

Gods and Ghost-Light:

Dobson, Eleanor

DOI:

[10.1017/S1060150316000462](https://doi.org/10.1017/S1060150316000462)

License:

Other (please specify with Rights Statement)

Document Version

Peer reviewed version

Citation for published version (Harvard):

Dobson, E 2017, 'Gods and Ghost-Light: Ancient Egypt, Electricity, and X-Rays', *Victorian Literature and Culture*, vol. 45, no. 1, pp. 119-135. <https://doi.org/10.1017/S1060150316000462>

[Link to publication on Research at Birmingham portal](#)

Publisher Rights Statement:

Dobson, E. (2017). GODS AND GHOST-LIGHT: ANCIENT EGYPT, ELECTRICITY, AND X-RAYS. *Victorian Literature and Culture*, 45(1), 119-135. doi:10.1017/S1060150316000462
© Cambridge University Press 2017

General rights

Unless a licence is specified above, all rights (including copyright and moral rights) in this document are retained by the authors and/or the copyright holders. The express permission of the copyright holder must be obtained for any use of this material other than for purposes permitted by law.

- Users may freely distribute the URL that is used to identify this publication.
- Users may download and/or print one copy of the publication from the University of Birmingham research portal for the purpose of private study or non-commercial research.
- User may use extracts from the document in line with the concept of 'fair dealing' under the Copyright, Designs and Patents Act 1988 (?)
- Users may not further distribute the material nor use it for the purposes of commercial gain.

Where a licence is displayed above, please note the terms and conditions of the licence govern your use of this document.

When citing, please reference the published version.

Take down policy

While the University of Birmingham exercises care and attention in making items available there are rare occasions when an item has been uploaded in error or has been deemed to be commercially or otherwise sensitive.

If you believe that this is the case for this document, please contact UBIRA@lists.bham.ac.uk providing details and we will remove access to the work immediately and investigate.

Gods and Ghost-Light: Ancient Egypt, Electricity, and X-Rays

By Eleanor Dobson

In a few minutes there was no doubt about it. Rays were coming from the tube which had a luminescent effect upon the paper. I tried it successfully at greater and greater distances, even at two metres. It seemed at first a new kind of invisible light. It was clearly something new, something unrecorded.

-- Wilhelm Röntgen

Last night I was hardly able to sleep, from the strong impressions made on my mind by the stupendous discoveries and results of experiments by Mr. Whetstone [sic] on electricity, and his most ingenious mechanical apparatus for an electric telegraph. . . . It far exceeds even the feats of pretended magic, and the wildest fictions of the East.

--W. J. Copleston

IN 1892 THE CELEBRATED PHYSICIST and chemist William Crookes commented on the existence of “an almost infinite range of ethereal vibrations or electrical rays,” which he believed could revolutionize telegraphic communications (174). A few years later, and aided by Crookes’s experiments with vacuums, the German physicist Wilhelm Röntgen successfully produced X-rays, a hitherto unrecorded form of electromagnetic radiation, which he tantalizingly described as “a new kind of invisible light” (Röntgen 413; Warner 256). Crookes was quick to speculate as to “the possibility of links between roentgen rays and the cerebral ganglia,” that an undiscovered organ in the brain might be “capable of transmitting and receiving . . . electrical rays” (Lyons 105; Crookes 176). X-rays, he thought, might prove a psychic counterpart to higher wavelength radio waves, allowing the transmission of

messages telepathically rather than telegraphically, and even communication with the world of the spirits (Lyons 105). Crookes theorized that the parapsychological was intimately entwined with the findings of contemporary physics, occupying different zones of the same electromagnetic spectrum. An ardent Spiritualist, he believed that the ether, the “impalpable, invisible entity, by which all space is supposed to be filled” and which contained countless “channels of communication” also sustained “ghost-light . . . invisible to the naked eye” and acted as a medium that allowed “ethereal bodies to rise up” (Crookes 174; Warner 253-56). In other words, the matter through which light and electrical signals passed was envisaged as the same substance which allowed the spirits to fluctuate between visible and invisible forms. These links between the electromagnetic field and the occult, endorsed by Crookes and certain other members of his circles such as the Society for Psychical Research, anticipated turn-of-the-century associations between electricity, radiation and ancient Egypt which, through its reputation as the birthplace of magic, was central to Victorian conceptions of the supernatural.

Victorian fascination with ancient Egypt has received a wealth of critical attention in recent years (Gange; Luckhurst, The Mummy’s Curse; Brier, Egyptomania; Willis, Vision, Science and Literature). This article seeks to contribute to this burgeoning critical conversation through an investigation of the connections between ancient Egypt and the electromagnetic spectrum in the late nineteenth and early twentieth centuries, emphasizing the way in which the ancient civilization somewhat paradoxically symbolized and was explained via the imagery and language intrinsic to this aspect of late Victorian modernity. More specifically, my analysis of how ancient Egypt was viewed through the lens of physics and vice versa reveals a broader trend that saw the modern defined by its relationship to antiquity, cutting edge science aligned with alchemy and a peculiar exchange between the figures of modern scientist and ancient god. I suggest that modern scientific discoveries

including novel electrical phenomena, X-rays, and radioactivity, evoked the magical, facilitating their employment by popular authors for the conception or visualization of ancient Egyptian supernaturalism via the language of the technological sublime. This is something specific to Egypt. Fred Nadis records that towards the end of the nineteenth century “imagining medieval times, exotic locales, or golden pasts” provided “escapes from [technological] modernity” (11); when antiquity was evoked in relation to physical discoveries, it was in order “to remind readers of how different the ‘modern’ world was from the ‘ancient’ world” (59), yet as this article demonstrates, representations of Egypt did not always harmonize with these views of antiquity as scientifically or technologically distant. While narratives of mummy reanimation via electrical means had their roots in the early decades of the nineteenth century – Jane C. Loudon’s futuristic triple-decker The Mummy!; A Tale of the Twenty-Second Century (1827) features the galvanic resuscitation of the Egyptian pharaoh Cheops, heavily influenced by Mary Shelley’s Frankenstein (1818) – it was not until the fin de siècle that ancient Egyptian characters would seize electricity for themselves, usurping the Western scientist and asserting their own superior intellectual enlightenment. In a movement away from the reassuring Darwinian notion of progress over time, it was the fiction of the late Victorian era that saw modern electrical phenomena mastered by ancient hands: it was for modern science to rediscover these advanced ancient techniques. Resultantly, this study challenges our perceptions of fin-de-siècle degeneration; rather than the criminal, the vampire, the dandy, or the New Woman, these narratives reveal a broader notion of societal degeneration that does not typecast or stereotype the individual. As Virginia Zimmerman, correctly states, “[f]ears of degeneration arose out of racist anxieties about contamination from already degenerate people (at home and abroad)” (14-15). Yet the narratives I address reveal a counterpoint to this fear that degeneration might occur, or indeed, was presently occurring. Rather, intellectual degeneration across society had already

transpired since a cultural and scientific peak in antiquity, leaving modern science endeavoring to duplicate the technologies of the past, and the most ancient of civilizations. Most significantly of all, this belief was not confined to the pages of fiction, but was entertained by some of the great scientific minds of the age.

