# The Alchemist in Fiction: The Master Narrative

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**Abstract:** In Western culture, as expressed in fiction and film, the master narrative concerning science and the pursuit of knowledge perpetuates the archetype of the alchemist/scientist as sinister, dangerous, and possibly mad. Like all myths this story may appear simplistic but its recurrence suggests that it embodies complex ideas and suppressed desires and fears that each generation must work through. This paper explores some of the most influential examples of such characterization, links them to contemporary correlatives of the basic promises of alchemy and suggests reasons for the continuing power of such images.

**Keywords:** *alchemists in fiction, Frankenstein, Faust, characters, narratives.*

## 1. Introduction

The most widely known creation myth of modern times is not that of *Genesis* or Darwin but *Frankenstein*. Why does Mary Shelley's novel, first published in 1818, still provide the most universally invoked imagery for science in the twenty-first century? Western culture relies on and reveres science far beyond any known precedent; yet, paradoxically, the master narrative of scientific knowledge in both literature and film focuses on an evil and dangerous maniac, obsessive, secretive, ruthless, and arrogant, drawing on many of the qualities popularly associated with medieval alchemy. This paper explores the reasons for this disjunction between the regard and monetary reward heaped on science and technology in the 'real world' and the judgment these disciplines receive in the world of film and fiction.

Fundamentally this master narrative concerning science and scientists is about fear – fear of specialized knowledge and the power that knowledge confers on the few, leaving the majority of the population ignorant and therefore impotent. In a typical scenario the mad scientist achieves a knowledge break-through that threatens the social order (sometimes the whole planet),

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either through evil designs or by accident ('collateral damage' in today's media-speak). Even though the disaster may be (and usually is) averted, the memory of disempowerment remains, augmenting the repository of previous fears, to be recalled the next time there is a new knowledge breakthrough and hence the perception of a new threat.

The origins and trappings of this potent story lie in the precursor of chemistry, alchemy. Although dismissed by scientists as outmoded and irrelevant to their practice, alchemy has continued to provide a potent source of myth-making for the critique of modern science. Its chequered reputation has been revived and reinforced as perennially pertinent by writers, by artists and film-makers and, perversely, by scientists themselves in response to both their own psychological proclivities and the constraints placed on them by contemporary scientific culture with its emphasis on the priority of publication and by military or industrial requirements of secrecy.

## 2. The popular appeal of alchemy

The craft of alchemy both intrigued and frightened those who hovered on its fringes. Its allure lay in the immensity and immediacy of its promises and its professions of power surpassing that of kings or priests. In their most crude form these promises might now seem to appeal only to the excessively naïve or the inordinately greedy, yet in their generic form they continue to be highly attractive. To understand the ongoing fascination with the figure of the alchemist, we need to review some of the perceived foci of alchemy and the way in which they achieved a paradigmatic status, as well as the origins of the evil reputation that coalesced about such practices.

The history of alchemy has been well documented (Burckhardt 1967, Caron et al. 1961, Cummings 1966, Debus et al. 1966, Edwardes 1977, Gettings 1986, Hollister 1990, Lindsay 1970, Read 1947) and will be familiar to readers of this journal, so here I shall select for mention only those particular preoccupations that seized the imagination of the medieval public and have continued to provide material for fiction, being constantly re-invented and reapplied to claim relevance to contemporary issues or to add a degree of universality to fictional representations of the scientist.

Among the foundational concepts of alchemy the following have retained an allure that is both theoretically satisfying and appealing to self-interest.

(a) The notion that all things are interchangeable and exist in a state of flux. One source for this premise was the Taoist belief, originating in China in the fifth century BCE, that transformation and change are essential and innate in all things. In Europe, parallel ideas were put forward by the philos-

opher Empedocles and further developed by Aristotle in his thesis regarding the unity of matter and the interchangeable qualities of the four elements. The aspect of Aristotle's theory immediately seized upon was his premise that everything in nature strives towards perfection. Since gold was considered the most perfect and noble state of matter, it followed that all baser metals must necessarily 'aspire' to become gold. This changed a general, theoretical principle into a specific, material one, with the added implication of inevitability. The alchemist's task was simply to assist nature in realizing its goal. In practical terms, this role had been regularly performed by Egyptian metalworkers who, using the secret recipes of the goddess Isis, were adept at 'extending' a given quantity of gold by producing alloys with silver, copper, tin, and zinc. Thus, from the beginning, alchemy was associated both with the apparent 'production' of gold and, simultaneously, with the suspicion that this was a deception, a confidence trick practiced on the greedy and the gullible.

In the eighth century these secrets of metallurgy passed to the Arabs who, through trade with the Chinese, added the idea of a transforming catalyst, the origin of the Philosopher's Stone, that would enable, or at least assist, base metals to be transformed into gold. Inevitably such a catalyst conferred power and subsequently wealth on the alchemist who claimed to possess it and to have the knowledge necessary to activate it.

(b) The 'elixir of youth', a universal panacea that would cure illness and prevent ageing, thereby conferring longevity, perhaps even immortality. Like the Philosopher's Stone for transformation of metals, the elixir of youth was a catalytic substance, usually a powder or liquid. As pharmacy developed from herbalism this alleged elixir achieved greater credibility.

These two aspects of alchemy were studied and written about at length by the Arabs for whom they were associated with the Islamic faith, part of a holy search for perfection. In medieval Christian Europe it was a very different story. These two projects were cause enough for suspicion but the third major preoccupation of alchemy finally placed it beyond the tolerance of the Church.

(c) Creation of homunculi. Compared with the previous two, this project might seem less desirable, even bizarre, but it constituted an even greater threat to the social fabric and to the doctrines of the medieval Church. Although the other claims of alchemy involved a degree of arrogance in the profession of 'unnatural' powers, the attempt to produce a tiny human being (always a masculine person) was an example of extreme hubris, since it claimed to by-pass both the Creator and the divinely ordained method for reproduction. It challenged the Church's teaching that the soul was created at the moment of conception and mimicked both the Greek legend of Prometheus moulding humans from clay and breathing life into them, and the crea-

tion story of Adam in *Genesis*. The sub-title of *Frankenstein* is '*or, the Modern Prometheus*' and in her epigraph from Milton Shelley makes specific reference to the parallel between Frankenstein's creation of his Monster (an outsize parody of the homunculus) and the genesis of Adam:

> Did I request thee, Maker, from my clay
> To mould me man? Did I solicit thee
> From darkness to promote me? [Shelley 1996, p. 3]

The Monster, too, compares his own creation to that of Adam. "Remember, that I am thy creature: I ought to be thy Adam: but I am rather the fallen angel, whom thou drivest from joy for no misdeed." (Shelley 1996, p. 66)

We can understand the appeal of the homunculus-peddlers better if we realize that robots are of the same conceptual family. They, too, represent 'beings' we have created at will through our intellect, without recourse to female biology, and which we hope to enslave. In contemporary biological terms, cloned organisms, genetic engineering, *in vitro* fertilization, and embryo transfers involve a comparable desire to take control of the genesis of organisms, especially in relation to humans.

