**T.C.**

**EGE ÜNİVERSİTESİ**

**SOSYAL BİLİMLER ENSTİTÜSÜ**

**İNGİLİZ DİLİ VE EDEBİYATI ANABİLİM DALI**

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**Selin YILMAZ**

**DANIŞMANI: Prof. Dr. Dilek DİRENÇ**

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**Doç. Dr. Nilsen GÖKÇEN**

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Ege Üniversitesi Sosyal Bilimler Enstitüsü Müdürlüğü'ne sunduğum **An Analysis of Mad Scientist Narratives in Nineteenth-Century British Literature** adlı yüksek lisans tezinin tarafımdan bilimsel ahlak ve normlara uygun bir şekilde hazırlandığını, tezimde yararlandığım kaynakları bibliyografyada ve dipnotlarda gösterdiğimi onurumla doğrularım.

Selin YILMAZ

# T.C.EGE ÜNİVERSİTESİ
# SOSYAL BİLİMLER ENSTİTÜSÜ

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## TEZ SAVUNMA TUTANAĞI

**ÖĞRENCİNİN**

**Adı Soyadı** : **Selin Yılmaz**

**Numarası** : **92140000003**

**Anabilim Dalı** : **İngiliz Dili ve Edebiyatı**

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**JÜRİ ÜYELERİ**

**Jüri Başkanı**

Unvan, Adı, Soyadı : Prof. Dr. Dilek Direnç

Karar : ✓ Başarılı O Başarısız O Düzeltme

İmza :

**Jüri Üyesi**

Unvan, Adı, Soyadı : Prof. Dr. Rezzan Silkü

Karar : ✓ Başarılı O Başarısız O Düzeltme

İmza :

**Jüri Üyesi**

Unvan, Adı, Soyadı : Doç. Dr. Nilsen Gökçen

Karar : ✓ Başarılı O Başarısız O Düzeltme

İmza :

**TEZ HAKKINDA JÜRİNİN GENEL GÖRÜŞÜ**

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# INTRODUCTION

New discoveries in science always create repercussions in arts and humanities because, as George Levine puts forth, science is "the most influential power in shaping and reshaping the way societies organize and the way people live, and … the way they think and imagine" ("Science and Victorian" 87). Such an essential element in the lives of people naturally influences their way of interrogating the world. Thus, when an invention is made in a branch of science, it prompts the theologian, the philosopher, the poet, and the novelist to meditate on it. The theologian naturally thinks of its religious implications and wonders if it correlates with the knowledge in the Bible, presupposes the existence of God, or poses a threat to the authority of the Church. The philosopher and the poet think of its larger implications and wonder how it will affect the way people grasp the world, nature, and reality. The novelist (or story writer) takes all of these questions into consideration and she further explores them in the form of fiction, creating fictional characters and events to imagine the possible influences of such discovery. Hence, since very early ages literature has naturally been closely intertwined with science and technology. Even in the ancient myths and stories of various cultures, there are depictions of inventors, alchemists, or medicine men, and their inventions, experiments, or practices. As well as speculating on possible scientific and technological developments, these myths and stories also voice reactions towards new knowledge and inventions, and also towards the attitudes of the individuals who invent or make use of them.

As people delved more into the mysteries of nature, explored new lands, invented new technologies, and developed new medicines, the consequences of acquiring and applying knowledge began to be a matter of much debate. The ancient myths "which reflect profound anxieties about our relationship with the natural world - Pandora's Box, The Sorcerer's Apprentice, and the Promethean or Faustian story" which "still permeate modern thought in many guises" (Haste 114) were evoked in the minds of people when there was new knowledge that "threatened" the harmony of the universe and the hierarchy between human and God. With new sciences and technologies came new anxieties, specifically the concern of going too far and unsettling the balance between science and religion (or ethics). Because literature is both affected by science

and is a comment on it, "it is understandable that literary authors might capitalize on lay fears surrounding science and scientists" (Stiles 324). Hence, as scientific knowledge became more extensive and the figure of the scientist turned into a more threatening figure, the fear of science and scientists was finally materialized in the form of the mad scientist narratives in the literature of the nineteenth century.

The mad scientist – interchangeably called "evil scientist/inventor" – does not actually denote a mentally unstable scientist. The mad or evil scientists are called "mad," because their aspirations transcend the boundaries of a "sane" mind and they have an obsession with science which makes them indifferent towards other elements in their lives. This obsession, combined with their exceptional intelligence, causes conflict between their scientific aspirations and morally acceptable practices of their time. As Peter Weingart states, mad scientist means a scientist "who trespasses ethical boundaries in order to gain forbidden knowledge and fame" ("Power Maniacs" 283). This also explains why the names of the fictional mad scientists still appear in articles or news when there are controversial scientific innovations such as cloning or genetic engineering. Hence, mad scientists in literature are not necessarily "mad" in the clinical sense, although most of them occasionally show signs of neurotic behaviour that results from their anxiety of failure and getting found out. What matters in mad scientist narratives is the moral corruption of the scientist rather than his pathological condition. In this sense, the word "mad" has a closer meaning to Cesare Lombroso's term "moral insanity," which became popular in the late-nineteenth century. For Lombroso, "[t]here are cases in which madness is simply a criminal tendency, a lack of any sense of morality" (83), and that "in the realm of moral character, the analogy between criminals and the morally insane is incontestable" (215). Lombroso quotes his "fellow psychiatrist Battanoli," who states that the morally insane "lack sentiments of affection and moral sense" as exemplified in two of his "morally insane patients" who are "bright and comprehending" but also "egoists, lacking feelings of affection" (215). In addition to these, Lombroso also claims that "[a]ll of the morally insane, even those who appear to be perfectly sound of mind, exhibit errors of judgment that derive from vanity and lead them to absurd contradictions" (217). Almost all modern fictional mad scientists have these traits, which means that their madness can also be read as moral criminality.

In the light of these, this thesis analyzes Mary Shelley's *Frankenstein, or the Modern Prometheus* (1818), Robert Louis Stevenson's *Strange Case of Dr. Jekyll and Mr. Hyde* (1886), H.G. Wells's *The Island of Doctor Moreau* (1896) and *The Invisible Man* (1897) as the pioneering texts of the long tradition of mad scientist narratives. It contends that these novels can be examined in two main frameworks: first, they are influenced by the science and literature of the pre-Enlightenment era (encompassing Middle Ages and Renaissance period) when "science" as it is understood today was not yet a secular practice and was named "natural philosophy," good natural philosophy meant explaining what was already observable and evil practices were the ones that conflicted with the teachings of the Church and aimed at manipulating natural forces. The other influence is post-revolutionary, encompassing the late-eighteenth century and all of the nineteenth century. This was the era after the Scientific Revolution when Baconian and Newtonian ideals had an effect on the understanding of good and bad science. According to this understanding, good natural philosophers had to have gentlemanly conduct, moral values, and a vast practical as well as theoretical knowledge. They had to work for the common good of humanity instead of following their private interests. Although there were slight differences in the expectations of the societies of these two periods from science and scientists, they agreed on the fact that science could become a dangerous tool when it was practiced secretly and obsessively by an overly-ambitious scientist.

Accordingly, the main premise of the first chapter of this thesis is that it would be inconclusive to explore the mad scientist trope without referring to the scientific developments in Europe from the Middle Ages to the nineteenth century because its roots date back first to medieval, then to the early modern period, when the conflicts between science and religion/morality resulted in the literary tradition of evil alchemists and natural philosophers. First, church-regulated Aristotelian-scholastic scientific tradition of the Middle Ages is explained in order to ascertain which sciences were regarded as acceptable and which ones were deemed heretical. It is then argued that the medieval alchemist is the forefather of the modern mad scientist as the main practice that corresponded to evil science was alchemy, which was focused on manipulating elements or transforming them into one another. In the most ancient alchemical prescriptions there "was a wish to control nature" and "to alter, improve, or at the very

least accelerate the ordinary processes of nature" (Brooke 433). Consequently, alchemists were condemned, persecuted or tortured by the authorities for fear that these practitioners of "forbidden" arts were meddling with God's perfectly-designed universe and also with life and death as they were trying to produce the elixir of life which would give them immortality. Considering their controversial role, it is not surprising that the medieval evil alchemists are the progenitors of the modern mad scientists, an idea which is also supported by many scholars including Roslynn Haynes and Joachim Schummer who have written substantial articles and books about the relation between the mad scientist figure and alchemy/chemistry. The medieval texts that include alchemists are analyzed in this chapter with a focus on the elements that nineteenth-century authors borrowed from those texts.

Other periods that the first chapter includes are the early modern era and the age of Enlightenment in Europe. This part addresses the effects of the Scientific Revolution that initiated the secularization of science in Europe (which would not take its final form until the end of the nineteenth century). Then it gives information about the men of science who contributed to the revolution and focuses on the most influential figure of the period; Francis Bacon, whose works embodied the new practical science that contrasted with Aristotelian-scholasticism. Bacon criticized Aristotle, separated theology from natural science, advocated experimental science and deductive method, argued that science had to serve the state rather than the Church, and imagined a society of natural philosophers who would collaboratively work for the advancement of humanity. It is asserted that the good and bad features of natural philosophers designated by Bacon – and later put into practice by the members of the Royal Society including the famous Isaac Newton – were so effective that they were still relevant in the nineteenth century when all of the fictional mad scientists had anti-Baconian traits. Baconianism and Newtonism were also among the reasons behind the emergence of the Industrial Revolution and Enlightenment movement in the eighteenth century when men of science started to seek progress and welfare of humanity as well as the domination over natural forces. In this period natural philosophers began to be more involved with experimenting in the name of progress. This new "experimental philosopher" figure and the laboratory he worked in became the defining aspects of the fictional mad scientists of the nineteenth century.

The second chapter examines the relationship between science and literature in Britain in the late-eighteenth and nineteenth centuries with a particular focus on electrochemical and Darwinian revolutions which influenced the subject matter of mad scientist narratives of the period. It explores the Romantic influence on natural philosophy at the end of the eighteenth century, which resulted in a combination of natural science and poetic imagery. The most evident example of such fusion was "vitalism" which regarded electricity, a material force, as a kind of spirit or soul that gave life to the human body. This idea would become the main theme of Mary Shelley's *Frankenstein*, along with the eccentric electrochemist Humphry Davy's practices. It is later pointed out that as the nineteenth century approached, science began to move away from philosophy, religion, and art and to become a distinct field. This century was very crucial for the history of science as it was the age when science acquired its modern meaning, natural philosophers gradually turned – after the term was coined by William Whewell – into "scientists" who were professionals at specialized fields. This transformation of the man of science from natural philosopher to scientist is a very important step in the development of the modern mad scientist trope. The emergence of mad scientist narratives in this age was related to eccentric experiments of chemists, galvanism applied on human corpses, rise in the number of self-experimenting scientists, and controversial vivisection experiments which had shown that science could go as far as disrupting organic bodies in order to achieve its goals. Although it was a theoretical rather than a practical science, Darwinism created controversy, too. Charles Darwin and his followers advocated a more secular approach to the history of humanity. Human beings were no more seen as the revered artwork of God, but as descendants of primitive apes. This theory brought with it the theories of devolution (reverse-evolution) and degeneration which asserted that the latent beast in human beings might overcome the evolved, intelligent man and cause him to revert back to his primitive form. This idea especially was voiced in the mad scientist narratives of the late-Victorian period.

The third chapter reads *Frankenstein* as a transitory text between evil alchemist or misguided natural philosopher narratives of earlier ages and more secular mad scientist novels of the late-Victorian period. *Frankenstein* continues older traditions by drawing on alchemical teachings (which Victor Frankenstein reads eagerly) and

including a man who follows scientific knowledge obsessively and who is confident that he will create a human being (Faustian hubris). *Frankenstein* also introduces and lends modern aspects to the tradition of mad scientist narratives such as in-depth portrayal of a man of science, private laboratory that is filled with modern equipments (not alchemical appliances), and a monster created through a scientific process. These features also occur in late-Victorian mad scientist novels; *The Strange Case of Dr. Jekyll and Mr. Hyde*, *The Island of Dr. Moreau*, and *The Invisible Man*, which are examined in the fourth chapter. It is stated in this last chapter that as science and technology advanced even more rapidly towards the *fin de siécle*, the number of mad scientists and the degree of their dangerousness increased. The word "mad" gained its meaning as an evil scientist particularly in this era because all of these novels included scientists that were selfish, unrepentant, and murderous. It is also argued in this chapter that by incorporating similar themes, these three novels establish the features of the mad scientist trope that prevail today. All of them include a controversial science that is engaged with manipulation of the body, the result of which is a monster (or a grotesque, uncanny being); all of them include scientists that are isolated, alone, working secretly, and have a tendency to kill people; furhermore, they all include benevolent scientists who become foils to the evil scientists.