*

That ancient Egypt may have been more scientifically advanced than modern Western civilization was, by the late nineteenth century, a familiar idea. The pyramids were lauded as miraculous feats of engineering on a par with modern railways, constructed using jewel-edged tools that anticipated nineteenth-century diamond-tipped drills (Gange 156). The general belief that alchemy had originated in Egypt, and that the practice had even inherited its name from the country's ancient title "Kemet," resulted in an enduring association between ancient Egypt and scientific sophistication (Colla 21; Elliott 1). As Patrick Brantlinger observes, within nineteenth-century literature, mummy stories were particularly quick to pay homage to the advanced wisdom of ancient Egypt (81). One of these tales, Arthur Conan Doyle's short story "The Ring of Thoth" (1890) features an ancient Egyptian who has lived for centuries as a result of ingesting an alchemical elixir of life. To the Egyptian, the secret behind his extreme longevity is "simply a chemical discovery" that Western civilization has yet to duplicate (Doyle 55). The text is saturated with references to modern apparatus in an ancient setting including test-tubes, distillers, and injecting devices, which facilitate experiments conducted in ancient Egyptian temples turned laboratories (55, 58). In creating this hybrid space characterized by its simultaneous antiquity and modernity, Doyle responds and contributes to an on-going association between the latest scientific breakthroughs and alchemy as the fabled pinnacle of scientific refinement.

By the time Doyle wrote "The Ring of Thoth," other authors including Edgar Allan Poe and Grant Allen had published fiction facetiously suggesting that ancient Egyptian

achievements in science and engineering matched or surpassed their Victorian equivalents. In Poe's tale, "Some Words with a Mummy" (1845), the reanimated Allamistakeo reveals that his ancient civilization had superior microscopes, and equivalents of the railway and steam engine, while in Grant Allen's "My New Year's Eve Among the Mummies" (1878), first published under the nom de plume J. Arbuthnot Wilson, the protagonist stumbles upon a group of mummified Egyptians who enjoy the benefits of watches, chloroform, and "brilliant gas-lamps" which, when lit with a lucifer match, illuminate the interior of their pyramid tomb (Poe 369-70; Wilson 101-03). In these satirical texts, where any hint of narratorial earnestness is undermined by the likelihood that the events described are merely dreams, the Victorian present does not necessarily symbolize progress or innovation. Although ancient Egyptian civilization is long gone, its scientific achievements continue to outshine those of the modern Western world.

Suggestions were made elsewhere, with varying degrees of sincerity, that the ancient Egyptians had known of electricity and had succeeded in harnessing its power. The eminent astronomer Norman Lockyer wrote about his experiences examining ancient Egyptian sites in The Dawn of Astronomy: A Study of the Temple-Worship and Mythology of the Ancient Egyptians (1894). Searching for evidence that ancient Egyptian laborers had worked by torchlight, he notes that "in all freshly-opened tombs there are no traces whatever of any kind of combustion having taken place, even in the inner-most recesses" (180). Unable to explain the lack of evidence of more elementary light sources, Lockyer recounts how he and his companion joked of "the possibility that the electric light was known to the ancient Egyptians," noting that the delicate paintwork on the walls of the tombs could not have been completed using natural light reflected from systems of mirrors, as others had previously suggested (180).

The occultist Helena Blavatsky entertained the belief more seriously, writing of the accomplishments of ancient civilizations in her first major work Isis Unveiled (1877). She claims that each new modern scientific revelation is overshadowed by the inevitable “possibility, if not certainty, that the alleged discovery was not totally unknown to the ancients” (526). The specific example she provides laments that abundant “proofs to the contrary” are not changing the erroneous general consensus that in ancient Egypt electricity was undiscovered and unharnessed (526). Other notable figures who credited ancient civilizations with knowledge of electricity include Marie Corelli, whose supernatural novels often rely on elements of scientific theory. Corelli united concepts from Christian Science, Spiritualism, and Rosicrucianism, which itself drew upon medieval alchemical traditions and ancient Egyptian theology, creating her own unique belief system that exalted electricity’s occult possibilities (Stiles 163-65). Knowledge of electrical forces, Corelli emphasized, was readily available to the ancients, and was only just being rediscovered by contemporary scientists (Kershner 73).

This article focuses on works by two of Corelli’s celebrated contemporaries: H. Rider Haggard and Bram Stoker, authors who achieved success in the late nineteenth century, and continued to weave contemporary science into their fictions into the twentieth. Haggard’s short story “Smith and the Pharaohs” (1912-13) reveals the influence of late nineteenth-century scientific showmanship and electrical light displays, while both this text and Stoker’s novel, The Jewel of Seven Stars (1903; 1912), turn processes of analyzing mummies through X-ray radiography on their heads: the mummy becomes the scientist, and its funerary paraphernalia become the emitters of radiation in a reversal of the ancient and modern. With discussions of ancient knowledge of electrical power – however tongue-in-cheek – already part of the wider cultural interest in this fabled civilization, these authors both react and contribute to shifting attitudes towards ancient Egypt. With the late nineteenth-century

magical revival came a growing acceptance that ancient Egyptian spells – or indeed, curses – might retain their potency in the modern world (Luckhurst, The Mummy's Curse 206, 213). Haggard and Stoker augment this sense of Egyptian antiquity's preeminence, by simultaneously denoting Egypt's superior or comparable scientific advancement through references to the phenomena and stunning visual effects that contemporary scientists could produce, and in the influences that these pioneers had on the ancient Egyptian characters depicted their works. As a consequence, ancient Egypt and the most remarkable scientific discoveries of the present day became unlikely bedfellows.