## 3. The public image of alchemists

Because alchemy re-entered Europe through translations of Arabic writings, it became a casualty of transferred racism and religious prejudice. Its practical and socially acceptable origins in metallurgy and medicine were soon obscured and instead it was associated by name and origin with a race regarded as infidels. Linked with the black arts, with heresy, astrology, and magic, it was decried and finally outlawed by the Church. A series of Acts were passed forbidding the practice of alchemy, culminating in Pope John XXII's formal edict *Spondent*, denouncing the alchemists as tricksters and counterfeiters (Duncan 1968, pp. 636f.). It was widely believed that alchemists were in league with the devil and that those who patronized their services were in danger of eternal damnation. Concealment, isolation, and the arcane symbolic language of the Hermetic tradition were evolved not only as a mechanism to guard secret knowledge, but also as a strategy for survival in the face of persecution. At first the astrological signs of the planets were used as alchemical symbols; later alchemists invented their own secret symbols. The 'Table of Chemical Symbols' in the *Encyclopédie* of Denis Diderot and Jean d'Alembert in the late eighteenth century still resembles the medieval alchemists' symbols. These characteristics, accidents of history, have been perpetuated in fiction, not only in relation to alchemists but as essential features in

the characterization of modern scientists, especially chemists, as cloistered, secretive, engaged in practices that violate the norms and moral values of society, speaking a language and writing in symbols designed to exclude the uninitiated.

Despite this reputation of illicit practices and even condemnation by the Church, alchemists exerted a continuing fascination because of their alluring promises. In various forms these all represented power to transcend the normal limitations of the human condition – the power of wealth, power over ageing and death, and power over the creation of life. For this reason alchemists were wooed by princes[1] and paupers alike, even though their clients may have suspected that they were being deluded. In modern dress these promises remain universally attractive and lucrative propositions, appearing closer to realization than ever before.

## 4. Prototypes of the alchemist in literature

The simple medieval stereotypes of the alchemist, memorably represented in Chaucer's *The Canon's Yeoman's Prologue and Tale* (Chaucer 1957, pp. 473-98), were the deluded 'puffer' who wasted his life and money in the pursuit of alchemy and the unscrupulous trickster who defrauded others. Although these were later tempered by more benign successors – the natural philosopher and the scientist – the recurrent fictional image of the knowledge-seeker retains many of the characteristics of the alchemist obsessed with the pursuit of dangerous or socially unlawful knowledge. These characters, invariably male, still shroud their research in secrecy and isolation. Likewise, the master narrative in which they feature perpetuates the same concerns and repeats the same moral strictures as were leveled against their predecessors.

The alchemist stereotype as we know it today results largely from an amalgam of two fictional characters, so universally recognized and enduring that they have become prototypes in their own right. Dr Faustus and Victor Frankenstein have continued to provide the imagery, even the iconography, for representations of both the alchemist and modern scientists. The former figure provides the link between medieval superstition and Renaissance aspirations to understand Nature, while the latter situates archetypal desires and knowledge hubris within the context of a recognizably modern world.

### 4.1 Faust

Probably derived originally from the real-life Georg Faust of Knittlingen,[2] Faust in all his literary manifestations was depicted as displaying intellectual

arrogance and an obsession with transcending the boundaries of human knowledge. Circulated orally, the Faust legends became increasingly exaggerated, involving magic and familiars. The first written account, the anonymous Spieß edition of *Historia von D. Johann Fausten* of 1587 had an unmistakable religious moral, focusing on the pact with the devil and Faust's gruesome end, accompanied by suitable passages from Scripture. However, *The Tragical History of Doctor Faustus* (1604), written only seventeen years later by English playwright Christopher Marlowe, presented the story in a quite different light. Although the incidents of Marlowe's play were based on those in the English translation of the Spieß text, the assessment of the protagonist is totally divergent.

Marlowe's Faust is a man of his time. His Renaissance-humanist longing to transcend the limitations of the human intellect is still tempered by the medieval awareness that such an aspiration, like Lucifer's revolt against God, is doomed to destroy him. Yet Marlowe contrives to imply that his ultimate destruction is the tragic waste of a gifted man. The kind of Faust figure that predominates at any point in history is an index of the status accorded by a society (or an author) to the individual and to the intellect, as opposed to the value placed on obedience to the prevailing hegemony, whether Church or State. At one end of the evaluation spectrum, Faust is condemned for his *hubris* and arrogant denial of God-given limits, and thoroughly deserves his terrible end. At the other extreme, Faust represents a noble Prometheus figure, asserting the right to freedom of knowledge and the full development of the individual's powers against a repressive regime, whether of Zeus, the Church, or public opinion. This is the Faust of German Romanticism, of Klinger, Goethe, and Lessing. Scientists are still regularly characterized across a similar range, depending on prevailing social and moral support for the intrinsic value of knowledge or for the contrary view that it should be subsidiary to the public interest and, if necessary, suppressed.

## 4.2 Frankenstein

Mary Shelley's character Frankenstein has become an archetype in its own right, universally referred to and providing the dominant image of the scientist in twentieth-century fiction and film. Frankenstein is the prototype of the mad scientist who hides himself in his laboratory, secretly creating not an elixir of immortality but a new human life, only to find he has created a Monster. Not only has his name become virtually synonymous with any experiment out of control, but also his relation with his creation has become, in popular misconception, complete identification: Frankenstein *is* the Monster. The power of the Frankenstein story can be attributed to the fact that, in its essentials, it was a product of the subconscious rather than the conscious

mind of its author and thus, in Jungian terms, draws upon the collective unconscious of the race.

The circumstances of the composition of *Frankenstein*, as described by the author in her Introduction to the 1831 edition, are almost as well known as the story itself and have themselves inspired other fictional accounts including a film and an opera[3]. Yet it is worth stressing that, according to Mary Shelley, the story was produced by the concurrence of two specific factors: the need to produce a horror story and the account of an alleged scientific experiment. Mary and Percy Shelley, their baby son William and Mary's stepsister Claire Clairmont were spending the summer of 1816 near Geneva, as neighbors of the poet Lord Byron and his personal physician Polidori. Kept indoors by a stretch of bad weather, Byron, Percy, Polidori, and Mary each agreed to write a ghost story as entertainment. Mary records that she found great difficulty in thinking of a suitable plot until the evening when the others were discussing the latest experiments allegedly conducted by Erasmus Darwin whereby he was said to have "preserved a piece of vermicelli in a glass case till by some extraordinary means it began to move with voluntary motion. Not thus, after all, would life be given. Perhaps a corpse would be reanimated; galvanism had given token of such things: perhaps the component parts of a creature might be manufactured, brought together, and endued with vital warmth" (Shelley 1996, pp. 171f.). That night Mary allegedly dreamed the central scene of her novel. Doctor Darwin has been transformed into "the pale student of unhallowed arts, kneeling beside the thing he had put together" (Shelley 1996, p. 172). This suggests that the very attempt to create life was already associated, at least in Mary's subconscious mind as accessed by her dream, with alchemy, the "unhallowed arts", with the demonic and the horrific. The problem of finding a subject for her story was instantly solved: "What terrified me will terrify others; and I need only describe the specter which had haunted my midnight pillow. […] making a transcript of the grim terrors of my waking dream." (Shelley 1996, p. 172)[4]

It is not difficult to supply reasons why the account of Darwin's alleged experiments should have had such a profoundly unsettling effect on Mary Shelley, aged eighteen, the youngest and least assured person present, and clearly intellectually overawed by the discussion (she tells us that she was "a devout but nearly silent listener"). Only the preceding year, Mary had lost her first child born prematurely and had recently undergone a second, difficult confinement. Inevitably she would have felt emotionally disturbed, even violated, by a discussion which not only abolished the role of the female in the creation of life, but trivialized the process by reducing it to "a piece of vermicelli in a glass case". Unable to argue at a rational level with the intellectual giants Byron and Shelley, she doubtless suppressed her disquiet, which emerged violently in her subsequent dream. What is more interesting for the

purpose of this exploration of images is her immediate identification of the highly visual nightmare image of the attempt to create life with her earlier aim "to think of a story [...] which would speak to the mysterious fears of our nature and awaken thrilling horror" (Shelley 1996, p. 171).