The conclusion chapter sums up the arguments presented in the previous chapters and investigates whether the role and impact of the mad scientist has changed since the Middle Ages or not. It looks at some of the twentieth century mad scientists found in literature and film, drawing attention to the fact that starting with the emergence of movies, mad scientists began to be more caricaturized with stereotypical mimics and actions. The conclusion also explores the connection between the fictional texts of the nineteenth century and the real events of the twentieth and twenty-first centuries, presenting the conviction that the fear of science and technology reflected in literature might turn into the realities of the future. Thus, it can be argued that nineteenth-century mad scientist stories not only reflected the anxieties and concerns of their age, but they also predicted the future catastrophes that are caused by the inventions of genius scientists.

In the light of these, this thesis considers the nineteenth-century mad scientist as a reconstruction of an old trope of the evil alchemist; however, it argues that the

nineteenth-century mad scientist is also a novel figure, a modernized version of a timeless archetype that represents the timeless fear that too much knowledge and the power of manipulating nature could result in catastrophe.

## CHAPTER I

## HISTORICAL AND LITERARY FOUNDATIONS OF MAD SCIENTIST NARRATIVES

In order to understand the reasons behind the emergence of the mad scientist stereotype in nineteenth-century British literature, one must look at the development of scientific thought and practice in Europe, specifically from the Middle Ages to the Romantic period. This approach is necessary, because both the stereotype and the unease and fears it embodies are not only the products of nineteenth-century scientific or technological developments, but, as can be observed in the various medieval and (pre-)modern reactions towards science, they are also the outcomes of a cumulative scientific knowledge that had become more and more innovative and secular through the ages. As this thesis argues, the fictional mad, evil scientist is the epitome of the criticism of both medieval alchemy and occult that have meddled with forbidden knowledge, and of the rational, cold scientific thinking of the Enlightenment that stands in contrast with Christian spirituality and Romantic sensuality; it is the antagonist of the good theologian-scholar who thinks that God's work is perfect as it is, therefore does not need improvement or manipulation, as well as of the good Baconian man of science who works for the betterment of humanity rather than for self-profit. Therefore, it is especially important to explore pre-nineteenth-century science and scientists with a particular focus on medieval alchemists and early modern natural philosophers, before looking into the phenomenon of the nineteenth-century mad scientist.

### 1. Science and Natural Philosophers in the Middle Ages

Looking for the roots of the mad scientist in the Middle Ages might at first seem like a futile act as the medieval period is commonly characterized by its lack of scientific activity. Indeed, it is very typical to think of the Middle Ages as the "Dark Ages[1]" because of the dominance of scholastic thought and practice in Western Europe

[1] Until the twentieth century – excluding the Romantic period –, the common belief was that the period after the barbarian invasion of Europe and disintegration of the Roman Empire was a period of intellectual and cultural regression. The idea is thought to be put forward first by Italian poet Petrarch, and it had been used in various historical texts ever since. The most explicit examples are Samuel R. Maitland's *The Dark Ages* (1889) and William Paton Ker's *The Dark Ages* (1904) – the latter, however,

in that period. Popular belief, shaped by the ideas of European historians since the Enlightenment, is that all sciences were seen as a threat to Christian teachings and therefore were considered to be both dangerous and unnecessary. As Elispeth Whitney argues, however, "since the mid-twentieth century […] this view has been almost completely supplanted among scholars by a more nuanced assessment which argues that while medieval science was not the *same* as modern science, it did provide the necessary preconditions and structure for modern science to emerge" (140). Most contemporary historians including Denys Hay who argues that Middle Ages were in fact "lively," not "dark" (50), and Christopher E. Snyder who remarks about "so-called Dark Ages" that "there are numerous indicators that these centuries were neither 'dark' nor 'barbarous' in comparison with other eras" (xiv), agreed that there was indeed a tendency towards making scientific and intellectual inquiries during the Middle Ages, although these inquiries remained within the borders of the Christian Church and were made by theologian-scholars or philosophers. Particularly after the twelfth century, when the scholars in Europe began to translate texts which "comprised the output of Greek and Roman poets and philosophers, and later, Arabic commentaries" (Cartwright and Baker 2), there occurred a revival of knowledge about the nature and the cosmos. Although, at first, "the thought of the pagan Greek philosophers did not sit easily with Christian theology" (Cartwright and Baker 2), these translations soon resulted in an intellectual activity both within and without religious institutions. As a result, the medieval mindset began to be shaped both by the teachings of the Church and by the teachings of ancient Greek philosophers and polymaths – especially Aristotle (384-322 BC), whose "philosophy was the most important backdrop of medieval thought" (Hintikka 72). This synthesis of ancient knowledge with religious teachings became the deciding factor in the acquisition and application of natural knowledge and in the practices of natural philosophy.

Another discrepancy about looking for the foundations of the mad scientist in the Middle Ages is related to the usage of the term "scientist." It is a generally known fact that the words "science" and "scientist" do not apply to medieval practices and practitioners; however, this does not rule out the argument that the mad scientist trope is rooted in the Middle Ages. The practices that were concerned with understanding,

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distinguishes early and late middle ages, claiming that the dark ages refer to the ages between 500 to 1100 A.D.

defining, and categorizing natural phenomena were not called science then, but they were gathered under the title of "natural philosophy." The term science, or, more precisely, *scientia*, on the other hand, was "the Latin word used by the scholastics for Aristotle's Greek *episteme*" (Dear, *Revolutionizing* 5), a word which meant knowledge and understanding. Unlike the experimental, secular, and specialized sciences of today, *scientia* "referred to any rigorous and certain body of knowledge that could be organized […] in the form of syllogistic demonstrations from self-evident premises. Under this description, rational theology belonged to scientia – indeed, it was the 'queen of sciences' – because its premises were the highest and most certain" (Park and Daston 3). For the science as it is understood and applied today, both the Greeks, medievals, and also the people of early modern period used the term natural philosophy, "the heading under which fields like physics, astronomy, chemistry, and physiology were placed" (Gossin 129) before the emergence of modern science. Until the nineteenth century, then, many practices that are now regarded as sciences were generally seen as subjects of natural philosophy, and people who conducted these practices were called natural philosophers, not scientists. Although natural philosophy seems like the closest practice to contemporary science, it was still a different conception than the science of today, since it "included not only the 'how' questions posed by modern science, but also the 'why' ones that are today excluded […] Philosophy and theology were all included in natural philosophy" (Sleigh 12). In other words, natural philosophy was a mixture of observation and reflection, experience and thought; it was the perfect way of acquiring knowledge for medieval theologians because of its stress on "understanding," rather than manipulating, nature. Since it included physical, philosophical, and theological elements altogether, its stress on morality was very eminent, and natural philosophers were expected to have moral values as well as knowledge about how and why things work as they do.

The "good natural philosophy" in the Middle Ages was put into practice by referring to the works of Aristotle, but it was essential to combine his philosophy with the teachings of Christianity in order to avert the accusations of heresy while contemplating on the workings of nature. The short-hand term for this approach to

knowledge was Aristotelian scholasticism[2], which intended only to explain, not manipulate, nature. Therefore, medieval natural philosophers were mainly occupied with understanding the world and the universe by using Aristotelian logic, rather than having control or dominance over the forces of nature. For them, knowledge meant experiental (sensory) knowledge that could be acquired through universal experiences. They knew that the Sun was rising from the east because they could observe it; they did not try to explain why the Sun was so hot or why it was spherical. The answer was "because it was designed so[3]." Aristotelian-scholastic natural philosophers never "thought of their enterprise as one of making new discoveries" (Dear, *Revolutionizing* 6); as a new discovery might result in disorder, the most feared concept of the period, and conflict with the idea that God had created everything in harmony and this harmony was eternal. It is not surprising that the approved natural philosophers of the Middle Ages were at the same time clerics or priests, and when the study of nature departed from religion and from the Christian church, it was regarded as threatening. Acceptable sciences of the Middle Ages, therefore, were the ones which complied with religious doctrines and Church-regulated Aristotelian scholasticism. The most important branch of natural philosophy was astrology, which followed the Aristotelian and (later) Ptolemaic cosmologies[4] that saw the heaven as composed of perfectly designed spheres that move in an eternal circle, stressing the unchanging nature of the world and the universe. Any idea that tried to oppose these views was condemned as heresy, and the owners of such ideas were persecuted. Anatomists and physicians were also revered

[2] Aristotle "emphasized that all knowledge ultimately comes by way of the senses" (Dear, *Revolutionizing* 4), and true knowledge was what everyone experienced in the same way. Aristotle's stress on the experience acquired by the senses might sound like he is in favor of experimental approach, but it is not so. In fact, what Aristotle and the medieval philosophers who followed his steps meant by experiental knowledge was simple; instead of a "critical epistemology," Aristotelian viewpoint suggested that "[i]f that is what we do, then that is what knowledge is" (Dear, *Revolutionizing* 5).

[3] This kind of argument, referred to as "teleological argument" or "the argument from design," dates back to Socrates and later to Plato, Aristotle and most importantly to the Stoics, who used it to explain the creation of the universe. It was an appropriate argument for Christianity, because it purported that men could be sure of God's existence by looking at his creations which were perfectly designed.

[4] In Aristotelian cosmology, the universe is designed as a perfect sphere and the Earth, which is also spherical, rests at its center, while all other planets and stars revolve around it. The universe is divided into two realms: "From the center of the earth to the sphere of the moon was the terrestrial or sublunary realm. Here change was incessant: things moved about, rivers ran downhill, smoke rose upward, clouds drifted across the sky, man tilled the fields and then lay beneath. In contrast, the region above the sphere of the moon was a changeless realm where celestial objects whirled around on a fixed, unchanging course" (Cartwright and Baker 2). Until the Copernican revolution, this had been accepted as the true explanation of the shape and motions of the universe.

figures as long as their practice abided by the teachings of Galen (130-210), another ancient Greek figure that was appreciated by the Church.

### 1.i. Medieval Alchemists: The Ancestors of the Mad Scientist

In the Middle Ages, practices such as alchemy and occult that tried to delve deeper into or manipulate nature were not included among good and moral sciences, and they were condemned as black magic or necromancy. Any practitioner of the "black arts" that posed a challenge to the harmony of the universe and to God's unchanging Word was seen as evil, and regarded as one of the most dangerous enemies of the faith. Indeed, alchemy has been a notorious practice for many ages and has been ingrained in people's unconscious as a dark, forbidden art that seeks to uncover and make use of the secret workings of nature. It has also been associated with the myths of disobedience and revolt, since, as David Deming also remarks, "chemistry began when man learned to control and use fire" (3). In a mythical and religious framework, fire denotes knowledge,[5] and it is also the main element of alchemy, used for melting and boiling metals. Because fire was associated with theft or revolt in many cultures and religions, alchemy was of course not so revered. Still, alchemical practices were borrowed by the West "in an atmosphere of renewed study, the so-called 'Renaissance' of the twelfth century" (Martin 54), and it has been one of the most controversial practices in Europe ever since. Its associations with fire and revolt put aside, alchemy was further seen as a troubling subject because it was directly concerned with the manipulation, or more precisely, transmutation and transformation of matter. John Read explains that

> in a narrow sense, alchemy may be interpreted as the pretended art of transmuting the baser metals into silver and gold. In a wider sense, it was the chemistry of the Middle Ages […] In its broadest aspect, alchemy appears as a system of philosophy which claimed to penetrate the mystery of life as well as the formation of inanimate substances.

[5] Acquisition of fire by humankind is a recurring theme in the myths of many different cultures. The most famous myth is that of Greek titan Prometheus, who steals fire from Mount Olympus and gives it to humans, symbolizing the transition of Godly knowledge to mortal beings. In Hindu religion the divine creature Mātariśvan and in Judaism the angel Azazel also give fire to humankind, initiating technological progress. The same theme occurs even in Aboriginal myths which depicts Mimi spirits giving fire to native Australian people.

> Alchemy was thus a complex and indefinite mixture of chemistry, astrology, philosophy, occultism, magic, and other ingredients. (251)

As such, alchemy required an extended knowledge of many other disciplines and a complete control over the elements; features which put the alchemist in a very authoritative position, similar to that of God.

It is not surprising, then, that alchemists were among the most condemned people in the Middle Ages. As Deming states, "[f]rom the time it was first introduced into Europe, alchemy had its critics" and was seen as "a suspicious activity tinged with heresy" (62). Natural philosophers that were interested in astronomy, physics, or geology remained too innocent compared to alchemists, considering they did not aim at any manipulation of nature; they only focused on explanation. The practices of alchemists, on the other hand, contradicted the scholastic natural philosophy which was occupied only with understanding and explaining God's work. Unlike other natural philosophers, alchemists were interested more in the unknown than the known. They conducted their experiments secretly in their notorious laboratories filled with crucibles, alembics, and so on. It was thought that in their laboratories, alchemists could artificially generate metals or turn them into one another. There were even "rumours that alchemists had the secret of infinite wealth, longevity and other strange powers such as being able to create life in the laboratory, and the ability to manipulate time" (Martin 14). Moreover, "alchemical writers, unlike those in the mainstream of the Scholastic tradition, were willing to argue that human art, even if it learned by imitating natural processes, could successfully reproduce natural products or even surpass them" (Newman 424). Hence, it can be said that the aim of alchemists was to go beyond understanding nature; it was to control the elements, to transform them, to produce more valuable and durable materials such as gold, or to invent the elixir of life which would make a human being immortal. Because of their passionate non-religious aspirations, they were usually labeled as "demon" or "satan," or thought to be cooperating with those creatures; not unjustly, since "few alchemists pretended to be able to achieve results without the assistance of demons" (Lea 473). Although historical records do not show such signs of collaboration, the rumors about the alchemists making pacts with the devil were enough to make them look dangerous.