I. Electricity as Spectacle

IN A SCIENTIFIC PARALLEL to Webb's fictional electrical reanimation of a mummy inside the Great Pyramid itself, electrical phenomena were known to occur in the vicinity of Egypt's most iconic architectural structures, which were, like ancient and modern obelisks, frequently topped with a metallic pyramidion made from materials with high electrical conductivity.¹ The German inventor Werner von Siemens, whose company manufactured the tubes with which Röntgen studied X-rays, recounted a peculiar experience in Egypt as he took some time away from laying telegraphic cable in the Red Sea in 1859. Standing at the summit of the Great Pyramid during a sandstorm, he notes in his Personal Recollections (1893) that he and his engineers could hear "a remarkable hissing noise" (186). Even more curiously, when one of his Arab guides lifted "his outstretched finger above his head a sharp singing sound arose, which ceased as soon as he lowered his hand" (186). Siemens raised his own finger and felt "a prickling sensation," which he deduced to be the result of an electrical phenomenon when he felt "a slight electric shock" as he attempted to drink from a wine

bottle (186-87). In a moment of inspired ingenuity, Siemens fashioned the wine bottle into a rudimentary Leyden jar, which he charged by holding it aloft, producing “loud cracking sparks” (187). The guides, believing the static electricity to be the result of “magic” which might damage the pyramid, requested that Siemens and his men leave (187). When he refused, one member of the group attempted to forcibly remove him, provoking Siemens to use the wine bottle as an electrical weapon. Touching his attacker on the nose, Siemens felt a “strong concussion,” noting that the guide must have had a much more “violent shock” as “he fell speechless to the ground, and several seconds elapsed, . . . before with a sudden cry he raised himself, and sprang howling down the steps of the pyramid” (188). Here Siemens adopts a role somewhere between the stage magician and the physicist. With theatrical execution, he harnesses the unusual electrical properties of the Great Pyramid, something which had already been described in earlier fiction featuring the reanimation of mummies, including Webb’s tale, which sets the resurrection scene within an inner chamber. In a reversal of the mummy reanimation plot, bringing the lifeless subject to a state of consciousness, Siemens utilizes electrical force to render the conscious subject cataleptic, at least for a few seconds.

By the closing years of the century, the image of the Westerner inspiring fear in Egyptians through demonstrations of electrical power also made its way into fiction. In Richard Marsh’s The Beetle (1897), the titular monster responds with terror to “an electrical machine, giving an eighteen inch spark” controlled by the inventor Sidney Atherton (111). Here, the Egyptian monster is superstitious and degenerate rather than progressive and advanced. Marsh’s character is a hybrid in every sense. Able to fluctuate between male and female, human and insect, its capacity to adapt to its new surroundings – a feature typical of ancient Egyptian characters reintroduced into the modern world – coupled with a contradictory fearfulness of contemporary technology, suggests a blurring of typecasts of the

ancient and modern Egyptian. This is also implied by the way in which the creature, supposedly a devotee of the ancient Egyptian religion, specifically the cult of Isis, “salaamed down to the ground” at the sight of the electrical spark (111), aligning the eponymous monster with the modern Egyptians fearful of Siemens’s powers atop the Great Pyramid, rather than literary ancient Egyptians who, in Haggard and Stoker, master and manipulate the electrical with ease.

Electricity was as one of the most thrilling phenomena wielded by scientists at the fin de siècle; demonstrations overlapped with the theatrical and were in direct competition with metropolitan theatres, panoramas, dioramas and magic lantern shows, among other visual spectacles (Morus, When Physics Became King 88). Electrical demonstrations – such as the galvanic stimulation of body parts – had proved popular in the late eighteenth century, and in the Victorian era lecture halls were filled by audiences desperate to witness evidence of the “strange invisible forces” explored by Michael Faraday in his presentations of electromagnetism (Parramore 1). By the late nineteenth century Nikola Tesla, a Serbian-American physicist and engineer, had emerged as one of Faraday’s most glorified successors, stunning eager audiences with his extraordinary displays of electrical mastery. Yet, unlike Faraday, who usually impressed with demonstrations of invisible electrical forces, or his eighteenth-century forerunners who relied on comparatively diminutive electrical flashes and simple shocks and sparks produced by galvanic batteries, Tesla amazed spectators by producing truly remarkable effects with visible light that were more akin to wizardry (Morus, Frankenstein’s Children 70). Iwan Rhys Morus and Graeme Gooday both emphasize the flamboyant showmanship that helped transform Tesla’s demonstrations into magical spectacles (Morus, Michael Faraday 214-15; Gooday, Domesticating Electricity 58-59). As Gooday notes, electricity was often anthropomorphized at the end of the nineteenth century, with personifications taking the form of goddesses, fairies, wizards, genies, and imps (19,

208). Tesla appeared to encourage his own depiction as one of these types: the wizard, or, a magical masculine embodiment of electricity itself, giving rise to a supernaturally-charged portrait at the hands of H. Rider Haggard in the early twentieth century.

In 1892, Tesla's lecture on fluorescent lighting at the Royal Institution was celebrated as a "dazzling theatrical display," securing his reputation as one of the great scientific showmen of the age (Gooday, "Profit and prophecy" 251). Contemporary reports of Tesla's demonstrations vary in style, mainly in the degree to which they explain the physics behind his impressive feats. They tend to be united, however, in a general sense of awe at the seemingly magical effects that Tesla produced. After Tesla's lecture at the Royal Institution, Lord Rayleigh eulogized Tesla's display, making particular reference to the way in which the scientist made his name appear "in letters of fire" ("Tesla at the Royal Institution" 168). While the article in Scientific American adheres mainly to the sober terminology of scientific observation (a "blue phosphorescent light" and "sparks . . . obtained over a distance of 1¼ inches" are recorded, among other phenomena), the author appears unable to contain an outburst of magical imagery towards the end of the piece: "The lecturer took in his hand a glass wand, 3 feet long, and, with no special connection of any sort to his body or to the glass, when waved in the magnet field it shone like a flaming sword" (168). This is in direct accordance with the notion of the technological sublime, as described by David E. Nye and Vincent Mosco, in which scientific descriptions lapse into the language of the magical (Nye 28; Mosco 22,123). The Times of London used the same simile as Scientific American: Tesla's vacuum tube "glowed in the darkness like a flaming sword" ("Mr. Tesla At The Royal Institution" 6).

Carolyn Marvin records that the scientists behind such publications as Scientific American were particularly careful to control their journals' authority by avoiding the overblown sensationalism characteristic of the popular press and fully embracing the

complicated terminology of the specific field in question, a ploy she refers to as “cognitive imperialism” (12, 192). She notes that the exceptions to these restrictions on spectacular hyperbole are phrases that convey “Magic and poetry cloaked in science,” citing articles on Tesla specifically as exemplars of such imagery (57). It is indeed evident that Tesla’s exhibitions could not be fully explained via the neat, impartial language of scientific description by the author of the Scientific American article, as parallels are drawn between his apparatus and fantastical magical implements; by association, Tesla himself is presented as a kind of sorcerer.