Frankenstein is not only the Romantic over-reacher determined to transcend human limitations; he is also the heir of Baconian optimism and Enlightenment confidence that everything can ultimately be known and that such knowledge will inevitably be for the good. "I doubted not that I should ultimately succeed [...]. A new species would bless me as its creator and source; many happy and excellent natures would owe their being to me." (Shelley 1996, pp. 31f.).

Frankenstein also accepts uncritically the reductionist premise of the eighteenth-century mechanists, that an organism is no more than the sum of its parts. As heir to a such a view, he has no sense of the extraordinary irony involved when he sets out to create a "being like myself" from dead and inanimate components, ignoring the possible need for any living or spiritual elements. Even in retrospect he seems to see no anomaly in this, for he tells Walton, not without pride: "In my education my father had taken the greatest precautions that my mind should be impressed with no supernatural horrors. I do not ever remember to have trembled at a tale of superstition, or to have feared the apparition of a spirit." (Shelley 1996, p. 30)

But the being he creates is not merely a mechanism, the sum of its inanimate parts; it is indeed a being like himself, with free will not subject to Frankenstein's control. As such, it enacts Frankenstein's own unconscious desires, both good and evil, which have been sublimated by the discipline of his research program and by cultural censorship. The Monster responds to the beauties of nature, to the joys of domesticity and the ideas of great books, occupations that Frankenstein had put aside for his research. But it also kills Frankenstein's younger brother William, his fiancée Elizabeth, and his friend Henry Clerval, the very people whom Frankenstein is duty-bound to love but whom he has subconsciously wished to be rid of because they attempt to distract him from his obsession. The Monster is thus both an *alter ego* and a substitute for the natural child he has denied existence by deferring his marriage with Elizabeth. This *Doppelgänger* relationship symbolizes the belief in the essential duality of man, the complex of rational and emotional selves, mutually alienated but finally inseparable (Bloom 1965, pp. 611-18; Levine *et al*. 1979, p. 15; Miyoshi 1969, pp. 79-89). This image was to be expanded in Stevenson's *The Strange Case of Dr Jekyll and Mr Hyde* (1886). In the image of the larger-than-human Monster, Shelley reaffirms the Romantic position that the unconscious is an intrinsic and more powerful part of the human experience than the rational mind and, if suppressed, will ultimately emerge to destroy the latter.

It is not surprising that playwrights and film makers have returned with such frequency to the story, modifying it to suit the prevailing tastes, values, and scientific debates of their time, but it is interesting that no screen version has retained Shelley's pessimistic ending.

The first physical presentation of Frankenstein was H.M. Milner's play of 1826, *Frankenstein; or, the Man and the Monster* and the story became the subject of one of the earliest films, the Edison Company's *Frankenstein* (1910). This film concentrated on the psychological aspects of the story, emphasizing the fact that the creation of the Monster was possible only because Frankenstein allowed his normal healthy mind to be overcome by evil and unnatural thoughts. Edison's ending was far more positive and romantic than Shelley's, echoing contemporary optimism about science: the Monster finally fades away, leaving only his reflection in a mirror. And even this is subsequently dissolved into Frankenstein's own image by the power of Elizabeth's love. Frankenstein has been restored to mental health and hence the Monster can no longer exist.

Carlos Clerens, the historian of horror films, rates the 1931 Universal film classic, *Frankenstein*, which introduced Boris Karloff as the Monster, as "the most famous horror movie of all time" (Clerens 1967, p. 64). Yet by comparison with the novel the film is hardly horrific at all. The heavily underlined moral, stated at the beginning, that "it is the story of Frankenstein, a man of science who sought to create a man after his own image without reckoning upon God", restores an element of supernatural order and justice to Shelley's entirely secular and unredeemed situation. In this version, Henry Frankenstein (who, following Peggy Webling's 1930 play on which the film is based, has exchanged given names with Clerval) is presented as the innocent victim of a mistake whereby his careless assistant has brought him the brain of a murderer instead of a noble person, for inserting into his creature. The evil character of the Monster is therefore merely an experimental error, rather than the inevitable result of Frankenstein's *hubris*, and the implication is that the creation of the Monster *per se* posed no abiding procedural problem; with due precautions a better result could be obtained next time. Such an attitude, including the otherwise anomalous introductory moral, was consistent with the adulation of scientists, and particularly of inventors, in the United States during the 1930s (Haynes 1994, pp. 163-5). Although the film ended with the Monster being burnt to death and the celebration of Frankenstein's wedding to the (spared) Elizabeth, the box-office success indicated a sequel. The final scenes of the 1931 film were cut from all prints in circulation and *Bride of Frankenstein* (1935) opened with a scene in which Mary Shelley relates to Shelley and Byron the sequel to her novel. In this film Frankenstein becomes the pawn of another scientist, the mad, evil Dr Pretorius who, having constructed various homunculi, now wishes to produce something larger. He

forces Frankenstein to create the mate for which the Monster of the novel had begged. The female Monster (in an extension of the *Doppelgänger* effect in the novel she is played by the same actress, Elsa Lanchester, as Mary Shelley) is striking but not hideous and she immediately rejects the Monster who in despair electrocutes her, Dr Pretorius, and himself. In this film Frankenstein has become entirely absolved of guilt, and the role of the evil scientist bent on creating life, has passed to the alchemist-like Pretorius.

*Bride of Frankenstein* was followed by a long succession of Frankenstein derivatives whose titles are sufficiently indicative of their content and of the way in which Frankenstein has been integrated into Western culture as an ever-contemporary by-word, almost as a real person, engaging in dialogue with other characters both real and imaginary.[5] At different periods the emphasis falls variously on horror, space travel, sexuality, or comedy associated with the figure of the scientist. One of the most interesting films in terms of the application of the Frankenstein story to a contemporary scientific debate is *Frankenstein 1970* (1958) in which Boris Karloff returns to the screen as the disfigured Victor Frankenstein, victim of Nazi torture. By means of an atomic reactor he raises to life the Monster from his ancestor's 1757 experiment, but they both die a horrible death from radioactivity when the reactor blows up. Only then is the Monster's face revealed. It is the face of a youthful Victor Frankenstein, symbolizing in startling visual imagery the identification of creator and creature, in this case the atomic scientist and his dangerous and faulty creation, atomic power.