History of the Middle Ages is full of examples of banishing alchemy and alchemists by various authorities such as Pope John XXII in 1317 and Henry IV in 1403. Some monarchs, however, were in favor of and even practiced alchemy, but only for financial gain, since they thought that they could transmute metals into gold. For the other practitioners of alchemy – the ones that were not affiliated with any monarch – there were very harsh punishments. As Deming informs:

> *The Canon Episcopi* of the tenth century, a condemnation of witchcraft, 'explicitly said that only God could transmute species.' During the thirteenth and fourteenth centuries, the Franciscan and Dominican monastic orders both found it necessary to repeatedly ban the 'study and practice of alchemy.' Penalties ranged from 'imprisonment to excommunication.' Not only was the practice of alchemy banned but the reading of alchemical treatises was forbidden as well. (63)

It is clear that the main reason for the punishment of alchemists was their transgression, or, their imitation of God's acts. Even people who were associated with alchemists or read their texts were condemned. There were some common lines in all acts of forbiddance, and one such example is the act of Metz which included the following statement: "none shall study or be instructed in the said art, or practise it or cause it to be practised, that they shall keep none of the writings if they have any, but within the space of eight days ... shall destroy or burn them" (qtd. in Duncan 635). In such an atmosphere of condemnation and persecution, medieval alchemists were forced to hide themselves and their studies from both religious and state authorities.

Alchemy and alchemists are crucial in the development of the mad scientist stereotype because of their controversy and so called "evil" aspirations. Many critics and scholars of literature see alchemists as the ancestors of the modern mad scientists. In his article "Historical Roots of the 'Mad Scientist': Chemists in Nineteenth-century Literature," Joachim Schummer explores the connection between alchemy and modern chemistry, and argues that "literary representations of chemists could easily draw on the well-developed literary figure of the medieval 'alchemists,' which was already loaded with moral, social, metaphysical and religious criticism" (100). For Schummer, nineteenth century mad scientists are the transformations of the mad alchemists of the Middle Ages, since both figures were associated with such concepts as materialism,

which included atheism, and hubris. He draws more parallels between the Middle Ages and the nineteenth century with his assertion that "[j]ust as the alchemist and to a lesser extent the astrologer had been the main (pre)scientific figures in medieval literature, the 'al-chemist' and some related figures, such as the 'physician' engaged in chemistry or pharmacy, became the main scientific figures in the nineteenth-century literature" (104). Schummer's observations are very useful in understanding the connections between the literary representations of medieval alchemists and modern scientists as they stress the persistence of religious and moral criticism of science in the history of Western literatures.

Another important scholar, and an eminent authority on the mad scientist stereotype, Roslynn Haynes also regards alchemists as the precursors of the mad scientist. In "From Alchemy to Artificial Intelligence: Stereotypes of the Scientist in Western Literature," she gives "the evil alchemist" as the first example of the timeless mad scientist trope (244). Just as the alchemists "were driven to secrecy, disguising their knowledge in obscure language and symbols," she argues, modern scientists also use "scientific language and formulae" that "are equally opaque today and are often interpreted as being designed to confuse and disempower outsiders" (245). Like Schummer, then, she associates both figures with one another in terms of their controversial and enigmatic natures. In another article of hers, Haynes remarks that two figures also share the characteristic of being extremely curious people who pursue dangerous knowledge, echoing "the cluster of myths relating to the pursuit of knowledge" which "has perpetuated the archetype of the alchemist, and his descendant the scientist, as sinister, dangerous, possibly mad and threatening to society's values, even to human survival" ("Whatever Happened" 31). The main point that Haynes makes is that although science and technology advances and people become more open-minded, the figure of the evil alchemist still lingers somewhere in their unconscious, and the "image of the obsessive, evil and dangerous scientist, which owed much to the reputation of the alchemists, embodies society's fears concerning arcane knowledge that also carries alluring promises" ("Whatever Happened" 33). This thesis is also in favour of Schummer and Haynes' ideas as it regards the mad scientist as a progeny of the medieval mad alchemist; however, it maintains that the nineteenth-century mad scientist is also a distinct figure, a modern interpretation of a timeless archetype.

By all means, medieval alchemists provide some of the most famous and durable features of the mad scientist stereotype such as their dual aspect of both being a hero and a villain (inspired also by real men of science), and their working in secrecy and solitude. The medieval alchemists' dual nature is related to their ancestors: blacksmiths. Since ancient times, smiths have been transforming metals for various uses; they "were the creators of both beautiful objects and objects of death and destruction. They were both revered as civilising heroes and as agents of the dark forces. This dual aspect was to be inherited by the alchemists" (Martin 42), and eventually by mad scientists. Just as smiths, alchemists could also choose to employ their art either for beneficial use or for evil purposes. Real life example of such an alchemist is Roger Bacon (c.1220-1292), who was "seen as the first champion of the scientific method," but who was also a performer of "alchemical transmutations," and it was often believed that "he gained his extraordinary learning from the Devil" (Martin 55). Although they also produced useful items, and even contributed to the development of modern chemisty, the negative aspects of the alchemists always weighed more than the positive ones. The conscious or unconscious fear of alchemists is reflected in mad scientist stories by showing the scientist as a solitary figure who works secretly, probably delving into forbidden knowledge in his laboratory. As Martin informs, "alchemy was a solitary process: one that both took place away from the eyes of the curious, in the secret enclave of the laboratory, and also in the solitude of the alchemist's own being" (24). The fact that alchemists did not reveal their work until it was finished added to their reputation as holders of secret knowledge. Since no one else knew their art, it was never certain if the alchemists were doing good or bad science. The suspicion towards the mad scientist has a similar basis; he is a menacing figure because his work is concealed from both his colleagues and from other people in his life such as his family and friends.

Secret laboratories of the medieval alchemists are often seen as the precursors of the laboratories of modern mad scientists. In his book *Alchemy, the Ancient Science*, Neil Powell describes the popular conception of an alchemist and his laboratory as follows:

> In a room hidden away from prying eyes, an old man bends over a flask of bubbling colored liquid. All around is a clutter of jars, bottles, and apparatus that looks somewhat like the equipment in a modern school

> chemistry laboratory. The walls are hung with animal skulls and astrologers' charts. A stuffed owl sits amid a jumble of thick leatherbound books with iron clasps. From time to time he stirs the liquid, muttering strange words to himself. (6)

This imagery is somewhat familiar to everyone who reads the passage; the reader has probably come across such a scene in a movie or a cartoon even if s/he has not read it in a book. It keeps recurring not only in alchemist stories but also in mad scientist ones, because it symbolizes the mysterious and dangerous nature of the alchemist's lab. In it, there are objects which may mean nothing to the ordinary people, but which become the tools of creation and destruction for the alchemist. Accordingly, the laboratory mostly looks dark and disorderly, representing the unconscious fears related to the chaotic creations of science. Modern mad scientist narratives also include similar depictions of laboratories to invoke anxiety and foreshadow the dangerous outcomes of the scientist's experiment(s).

### 1.ii. Representation of Alchemy and Alchemists in Medieval Literature

As the mad scientists of the Middle Ages, the alchemists found place in the works of famous medieval writers such as Dante Alighieri (1265-1321) and Geoffrey Chaucer (1343-1400), who "represent[ed] the literary satire directed against the alchemist as puffer and fraud who deceives others and often himself about his ultimately vain and fruitless quest" (Gossin 9). Chaucer and Dante were more than poets, they were also "deeply versed in philosophy and science, and both wove scientific concepts into their poems. They also shared the view that their universe was geocentric in a physical sense but profoundly theocentric in a moral one" (Cartwright and Baker 12). Their strong morality contrasted with the supposed immorality of alchemists; thus, they did not refrain from condemning such practitioners in their works. *The Divine Comedy* (begun c.1308 and completed in 1320), which "shows Dante's predominantly scholastic view of the world" (Gossin 98), includes alchemists as sinners who are sentenced to eternal punishment in Hell. Dante puts alchemists among falsifiers, seeing them as the corruptors of matter (metals). Alchemists are regarded as falsifiers because they try to imitate God's work by using earthly tools, but since they are only human beings, what they produce may become nothing but a false replica. For

the medieval mind, only God could create original entities; therefore, alchemists were condemned to suffer in Hell as the soul of Capocchio does in the Canto 29 of "Inferno." As most of the other characters in *Divine Comedy*, Capocchio is likewise a counterpart of a real, historical figure; a thirteenth-century alchemist called Griffolino d'Arezzo, who was burned at the stake for his involvement in the forbidden arts. Hence, as Dante explicitly demonstrates, the fate of an alchemist was to suffer both in life and in death. This mindset that saw alchemy as an act to imitate God continued for many centuries, and the vision of the scientist as a mere replicator – or, alternately, an unable or clumsy "creator" – shaped the conception of the mad scientist stereotype of the following periods.

Another major medieval text that included a corrupt alchemist is Geoffrey Chaucer's *Canterbury Tales* (written between 1387-1400). Like Dante, Chaucer saw alchemists as the practitioners of fake transmutations and presented their fate as a road to downfall. In *The Canon's Yeoman's Tale*, the yeoman states that

> (Whoso it useth, sore shall he rue);
> And of my swink* yet bleared is mine eye; (**labour*)
> Lo what advantage is to multiply!
> That sliding* science hath me made so bare, (**slippery, deceptive*)
> That I have no good*, where that ever I fare. (**property*) (582)

Here the yeoman talks about how the "deceptive" practice of alchemy made him sick, weak and poor. He also warns people about dangerous alchemists who can be spotted easily by their looks and smell:

> And evermore, wherever that they gon,
> Men may them knowe by smell of brimstone;
> For all the world they stinken as a goat. (587)

Cartwright and Baker draw attention to the likening of alchemists to goats and assert that it is a consciously-made demonic reference: "the demonic associations of goat and brimstone serve to link alchemy with the devil" (26). Thus, Chaucer here reflects a very common habit of the medievals, which is to associate every practitioner whose acts contradict with religious teachings with the Devil. In addition, like Dante, Chaucer also took inspiration from a real-life alchemist while designing his fictional one. Cartwright and Baker assert that Chaucer "may have had a particular alchemist in mind. There was

a canon at Windsor, one William Shuchirch, known to have practiced alchemy. It is possible that Chaucer is satirizing this individual, and he "may even have been a victim of alchemical fraud himself" (26). Whether or not the yeoman's story is true, the certain fact is that Chaucer's descriptions of the alchemists are the representations of how most people viewed them in the Middle Ages.

William Langland's (1332-1386) allegorical poem *Piers Plowman* (written c.1370-90) also includes references to alchemy along with a suspicion towards other sciences such as astronomy and geometry. The most obvious condemnation can be found in the following lines which describes the follies of sciences:

> As Astronomy is hard thing, and evil for to know,
> Geometry and Geomesy is ginful [guileful] of speech;
> Whoso thinketh work with those three thriveth full late —
> For sorcery is the sovereign book that to the sciences belongeth.
> Yet are there fibicches in forcers of fele [sole] men's making,
> Experiments of Alchemy the people to deceive;
> If thou think to do well, deal therewith never!
> All these sciences I myself subtled and ordained
> And founded them foremost, folk to deceive. (lines 209-17)

It is not hard to guess why Langland is hostile towards these sciences, particularly towards alchemy. They contradict with how the medieval people defined righteous science, namely, the science that did not intrude much in God's design. If the sciences try to do so, they become guileful and tricky, meaning that they try to confuse people's minds and detract them from the true Word which is included in the Bible.

As can be deduced from both real and fictional reactions towards alchemists, in the Middle Ages the main conflict was between religion and people who were interested in the practices that were forbidden by religion or by other authorities. Because morality was largely interrelated with religion, a virtuous natural philosopher had to be religious as well, and he also had to comply with Aristotle's texts as they included the most compatible techniques for the scholastic understanding of nature. The evil, bad, mad alchemists trespassed the borders defined by Christian morality; therefore, they were the main enemies of the society. Although this argument seems simplistic, it defined the conception of an evil man of science for the following centuries. Even though the

"religion" part of the religion/science dichotomy lost its force towards the mid-nineteenth century, the concept of morality still remained strong, and it was the main criteria to decide whether a science or scientist was good for the society or not.