Tesla carefully controlled how he was perceived. In a later piece in Pearson’s Magazine entitled “The New Wizard of the West,” his laboratory is described as a “miracle-factory” and he himself is an “audacious wizard” (M’Govern 470-71). The interviewer lists a series of amazing demonstrations. Tesla summons “a ball of leaping red flame” by simply “snapping his fingers;” he makes the darkened laboratory glow with “a strange light as beautiful as that of the moon” but as powerful as sunlight; he withstands powerful currents that instantly kill animals; and finally he emerges from darkness with an illuminated “halo . . . formed by myriads of tongues of electric flame” which emanate from his own body (470-71). One of the images accompanying the article (see Figure 3), an illustration of Tesla by Warwick Goble (who was yet to embark upon the illustrative projects for children’s books and fairy tales, for which he is now acclaimed), further enhances the connection Tesla was cultivating between himself, as a modern scientist, and as a “quasi-alchemical [master] of a hidden mystery” (Gooday, Domesticating Electricity 58). The syntax of the image’s caption, “Nikola Tesla holding in his hands balls of flame,” is deliberately archaic, evoking biblical phrasing, in order to reflect a sense of antiquated religious grandeur. Holding spectral light in each hand, Tesla was meant to symbolize a kind of timeless enlightenment, simultaneously existing within the modern and ancient worlds.

The now infamous photographs of Tesla sitting among seven meter sparks in his Colorado Springs laboratory were part of the same scheme. The images were exposed multiple times (a technique often used to fake spirit photographs), creating the impression of the scientist, calm within the center of a veritable thunderstorm that rages around him. As Gooday eloquently expresses, Tesla, “magus-like,” was encouraging an image of himself as “manipulator of lightning and prophet of the most spectacular electrical technologies” (59). The religious connotations are hard to ignore. Holding orbs of light in his hands or emitting huge sparks from his own body that create the illuminative appearance of a halo, Tesla was only serving to further his depiction as “a half-intoxicated god,” one who, like the characters of early science fiction who sought to reanimate mummies, disclosed plans to perform miracles with his modern machines by waking the dead (M’Govern 476). Tesla was not alone in this practice. His rival and fellow inventor, Thomas Edison, was nurturing a similar image of himself as a maker of magic through his theatrical use of the electric light, employing the language of ancient occultism in order to further this persona (Willis 176-77, 200). Although Tesla excelled at exemplifying contradictory roles, as simultaneously “hypermodern” and “archaic,” common to both scientists was a desire to enrapture and beguile with scientific exhibition combined with grandiose ceremonious showmanship, one which presented the physical as the magical and the scientist as the enchanter (Nadis 66).

Tesla differed from his colleagues and competitors, however, in the audacity of his eccentric claims. From an early age he had been able to visualize complex machines which he could test in his mind; eventually he would state that the visionary ideas that suddenly came to him were being transmitted from Mars (Klein 378). He also made fantastical assertions about electrical knowledge in the ancient world. Describing “the history of electrical development” as “a story more wonderful than any tale from the Arabian Nights” in an article written for Manufacturers Record, Tesla believed that “Moses was undoubtedly a practical

and skillful electrician far in advance of his time,” and considered it “very plausible to assume that the sons of Aaron were killed by a high-tension discharge” (Tesla 37). Such bold proclamations about the mastery with which the ancients handled electricity were far more often attributed to occultists such as Blavatsky, yet Tesla’s reputation for genius resulted in the publication of these notions in respectable journals. That the editor of Manufacturers Record, a practical periodical focusing on developments in trade and industry, would introduce Tesla as “inventor, physicist, electrical wizard and seer,” suggests that – from Tesla’s lips – the idea of Moses, educated among the palatial courts of Pharaoh, creating electrical weapons, should be entertained more seriously (Tesla 37). As a modern “electrician,” Tesla considered himself an inheritor of the knowledge of these ancient forerunners.

Gooday stresses the influence of such showmanship on the scientific romance literature of the period, which often combined electrical and otherworldly subjects (Domesticating Electricity 58). Indeed, a number of early twentieth-century novels and short stories allude to or honor Tesla’s genius, the most famous of these being J. Weldon Cobb’s To Mars with Tesla; or, the Mystery of the Hidden World (1901).² H. Rider Haggard’s short story “Smith and the Pharaohs” (1912-13) makes an interesting case study, as it appears to explicitly draw upon descriptions of Tesla’s impressive electrical performances, uniting these current concepts with ancient supernaturalism rather than the hypermodern. In Haggard’s tale, Smith, an amateur Egyptologist, finds himself locked in the Cairo Museum overnight. Looking for a suitable place to sleep, he enters the central hall, boarded up whilst awaiting repairs. Here, in the darkness, the spirits of the museum’s mummies convene with those of the gods, forming a “great congregation” (Haggard 50).³ The phantoms stand in ranks facing the god Osiris, who stares out from the top of a flight of steps, emitting a spectral glow. The room is brightened by the “pale and ghostly” light which, like the light Tesla summoned on stage, is described as

having “a blue tinge” (50). As the light increases in intensity, it shoots out in “long tongues . . . which joined themselves together, illuminating all that huge hall” (50). Later, after Osiris undergoes quasi-alchemical transformations into the goddesses Isis and Hathor and disappears altogether, the light takes the form of “a blue spark” which transforms into “upward pouring rays” (57). The strange forms that the supernatural light appears to take are reminiscent of descriptions of Tesla’s fluorescent light, powered by an alternating current, and the positioning of Osiris and the spirits echo the set-up of the lecture hall, with Tesla at the front, and his eager audience facing him in rows. Indeed, much of the imagery and terminology is replicated from press reports of his demonstrations, particularly the “tongues” of light, and the religious parallels between Tesla’s and Osiris’s light-producing bodies. If Haggard’s story was indeed influenced by Tesla, the ethereal light symbolizing ancient Egyptian magic is aligned with very modern ways in which electricity could be manipulated. Haggard’s merging of the powers of the mortal scientist and immortal god, modernity and antiquity, reveals the extent to which Victorian and Edwardian electrical display was impacting upon popular culture, but also the reciprocity of this relationship: the supernatural was projected back onto the scientific, encouraged by scientific romances such as Haggard’s which not only brought these threads together, but often rendered them indistinguishable. The metropolitan experience of electric lights, obelisks, Egyptian curios, and wizard-like showmen inspired the celebration and explanation of science via the imagery of antiquity in Haggard’s work. These combinative processes, however, were not restricted to electricity as visible light, but was also apparent in discussions of other kinds of electromagnetic radiation, including invisible X-rays.