## 5. The endurance of the alchemist stereotype

It may seem anomalous that, after the rise of the great scientific societies in the seventeenth century and the European Enlightenment of the eighteenth century with its emphasis on rationality, this archetype has endured, not only in fiction but also in the more recent medium of film. From his extensive analysis of horror films in English between 1931 and 1960, Andrew Tudor estimated that 30% of the villains were scientists; 40% of the threats were spin-offs from science; and a mere 10% of the heroes were scientists (Tudor 1989b, pp. 589-92). It should be noted that, whether noble or evil, the scientist figure remained overwhelmingly male even when this no longer reflected the actual degree of involvement of women in science.

The most obvious reason for the perpetuation of the evil alchemist figure is that the personality traits to which alchemy appealed – greed, vanity, desire for power, immortality, and manipulation of other human beings – remain

prevalent and those who profess to satisfy them in some form continue to be regarded with mingled fascination and fear.

However, I want to suggest ten more specific reasons for the persistence of the alchemist-derived character and for the imaginative power it continues to exert.

(i) One of the most common forms of the stereotype, the seeker after forbidden knowledge, has its roots in much older mythology, suggesting that it is deeply ingrained in human consciousness, perhaps within the subconscious: the narratives of Eden, of Prometheus, of Daedalus and Icarus, and of Pandora's Box all feature protagonists who sought transcendent knowledge and were punished by some higher authority or by the inevitability of events. Coming from this implicit lineage, their modern descendants carry a transferred kudos and more powerful resonances than any 'new' story could generate. The scientist who discovers some power (whether it be a weapon or nuclear power or the ability to create, clone, or modify life) that cannot be contained or controlled is Pandora trying vainly to push the escaping Troubles back into the box. Like these archetypal myths, nearly all alchemist narratives focus on a reversal of expectation and consequent nemesis: the glorious promises turn to ashes and destruction – sometimes because they are not achieved, as in Balzac's *La Recherche de l'Absolu* (1834), but more often because they *are* achieved in the short term but bring unforeseen disaster in their train. The preeminent literary example here is Frankenstein, whose tragedy begins at the precise moment of his experimental success.

> I saw the dull yellow eye of the creature open; it breathed hard and a convulsive motion agitated its limbs.
>
> How can I describe my emotions at this catastrophe? […] I had desired it with an ardour that far exceeded moderation; but now that I had finished, the beauty of the dream vanished, and a breathless horror and disgust filled my heart. Unable to endure the aspect of the being I had created, I rushed out of the room. [Shelley 1996, p. 34]

(ii) Science, like alchemy, claims access to a kind of power that cannot be gained by force of arms or other traditional forms of supremacy. The medieval Church was therefore justified in regarding alchemy as a rival *power*. Francis Bacon's aphorism 'knowledge is power' is nowhere so obvious as in the allure of science. To those trained in a scientific discipline, knowledge is not threatening; it is more likely to be regarded as one of the highest achievements of the human intellect. To understand how it appears to the uninitiated, who feel disempowered through lack of understanding or inability to control its consequences, we might consider an analogy with other contemporary forms of power and their concomitant sources of fear: the seductive power of an idea for which its supporters willingly die, international terrorism, the power of cataclysmic natural events, such as earthquakes, vol-

canic eruptions, cyclones, tsunamis, and, less immediate but no less real, potential long-term environmental disaster for our planet.

(iii) The most publicized goals of modern science bear a striking similarity to those of alchemy. It seems that our wish list has changed little since our medieval ancestors visited their local alchemist under cloak of darkness, fearful of being observed but greedy for results.

(a) Perpetual motion represents limitless power at close to zero cost. In the nineteenth century electricity filled this role; in the twentieth it was nuclear power. Both have been regarded with similar ambivalence as both benefactor and destroyer. Albert Robida's illustration "The Energy Explosion" in *La Vie électrique* (1887) personifies Electricity as a provocative woman who both liberates and enslaves the world. In the case of nuclear power, writers have been only cautiously optimistic. The scientific utopia, pioneered by Sir Francis Bacon's *The New Atlantis* (1626), has had few successors. H.G. Wells' scientific utopias were balanced by his dark studies of scientific monomania. Simon Newcombe's patriotic American novel *His Wisdom the Defender* (1900) posits a 'thermic engine', forerunner of a nuclear power plant, which can precipitate a new industrial revolution. The scientist-hero Campbell uses this power to enforce world peace and cooperation. Such benign use of physical power was later characteristic of the pulp science fiction magazines *Amazing Stories*, *Astounding Stories,* and *Marvel* of the 1920s and '30s.

(b) The transmutation of metals to gold was superseded by the promise of producing artificial diamonds and then by the discovery of radioactive elements and industrial processes with immense profits out of all proportion to outlay. Our contemporary equivalent is the use of biological processes to create complex end-products more efficiently and cheaply than from *in vitro* chemical reactions, but with considerable scope for potential accidents and unforeseen problems.

(c) In place of elixirs for eternal youth we have been offered herbal remedies from tea fungus and garlic to Manchurian mushrooms and gingko, magnetism, positive ions and, more recently, anti-oxidants, botox, testosterone, and hormone replacement therapy.

(d) Our strategies to cheat death include ever-new miracle drugs, organ transplants, stem cell grafts, and injections of blood stem cells.

(e) Superseding the preoccupation with homunculi, twenty-first century cloning techniques, artificial insemination, genetic engineering, embryo transplants, surrogate parenting, and reproductive material produced from the DNA of somatic tissue are highly sought after by those prepared to outlay the immense cost.

All have been greeted with a combination of exultation at the possibility of overcoming human limitations and fear of unscheduled consequences and socio-moral dilemmas.

(iv) The most radical and widespread literary criticism of science emerged in the nineteenth century as part of the Romantic reaction against the European Enlightenment. It was characterized by an uncompromising rejection of rationalism, mechanism, reductionism, and scientific materialism as necessary and sufficient explanations of the world and, in particular, of human experience. In contrast to the Cartesian dream that reason, epitomized in mathematics, would simplify and ultimately resolve all problems, the Romantics argued for something much more than mechanism – for a metaphysical or spiritual dimension beyond the parameters of measurement and for the validity of non-rational forms of knowing: imagination, intuition, dreams, the emotions, and the subconscious. The villains of Romanticism were neo-alchemists, reducing the world to symbols and isolating themselves from the healing power of Nature, which might have restored them to sanity and wholeness. These images have been powerfully presented in fiction, vindicating the Modernist premise that twentieth-century society had no humanity touch or emotional well-being.