## 2. Early Modern Science and Natural Philosophers

Towards the end of the fifteenth century, scholasticism began to lose its dominance because of several reasons, including political, economic, and scientific. Feudal social structures were giving way to more centered regimes, capitalist economy was in the process of development, and in one of the most popular medieval sciences, a huge revolution was about to happen. In general, natural philosophers (also artists, intellectuals, and poets) were adopting a new vision and a new way of life. Especially in arts and sciences, there was a new approach called "humanism," which emerged as a reaction to scholastic-Aristotelian philosophy. Humanism first presented itself in education (in the universities) as a critique of the curriculum that favored theology over all branches, and of the "corrupted" Latin used by the scholastics. As a reaction, humanists "had set themselves in opposition to the whole pattern of medieval life, and they strove to create a new pattern as near as possible to that of classical antiquity. They no longer wished to see the Ancients through the long chain of tradition, through the Arabs and the schoolmen, but directly, by digging up the statues, by reading the texts for themselves" (Bernal 383). In other words, humanists preferred to acquire ancient knowledge first-hand, and then to achieve the greatness of ancient scholars. Although they rejected the medieval approach, humanists still did not have a unified agenda that aimed at progress as the natural scientists of the following ages. As Peter Dear states, "not progress, but renewal was the humanist watchword; it meant restoring the highest accomplishments of the ancients" (33). Another watchword was to "equal and surpass" the ancients; it was not wrong to indicate the mistakes and shortcomings of the teachings of Aristotle or Galen as it was during the Middle Ages. Although it did not indicate a clear break with old traditions, humanism still paved the way for the Scientific Revolution[6] of the seventeenth century with its stress on individuality and confidence in human abilities.

[6] Scientific Revolution is "the transformation of natural knowledge in the sixteenth and seventeenth centuries that created modern science" (Burns xiii). During the scientific revolution, science gradually

The Scientific Revolution encompasses a crucial period in Europe's history, when "the whole edifice of intellectual assumptions inherited from the Greeks and canonized by Islamic and Christian theologians alike was overthrown and a radically new system put in its place. A new quantitative, atomic, infinitely extended, and secular world-picture took the place of the old qualitative, continuous, limited, and religious world-picture" (Bernal 375). This transition was an influential factor in the transformation of science and scientists from ancient to modern. Natural philosophers of this period were not necessarily associated with any Church or monastery; thus, most of them worked in a more secular environment than their medieval counterparts. Instead of religious authorities, they were generally supported by kings or other aristocrats, and this patronage provided them money for their study and for buying the required instruments for experimentation. Although their surroundings were more secular, natural philosophers of the Scientific Revolution still had to comply with the Christian doctrines, but they were also allowed to oppose the teachings of some of the ancient natural philosophers such as Aristotle and Galen. It is with this opposition to the ancients that a new attitude in science emerged, which transformed the image of the natural philosopher. It is essential to analyze this new image – its real and fictional representations – for a better understanding of the criticism of science through the mad scientist stereotype in the nineteenth century, because it was in this period that a new set of norms for defining "good" natural philosopher/scientist emerged.

The seeds of the Scientific Revolution were planted by several influential figures which would later be called as the fathers of modern science and scientists. The most important ones were a Polish mathematician and astronomer Nicolaus Copernicus (1473-1543), a Flemish anatomist and physician Andreas Vesalius (1514-1564), and a Swiss chemist, botanist, and physician Paracelsus (1493-1541). These figures are significant, because their new natural philosophy affected not only the lives of real people, but also the representations of fictional natural philosophers. Copernicus's *De revolutionibus orbium coelestium* (*On the Revolutions of the Celestial Spheres*)[7] and

moved away from scholastic and magical thinking, from explanations based solely on Aristotelian system, and from non-experimental, contemplative construction of knowledge. Although science was not yet secular, this era is usually seen as the time when the process of science's separation from religious thinking began.

[7] This groundbreaking book suggested a heliocentric planetary system, which challenged the long held belief that the Earth rests at the center of the universe. Copernicus asserted that the daily cycle of day and

Vesalius's *De humani corporis fabrica* (*On the Fabric of the Human Body*)[8] were published in the same year, 1543, and immediately drew heavy reactions. While the former contradicted Aristotelian and Ptolemaic cosmologies, the latter contradicted Galenic anatomy. Copernicus' book was more revolutionary since it suggested a completely different planetary system which put the Sun at the center. This was instantly regarded as heresy and created unrest[9] among people in the following decades. However, Copernicus was not as radical as to defend his ideas without support from the ancients – such as Cicero, Hicetas, Aristarchus, Philolaus and Plutarch – and from religion too. Although he initiated a scientific revolution, he was still a devout Christian and he dedicated his book to Pope, adding that it would "make some contribution also to the Church" (16) such as constructing a more accurate calendar. Andreas Vesalius' revolution, on the other hand, was in the field of anatomy on which he wrote several books. With his dissection experiments on the human body, which were among the first ones in history, Vesalius proved most of Galen's teachings wrong, and advocated a mechanical approach towards the human body, which, he came to believe, was a mechanism that worked with the collaborative contribution of all organs. He separated anatomy from older hermetic views of it, which associated parts of the human body with celestial objects, and which argued that treatments should be made in the right time when the stars are arranged for the treatment of particular illnesses. Like Copernicus, however, Vesalius' work also had religious allegories. Even the drawings in his books

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night occurs with the Earth's axial rotation and the yearly changes occur when it revolves around the Sun. He also observed and noted the change in the position of the Earth on its orbit. Although his ideas were rejected at first, they were gradually incorporated into the works of following astronomers such as Johannes Kepler and Galileo Galilei, who were strong followers of the Copernican model.

[8] Vesalius's revolutionary book is regarded as a milestone in anatomy, since it is the first major work that depicts human body as a concrete mechanism with a three-dimensional structure and with various organs that have different functions. He removed the elements of scholastic-Aristotelian and Galenic teachings from the field of anatomy and added a more practical, rational approach.

[9] The unrest caused by new developments in natural philosophy was also reflected in literature. The most obvious example is found in English poet John Donne's poem "The Second Anniversary," which includes the following lines:

> And new philosophy calls all in doubt,
> The element of fire is quite put out;
> The sun is lost, and th' earth, and no man's wit
> Can well direct him where to look for it.

Here Donne voices his concern over the new astronomical system which removed the Earth from the center of the universe. Through the metaphor of dislocation, he also shows concern for other scientific findings which disturbed the *status quo* that had been preserved by natural theology.

were allegorical and still reflected human beings as spiritual beings rather than mere mechanical bodies.

The third influential figure, Paracelsus (Phillipus Theophratus Bombastus von Hohenheim) was a polymath whose main interest was chemistry. In all his studies, he advocated and practiced *scientia experimentalis*, which meant that true knowledge could be acquired by forming direct contact with nature. Like Copernicus, his views contradicted with those of the revered ancients. As Susan Garber explains, Paracelsus "focused much of his writing on medical topics, where he opposed the authority of Galen and Aristotle in favor of an empirically based medicine that made extensive use of chymical [chemical] remedies" (30). Unlike Copernicus, who had a rather mild character, Paracelsus was more like a mad scientist figure. He defended his ideas zealously, saw himself as the leader of a new scientific movement, invented his own lexicon, and notoriously burned the texts of Galen and Ibn-Sīnā in front of a group of physicians, imitating Martin Luther's burning of the papal bull in 1520. Although Paracelsus was a marginal and revolutionary figure, like Copernicus and others, he still did not separate science completely from metaphysics. As much as he was an al/chemist, he refused to be associated with its darker practices. Instead, he thought that preparing chemical remedies for sick or wounded people "was a more noble and Christian task than seeking riches through the transmutation of base metals to gold. Christ, after all, by his own example, had conferred the highest sanctity on the healer" (Brooke 433). In consequence of his devotion to Christianity, "[h]e gave chemistry an even higher profile by presenting it as the science that could best assist an understanding of the Creation narrative in Genesis. Creation was seen as a chemical process, as the elements were separated from a primordial water" (Brooke 433). Like Copernicus and Vesalius, then, Paracelsus also tried not to contradict religion. Whatever their real purpose was, on the surface these men of science were much concerned about not disturbing religious authorities as it would harm their reputation and turn their fate into an alchemist's. This cautionary approach would be repeated many times by "good" natural scientists in the following decades and centuries, even by the epitome of rationalist thinking Isaac Newton (1643-1727), who would reconcile his findings with God's creation of the universe.

As can be inferred from the examples, during the Scientific Revolution, the common idea among all famous natural philosophers was that practical knowledge was more important than sensory knowledge. English astronomer and physician William Gilbert[10] (1544-1603), for instance, advocated first-hand examination of things (empiricism), and rejected traditional methods of acquiring knowledge. Similarly, Italian polymath Galileo Galilei (1564-1642) rejected and fought against Aristotelian natural philosophy and employed a more empirical approach towards understanding phenomena. His experiments and theories on the movement of objects became a prototype for Newton's classical mechanics and his work on gravity. Another English physician and anatomist William Harvey (1578-1657) likewise followed the empirical tradition rather than the scholastic one, and became the first anatomist to detail the blood circulation in human body. All of these natural philosophers contributed to the development of modern science with their studies that paved the way for the secularization of each of their disciplines. Yet, there was one figure in England whose influence on the new understanding, theory, and practice of science was much more than the others and whose ideas radically affected society's response to natural philosophers. This influential man was called Francis Bacon.

### 2.i. Francis Bacon and the Royal Society: Establishing the Image of the "Good" Natural Philosopher

Francis Bacon (1561-1626) is one the most prominent figures in English (and also European) history of science, for his views greatly influenced people's vision of science and scientists in the following periods. He is often dubbed as a pioneer of modern science, and as Stephen Gaukroger comments, "it is Bacon who, more than anyone else, urges and guides the transformation of philosophers into what later came to be known as scientists, inducing the birth of a new discipline quite different from philosophy as traditionally practised, and leaving not just philosophy, but the humanities generally, with the problem of forging a new identity for themselves" (1).

[10] Gilbert was the personal physician of Queen Elizabeth I and was also known for his work on magnetism. Following the footsteps of Vesalius, he rejected scholastic Aristotelian and Galenic teachings. His experiments with magnetism contributed much to the developments in electricity in eighteenth and nineteenth centuries. He is indirectly one of the inspirations of the first fictional mad scientist Victor Frankenstein, by directly influencing such figures as Luigi Galvani, Giovanni Aldini, and Humphry Davy, all of whom conducted electrochemical experiments like that of Frankenstein.

This means that Bacon set the foundation of a new idea of the natural philosopher (later, scientist) as a man different from a theologian or a thinker/philosopher. For Bacon, science had to be experimental and practical rather than contemplative as it was in the Middle Ages. He criticized scholastic practices and mainly Aristotle, who, Bacon thought, was followed blindly by natural philosophers. Bacon stated that Aristotle "did not properly consult experience as the basis of his decisions and axioms; after making his decisions arbitrarily, he parades experience around, distorted to suit his opinions, a captive" (*The New Organon* 52). This approach was the main problem with natural philosophy; hence, Bacon tried to reconstruct this rather abstract and metaphysical natural science by turning it into a more secular and rational one, "emphasizing the practical benefits to be derived from knowledge of nature and praising the craft knowledge of artisans" (Dear, "The Meanings" 110-1). As a result, Bacon's philosophy and methods[11] became the basis for the scientific practices of his time.

Bacon opposed the teachings of scholastics who asserted that good science must contemplate rather than invent; however, his alternative system created other criteria for good science and scientists which are at the core similar to the precepts of medieval morality. Again, for Bacon, science had to serve a higher authority; but this time the state rather than the Church, and it had to have moral values as well as practical ones. In his analysis of Bacon's importance for modern science, Steven Shapin asserts that Bacon wanted to reform natural knowledge so that it would be "an effective arm of state power" and "a pursuit suitable for civically engaged gentlemen" (189). Thus, Bacon still did not think of science as an individual, objective discipline that did not include a religious or political agenda. On the contrary, he thought that science could empower the state if it was practiced by well-learned, devoted men with good character and faith. This is probably why Bacon was almost never included among the dangerous men of science whose ideas might critically revolutionize knowledge. His stress on the utility of science made him a favourable figure whose words were taken seriously. His most inspiring ideal was to form a scientific community that worked for the advancement of humankind; "[a] group of intellectuals working together (collaborating) at their task,"

[11] Bacon proposed the method of deduction against the older practice of Aristotelian inductive natural philosophy. The deductive method consisted of collecting data from experiments and observations, and arriving to a conclusion based on all of the results. Bacon saw this method as the best way to obtain natural knowledge.

and these intellectuals "would create the new system. Once elaborated, the new system of knowledge would be used to solve practical problems in human life. Knowledge, then, would acquire a certain utility (usefulness) for human society, would serve the cause of PROGRESS, and would play a central role in creating a human utopia" (Reill and Wilson 36). As his ideal reflects, Bacon advised that the men of science should be given a leading role in society, and from then on, their prestige indeed continually increased.

Bacon's ideas on science and scientists are relayed through fiction in his famous book *The New Atlantis* (1627), which depicts a utopic vision of an advanced state on an island called Bensalem. Typical of utopian narratives, a ship crew finds an island and they start to learn about the culture and lifestyle of its residents. It is revealed to the visitors that the major institution of Bensalem is a college called Salomon's House, which is referred to in the book as "the very eye of this kingdom" (20) and "the noblest foundation that ever was upon the earth" (33). Salomon's House reflects Bacon's ideal: it is a college "dedicated to the study of the works and creatures of God" (33), funded and supported by the state and is useful to the state in return. The spokesperson of the college explains that "[t]he end of our foundation is the knowledge of causes, and secret motions of things; and the enlarging of the bounds of human empire, to the effecting of all things possible" (51). This vision, relayed through the mouth of a fictional character, became the vision that guided the real natural philosophers of the late-seventeenth and eighteenth centuries.