II. X-Rays and Radioactivity

FOLLOWING THEIR DISCOVERY in the late nineteenth century, X-rays proved an even more mysterious phenomenon than static electricity and visible light effects. Higher frequency waves than the light of the visible spectrum, they were considered “a new kind of invisible light,” which could penetrate the flesh but not bone (Röntgen 413). The ghostly images that they produced, seemingly depicting the human body as it would appear after death, had strong supernatural connotations, and there was speculation by some, including Crookes, by this time the President of the Society for Psychical Research, that they would prove to be related to the telepathic transmission of thoughts (Lyons 105). Their visual similarities to spirit photographs, with their translucent flesh and skeletal motifs, meant that as soon as the first X-ray radiographs were produced, they were regarded as new tools in the effort to prove the existence of the spirit world, and reinvigorated the late nineteenth- and early twentieth-century fascination with Spiritualism (Natale, “Invisible Made Visible” 353; Natale, “Cosmology of Invisible Fluids” 272; Mallet 8). Indeed, X-rays became one of the tools of the psychical researcher, notably put to use by Cesare Lombroso in his investigations into the ectoplasmic materializations produced by the Spiritualist medium Eusapia Palladino (Luckhurst, Invention of Telepathy 229). Simultaneously, X-ray radiographs were treated as modern spectacles via technologies such as Thomas Edison’s fluoroscope, a device that created X-ray images that moved in real-time, and in the still, reproduced images of the periodical press, thus, occupying a similar place in the cultural consciousness as that of electricity (Natale, “Invisible Made Visible” 348; Mussell 78). While its impact was neither as widespread nor as apparent as the electricity which was illuminating cities by the end of the Victorian era, as a scientific marvel, it was still spectacular, sensational and otherworldly.

Just a few months after Röntgen’s discovery, X-ray radiograms of mummified remains were produced for the first time, published in Walter Koenig’s 1896 booklet “14

Photographien mit Röntgenstrahlen aufgenommen im Physikalischen Verein” (Eladany 122). The benefits of using this technique were immediately apparent, and as a result it proved popular with some of the era’s most eminent Egyptologists. Among them were Flinders Petrie, who took plates of a mummy at the British Museum in 1897, and Gaston Maspero, who was the director of the Cairo Museum when its mummy of Thuthmoses IV was examined using Egypt’s only X-ray equipment in 1903 (El Mahdy 75). Grafton Elliot Smith (often published under his initials, as G. E. Smith), the anatomist who carried out the procedure for Maspero, seems to have influenced Haggard’s “Smith and the Pharaohs,” most likely serving as inspiration for the tale’s protagonist J. E. Smith. The similarities between the two men’s names, the setting of the Cairo Museum and a passing reference comparing the glare of the Egyptian spirits to “a Röntgen ray” indicates the historical flavor that characterizes so much of Haggard’s fiction (Haggard 60). Further evidence lies in the resemblances between Maspero and Haggard’s unnamed director of the museum: both are amiable, French, and willing to turn a blind eye to the discoverers of artifacts pocketing some of their more precious finds. The parallels are all the more striking considering that Maspero was still the Cairo Museum’s director when Haggard wrote the story, the first instalment of which was published in 1912, the same year as Smith’s study of the museum’s mummies, which he had unwrapped with Maspero between 1881 and 1905 (Eladany 126). Furthermore, as Roger Luckhurst records, the winter of 1912 saw Haggard’s third trip to Egypt which stimulated a wave of Egyptian themes in Haggard’s subsequent works, “Smith and the Pharaohs” among them (The Mummy’s Curse 196). Notably, the royal mummies that Haggard’s narrator lists include that of Meneptah, which Haggard and his daughter Angela had privately inspected during this very visit, an opportunity facilitated by Maspero (Addy 22). Rameses II is another pharaoh specifically mentioned, along with an anecdote about the pharaoh’s unrolling that appears to be based on the real procedure undertaken by Maspero, in

which the mummy's arm spontaneously lifted upon unwrapping. The narrator also refers to Seti II, whose mummy had been among the nine unwrapped by Smith in 1905 (Brier, Egyptian Mummies 173).⁴ Certainly, Haggard approved of X-raying techniques. He wrote a letter to the Daily Mail expressing such views, suggesting that, out of respect, mummies should be returned to their tombs after examination, rather than be installed behind glass in a museum: "The mummies can first be unrolled, photographed, measured, weighted, Röntgen-rayed, etc. After that what more has science to learn from them?" (Addy 52).

Considered in this context, Haggard's tale where the "Röntgen ray" emanates not from the Egyptologist's equipment but from the very bodies he is supposed to be studying, sees the removal of agency from the Egyptologist. Haggard translates a kind of supernatural mastery of electromagnetic energy onto the gods and ghosts of ancient Egypt and, in a narrative twist of a decidedly theosophical character, we learn that Smith (based on a scientist familiar with radiography) is the reincarnation of an ancient Egyptian (implied to be the ancient predecessors to showmen such as Tesla). Thus Haggard's chronology is one in which the lore of the ancients, lost over the millennia, is exposed to the modern, comparatively degenerate mind – although the individual who becomes privy to this power is one spiritually descended from this civilization.

Haggard's veiled allusions to real practitioners with an interest in X-raying mummies correspond to Bram Stoker's reliance upon developments in theories of radiation when writing The Jewel of Seven Stars, an influence recorded by David Glover (xvii) and Carol A. Senf (84). Stoker first published his novel in 1903, the year in which scientific pioneers in the field of radioactivity, Marie Curie, Pierre Curie and Henri Becquerel, jointly received the Nobel Prize in Physics (Hebblethwaite xxviii). Ernest Rutherford and Frederick Soddy explained the concept of radioactive decay the same year, which also saw Crookes invent an instrument for observation of the process, the spintharoscope (xxviii). Stoker alludes to a

number of recent scientific discoveries in this field to add a level of academic credence to his reimagining of the classic mummy reanimation plot, in which “the exertion of magical will and radioactive particles coexist in the vanishing point between science and the occult” (Luckhurst, The Mummy’s Curse 175). The experiment requires a number of magical items and the sarcophagus of Queen Tera to be arranged in a specific way to recreate the magnetic, electric and radioactive conditions of Tera’s original Egyptian tomb, creating “a kind of magical nuclear device” (174). If successful, the novel’s fanatical Egyptologist Abel Trelawny hopes that they will “be able to let in on the world of modern science such a flood of light from the Old World as will change every condition of thought and experiment and practice” (Stoker, The Jewel of Seven Stars 2008 200). Trelawny’s image of ancient Egyptian knowledge as a flood of light is apt; throughout the novel, otherworldly light symbolizes the mysterious nature of ancient Egyptian power, which hovers at the nexus between science and sorcery. Trelawny believes that the ancient Egyptians possessed “a knowledge beyond what our age has ever known,” and as a result would revolutionize the modern world through its advancement of scientific understanding (213).