This vilification of science began prior to the Romantics, with the eighteenth-century English satirists who presented the virtuosi[6] of their day as divorced from reality, unable to relate to human concerns, and so obsessed with their narrow focus of interest that they fell into grave errors of fact as well as moral disrepute. Thomas Shadwell's popular play *The Virtuoso* (1676) and its many imitators, notably Samuel Butler's *The Elephant in the Moon* (1676), Jonathan Swift's *Gulliver's Travels* (1726), especially Book III ridiculing the astronomers of Laputa and the Projectors of Balnibarbi, and Alexander Pope's *Essay on Man* (1733) all satirized the arrogance of contemporary natural philosophers.[7]

These criticisms were amplified in the wholesale rejection of science by the English Romantic poets, Blake, Wordsworth, and Keats, and to a lesser extent by the views of their German counterparts who proposed a *Naturphilosophie* affirming a continuity between the spirit of Man and a spiritual dimension in Nature.[8] Of these Blake was the most condemnatory. His 'infernal trinity' comprised Francis Bacon, the exponent of experimentalism, Newton the arch-mechanist and John Locke, representing the philosophy of the five senses (Blake 1966, pp. 636, 685). In Blake's view these three men were dangerous heretics who, blinded by materialism, failed to see the complexity of truth. Wordsworth and Keats viewed the practitioners of a science more in pity than in anger – pity for their limitations of perception and experience and their rejection of imaginative truth.

The Romantic view has remained particularly influential among prose writers as well as poets. Thomas Carlyle lamented, "Men are grown mechanical in head and in heart as well as in hand" (Carlyle 1915, p. 228), and Charles Dickens satirized the British Association for the Advancement of Science,

which met for the first time in 1831, as "The Mudfog Association for the Advancement of Everything" (Dickens 1837, pp. 397-413). Its members are depicted as having lost all humanitarian sympathies and values, as socially irresponsible and emotionally and morally deficient.

Balthazar Claës of Balzac's novel *La Recherche de l'Absolu* (1834) is far more complex. Although Balzac's major interest is the psychological, almost clinical, study of a genius and the effect of his obsession on his family, the underlying moral is the Romantic belief that preoccupation with science atrophies the normal emotions that sustain personal relations and social responsibilities. Claës's wife, Josephine, pleads the case for the emotions when she tells him, "Science has eaten away your heart" (Balzac, n.d., p. 84), and contrasts her own selfless devotion with his uncaring obsession with his chemistry. His response, a piece of unwitting self-condemnation, is to redefine feelings in the current chemical term, 'affinities': "Unluckily, such affinities as these are too rare, and the indications are too slight to be submitted to analysis and observation" (Balzac, n.d., p. 85).[9]

The notion of the homunculus was resurrected to provide a useful symbol of such mechanistic philosophy, no longer as a tiny figure but expanded to a full-scale person– or even bigger – dangerous in his power. In a macabre parody of Julien Offray de La Mettrie's *L'Homme machine* (1747), Shelley's Frankenstein assembles his eight-feet-tall 'child' from the components of corpses and brings it to life with an electrical discharge, a method that would have been regarded by her contemporaries as at least feasible, since it mimicked Benjamin Franklin's well-known experiment with a kite in an electrical storm and popular demonstrations of the time practiced publicly on the corpses of executed criminals to show the effect of galvanic action.[10]

In E.T.A. Hoffmann's novel *Der Sandmann* (1817) the title character Dr Coppelius, overtly a lawyer, is also a closet alchemist. As a child, the protagonist Nathanael had watched in horror as Coppola and his father attempted to produce an automaton in a setting that is heavily suggestive of an alchemist's laboratory. Returning years later in the guise of a dealer in scientific glasses, Coppelius persuades Nathanael to look through his telescope and see the beautiful girl Olimpia, technically flawless but lacking emotions and spontaneity. In the descriptions of Olimpia, Hoffmann vividly expresses the Romantic abhorrence of mechanism. The infatuated youth Nathanael is perturbed to discover how stiffly she holds herself and how mechanically she dances. She plays and sings like a clockwork model, with the emotionless tone of a singing machine, and when Nathanael bends to kiss her, her lips are ice-cold.[11] Her mechanical nature is finally demonstrated when he hurls her to the floor causing her dismemberment. But Nathanael, too, is destroyed by his dalliance with mechanism and the deluding instruments of Coppelius. Under the spell of the distorting telescope he flings himself to his death from

the top of a tower. Simultaneous fascination with, and fear of, mechanism is also apparent in Ambrose Bierce's story, 'Moxon's Master' (1894). Bierce's story is important because it explicitly discusses, through a dialogue between the narrator and the scientist-inventor Moxon, who has constructed a chess-playing automaton, the question of what, if anything, distinguishes living systems from machines. Instead of the mechanist view that all organisms are merely complex machines, Moxon takes the contrary view, namely that "all matter is sentient, that every atom is a living, feeling, conscious being" (Bierce 1946). He claims to have shown that plants think and he now believes that even the constituent atoms of minerals think, as they arrange themselves into mathematically perfect patterns. Moxon has made a machine to entertain himself and to demonstrate his theories; but he has not worked through the consequences, for it is the validity of those very theories that is his undoing. In accordance with Moxon's own postulates, the machine is alive and therefore not content to accept a subservient, machine-like role. In frustration at losing the game and anger against its opponent, it reaches forward and strangles its creator with its iron hands. This ending looks back to *Frankenstein* and forward to the twentieth-century stereotype of the scientist unable to control his created beings.

Conceived eighty years after *Frankenstein*, Wells' *The Island of Dr Moreau* (1896), although its protagonist is a biologist, draws heavily on the same tradition of the alchemist and his attempts to produce life by mechanical means. Forced to flee England because of his illegal research in vivisection, Moreau works in isolation in his island laboratory creating his Beast People by vivisecting and transplanting parts from various living creatures to produce new hybrids, the biological counterparts of interchangeable, modular constructions. Like Frankenstein and Moxon, Moreau dies when his creatures revolt against him.

In twentieth-century mainstream fiction the successors to chess-playing automata were robots. These have been used largely to encapsulate the amoral mentality that the authors associated with scientists, engineers and, in some cases, the general ethos of a technological society. For writers with a humanities background the authorial voice is invariably critical, usually satirical, as in the prototypical work on robots, Karel Capek's *R.U.R.* (1921). On the other hand, the robot stories by writers who have come to fiction from a career in science are usually markedly different in tone. Isaac Asimov's robots, for example, are the heroes of the stories in which they appear, being 'morally' as well as intellectually superior to the flawed human characters whom they so devotedly serve.[12]

Specters of mechanism continued to haunt twentieth-century horror films. Apart from the many versions of *Frankenstein*, *The Cabinet of Doctor Caligari* (1919), *Dr Cyclops* (1940) and the three film versions of Wells' *The*

*Island of Doctor Moreau*[13], the Romantic condemnation of rationalism and mechanism finds expression in numerous details. For example, we should *know* from film conventions that Dr Strangelove (1963) is suspect because his withered hand and his motorized wheelchair mark him as being cut off from Nature, just as, in medieval times, physical ugliness was believed to indicate the moral imperfection of alleged witches.