Bacon himself was an exemplary figure of science and his advices were quite noteworthy for the people of his age. For Bacon, "the reformed man of science was supposed to live a *vita activa*, and reformed science was to be done in public places" (Shapin 189). He saw science as "an honorable but not a mysterious career" (Millhauser 289), and stressed the importance of specialization of natural knowledge and collaborative study of different specialists to have a common achievement. As such, in *New Atlantis* there are not any particular men of science that were focused on. In Salomon's House, the men are divided into categories according to their professions; "there is no personal detail, no confrontation with individuals (except the governor) or personalities; one gathers only that the spirit animating this academy is workmanlike and that (as in other academies since) there is a good deal of committee work"

(Millhauser 288). The book was so influential that it shaped the understanding of a "good natural philosopher" for the years to come. Still, when people imagine good scientists – which are the exact opposites of medieval alchemists and evil, mad scientists – they think of Baconian terms such as having moral values as well as scientific knowledge, working openly and in collaboration with other scientists, and doing research for the benefit of humanity, not for himself/herself.

Although he supported secular science, Bacon was still a pious man and saw science as a means to find about God and his work. In this he did not differ much from medieval natural philosophers. Hence, although Bacon's ideology contrasted with that of scholasticism, he still maintained the idea that some knowledge is forbidden, and that knowledge should not be acquired by a heretic (non-Christian) person who would keep his art secret. Instead of showing the wrongs of natural philosophers, Bacon presented the ideal one who had to be a "modest, and virtuous seeker of truth about God's nature" (Shapin 190). In this he differed from previous authors who presented corrupted alchemists and natural philosophers in order to criticize the negative outcomes of science. Yet, behind Bacon's praise of virtue, modesty, and openness, there is a hidden condemnation of proud, secretive individual overachievers who refuse to join the science collective that would construct a utopia. This unfavourable figure, born in the middle ages and condemned by the masses, gradually evolved to finally become the mad scientist of the nineteenth century.

Thirty years after Bacon's death, the fictional Salomon's House became a reality in the form of a scientific society. Gresham College, which was the first college that began to give scientific education in England, became the meeting place of a group of aristocrats and learned men who were prompted by the architect, mathematician, and astronomer Christopher Wren's lectures and decided to establish a society dedicated to scientific experimentation. In 1662, they named themselves The Royal Society of London, "adding the phrase 'for promoting Natural Knowledge' in the revised charter of 1663" (Lynch 20). In the same charter, they defined their edicts as "the explicit recording of observational and experimental matters of fact in a manner clearly influenced by Bacon's method of induction from tables of facts" (Lynch 20). In 1667, one of their members, Thomas Sprat, published a book called *History of the Royal Society of London*, which again stressed their strong bonds to Baconianism. Sprat

declared: “I shall only mention one great Man, who had the true Imagination of the whole extent of this Enterprise, as it is now set on foot; and that is, the Lord Bacon” (35). The book also featured a poem titled “Ode to the Royal Society,” written by the poet Abraham Cowley, which included following lines that praise Bacon:

> Bacon at last, a mighty man, arose
> Whom a wise king, and nature, chose
> Lord Chancellor of both their laws,
> And boldly undertook the injur’d pupil’s cause.
> […]
> And, like th’ old Hebrews, many years did stray
> In deserts but of small extent,
> Bacon, like Moses, led us forth at last;
> The barren wilderness he past;
> Did on the very border stand
> Of the blest promised land,
> And from the mountain’s top of his exalted wit,
> Saw it himself, and shew’d us it. (Sprat n.pag.)

This poem may be the first example of the kind that exalts a man of science and poses as a precursor for the poems that will be dedicated to Newton some years later. As can be seen in Cowley’s praises, natural philosophers such as the members of the Royal Society gained a more esteemed place in society after Bacon, and encouraged by him, they made empirical experiments and put forward studies that aimed for utility. The most significant works that were produced by the society’s members included John Evelyn’s *Sylva* (1664), Robert Hooke’s *Micrographia* (1665) and John Wilkins’ *An Essay towards a Real Character, and a Philosophica Language* (1668). The works of these men were collaborative and their experiments were openly conducted. They were the “good” scientists who made “good” science, and their approval by the king – hence the adjective “Royal” – also points to their positive reception.

The Royal Society and its members play an important part in the development of literary scientists, for they provided the image of the man of science as an experimenter. The society “has, ever since its foundation in 1660, been particularly concerned with experimental science. Early members like Boyle, Hooke and Newton all advocated and

practised experiment" (Boas Hall xi). Their laboratories and scientific studies, however, were not like those of alchemists, and all members of the Society were very careful in drawing the line between dangerous and beneficial experiments. In *History*, Thomas Sprat mentioned the alchemists of the earlier periods and argued that although some of them abused their practice, most of them contributed to the development of science with their experiments. He wrote that there were three types of *chymyst*s (a word which was used both for alchemists and chemists); "such, as look after the knowledge of Nature in general: Such, as seek out, and prepare Medicines: and such, as search after riches, by Transmutations, and the great *Elixir* [of life]" (37). He then added that the first two "have been very succesful," while the members of the last type never realized their dreams, because they were too obsessed with achieving immortality (37). As Sprat argued, the aim of all men of science, including al/chemists, must be obtaining "the knowledge of nature" through experimentation and then using it for creating beneficial tools for humankind, not for their own exaltation. These ideas of the members of the Society, along with the ideas of Bacon who inspired them, established the image of a good natural philosopher again in contrast to the proud, secretive, mad alchemist figure. This contradiction was soon internalized by the society, and was reflected in the literature of the period, too, in such works as Ben Jonson's *The Alchemist* (1610) and Christopher Marlowe's *The Tragical History of the Life and Death of Doctor Faustus* (1592), which are analyzed in the following section.

Like Bacon, natural philosophers of the Royal Society were men of faith as well as being the followers of the new, empirical scientific method. William Powell Jones explains that "[t]he scientists of the Royal Society in England after 1660 - Sprat, Glanville, Boyle, Ray, and others - asserted their Christian orthodoxy by showing the wisdom of God in nature and freely implying that no scientific demonstration could explain the ultimate mysteries of the creation" (97). Although some of their approaches were criticized and mocked, they were never seen as a threat to the stability of the nation, or to the Church or other authorities, because of their faithful claims. Against the people who accused them of diverging from religion, they reacted with defensive texts. One such example is Robert Boyle's *The Christian Virtuoso: Shewing that by Being Addicted to Experimental Philosophy a Man is rather Assisted than Indisposed to be a Good Christian* (1690), which, as its title suggested, asserted that science did not

preclude God; on the contrary, it proved his existence. Boyle and his colleagues believed that natural philosophy was a way of understanding God; while the Church interpreted the first one of God's greatest creations: the Word; natural philosophy interpreted the second: the Work (i.e. the nature). Since these two concepts were interrelated, natural philosophy could never be heresy. This claim was acknowledged quickly, and many pioneers of the Enlightenment, including Isaac Newton, carried out their experiments with the ultimate aim of understanding how God's mind works.

Although there were many revolutionary natural philosophers in the early modern period, their work was still embedded with the medieval mindset. As such, natural philosophers and "scholars were expected to have special moral qualities" (Kivisto 29) as well as scientific knowledge. Being a clever, knowledgeable, and practical man was not enough to be called a good natural philosopher. In fact, the most important aspects were conscience and modesty, which were seen as the true guides of the man of science. Gottlieb Spitzel, a prominent scholar of early modern period, "stressed that science should be accompanied by conscience; otherwise human learning produced harmful self-satisfaction and vainglory" (Kivisto 37). He also "warned men of the slippery road offered by science unless a man was allied with virtue and thus grew in true wisdom" (Kivisto 214). His warnings echo the warning of all mad scientist narratives that if the scientist diverges from morality in search of self-satisfaction, the result would be damaging both to him and to the people that surround him. When the early modern period is analyzed, it seems that there were not truly evil natural philosophers. Although all of them – Copernicus, Galileo, Paracelsus, and others – were at first condemned for going against the traditions and Christian teachings, they never challenged the foundation of Christianity. The only way for these scientists to be accepted was to prove people that what they did was a benevolent act and in the long run it would be useful in understanding how the God's edifices work. During the Renaissance, innovation was still received with suspicion. As Dear states, "[p]resenting one's work as innovative was seldom regarded as the best way to be taken seriously; innovations were light and insubstantial" (*Revolutionizing* 35). Even Copernicus referred to older works while trying to persuade his contemporaries to accept his "new" astronomical model. After Bacon, the reconciliation took the form of utility; now scientists had to prove that their works were beneficial for the advancement of mankind.

They had to show that their studies was not dangerous, that they worked together, openly, without secrecy and pride. They had to be working for the general good of mankind, not for their own profit. Although the opposition towards them is usually seen as a religious one, it is in fact a more ancient fear of novum; the fear of new knowledge that might bring about new consequences and disturb stability. This mindset is also observable in the literature of the period.

### 2.ii. Alchemists and Natural Philosophers in Early Modern Literature

Three different representations of early modern natural philosophers in English literature reflect how science and scientists were viewed in that period. Moreover, they contribute to the formation of the mad scientist image of the following ages. Two of these representations are found in works that criticize alchemists (and evil natural philosophers), namely, Ben Jonson's *The Alchemist* and Christopher Marlowe's *The Tragical History of the Life and Death of Doctor Faustus*, while one of them is found in Bacon's *New Atlantis*, which was seen as the epitome of how an examplary scientist should be. *New Atlantis* is possibly the first of its kind in terms of praising natural philosophers for their commitment to experimentation and inquiry. While Bacon defined good science and instructed how to practice it, Jonson and Marlowe followed the older tradition of condeming overachieving, greedy men of science, or alchemists. Although their approach was different – Jonson's was a satire while Marlowe's was a tragedy – at their core their plays incorporated the same issue: abusing knowledge, and the power it brings, for personal gain.

Ben Jonson's *The Alchemist* is seen as "the most extensive satirization of alchemy" (Cartwright and Baker 47), much like in the tradition of medieval satires which depicted the follies of an alchemist who is obsessed with self-profit. In his introduction to the play, Martin Butler asserts that "Jonson was more likely to have been conscious of precedents in *The Canon's Yeoman's Tale* of Chaucer" (3), and this consciousness is observable in the actions and traits of the protagonist of the play. During the Elizabethan era, alchemists were still regarded as dangerous falsifiers who trick people with their alchemical skills. As a reaction to such malignancy, they were either castigated or made fun of. Hence, like Chaucer's tale, Jonson's play is also a good example of the reflection of alchemists as greedy people who used forbidden knowledge

for their own good, disregarding its harmful effects on other people. A further similarity between the works of two different centuries is the relation of their fictional characters to historical figures; "[i]t is likely that Jonson based his play on the activities of Simon Forman and John Dee;" former "a notorious astrologer, occultists, and physician working in London," and latter "a mathematician, astrologer, and mystic who impressed Queen Elizabeth" (Cartwright and Baker 47). As Dante and Chaucer did, Jonson based his play on the real events of his time, which highlights the function of literature as a criticism of dubious scientific and alchemical practices.

Jonson's play also voices his own opinions on the practice of alchemy. He "was philosophically conservative and resented the pseudo philosophical thinking inherent in alchemy and its pretensions to manipulate nature to satisfy human greed" (Cartwright and Baker 50). He therefore refers to the alchemist, named Subtle, and his apprentice, named Face, as "a cheater and his punk" (4). Throughout the play the audience witnesses the detrimental and corruptive nature of alchemy. In his dialogue with Sir Epicure Mammon, for instance, Subtle informs him about the practices of alchemy, justifying it as a natural act. He says that "[n]ature doth first beget the imperfect, then/ Proceeds she to the perfect" (II. iii., 158-9), meaning that imperfect things must be transformed into perfection through alchemical knowledge. Thus, alchemy becomes a tool to correct the mistakes of the nature, such as man's mortality. This idea has heretic undertones and Jonson's way of relaying it promotes his critique of the art. In another instance, Surly, a character that earns money by cheating people in card play, likens alchemy to his own cheating methods by remarking that "alchemy is a pretty kind of game,/ Somewhat like tricks o'the cards, to cheat a man" (II. İii., 180-1). Here again the stress is on falsifying, putting forth the manipulative nature of the alchemists. Despite being a comedy, Jonson's play is a serious critique of alchemy and it can be included in the tradition of censuring evil, mad, trickster alchemists.