The key to Tera’s revival is a Magic Coffin, which “glows from within” when exposed to starlight or the light of special lamps, but not the ordinary natural light of the sun (168). Stoker implies that the artifact responds to types of radiation listed by Trelawny, including “Röntgen and Cathode and Becquerel rays,” and also suggests that newly discovered substances radium, helium, polonium and argon may be involved in contributing to its unusual properties (181). The special lamps which produce this unusual luminescence are explained to contain cedar oil (oil that was, incidentally, commonly used in mummy embalming), which is described as having a particular refractive effect on the light (Brier, Egyptian Mummies 43). Their flames burn with “a slow, steady light, growing more and more bright; and changing in colour from blue to crystal white” (Stoker, The Jewel of Seven

Stars 2008 241). The light, already signified as unusual through its changes in hue and intensity, performs similarly to X-rays. When the light interacts with the Magic Coffin, it shines with a “delicate glow” which increases in luminosity until it appears “like a blazing jewel” which emits a “faint greenish vapour” (241). An exaggerated version of the fluorescent screens that Röntgen observed glowing faintly green when exposed to X-rays, and which became staple tools in scientific investigations into radioactivity, the Coffin demonstrates the ways in which ancient Egyptian technologies, which may seem to be magical to the unfamiliar, quite literally outshine contemporary scientific equipment (Mallet 89).

Kate Hebblethwaite notes that the concept of transmutation also plays its part in Stoker’s plot. Suggesting that Tera’s resurrection is “a spiritual version of Rutherford and Soddy’s theory of the conversion of one chemical element into another through nuclear reaction,” Hebblethwaite argues that in the original ending of the text in which the queen vanishes, she has in fact taken possession of Margaret’s body, her spirit moving from one medium to another (xxx). While the hypothesis of radioactive transmutation outlined in Rutherford and Soddy’s “Theory of Atomic Disintegration” (1902) was proposed in the year preceding the initial publication of Stoker’s novel, making this concept’s influence on the text incredibly up-to-date, there is something much more ancient at work. At the time, both transmutation and X-rays were closely associated with alchemy (Morrisson 4). Rutherford and Soddy’s discovery was often illustrated in the press by ancient alchemical emblems, such as the ouroboros, a symbol first used by the ancient Egyptians, while the end of the nineteenth century saw an alchemical revival, during which there were numerous reports that common metals had been transformed into gold through the application of X-rays (Morrisson 114; Mallet 11, 51). In Glasgow in 1904 a company was founded whose aim was to modify lead into mercury and iron into copper, while in France four sizeable societies and a university

were established dedicated to alchemy (Mallet 51).⁵ As a legendary science with its origins in ancient Egypt, the transformation of one woman into another appears to be part of an alchemical mythology that also emphasizes the permanence of the soul. Tera's ruby cut into the shape of a scarab, and placed over her heart during the experiment, functions as the philosopher's stone, converting death to life by providing the queen's spirit with a younger body, mirroring contemporary depictions of radium as "a miraculous healing agent, the elixir of life" or indeed the legendary stone itself (Mallet 209; Morrisson 118).

It is clear from such parallels that Stoker was drawing upon the very latest scientific developments in his novel, and indeed, Clive Leatherdale has proposed that there is evidence to suggest that Stoker was keeping abreast of the publications of these great scientists of the age, including one co-authored by Laborde and Pierre Curie c. 1900 (Stoker, The Jewel of Seven Stars 1996 194, Leatherdale note 19). Like Haggard, who fashioned the Egyptian god Osiris as a kind of ancient Tesla, Stoker did not stop at scientific concepts, and drew upon real scientists as inspiration. The similarities between the Polish physicist and chemist Marie Curie and the novel's ancient Egyptian Tera are striking. Curie was depicted romantically by the press; she was driven to discover forces that were enigmatic and hidden, which created "beautiful and eerie effect such as luminescence, color changes in gems, and unexpected chemical reactions" (Mallet 209). The perceived disparity between Curie's unobtrusive and delicate demeanor and her phenomenal achievements as a pioneering female scientist, only served to further public fascination with her and her work (209-10). As women at the forefront of their respective – and, seemingly, closely related – sciences, Curie and Queen Tera appear to have much in common. While a number of critics have already identified the cryptic encoding of Tera's name within her English doppelgänger, Margaret Trelawny's, linking the novel's female characters with Curie reveals yet another facet to Stoker's

polysemic name-play; the similarities between “Margaret” and “Marie” point to a deliberate alignment of the novel’s female characters and this contemporary scientist.

It is likely, given these connections, that Curie’s sudden celebrity catalyzed the writing of The Jewel of Seven Stars. In around 1873, Stoker recorded an idea for a narrative in one of his early journals: “Story of a man brought to life in a dissecting room by the application of a new power unexpected” (Stoker, The Lost Journal of Bram Stoker 66). If the novel emerged from this kernel – which resembles The Jewel of Seven Stars more than any other work in Stoker’s œuvre – the alterations to the original concept thirty years later may be significant. Curie’s remarkable discoveries certainly brought to light “a new power unexpected” that captured the public imagination, and as such would have provided a suitable foundation upon which Stoker could weave his scientific romance. The multiple ties to Curie and her work evident in the novel suggest that the change of the subject’s sex from male in his original idea to female in his published work was also provoked by Curie and the fascination that she inspired as the first female recipient of a Nobel Prize. Stoker’s translocation of this “power” into ancient Egyptian civilization makes its reappearance and importance in the modern world all the more “unexpected.”

By channeling these neoteric scientific concepts in The Jewel of Seven Stars, Stoker combined generic elements of the Gothic fantasy – so often preoccupied with antiquity – and the recent findings of contemporary science. Haggard followed suit, retrospectively offering an explanation for the life-giving pillar of fire in She (1887) based on the discovery of radium in his sequel Ayesha, the Return of She (1905), a couple of years after the initial publication of Stoker’s novel (Morrisson 27); of course Ayesha, in this incarnation, is an alchemist (Burdett 227). As a civilization whose remnants and mortal remains were being re-examined in the light of revolutionary scientific techniques, ancient Egypt’s association with the modern scientific process, and radical new media such as the X-ray radiograph, itself strongly

associated with Spiritualism, was inevitable. Marjorie C. Mallet even suggests that Spiritualism – and occultism more generally – prepared society to accept the newly discovered invisible rays and the ghostly images that they produced (17). Credited with unparalleled aptitude in such magical sciences as alchemy, ancient Egypt seemed to be antiquity’s counterpart to the incredible spectacles produced by modern trailblazing scientists, whose experiments offered tantalizing possibilities of telepathy or communion with the spirit world. This concept was not merely confined to the realms of fiction, but treated by some as an actual possibility. Soddy, for example, argued that the destruction of mythological city of Atlantis had come about through the Atlanteans’ inexpert attempts to use atomic energy (Morrisson 164). The use of the imagery and theory behind contemporary science in these texts thus hints at a greater hope that continued study of antiquity might lead to similarly revolutionary advances in occult science, which would make accessible the ghosts of the past.