(v) The alchemist figure is often also an idealist, intense, highly motivated, and focused totally on his quest to transcend the human condition. Frankenstein is the heir of Baconian optimism and Enlightenment confidence that everything can ultimately be known and that such knowledge will inevitably have a beneficial outcome. Deterred by M. Krempe's emphasis on the daily grind of chemistry, he responds ecstatically to M. Waldman who, in language reverberating with biblical echoes, claims for modern chemistry supremacy over other branches of knowledge because of the transcendent power it offers. Speaking of the "modern masters" of his subject, he asserts:

> [T]hese philosophers [chemists] have indeed performed miracles. They penetrate into the recesses of nature and show how she works in her hiding places. They ascend into the heavens; they have discovered how the blood circulates and the nature of the air we breathe. They have acquired new and almost unlimited powers; they can command the thunders of heaven, mimic the earthquake, and even mock the invisible world with its own shadows. [Shelley 1996, p. 28]

What captivates Frankenstein is less the lure of knowledge for its own sake than the promise of the power it confers. "Life and death appeared to me ideal bounds which I should first break through, and pour a torrent of light into our dark world. A new species would bless me as its creator and source; many happy and excellent natures would owe their being to me." (Shelley 1996, p. 32) That is, he sees himself as re-enacting the role of the Creator and, in accordance with the Romantic quest, wrenching opposites into unity at his will.

The word 'Absolute' in Balzac's *La Recherche de l'Absolu* also suggests a transcendent reality beyond the analytical procedures and chemical terms of a particular experiment. Thus although Claës is presented as deficient in feelings toward his family, there is an aura of grandeur attaching to him, not only in his acknowledged genius, but in his devotion to an ideal, his self-sacrifice and the insults which he endures from 'ordinary people'. Balzac's characterization, in fact, reflects the same complexity of response as Blake's rendering of Newton, a visionary even while attempting to confine the universe within a reductive, analytical system. Like Robert Browning's character, Paracelsus, Claës discovers the secret of the Absolute only at the moment of death, for it is a metaphysical, rather than a physical truth. Echoing Marlowe's Faustus, Claës is presented as a tragic figure whose essential nobility and human potential are wasted. Similarly, Aylmer, the protagonist of Hawthorne's short

story 'The Birthmark' (1845), is unmistakably introduced as an alchemist: "a man of science, an eminent proficient in every branch of natural philosophy, … He had left his laboratory to the care of an assistant, cleared his fine countenance from the furnace-smoke, washed the stain of acids from his fingers, and persuaded a beautiful woman to become his wife" (Hawthorne 1987, p. 175). Like Frankenstein he has studied the works of Albertus Magnus, Cornelius Agrippa and Paracelsus. Aylmer, too, is an idealist. Living in a time when "kindred mysteries of Nature seemed to open paths into the region of miracle" (Hawthorne 1987, p. 175), he becomes obsessed with perfection and determines to remove his wife's one tiny blemish, a birthmark, symbol of the inescapable imperfection of the human condition. The elixir vitae he persuades her to drink in order to remove the mark kills her.

(vi) Alchemists and scientists are typically presented in literature as having different allegiances from other people. Like religious and political extremists, they are ruthless in their idealism, prepared to sacrifice people or animals in the cause of their experiments. Wells' Invisible Man kills and robs without remorse to finance his research, while Doctor Moreau is deaf to the screams of pain of his experimental animals. More recently the scientist character frequently enacts the view that the pursuit of scientific knowledge justifies any means, for example, suppressing knowledge of likely side effects, environmental pollution, the possibility of 'jumping genes' or contamination from genetically engineered organisms, lest research projects be curtailed.

(vi) A major factor in the continuing appeal of the alchemist narrative is its ability to evoke perennially convincing patterns of horror, mystery, and evil. Horror continues to fascinate us. Even though most of the examples from past centuries with their focus on graveyards and charnel houses, corpses, ghosts, and monsters have ceased to frighten us, many elements of the Frankenstein narrative remain perpetually relevant as symbols of changing technology, if not of that technology itself. Films have intensified this relevance with special effects, reaching out to a far wider audience than the written word. Horror fiction and horror movies allow us to indulge our worst impulses and fears, to be, at least vicariously, complicit in what violates culturally sanctioned norms. They transgress the boundaries of 'decency' and blur the categories that make up social structures. The writer Stephen King asserts that the effect of horror fiction is to shore up the *status quo*, because we see that the alternative is too terrible and hasten back to the 'real world' with a sense of relief.

> Monstrosity fascinates us because it appeals to the conservative Republican in a three-piece suit who resides within all of us. We love and need the concept of monstrosity because it is a reaffirmation of the order we all crave as human beings […] it is not the physical or mental aberration in itself which horrifies us, but rather the lack of order which these aberrations seem to imply. […] After

> all, when we discuss monstrosity, we are expressing our faith and belief in the norm and watching for the mutant. The writer of horror fiction is neither more nor less than an agent of the *status quo*. [King 1983, p. 30]

While this comment applies to any example of horror from the supernatural to the psychological, from drug-induced states to the rampage of a serial killer, in the case of the evil alchemist and particularly of his fictional scientist descendant there are additional intensifiers. First, an audience is prepared to suspend disbelief about the 'chamber of horrors' that science might unleash in the foreseeable future; from extra-terrestrial events through *Silkwood* (1983) and *Jurassic Park* (1993) to *Erin Brockovich* (2000) it seems that scientists can be plausibly implicated in almost any disaster. Turney (1998) has explored this latent suspicion of science, particularly in the biological sciences. Second, there is the attraction of seeing the powerful one dragged down (and in fiction and film he almost invariably is: the threat is averted, natural order is restored). Third, there is the lingering suggestion that such fictional events could recur in the real world, causing similar havoc and disaster.

(viii) Scientists themselves have continued to provide writers and filmmakers with ongoing instances of the alchemist stereotype in the following ways.

(a) Mystery and obfuscation. The symbols, formulae, and theories of chemistry and physics are as opaque to non-initiates as those of alchemy were in their time.

(b) Ruthless determination to achieve their goal. A 2001 BBC program *Celluloid Scientists* opened with the words: "the scientists were so preoccupied with whether they *could* that they didn't stop to think if they *should*". Enrico Fermi is quoted as having said in relation to his work on the bomb, "Don't bother me with your conscientious scruples. After all, the thing is beautiful physics." (Buck, 1959, p. 206) and there have been copious literary examples of this attitude derived from twentieth-century science. In C.P. Snow's novel *The New Men* (1954) it is widely believed amongst the nuclear physicists "that the plutonium bomb was dropped [on Nagasaki] as an experiment to measure its 'effectiveness' against the other. 'It had to be dropped in a hurry', said someone, 'because the war will be over and there won't be another chance'." (Snow 1954, p. 201)

(c) Failure to show concern about the social and moral impact of their research. This has been most pronounced in the case of nuclear physicists. J. Robert Oppenheimer regarded the 'success' of the atomic bomb as "technologically sweet". Edward Teller was the alleged prototype of Dr Strangelove and of Richard Tzessar in Heinrich Schirmbeck's *Ägert dich dein rechtes Auge* (translated into English as *The Blinding Light* [1957]). Tzesssar refuses to acknowledge a moral dimension to his research. "We serve the God of free research, the God who says '*Fiat scientia pereat mundus* – let there be

knowledge though the world perish! … We have no power to prevent it." (Schirmbeck 1957, p. 341) Irving Langmuir of the General Electric Company inspired the amoral Felix Hoenikker in Vonnegut's *Cat's Cradle* (1963) who discovers and plays with the lethal substance, Ice 9. Turney (1998) has catalogued numerous instances of such lack of concern for consequences in the area of genetics.