Christoper Marlowe's *The Tragical History of the Life and Death of Doctor Faustus*, on the other hand, is a tragedy that reflects the dangers of proudly and ambitiously pursuing forbidden knowledge. Along with medieval alchemists, Faustus is also seen as one of the progenitors of the mad scientist stereotype. Christa Knellwolf King explains that the Faustus legend "began as an oral tale about the provocative actions of a fictional character modelled on medical doctors, pharmacists, alchemists,

quacks, experts in natural magic and performers of fairground spectacles. While not all of these historical characters possessed special knowledge, all of them challenged established beliefs in one form or another" (1). This idea asserts that the legend is based on several contradictory figures, hence Faustus can be seen as a representation of all evil alchemists and natural philosophers in medieval and early modern periods. Another general belief is that the play is based on the story of a real alchemist named Johann Georg Faust, whose life and deeds were told in a book titled *Historia von D. Johann Fausten* (shortly known as *Faustbuch*), which was published by Johann Spies in 1587. The book's English translation is known to have inspired Marlowe to write his tragedy. Hence, again, the fictional evil, arrogant natural philosopher/occultist/alchemist is in fact the representation of a real-life figure, as in the case of medieval representations and Jonson's *The Alchemist*. Probably all of the former mad scientist narratives are based on real figures, whose common traits include being men who are interested in forbidden, "dark" knowledge, and who abuse this knowledge for some kind of profit. They reflect the reactions of their age towards people who inquire too much, know too much, and practice their art without ethical and moral concerns.

*Doctor Faustus* depicts the downfall of an accomplished scholar, who, having mastered all sciences including theology, turns to magic and dark arts in order to satisfy his greed for knowledge, power, and authority. In the end Faustus is condemned, because he strays away from Christianity and looks for answers in the ancient arts. As Kenneth L. Golden states, "images of Christian mythology no longer work for Faustus when he comes to a crisis in his life. They continue to operate only in a very strange way, in the nature of the neurotic. But they do not form the basis for anything like a healthy approach toward life" (202). Golden's analysis of Faustus as a neurotic scholar is a notable one, since it focuses on his anxiety and obsession. Faustus is an individual who becomes disillusioned with what has been taught to him as ultimate knowledge, and this dissilusionment turns him into an obsessive perfectionist who wants to achieve the "true" knowledge of everything. As a result, he chooses to follow his own methods, working secretly, for his own exaltation. His ambition echoes ancient myths and religious narratives in which a human being tries too hard to become more than human. In fact, there is a reference to Icarus in the prologue of the play:

Till, swoll'n with cunning, of a self-conceit,

His waxen wings did mount above his reach,
And melting heavens conspir'd his overthrow.
For, falling to a devilish exercise. (Prologue, 20-3)

Like the fall of Icarus, his elevation results in a descent. This is a typical, age-old warning to mankind: if you are not satisfied with your place in the order and try to usurp a higher place (God's, for instance), you will appropriately be punished. At first, this seems like a matter of challenging authority or the fear of losing it; but in fact it is about knowledge. Prometheus, Adam and Eve, the people of Babel; all of them are punished for similar ambitions. All myths of fall and punishment that are related to God's authority are indeed myths of awakening, of obtaining knowledge which only God is allowed to have. This common myth also resides at the core of all mad scientist narratives, even in the ones which include literally insane scientists. The main point is that only God can have too much knowledge and if human beings do so they become corrupted, evil, mad, because they all have the potential of abusing the power of knowledge, while God does not.

Faustus, therefore, shares with the alchemists and magicians the sin of following dark, secret practices. It is stated by the chorus that Faustus

surfeits upon cursed necromancy;
Nothing so sweet as magic is to him,
Which he prefers before his chiefest bliss. (Prologue, 25-7)

Faustus turns to dark magic, because he thinks that he has perfected all other arts. His need to achieve knowledge more than he is allowed to reminds alchemists' aspirations. Moreover, his collaboration with Mephistopheles, who represents the spirit of new natural philosophy, is analogous with the alchemists' supposed alliance with the Devil. As this resemblance reflects, Marlowe's Faustus, just as medieval alchemists, has a huge role in shaping the mad scientist stereotype of the nineteenth century. The character gives the modern mad scientist some of his/her most recurring traits; like alchemists, he has a personal study/laboratory filled with tools and occult books that help him in his work, he conducts his studies secretly, and he pursues powerful knowledge without regarding its consequences, and he has a hubris that makes him desire a godlike power:

O, what a world of profit and delight,

Of power, of honour, of omnipotence,
Is promis'd to the studious artizan!
[…]
A sound magician is a mighty god:
Here, Faustus, tire thy brains to gain a deity. (I.i., 55-65)

The magic that Faustus desires and uses will turn into science in the nineteenth century as the evil, mad alchemist turns into the mad scientist. Although the mode of manipulation changes, the ambition remains the same. The role of Faustus in literature and science is best explained by Cartwright and Baker, who argue that "in the character of Faustus Marlowe provided a metaphor (and hence the adjective "Faustian") for irresponsible meddling in the arcane arts that science has struggled to shake off ever since" (56). The mad scientists of the succeeding ages, therefore, draw heavily from this Faustus metaphor whose "charge is that, like Faustus, scientists trespass across traditional and divinely set moral boundaries in their insatiable search for knowledge and power, and in so doing bring damnation on themselves and those around them (Cartwright and Baker 56). This negative image of natural philosophers and scientists has been so persistent that it is relevant even today.

In addition to the plays that invoked the older alchemist image, there were also some literary works that satirized the conducts of new natural philosophers. In the seventeenth century, the establishment of the Royal Society took the attention of satirists who constantly mocked the experiments of the fellows of the foundation such as Samuel Pepys, Robert Boyle, and Robert Hooke. Margaret Cavendish's *The Description of a New World, Called The Blazing-World* (1666) and Thomas Shadwell's *The Virtuoso* (1676) mock the practices of such natural philosophers. In *The Blazing World,* which has a similar structure to *New Atlantis*, Cavendish describes the adventures of a young woman who passes the North Pole with a ship only to find a utopic island on which talking human-animal hybrids live. It is quite obvious that the island and its residents are the satirization of Bacon's Salomon's House and its real-word counterpart the Royal Society. Mocking Bacon's division of labour, Cavendish gives each type of animal a different profession: "The bear−men were to be her experimental philosophers, the bird−men her astronomers, the fly−worm− and fish−men her natural philosophers, the ape−men her chymists, the satyrs her Galenick physicians"

(134) and so on. Moreover, such as the members of the Royal Society, the animals are occupied with experiments all the time, whether they are illogical and useless or not. It is important to note that Cavendish herself had been an observer of some of the experiments of the Royal Society, the first woman to had ever done so. She saw the excessive stress on rationality and focusing on little details as the faults in their practices, and their tools as deceiving objects. In the book, the protagonist tells the natural philosophers that "your Glasses are false Informers, and instead of discovering the Truth, delude your senses" and adds: "Nature has made your sense and reason more regular than Art has your Glasses" (141-2). In this statement one can easily observe Cavendish's dislike and criticism of new technologies as she considers artificial tools as falsifiers, just as she sees the new natural philosophers as useless men.

Another satirization of new sciences can be found Shadwell's *The Virtuoso*, which depicts an experimental philosopher named Gimcrack, who was probably based on famous experimenter of his time, Robert Hooke, who also went to see the play and was convinced that it was about him. "Playgoers were of course correct to look to Hooke as one of *The Virtuoso*'s targets," explains John Shanahan, "for the play had directly parodied material from his *Micrographi*a (1665) among other recent Royal Society works" (549). Another direct and obvious satire of the Society is made by Samuel Butler, whose poem *A Satire on the Royal Society* openly mocks their experiments such as dissecting dogs and blowing air into the lungs of creatures to keep them alive longer. Another poem of his, The *Elephant on the Moon* (c.1670), mocks a group of astronomers who observe a battle scene on the Moon while looking through a telescope, and later find out that there were insects and a mouse trapped in the tube of the telescope. Butler's mock heroic poem *Hudibras* (1684) also satirizes people who are interested in useless scientific practice. All of these reactions towards scientific revolutions in literature demonstrate that people, or at least most of the writers of the early modern era, were suspicious towards natural philosophers and their experiments. However, they were criticized not for pursuing Bacon's dream of gaining useful knowledge by empirical research, but for losing their moral and ethical values in the pursuit of scientific knowledge. Moreover, it was usually thought that their experiments were far from being useful to society; instead, they were only conducted to appease

their own curiosity. Such selfish pursuits contrasted with the image of the good natural philosopher, and this is why they were usually the subjects of satire and criticism.

## 3. Science and Natural Philosophers of the Enlightenment

The effects of the Scientific Revolution prevailed in the late-seventeenth and eighteenth centuries, and the aims of the experimental science to build a progressive society finally materialized in the technologies that brought about the Industrial Revolution. In Britain, eighteenth century "was basically dominated by a Newtonian worldview […] Not only were many of his principles quickly accepted, but Newton also became the symbol for the power of natural philosophy to transform the world" (Reill and Wilson x). As a result, natural philosophy was no longer a means of explaining the natural forces, but it turned into a means of "controlling Nature through the knowledge of its eternal laws" (Bernal 375). This shift in the understanding of knowledge owes its emergence to a philosophical and intellectual movement, famously called the Enlightenment, which came forth in the late seventeenth century and has had a major impact on Western thought since then. It is fittingly envisaged as "the beginning of modernity, the time when the basic questions facing our world were posed, though not answered, at least adequately" (Reill and Wilson ix). Many ideas, events, and people contributed to the emergence of this movement. In England, the primary scientific figures were of course Bacon and Newton, whose philosophies and science determined the mindset of the eighteenth century.

Hence, the Enlightenment was marked by a strong belief in science as the main tool of progress and welfare. In the words of Andrew Bennett and Nicholas Royle, "the notion of the Enlightenment entails the assertion of the power of reason over both superstition and nature, the belief that a combination of abstract reason and empirical science will lead to knowledge and eventually to political and social progress" (327). Progress, therefore, was possible through reasoning, but this reasoning must not be abstract. Instead, it should intersect with "critical analysis: the open-ended questioning of traditional facts guided by observation, imagination, and a thorough grounding in empirical data. This was called the critical method and drew its inspiration from Newton's formulation of the procedures for scientific explanation" (Reill and Wilson x). The key ideas of the Enlightenment, therefore, were reason, empiricism, secularism,

and universalism. Enlightenment's spirit is best summed up by the famous challenge of Immanuel Kant: "Dare to know! Have courage to use your own reason!" With such courage and a strong belief in rational thinking as the true way of achieving progress, (natural) philosophers of the eighteenth century were aware that they were living in a crucial period of human history. As Bernal comments, "[i]t was an age of conscious building of civilization – Le Grand Siécle – and the scientists were recognized and honoured as part of one common republic of letters" (449). The most honored man of science was of course Isaac Newton, who in time became a kind of a national hero as he established a new scientific method which was accepted as the ultimate explanation of the laws of the universe.

### 3.i. Isaac Newton: Natural Philosopher as a National Hero

Like Bacon, Isaac Newton is an important figure in the history of science, and in fact the two men are related in a way, since "Bacon was widely regarded as having provided Newton with his methodological foundations" (Gaukroger 2). Although he is known as one of the most famous scientists of all time, Newton was not really a scientist as the word was not in usage yet. He was a natural philosopher who wanted to understand God's mind and formulate the working mechanism of his creations. Newton's most influential work was *Philosophiae naturalis principia mathematica* (Mathematical Principles of Natural Philosophy), which he published in 1687. As soon as the revolutionary book was released, Newton became famous as the leading natural philosopher of his age. The book laid the foundations of the theory of gravity; but most importantly, it changed how people viewed the universe. Positive reactions towards the revolution of Newton stands in contrast with the previous reactions towards revolutionary scientists; hence, one might think how Newton was seen as a national hero instead of a heretic, and what made his revolution so acceptable. The answer is probably that he was a devout believer in God and made his science compatible with Christianity. Newton "believed that God is active in the world. The concept of forces represented, for him, one form of this divine presence and activity" (Reill and Wilson 424). Thus, he combined the idea of God with a mechanical, clockwork universe and God became a mathematician, or a watchmaker, who organized the universe in a perfect way. He wrote in *Principia* that "[t]his most beautiful system of the sun, planets, and

comets, could only proceed from the counsel and dominion of an intelligent and powerful Being. And from his true dominion it follows that the true God is a living, intelligent and powerful being" (qtd. in Clark 185). Newtonian science, therefore, regarded the whole universe as a flawless mechanism created by a powerful God and proposed that the mechanical laws of Newton could be applied everywhere to explain God's mechanics. This unitarian metanarrative immediately brought science to the forefront. It was no longer seen as a practice of curious aristocrats or cunning would-be (al)chemists who wanted to rule over all matter. It became a serious practice and an ally of both the state and religion, validating their authority with experiments and facts.