III. Scientists and Gods

UNLIKE THE SCIENTIFICALLY-INFLECTED fantastical stories of the nineteenth and early twentieth centuries which, as Melanie Keene argues, “demonstrate how, for many, the sciences came to replace the lore of old as the most significant marvel and wonder,” this literature provides a counterpoint to perceptions of antiquity as inconsequential when confronted by modern developments (19). Instead, this fiction posits science and antiquity in a dangerous embrace. Resultantly, it is clear that in the late Victorian and Edwardian consciousness, modernity did not necessarily equate to scientific or spiritual advancement. Alchemy, as the pinnacle of mythological science, was, by its very definition, ancient, foreign

and teetering on the brink of the magical. As a result, modern scientific developments that appeared to approach the unreachable heights of alchemy were often best described in ancient terms. In ancient Egypt, the lapis lazuli blue hair and gold-plated skin on funerary masks signified the alchemical transformation from mortal into god, a miraculous process that could only be undertaken after death. In the late nineteenth century, equivalent acts which produced otherworldly color-changes, sparking and luminescence about the body of the scientist mimicked a similar process of deification. The more miraculous the scientific processes seemed to be, dramatized as sensory bombardments of glowing colored tubes, blazing letters, glass wands, eerie luminosity and biblical tongues of flame, the closer the scientist became to a deity.

Outside of the lecture hall, the fantastic imagery of scientific breakthroughs found its way into literature describing ancient powers. Most telling of all are the references to real scientists – most notably, in Haggard and Stoker’s veiled allusions to Nikola Tesla and Marie Curie. They align their ancient Egyptian characters with the modern scientists to give their literary magic modern relevance and potency. In doing so, they also ascribe some level of mysterious otherworldly qualities onto these scientists, romantic notions which were already being nurtured by the scientists themselves, or by the journalists who detailed their experiments. As Perry Miller states of the technological sublime, “the TRUE SUBLIME behind the obvious SUBLIME of the immense pageant of Technology . . . is MIND itself” (321). Visionaries like Tesla and Curie became godlike through their mental powers, which resulted in technologies which could produce such wonder, whose transcendence emulated ancient miracles and related back to alchemical tradition. Concurrently, ancient magic was given new significance within the realms of these new quasi-alchemical disciplines. In contrast to an evolutionary idea of linear progress over time, of a potentially threatening

stream of unstoppable innovation, visionaries and their discoveries were imagined as inheritors of ancient practices, heirs to Egypt and recipients of alchemical lore.

While ancient Egypt's scientific superiority had most frequently been employed as a satirical device in Victorian texts, downplaying modern achievements, the writings of Stoker and Haggard reveal a significant shift in tone, recasting the farcical as the solemn. With impressive visionaries such as Tesla proposing that the ancients had known of the forces only recently rediscovered, such claims took on a new sense of gravitas. Accordingly, it became appropriate and potent for individuals breathing the same cultural air to explore Egyptian themes through novel physical concepts, and to describe demonstrations of these new marvels couched in language evoking antiquity. In opposition to the portrayal of modern literary scientists wielding god-like powers over their experimentees, The Jewel of Seven Stars and "Smith and the Pharaohs" illustrate a transfer of agency from the experimenter to the subject. Ancient Egyptian bodies, once submitted to scrutiny, began to exert power over their investigators, manipulating the latest scientific phenomena with a fluency outdoing and overwhelming their modern counterparts.

University of Birmingham

Notes

1. That ancient Egyptian obelisks and pyramids were often topped with gold or electrum, materials that are effective at conducting electricity (and in the case of electrum, evoking connections to electricity through its name), appears to have been a coincidence. These materials were selected for their aesthetic qualities, meant to effectively reflect sunlight from the monuments' summits.

2. Other literary homages and allusions to Tesla are evident in L. Frank Baum's The Master Key (1901), J. George Frederick's "The Dupe of a Realist" (1902), Jean Delaire's Around a Distant Star (1904), Everard Jack Appleton's "The Sound Machine" (1906), Florence Edith Austin's "A Missile from Mars" (1906), and H. Gernsback's "The Magnetic Storm" (1918).

3. H. Rider Haggard's "Smith and the Pharaohs" first appeared across the December 1912, January 1913 and February 1913 editions of the Strand Magazine. For ease of referencing, I refer to the tale as it was first published in its entirety, in the J. W. Arrowsmith edition of Smith and the Pharaohs and Other Stories (1920), the format in which the work is usually read.

4. The practice of X-raying mummies also had an influence on R. Austin Freeman's detective story, The Eye of Osiris (1911), which includes a scene featuring the technique.

5. The company, Kosmoid Ltd., was founded by Alexander Shiels. See Harvie for the most thorough account of the events.

Works Cited

Addy, Shirley M. Rider Haggard and Egypt. Accrington; Kessingland: A. L., 1998.

Blavatsky, H. P. Isis Unveiled: A Master-Key to the Mysteries of Ancient and Modern Science and Theology. Vol. 1: Science. New York: J. W. Bouton, 1877.

Brantlinger, Patrick. Taming Cannibals: Race and the Victorians. Ithaca: Cornell UP, 2011.

Brier, Bob. Egyptian Mummies: Unraveling the Secrets of an Ancient Art. London: Brockhampton, 2001.

- . Egyptomania: Our Three Thousand Year Obsession with the Land of the Pharaohs. New York: Palgrave Macmillan, 2013.
- Burdett, Carolyn. "Romance, Reincarnation and Rider Haggard." The Victorian Supernatural. Ed. Nicola Bown, Carolyn Burdett and Pamela Thurschwell. Cambridge: Cambridge UP, 2004. 217-33.
- Colla, Elliott. Conflicted Antiquities: Egyptology, Egyptomania, Egyptian Modernity. Durham: Duke UP, 2007.
- Copleston, W. J. Memoir of Edward Copleston, D.D., Bishop of Llandaff. London: John W. Parker & Son, 1851.
- Crookes, William. "Some Possibilities of Electricity." Fortnightly Review 51.302 (1892): 173-81.
- Doyle, Arthur Conan. "The Ring of Thoth." Cornhill Magazine 14.79 (1890): 46-61.
- El Mahdy, Christine. Mummies, Myth and Magic in Ancient Egypt. London: Thames and Hudson, 1989.
- Eladany, Abeer Helmy. "A Study of a Selected Group of Third Intermediate Period Mummies in the British Museum." PhD thesis. University of Manchester, 2011.
- Elliott, Chris. Egypt in England. Swindon: English Heritage, 2012.
- Gange, David. Dialogues with the Dead: Egyptology in British Culture and Religion 1822-1922. Oxford: Oxford UP, 2013.
- Glover, David. Introduction to The Jewel of Seven Stars by Bram Stoker. Ed. David Glover. Oxford: Oxford UP, 1996. ix-xxii.
- Gooday, Graeme. Domesticating Electricity: Technology, Uncertainty and Gender, 1880-1914. London: Pickering & Chatto, 2008.