(ix) Also contributing to the ongoing use of the alchemist stereotype is the appeal of a simplistic, universally understood image. The name 'Frankenstein' has become instantly recognized shorthand for any field of experimentation popularly perceived as dangerous or likely to backfire. From developing viruses for germ warfare, to delivering genetically modified vegetables ('Frankie foods'), cloning sheep, or growing new organs from embryonic stem cells, media reports almost invariably invoke Victor Frankenstein.

(x) On the other hand, the psychological *complexity* of Mary Shelley's protagonist makes him endlessly relevant as a figure of modern science. Unlike the film-makers who have adapted her novel for the screen, Shelley was not greatly interested in the scientific effects beyond the claim that they were "not of impossible occurrence" (Shelley 1996, p. 5). Frankenstein's laboratory is disposed of in one sentence, "In a solitary chamber, or rather cell, at the top of the house, and separated from all the other apartments by a gallery and a staircase, I kept my workshop of filthy creation" (Shelley 1996, p. 32), because the main theatre of action is located within the man himself.

Many of his characteristics are perceived as fitting very well with the popular image of a scientist's life.

(a) Delusion that his research is solely for the benefit of humanity rather than for his own career-path, self-aggrandizement, or satisfaction. Scientists are prone to present research applications in similar terms.

(b) Secrecy about what he is doing and the psychological effects on his personality of this chosen isolation from other human beings. The knowledge that his research is illegal (involving grave-robbing and dissection of corpses) causes Frankenstein to become even more secretive. Similarly, scientists' fear of having their research curtailed by ethics committees, animal liberationists, or environmentalists now engenders a parallel kind of secrecy. Additionally, many employers, in both the government and the private sector, demand such secrecy for processes tied up in patents or involved with national security. In many cases scientists working in industry or for the military are not permitted to publish their work in professional journals.

(c) Obsessive dedication to his research, to the exclusion of relations with family and friends and the suppression of human affections. This obsession includes a fanatical desire to complete a project no matter what the cost, and especially to complete it *first*, a perennial concern of scientists enforced by the requirement of publication and funding.

(d) Exclusion of those who might have given him the ethical advice he did not wish to hear. Rejecting the overtures of his father, his fiancée, and his friend Clerval, Frankenstein leaves their letters unanswered. He has also isolated himself from Nature until, working day and night in his laboratory without regard to natural rhythms, he has lost the ability to appreciate natural beauty and diversity.

(e) Rejection of responsibility for the results of his research. His inability to retain or reclaim control over the outcomes actually disempowers Frankenstein. He cannot (or chooses not to) restrain his Monster. Until recently scientists felt it an unfair imposition to be expected to deal with the consequences of their research, the possible development of their experiments, and their ethical and social implications. Now, in most cases, they have no such option. Under pressure Frankenstein agrees to create a female as a mate for the Monster, then reneges on this agreement. Similarly, dependent on funding from granting committees or corporations, today's scientists are required to work in specific 'fashionable' areas.

Shelley also explores the relation between Frankenstein's pursuit of scientific success, his failure as a human being, and his social guilt. The inevitable neglect of human ties involved in the scientist's total dedication to his research results not only in his own isolation and loneliness but also in a moral and emotional loss to society. Whereas many other Romantic treatments of the scientist's isolation assumed that this was a voluntary state that could, at will, be reversed, Shelley suggests that there is an inevitable loneliness and guilt contingent on scientific research. Frankenstein begins by frequenting remote and lonely places. At first this isolation is dictated by the requirements of his research since he collects his materials from graveyards and charnel houses; but subsequently his separation from society becomes a necessity imposed by the result of his experiment – the existence of the Monster. In relating his tale to Walton, another scientist pursuing an obsession in contravention of the natural ties of affection, Frankenstein digresses to moralize explicitly: "If the study to which you apply yourself has a tendency to weaken your affections, and to destroy your taste for those simple pleasures in which no alloy can possibly mix, then that study is certainly unlawful, that is to say, not befitting the human mind." (Shelley 1996, p33)

## 6. Terror and desire

Ultimately the perennial fascination of the master narrative of alchemy is that it tells a story of what we both desire and fear to know– the story of power beyond our dreams but also beyond our control. Paradoxically, no century

has had more control over the material universe than ours, and yet we are still confronted with an unpredictable world where we are stalked by terrorism, by AIDS and other pandemics, and by a latent and recurrent nuclear threat. Caught between terror and desire, we are a captive audience for stories that make sense of our uncertain existence by embedding it in the archetypal legend of the powerful mage, the sinister alchemist, the perplexed chemist.

Our society still desires to do a range of secret deals with its scientists, even while professing to treat them with suspicion: nuclear power plants and nuclear waste dumps, in vitro fertilization, cloning, genetically engineered organisms and production processes, surrogate parenting, the trade in organs and genes, anti-diversity treaties with seed companies marketing the total package of genetically modified, fungus-resistant crops as their exclusive intellectual property and hence a monopoly.

## 7. Conclusion

By bringing together in Frankenstein the apparently opposite qualities of the scientist and the Romantic visionary, Mary Shelley not only enriched immeasurably her depiction of the scientist over earlier representations, but extended the basic Romantic protest against materialism and rationalism. She showed that Frankenstein, although apparently so rational, so desirous of secularizing the world and denouncing its mysteries, is actually, at crucial points, highly irrational, suppressing those considerations which might conflict with his obsession. Levine points out that Frankenstein "as a modern metaphor implies the conception of the divided self, the creator and his world at odds. The civilized man or woman contains within the self a monstrous, destructive, and self-destructive energy" (Levine *et al*. 1979, p. 15). The novel thus becomes a scientific formulation of the archetypal myth of *psychomachia* or the conflict within the soul, epitomized in Stevenson's *Dr Jekyll and Mr Hyde*. In these wholly secular versions, science and technology are a concretization of inner desires, masquerading as rational but, like the Monster, equally capable of springing from the dark, unacknowledged depths of their creator's subconscious. This perception suggests an important qualification of the Enlightenment belief that the pursuit of knowledge is, by definition, rational and good and should not be restricted by any socio-moral considerations.

The pervasive and enduring narratives featuring alchemist-like figures and in particular the two prototypical protagonists Faust and Frankenstein, suggest the prevalence and universality of this particular knowledge myth and raise the question of what alternative knowledge myths there might be. There have been other narratives – the utopian, science-based society of Sir Francis

Bacon's *New Atlantis*, H.G. Wells' scientific utopias, the happy robot lands of Isaac Asimov – but they have failed to survive catastrophes, the innate pessimism or resentment of writers, and perhaps of our skeptical selves. We may ask whether science, and specifically chemistry, can ever align itself on the other side in the archetypal saga of good versus evil, for example by offering solutions to the environmental disasters that we are only just beginning to acknowledge, or by working to equalize the distribution of material wealth in the world, the inequality of which is a major cause of racial, political, and religious terrorism.