For most British people, Newton was the epitome of the good scientist; he set the criteria against which other scientists should be judged. Newton was so idolized that his secret interest in alchemy was not known publicly in his lifetime. Even when it was known, it was a fact that was hard to accept, because alchemy clearly contradicted with the new scientific system that Newton was trying to establish; a system based on observation and experimentation, not on hermetic or occultist practices. When it became known that Newton "kept a cauldron stocked with odd ingredients, it was considered to be something of a scandal" (Christianson 54), because those tools had alchemical implications which would turn Newton into a mad alchemist figure. Newton's biographer, the Scottish scientist David Brewster (1781-1868) also mentioned Newton's association with alchemy in his biography. He did not deny the fact that Newton was indeed interested in alchemy, since there was sufficient proof to claim that. However, he still could not grasp why Newton practiced that condemned art. Brewster wrote: "There is no problem of more difficult solution than that which relates to the belief in alchemy, and to the practice of its arts, by men of high character and lofty attainments" (372). He tried to rationalize Newton's interest in the practice by talking about the good aspects of alchemy. "The expectations of the alchemists to find a universal medicine altogether," he said, was not "irrational and useless" (373) as most of their practices. It should be noted here that Brewster still judged good science based on the aspects of Baconian science; i.e. the science which is conducted openly and aimed at universal welfare of humanity. He could not imagine Newton as an alchemist working in his secret laboratory, manipulating metals for no benefit but to satisfy his own curiosity. If Newton was an exemplary man of science, he must have a grand plan even in his

alchemical practices. This approach demonstrates that the image of the evil, mad scientist after the Enlightenment was still based on secretive and proud al/chemists, who were the opposite of Baconian moral scientists that followed both the scientific method and the way of God.

It is important to note that in eighteenth-century Britain, science still did not revolutionarily contradict religion. Although Enlightenment encouraged critical thinking and questioning of traditional knowledge, science was still not threatening in terms of its challenge of core religious beliefs. As in the example of Newton, natural philosophers and poets who wrote on the new philosophy tended to reconcile it with religion. A good example is William Derham (1657-1735), who gave lectures on the writings of Boyle on the relationship between science and religion. The lectures were named *Physico-Theology, or, A Demonstration of the being and Attributes of God from the Works of His Creation* (1716), and consequently "Physico-Theology became an apt name for a whole tradition of theorizing and a mental outlook that found consistency between scientific principles, natural laws, and the existence of a Creator" (Cartwright and Baker 98). There are a large number of scholars who draw attention to this physico-theological approach of eighteenth-century natural philosophers towards new sciences. One recent example is Thomas Broman, professor of history of science, who suggests that "the Enlightenment as a cultural movement was not implacably or even largely inimical to religion, and the science produced during the eighteenth century was anything but secular in character. Quite to the contrary […] perhaps the most significant strand of scientific work during the century was directly and explicitly tied to metaphysical and religious issues" (185). This strand was followed by the fellows of the Royal Society and other men of science such as Joseph Priestley who was both a theologian and a chemist.

Another figure that points out the religious tendencies of Enlightenment natural philosophers is science historian Steven Shapin. He argues that the figure of a good natural scientist in that period was based on his moral qualities and his dedication to the theories of divine creation: "A natural order bearing the sure evidence of divine creation and superintendence was understood to uplift those who dedicated themselves to its study. Godly subject matter made for godly scholars. This was the major way in which the culture of natural theology sustained an image of the man of science as virtuous

beyond the normal run of scholars" (166). Baconian attributes were also still important in this period, and as Shapin remarks, "[t]he image of the selfless man of science, offering much to the nation and neither receiving nor expecting to receive much in return, was lent credibility" (166). Moreover, in eighteenth-century Britain science was strongly affiliated with the state – another effect of Baconianism – and state-regulated science was seen as the pinnacle of human advancement. Hence, the good natural philosopher also had to be an ally of the state. The general belief was that "[p]roper science could indeed support proper social order," but it could also be abused as in the example of the French Revolution, which "was, in Edmund Burke's view, rationalism and speculative philosophy gone mad, bad, and dangerous" (Shapin 175). While associating the revolution with mad science, Burke likened the republicans to the negative scientist figures; "[b]y their violent haste, and their defiance of the process of nature," he wrote, "they are delivered over blindly to every projector and adventurer, to every alchymist and empiric" (166). As can be seen in Burke's statement, alchemists, chemists, and experimental philosophers who followed empirical methods were all linked with the ideas of revolution and disorder; hence, they were regarded as dangerous people. Only conformist natural philosophers could be virtuous and useful for the state and the society.

### 3.ii. Science and Literature in the Eighteenth Century

In the eighteenth century, there were not any major scientist figures in drama or prose as in the case of *Doctor Faustus*, but scientists were usually reflected as a group of people, much in the tradition of *New Atlantis*. In poetry, however, there was one important recurrent figure and it was not fictional but a real natural philosopher. This revered man of science was none other than Isaac Newton, for whom many poems were written. The first example was Edmund Halley's poem to Newton which he put at the beginning of *Principia*, the book he also sponsored. The poem, titled "To the Illustrious Man Isaac Newton and This His Work Done in Fields of the Mathematics and Physics, a Signal Disctinction of Our Time and Race," ended with the following lines:

> Then ye who now on heavenly nectar fare,
> Come celebrate with me in song the name
> Of Newton, to the Muses dear; for he

Unlocked the hidden treasuries of Truth:
So richly through his mind had Phoebus cast
The radiance of his own divinity. (xv)
Nearer the gods no mortal may approach.

This almost-deification of Newton is a characteristic of late seventeenth and eighteenth centuries, and there are many more examples of poems that praise him, the most famous being Alexander Pope's "Epitaph on Sir Isaac Newton," which states:

Nature and Nature's law lay hid in the Night
God said, "Let Newton be" and all was light. (114)

As Halley's poem and Pope's couplet reveal, Newton was seen as a genius, a natural philosopher who illuminated whole mankind about the laws of nature. He was well loved because he fitted to the image of the ideal man of science that was proposed by Bacon and accepted by the people of the early modern period. Newton was like a perfect Bensalemite; his study was not secret, nor personal; but it was universal and published for all humanity to read and, most importantly, it was beneficial in the way that it was practical and scholars could make use of it to explain the motions of objects both on Earth and in the universe (although this was later proven wrong by Einstein). Newton, therefore, was never satirized as the members of the Royal Society had been; "[h]is genius and austere gravitas also raised him above the contempt of the satirists" (Cartwright and Baker 89). In his day and even a century later, then, Newton was the greatest authority on science and he was also revered for his morality and personality as an exemplary natural philosopher. In short, he "transformed the image of the scientist from someone who dabbles in forbidden knowledge to the wise man who lays out God's laws, a priest of nature rather than a magician" (Cartwright and Baker 96-7). In other words, he was the exact opposite of a Faustian figure, and this is why he evaded most of the criticism that previous natural philosophers faced.

While poems praised Newton, prose ficton of the period was not so kind to the experimental philosophers. The major fictional work that included a critique of the new science and new philosophers in the eighteenth century was Jonathan Swift's *Gulliver's Travels into Several Remote Nations of the World*, which was published in 1726. Before writing his famous book, Swift, who was known as a fierce satirist, had already been occupied with satirizing natural philosophers, alchemists, and occultists in his short

writings. As Pamela Gossin remarks, “Swift's long-standing objection to Enthusiast belief in occult mysteries lent itself to witty attacks on astrology *(The Bickerstaff Papers,* 1708) and alchemy *(Tale of a Tub,* 1704)” (451). In the former writings, Swift used the pseudonym Isaac Bickerstaff and predicted the death of the astrologer John Partridge, who constantly questioned the Church’s teachings. In *A Tale of a Tub,* Swift criticized over-enthusiactic people who blindly went after new knowledge and forgot about morality and modesty on the way, mimicking Chaucer and Jonson’s satirization of alchemists. Following these critiques, Swift finally published a longer work, *Gulliver’s Travels*, in which he satirized the natural philosophers of the Enlightenment, showing them as fools who were engaged with petty experiments. He did not focus on a particular natural philosopher, but handled them as a group of people just as Bacon treated them. As Millhauser also points out, the references in *Gulliver’s Travels* to *The New Atlantis*, Royal Society, and Newton are hard to miss: “On the one hand, Salomon's House; and, as a kind of this world counterpart to it, the Royal Society – Sir Isaac's Parliament. And, on the other hand, [Laputa]” (290). Hence, it can be said that Swift’s fiction is based on real people and real events just as previous satires were based on real alchemists or natural philosophers.

In *Gulliver’s Travels*, Swift touches upon so many issues, but in the third part he focuses on a scientific society which reminds the Royal Society of London. The protagonist Gulliver visits a floating island called Laputa, whose residents are people that are obsessed with science. Gulliver informs the readers that “the minds of these people are so taken up with intense speculations, that they neither can speak, nor attend to the discourses of others, without being roused by some external taction upon the organs of speech and hearing” (172). Here the criticism is aimed at natural philosophers who focus on nothing but their scientific experiments and speculations. Since they are not aware of their surroundings in which real events take place, their science remains superficial and absurd. Laputans neglect daily chores in pursuit of trivial experiments, so they need to keep “a flapper (the original is *climenole*) in their family, as one of their domestics; nor ever walk abroad, or make visits, without him” (172). These flappers warn the scientists when something serious happens around them, bringing them back to reality. What is being satirized here is scientists’ obsessive occupation with rational thinking which ironically makes them less human. This detachment from humanity is

also represented literally in the physical attributes of scientists whose bodies look like geometrical shapes instead of a regular human body. As well as being non-human, the people of Laputa also lack moral values and mistreat other people such as collecting mandatory petitions in the form of wine and food from the people who live on the land. The Laputans' only useful invention, the island itself, is used to threaten people. Science is not only pointless, but it is also dangerous for the people who do not understand it. Although *Gulliver's Travels* is a satire, it still has some serious criticism about the implications of science and the immorality of the natural philosophers who may turn into villains and make science and technology their tools of oppression.

As can be concluded from Swift's satire, literature of Britain was mostly hostile towards natural philosophers and of course towards alchemists. Although this hostility receded after figures like Bacon and Newton increased the prestige of science, it never really vanished, because scientific inquiry and practice had always been polemical. Religion and morality play an important part in how people react to science and its practitioners, even today. Hence, it is not surprising that in the Age of Enlightenment, the images of good or evil scientists still depended on their morality more than their scientific competence. The warnings against the abuse of science, which had often been expected to happen, were relayed through literature since very early ages. Fictional alchemists and natural philosophers were inspired by real figures and thus they reflected real anxieties of people concerning the men with the power of scientific knowledge. Those anxieties accumulated as ages went by, and as science progressed, knowledge became a more dangerous force. It had constantly been thought that at the wrong hands scientific knowledge could be deadly. This deadliness was usually only in theory; alchemists never produced what they desired and black magic did not bring the end of humanity. By the end of the eighteenth century, however, what was in theory was becoming real. A new science, electricity, combined with an older one, chemistry, would give humankind what they had always dreamed of: a complete dominance over the forces of nature. Accordingly, practitioners of electrochemistry would be powerful manipulators whose intentions must remain within ethical boundaries in order not to become deadly. As nineteenth century approached, satire or mockery was no longer working against such crucial implications of science. Writers would need more serious

depictions which would reflect their concerns about the developing sciences and technologies. It was time for a new image; not an occultist, alchemist, or necromancer. It was time for the mad “scientist” to emerge.

## CHAPTER II

## CONSTRUCTING THE NINETEENTH-CENTURY MAD SCIENTIST

Both scholastic-Aristotelian and Baconian (utilitarian-progressive) conceptions of natural philosophy defined the man of science, either natural philosopher or experimenter, as a learned man who also had a good character and manners, religious and moral values, and who did not give into pride or passion, but instead had a benevolent aim in his studies. This image of the good natural philosopher was situated against a mad, evil figure, who was almost always an alchemist (or at least a man who was occupied with magic or occult) that was involved in forbidden practices with the aim of achieving personal wealth or a godlike power. These older images might be expected to vanish after the revolutionary period of late-eighteenth and nineteenth centuries which saw the professionalization and secularization of science. However, as the previous chapter argued, these stereotypical features were so ingrained into Western culture and literature that they still found place in nineteenth-century mad scientist narratives. Still, it is an undeniable fact that after the late-eighteenth century, Europe entered a period of a radical scientific and technological transformation, which in turn altered the way people lived and perceived the world. The major agents in this profound change were scientists and inventors; thus, there is no wonder why those figures who held the power of transformative knowledge were both revered and feared. At the dawn of the nineteenth century, British society had already witnessed many controversial scientific experiments and there was more to come. The collective awe of common people in the face of such experiments and their suspicion towards the possible negative implications of science would be shared by the poets, authors, and other artists of the era as well.