- . "Profit and prophecy: electricity in the late-Victorian periodical." Science in the Nineteenth-Century Periodical. Ed. Geoffrey Cantor et al. Cambridge: Cambridge UP, 2004. 238-54.
- Haggard, H. Rider. "Smith and the Pharaohs." Smith and the Pharaohs and Other Stories. Bristol: J. W. Arrowsmith, 1920. 7-74.
- Harvie, David. "Alchemist of Kosmoid Hall" Herald Scotland, May 24 1997. Web. 10 Feb. 2016.
- Hebblethwaite, Kate. Introduction. The Jewel of Seven Stars by Bram Stoker. Ed. Kate Hebblethwaite. London: Penguin, 2008.
- Keene, Melanie. Science in Wonderland: The scientific fairy tales of Victorian Britain. Oxford: Oxford UP, 2015.
- Kershner, R. B. "Modernism's Mirror: The Sorrows of Marie Corelli." Transforming Genre: New Approaches to British Fiction of the 1890s. Ed. Nikki Lee Manos and Meri-Jane Rochelson. Basingstoke: Macmillan, 1994. 67-86.
- Klein, Maury. The Power Makers: Steam, Electricity, and the Men Who Invented Modern America. New York: Bloomsbury, 2008.
- Lockyer, J. Norman. The Dawn of Astronomy: A Study of the Temple-Worship and Mythology of the Ancient Egyptians. London: Cassell, 1894.
- Luckhurst, Roger. The Invention of Telepathy: 1870-1901. Oxford: Oxford UP, 2002.
- . The Mummy's Curse: The True History of a Dark Fantasy. Oxford: Oxford UP, 2012.
- Lyons, Sherrie Lynne. Species, Serpents, Spirits, and Skulls: Science at the Margins in the Victorian Age. Albany: Suny P, 2009.
- M'Govern, Chauncy Montgomery. "The New Wizard of the West." Pearson's Magazine May 1899: 470-76.

- Mallet, Marjorie C. Radioactivity: A History of a Mysterious Science. Oxford: Oxford UP, 2011.
- Marsh, Richard. The Beetle. Ed. Minna Vuohelainen. Kansas City: Valancourt, 2008.
- Marvin, Carolyn, When Old Technologies Were New: Thinking about Electric Communication in the Late Nineteenth Century. Oxford: Oxford UP, 1990.
- Miller, Perry. The Life of the Mind in America: From the Revolution to the Civil War. New York: Harcourt Brace, 1965.
- Morrisson, Mark S. Modern Alchemy: Occultism and the Emergence of Atomic Theory. New York; Oxford: Oxford UP, 2007.
- Morus, Iwan Rhys. Frankenstein's Children: Electricity, Exhibition, and Experiment in Early-Nineteenth-Century London. Princeton: Princeton UP, 1998.
- . Michael Faraday and the Electrical Century. Cambridge: Icon, 2004.
- . Shocking Bodies: Life, Death and Electricity in Victorian England. Stroud: The History, 2011.
- . When Physics Became King. Chicago: The U of Chicago P, 2005.
- Mosco, Vincent. The Digital Sublime: Myth, Power, and Cyberspace. Cambridge: MIT P, 2004.
- “Mr. Tesla At The Royal Institution.” Times 4 Feb. 1892: 6.
- The Mummy!: A Tale of the Twenty-Second Century. Vol. 1. 2nd ed. London: Henry Colburn, 1828.
- Mussell, James. Science, Time and Space in the Late Nineteenth-Century Periodical Press. Aldershot: Ashgate, 2007.
- Nadis, Fred. Wonder Shows: Performing Science, Magic, and Religion in America. New Brunswick: Rutgers UP, 2005.

- Natale, Simone. "A Cosmology of Invisible Fluids: Wireless, X-Rays, and Psychical Research around 1900." Canadian Journal of Communication 35 (2011): 263-75.
- . "The Invisible Made Visible: X-Rays as Attraction and Visual Medium at the End of the Nineteenth Century." Media History 17.4 (2011): 345-58.
- Nye, David E. American Technological Sublime. Cambridge: MIT P, 1994.
- Parramore, Lynn. Reading the Sphinx: Ancient Egypt in Nineteenth-Century Literary Culture. Basingstoke: Palgrave Macmillan, 2008.
- Poe, Edgar A. "Some Words with a Mummy." American Review: A Whig Journal 1.4 (1845): 363-70.
- Rauch, Alan. Useful Knowledge: The Victorians, Morality, and the March of Intellect. Durham: Duke UP, 2001.
- Röntgen, Wilhelm. "The New Marvel in Photography." Interview by H. J. W. Dam. McClure's Magazine 6.5 (1896): 403-15.
- Senf, Carol A. Science and Social Science in Bram Stoker's Fiction. Westport: Greenwood, 2002.
- Stiles, Anne. Popular Fiction and Brain Science in the Late Nineteenth Century. Cambridge: Cambridge UP, 2012.
- Stoker, Bram. The Jewel of Seven Stars. Ed. Clive Leatherdale. Westcliffe-on-Sea: Desert Island, 1996.
- . The Jewel of Seven Stars. Ed. Kate Hebblethwaite. London: Penguin, 2008.
- . The Lost Journal of Bram Stoker: The Dublin Years. Ed. Elizabeth Miller and Dacre Stoker. London: Robson, 2012.
- Tesla, Nikola. "The Wonder World to be Created by Electricity." Manufacturer's Record 9 Sept. 1915: 37-38.
- "Tesla at the Royal Institution." Scientific American 12 March 1892: 168.

- Von Siemens, Werner. Personal Recollections of Werner von Siemens. Trans. W. C. Coupland. London: Asher, 1893.
- Warner, Marina. Phantasmagoria: Spirit Visions, Metaphors, and Media into the Twenty-First Century. Oxford: Oxford UP, 2006.
- Willis, Martin. Mesmerists, Monsters, and Machines: Science Fiction and the Cultures of Science in the Nineteenth Century. Kent: Kent State UP, 2006.
- . Vision, Science and Literature, 1870-1920: Ocular Horizons. London: Pickering and Chatto, 2011.
- Wilson, J. Arbuthnot [Grant Allen]. "My New Year's Eve among the Mummies." Belgravia 37.148 (1879): 93-105.
- Zimmerman, Virginia. Excavating Victorians. Albany: State U of New York P, 2008.