## Notes

[1] In 1583 the Holy Roman Emperor Rudolph II moved his court from Vienna to Prague, where it became a center for the discussion of the occult and its relation to medicine, cosmology, and the production of gold. The search for the philosopher's stone consumed Rudolph and much of Prague's nobility. The famed English astrologer/wizard John Dee and his partner Edward Kelly spent five years together in Prague (much of it financed by Rudolph) performing magic tricks alleged to foretell the future. Kelly stayed on when Dee returned to England, claiming to have discovered the coveted secret methods for turning lead into gold. Kelly gained a knighthood, but was eventually imprisoned on charges of sorcery and heresy. Queen Elizabeth I of England also encouraged alchemy in the hope of replenishing the royal coffers (French 1972).

[2] Georg Faust was born around 1480 and appears to have had the reputation of a traveling conjuror, hypnotist, and quack doctor on the one hand and of an alchemist and serious student of natural science on the other (Smeed 1975, p. 13).

[3] Ken Russell's film *Gothic* (1986) and the opera *Mer de Glace* (1991), libretto by David Malouf.

[4] In her Introduction to a recent edition of *Frankenstein*, Marilyn Butler has pointed out that the original (1818) edition of the novel carried no such moral implications. The scientific references were to the celebrated public debate of 1814–1819 carried on between John Abernethy and William Lawrence, two professors at London's Royal College of Surgeons, on the origins and nature of life. Abernethy rejected materialist explanations and opted for an added force, "some subtile, mobile, invisible substance" analogous equally to the soul and to electricity. Lawrence, who was Percy Shelley's physician, put forward the materialist position as being the only intellectually respectable one. His views had considerable influence on both Mary and Percy Shelley and his aggressive materialism was strongly represented in the first edition of Frankenstein. It seems certain that the discussion between Percy Shelley and Byron later described by Mary in her Introduction of 1831 was concerned with the vitalist debate and Butler further suggests that the Frankenstein of the first edition, the blundering scientist attempting to infuse life by means of an electric spark, is a contemptuous portrait of Abernethy while the unhealthy relationships of the aristocratic Frankenstein family recall Lawrence's research on heredity and sexual selection. When Lawrence's *Lectures on Physiolo-*

*gy, Zoology and the Natural History of Man* elicited a virulent review in the influential *Quarterly Review* of November 1819 and Lawrence himself was suspended from the Royal College of Surgeons until he agreed to withdraw his book, Mary Shelley feared the same fate would befall *Frankenstein*. She therefore revised it extensively in 1831, removing all controversial references, adding suitably remorseful statements by Frankenstein and, of course, the Introduction with its indication that we should read the novel as a frightful "human endeavour to mock the stupendous mechanism of the Creator of the world" (Shelley 1996, p. 172). This is the edition most commonly reproduced and it is consequently the one that has colored successive interpretations of the novel (Butler 1993, pp. 302-13).

[5] *Son of Frankenstein* (1938), *The Ghost of Frankenstein* (1942), *Frankenstein Meets the Wolf Man* (1943), *House of Frankenstein* (1944), *Abbott and Costello Meet Frankenstein* (1948), *I was a Teenage Frankenstein* (1957), *The Curse of Frankenstein* (1957), *The Revenge of Frankenstein* (1958), *Frankenstein's Daughter* (1958), *Frankenstein 1970* (1958), *El Testamento del Frankenstein* (1964), *The Evil of Frankenstein* (1964), *Jesse James Meets Frankenstein's Daughter* (1965), *Frankenstein Conquers the World* (1965), *Frankenstein Meets the Space Monster* (1965), *Frankenstein Created Woman* (1967), *Frankenstein Must be Destroyed* (1969), *Gothic* (1986), *Frankenstein, the Real Story* (1993).

[6] The term 'virtuoso' was used for wealthy patrons of natural philosophy who enthusiastically undertook miscellaneous projects, without rigor or training. Indiscriminate hoarders and collectors of anything and everything, the virtuosi amassed private museums or 'cabinets' (Haynes 1994, pp. 35-49).

[7] Butler's poem satirized almost the whole membership of the Royal Society of his day, including Hooke, Boyle, and Leeuwenhoek (Haynes 1994, pp. 43f.). It was widely (and wrongly) assumed that through his 'Virtuoso', Sir Nicholas Gimcrack, Shadwell was lampooning the Royal Society since many of the experiments described were only slightly altered from those reported in contemporary *Transactions of the Royal Society* (Haynes 1994, pp. 45f.). Swift's term 'Projectors' had particular significance since 'real life' Projectors were speculators whose extravagant projects threatened innocent investors with financial ruin. The most notorious of such financial speculations was the 'South Sea Bubble'. The Flying Island of Laputa carries references to Newton's calculations and to William Gilbert's experiments in magnetism. Through his Laputans and Projectors Swift parodied John Locke's theory of knowledge and specific experiments of the Royal Society (Haynes 1994, pp. 68-72). Pope, although he produced the most famous epigraph on Newton – "Nature and Nature's laws lay hid in night; God said, 'Let Newton be!' and all was light."– was nevertheless critical of the arrogance of natural philosophers who confused mere observation of phenomena with understanding (Haynes 1994, pp. 67f.).

[8] Friedrich Schelling proposed that nature was an immense living organism and hence the goal of science was to discover the *Weltseele* of this organism. On the other hand, many of the German Romantic poets had received a scientific education. Novalis had studied mineralogy, physics, chemistry, and mathematics; Schlegel had studied physics; Goethe had studied botany, as well as being well read in chemistry and optics; Ritter was a pharmacist, chemist, physicist, and physiologist (Haynes 1994, pp. 76-8).

[9] This is almost certainly a reference to Goethe's novel *Die Wahlverwandtschaften* (*Elective Affinities*) (1809).

[10] Percy Shelley had long been interested in electricity and galvanism. He had constructed a large-scale battery and repeated Franklin's experiment (Holmes 1976, pp. 44f.).

[11] Hoffmann is believed to have been inspired to write his stories of mechanical inventions after seeing an exhibition of automata in Dresden in 1813 (Warrick 1980, p. 34). He may also have been inspired by Jean-Paul Richter's novel *The Death of an Angel*. Hoffmann's *Der Sandmann* in turn inspired Adolphe Adam's *La Poupée de Nuremberg* and the ballet *Coppelia*: *or the girl with the enamel eyes* (1810).

[12] Asimov's robots have spawned a lucrative progeny of 'cute', harmless robot characters, popularized in films, such as the $R_2$-$D_2$ and C-3PO models of *Star Wars* (1977). Like E.T., these robots are essentially novel pets with just enough initiative to make the games interesting but always, in the long run, deferential to their humans. In some ways, the complacency they generate could be regarded as the most sinister response of all.

[13] *The Island of Lost Souls* (1933) directed by Erle Kenton and starring Charles Laughton as Doctor Moreau; *The Island of Doctor Moreau* (1977) directed by Don Taylor and starring Burt Lancaster as Doctor Moreau; *The Island of Doctor Moreau* (1996) directed by John Frankenheimer and starring Marlon Brando.

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