modern alchemy" halted abruptly in 1945, when the destruction of Hiroshima and Nagasaki revealed the devastating realities of atomic energy and radiation (Morrisson, "Alchemy" 27). Chemistry did ultimately transcend magic, but in doing so, it again became, like the Invisible Man, a source of horror that its present-day practice has yet to surmount in the wake of the nuclear disasters, chemical spills, and our continued reliance on chemical weapons.

The depiction of chemistry in *The Invisible Man* provides an example of the next step in the century-long process of Victorian authors who struggled with the troubling past, present, and future of chemistry during a period of rapid, revolutionary developments. Wells would again explore the monstrous future of chemistry in *The World Set Free* (1914), but additional research is needed to uncover more examples of early-twentieth century fiction that feature chemistry. While Morrisson has already examined the influence of alchemy on the scientific and public discourse about chemistry from the 1890s to the 1930s, the depiction of chemistry in the speculative fiction of that same period—during the rise of the pulp science fiction magazine—remains a subject of untapped potential for scholars of science and literature. Such research may help reveal why, with the exception of the continued popularity of poisons in detective fiction, literary depictions of chemistry continue to be curiously rare in comparison to fields such

as biotechnology, genetics, and cosmology (Ball 47, 48; Labinger 55. 56).[3] Mainstream literature and science fiction have largely overlooked chemistry in favour of sciences that evoke a greater horror with the unknown possibilities of cloning, genetic modification, and space exploration. However, chemistry does make constant appearances in recent horror and fantasy narratives that, moreover, call attention to the same associations between chemistry, alchemy, and the occult that persist in the popular imagination. For example, the Neo-Victorian television series *Penny Dreadful* (2014-) revives such fictional chemists as Frankenstein and Jekyll in a universe of occult magic, in which they employ their radical science to assist the protagonist in the battle against demons and witches. Perhaps more notable is the revitalization of alchemy's history in J. K. Rowling's *Harry Potter and the Philosopher's Stone* (1997), which directly links that history to the magical world's equivalent of modern chemistry: "the subtle science and exact art" of Potions that enables its practitioners to "bottle fame, brew glory, [and] even stopper death" (102). These traces of the occult in depictions of chemistry in recent fantasy and horror reveal that, although alchemy's spiritual elements were both strategically side-stepped and heartily dismissed in the absorption of alchemy into mainstream chemical practice, they could not be erased. Instead, they live on in the darker corners of the imagination, at once shaped by and shaping continuing concerns regarding the uses and abuses of chemistry.

[3] *Chemistry and Science Fiction* provides brief lists of twentieth-century stories that feature chemistry. However, in cases such as Michael Crichton's *The Andromeda Strain*, chemistry is not the focus of the story, but merely a means to analyse a virus (Stocker 271). The brevity of the lists is in itself revealing when one takes into account the vast number of science fiction stories published during the twentieth century.

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