### 1. Science and Natural Philosophers in the Romantic Era

Towards the end of the eighteenth century, a new attitude emerged among artists, philosophers, and men of science. Referred to as Romanticism, this attitude or movement advocated a revival of pre-Newtonian and pre-Baconian practice of natural philosophy and a reinterpretation of medieval culture. The Romantics rejected “the Newtonian paradigm of a universe divided by Cartesian dualism and occupied only by

inert and passive matter" (Gossin 77), and instead they favoured the perception of the nature as an organic whole. This attitude is usually "summed up in a single term: *organicism*," which "has been defined as the opposite of *mechanism*" (Tresch 2). The organicist attitude resulted in a change, again, in the conception of "natural philosopher" in the decades around 1800. In the eighteenth century, the idea of progress through rational and empirical science brought forth a potential of separation of science from philosophy. As Dietrich von Engelhardt notes, "[d]uring the course of the eighteenth century an increasing number of scientists and physicians rejected the influence of philosophy and advocated purely empirical, specialized science. The natural sciences and medicine established their independence from philosophy" (13). The future was imagined as a place in which scientists and inventors were the sole leaders of advance; an idea that was connected to the exaltation of the figures such as Bacon and Newton. However, at the end of the century, the overt stress on rationality resulted instead in a criticism of such attitude in new scientific circles. Unlike their predecessors, the Romantic natural philosophers "rejected the separation of natural science from philosophy and the absolutizing of its positivistic perspective" and "[t]hey pleaded and argued for the unity of natural phenomena and natural sciences, the responsibility of man for nature, and the unity of nature and culture" (Engelhardt 13-4). In Germany, this new Romantic science was called *Naturphilosophie*[12], which warned people against the cold rationality of the Enlightenment and called for a unity between different fields of philosophy and art. Similarly, British natural philosophers and poets of this period thought that without passion and intuition, the sole existence of science could never be enough to create a better future for humanity. On the contrary, if natural philosophers were only rational beings, they would be further away from humanity; thus they would become more dangerous as they could easily abuse the power of science without moral concerns.

[12] *Naturphilosophie* is used by the English to refer to the movement of Romantic natural philosophy (original: *Romantische Naturphilosophie*) in Germany. The movement was closely related to the German Romanticism in the arts and the literature of the period, represented in the works of writers such as of Johann Wolfgang von Goethe and Johann Christoph Friedrich von Schiller. Schiller was also a philosopher and a physician, a befitting example of a romantic man of science and letters. The philosophy of the Romantics, along with those of German idealists Georg Wilhelm Friedrich Hegel and Friedrich Wilhelm Joseph Schelling, laid the foundation of a new understanding of nature, human, and all matter, which was characterized by an inclination to see a correspondance between nature and human spirit.

For the Romantic natural philosophers, science was still not an independent discipline that was free from the influence of religion and philosophy. As Engelhardt again points out, "to present scientific publications, observations and experiments in the natural sciences of the Romantic era were always combined with reflections on history, society, arts, philosophy and religion" (14). However, the effect of religion was not as strong during the Romantic era as it was in the Middle Ages or in the early modern period. For the Romantic natural philosophers, philosophy had more impact than religion on understanding and defining natural activities and their relation to human life. Hence, it can clearly be argued that in the Romantic era, natural philosophy was still intact, and indeed it reached one of the highest points in its history in terms of the interrelation between scientific and philosophical interests. The two areas, which were attempted to be separated in the eighteenth century, came close again towards the end of the century. Moreover, in this period natural philosophy also became closely interrelated with literature, especially with poetry. Romantic poets were even more interested in science than their predecessors; their reactions towards it varied from criticism to awe and their works included traces of the new scientific advancements, sometimes with their own ideas and comments on them. Since the first example of a nineteenth-century mad scientist was conceived in a Romantic atmosphere, among a group of Romantic poets and authors, it is necessary to examine how the Romantics in Britain reacted to scientific changes of the period.

### 1.i. Romantic Poets and Natural Philosophy

Probably one of the best examples of a Romantic poet interested in science is William Blake, who is famous for his critique of science and the major figures of the Enlightenment such as Isaac Newton and John Locke. Blake was a spiritual poet and painter who did not attend school but grew up reading the Bible, which affected his personality and art greatly. Blake claimed that he saw visions with religious undertones throughout his life. These visions that cannot be explained by any rational science impelled him to see rationality as an insufficient way of explaining life and the universe. As a result, Blake developed contempt for the scientific thinking of the Enlightenment. Explained briefly, Blake "railed against what he viewed as a unified threat to the imagination and to the humane life: Locke's sensationalist epistemology, Newton's

mechanical laws of nature, materialism, atomism, and industrial capitalism" (Cartwright and Baker 124). He thought that these forces did not contribute to the progress of humanity; on the contrary, they made humans less human by ignoring the emotional and moral side of their being. Like Swift, Blake sometimes resorted to satire as a form of critique of the Enlightenment epistemology and rational men of science. His satires were thus "on the corruption of science. *An Island in the Moon,* his burlesque narrative written about 1785, with its irreverent and obscene humor, is another of those eighteenth-century satires on pseudo-science that laughs at the collections and experiments of the dilettante scientist" (Jones 113). In addition to employing humour, Blake also had a more serious attitude towards the possible dangers of science. His famous statement, "Art is the Tree of Life. Science is the Tree of Death"[13] explains his general view on the dichotomy between science and art. The fact that he saw science as death is not a new attitude, but it may be one of the first examples of a modern technophobia[14].

Blake also imagined that in the future humanity would be standardized by science and technology. In 1802, in a letter to his friend Thomas Butt, he declared: "May God us keep From Single vision & Newtons sleep" (qtd. in Jones 112). Here Blake refers to Newton's natural philosophy which aimed to see the world in a single, unified way. For Blake, this kind of vision towards life and the universe hindered the development of men in multiple ways and turned him into a soulless being with limited perception. His famous painting of Newton, showing him as a reclining figure focused on a compass and a sheet of paper, is a perfect example of how he sees natural philosophers of the eighteenth century. Through the image of Newton, whom he used "in many serious poems to represent the spirit of mechanistic science that kills the imagination and deadens the spirit of poetry symbolized by Milton" (Jones 113), Blake

[13] This statement is found among Blake's notes on his engraving of the statue of Laocoön (an ancient Greek priest who warned the Trojans of the wooden horse) in Vatican. The date of Blake's engraving is c.1826-7.

[14] The term "technophobia" is used to denote a certain negative attitude towards scientific and technological developments. Some scholars approach it as a more pathological condition; Mark J. Brosnan, for instance, describes it as "a negative affective and attitudinal response to technology which the technophobe acknowledges to be irrational" (10). However, technophobia has a more extensive use in cultural and literary studies. Daniel Dinello, the author of *Technophobia! Science Fiction Visions of Posthuman Technology*, represents the non-medical approach and argues that technophobia "is meant to suggest an aversion to, dislike of, or suspicion of technology rather than an irrational, illogical, or neurotic fear" (8). This is a better explanation for the case of technophobia that became apparent in Britain after the Industrial Revolution, as reflected in Blake's ideas.

in fact denounced all men of science who led the way to the analytical standardization of both knowledge and the image of the natural philosopher. The way he turned Newton, a hero of science, into a threatening figure based on his cold rational approach is a good example of the Romantic view of the "bad" scientist. Blake was a devout man and these views might be correlated with his religious beliefs, but they could be seen more as a foresight on the future of humankind if they allowed rational science to rule them.

In addition to Blake, Romantic poets such as Samuel Taylor Coleridge and William Wordsworth had their own comments on science. They followed the developments in such sciences as anatomy or electrochemistry, and even had friends who were natural or experimental philosophers. Samuel Taylor Coleridge, for instance, was a close friend of Humphry Davy, the famous electrochemist of the era, and he even practiced science himself. In his book *Poetry Realized in Nature: Samuel Taylor Coleridge and Early Nineteenth-century Science* (1981), Trevor H. Levere gives very detailed information regarding Coleridge's interest in natural philosophy. As an example, he presents one of the letters Coleridge wrote to his friend Tom Poole, which includes the following lines:

> If I could realize this scheme, I should [in Jena] study Chemistry & Anatomy, […] On my return I would commence a School for 8 young men at 100 guineas each — proposing to perfect them in the following studies in order as follows -
>
> 1. Man as Animal: including the complete knowledge of Anatomy, Chemistry, Mechanics & Optics. –
> 2. Man as *Intellectual Being* . . .
> 3. Man as a *Religious Being* . . . History . . . (16).

In this extract, it is obvious that Coleridge had a vast knowledge about the sciences, philosophy, and religion, all of whom he believed he could teach to other people. A more important aspect of the letter is the fact that Coleridge stresses his desire to study two particular sciences: chemistry and anatomy. These are the exact sciences that the fictional mad scientists of the nineteenth century were specialized in. Hence, it could be contended that Coleridge's interest illustrates the prominence of these sciences in that particular era and their high appeal for poets and authors.

Coleridge's close friend William Wordsworth was likewise interested in science, yet he had a rather sceptic approach towards it, more like that of Blake. Cartwright and Baker explain that "Wordsworth's response to science in his writing is quite complex. He celebrates mathematics and Newtonian physics as examples of certitude that the human mind can take pleasure in. But he detests science (and any form of reasoning for that matter) that undermines religious belief or does not respect the moral dimension of life" (129). What Wordsworth criticized was not new sciences, but the new men of science who disregarded moral values in their pursuit of knowledge. In fact, in several of his poems Wordsworth uttered "derogatory remarks" about some men of science, and when confronted for his remarks he "defended himself by saying that he was only attacking those scientists who were concerned with 'a bare collection of facts for their own sake or to be applied merely to the material uses of life,' adding that he 'venerated' those scientists like Newton who had the effect of 'elevating the mind to God'" (Cartwright and Baker 136). Although Wordsworth shared Blake's contempt for rational science, he differed from Blake in his positive view of Newton and his science. His ideas indicate that Newton was still seen as the epitome of the good scientist – based on his spiritual and moral inclinations – in the early nineteenth century. However, as the remarks of Romantic poets imply, understanding of evil science and scientist was changing. It was no longer the hermetic, proud, immoral alchemist that was dangerous, but the rational, cold (and still immoral) natural philosopher was the one to be feared. This Romantic approach towards science is best summed up in Wordsworth's lines in his poem "The Tables Turned:"

> Our meddling intellect
> Mis-shapes the beauteous forms of things:--
> We murder to dissect. (48)

This idea forms a parallel with the lines in another Romantic poet John Keats's poem "Lamia" where the persona asks: "Do not all charms fly / at the mere touch of cold philosophy?" (181). Both poets see intellect and science as the antagonists of beauty and their poems clearly reflect the anti-rationalist Romantic vision of natural philosophy.

The concerns of the Romantic poets regarding new scientific approaches were not unjustified. The new sciences and technologies of the early nineteenth-century were

in fact radical and this time even more life-changing than ever. Although having dominion over nature had been the aim of science since Bacon, when it indeed happened it was revealed that if science knew no boundaries it could manipulate the fundamental constituents of nature and human life, resulting in unwanted casualties. Science thus became a challenging field for both religion and morality. It began to delve into fundamental questionings of nature, life, death, and what it means to be human. It eroded the foundations of many philosophies and scientific practices, resulting in a second scientific revolution and an industrial one that was the first of its kind. All of these changes would trigger the emergence of the mad scientist figure in nineteenth-century literature.

## 2. Sciences and Technologies That Shaped the Mad Scientist

In 1781, the British man of science and inventor James Watt[15] designed a machine that would have a great impact on the developments of the following centuries. His revolutionary invention was the practical steam engine, which was the embodiment of science-technology interrelation. Watt was not only an inventor, but he was also a distinguished chemist and had knowledge of natural philosophy as well. Humphry Davy said of him: "Those who consider James Watt only as a great practical mechanic form a very erroneous idea of his character; he was equally distinguished as a natural philosopher and a chemist, and his inventions demonstrate his profound knowledge of those sciences, and that peculiar characteristic of genius, the union of them for practical application" (qtd. in Carneige 10). In a Baconian point of view, then, Watt was a perfect example of a useful and diligent, "good" man of science. He contributed to the progress of his country and thus was seen among the national scientific heroes. However, the practicality of his scientific knowledge would not only be beneficial, but it would also cause unrest in society as it was dangerous as well as useful. This duality of benefit and damage would become one of the key features of nineteenth century mad scientist narratives as well. Like Watt's invention, the inventions of mad scientists might have bad consequences for a large number of people although (in some cases) the initial aim

[15] Scottish James Watt studied at the University of Glasgow, where his attraction to steam engines began to develop. He was not the first designer of a steam engine, but he mastered the technology and with his scientific knowledge (especially of chemistry), he updated the former engines to turn them into more practical, powerful, and cost-effective machines.

of the scientist was not to cause catastrophe. This does not mean that Watt had bad intentions while designing his revolutionary device. However, it still turned into a monster for many people who thought that they would lose their jobs and sometimes even their lives to the soulless machine. Britain was thus entering a period in which science and scientists/inventors would have ethically a more dubious position.

With the usage of Watt's invention in various areas such as manufacturing and transportation, people began to see the direct results of techno-scientific advancements in their daily lives. In the previous centuries, "[p]rogress was still rather an ideal than an achievement. The great transition of the fifteenth, sixteenth, and seventeenth centuries had not brought about any revolutionary change in the material mode of life" (Bernal 495). In the nineteenth century, however, "[s]cience came to be a major agent for effecting technical developments" (Bernal 505). Science stimulated technology, which in turn triggered the Industrial Revolution that affected not only the economy, but also the social structure of the society; "all varieties of customs, habits, attitudes, ideas, and social and political institutions [were] caught up in its flow, altered, and set on a new foundation" (Winner 103). It was proven that science, combined with technology, could indeed result in progress; but this progress also had adversaries. There was a vast number of people, especially from lower classes, who feared that machines would leave human workers unemployed, considering they were faster and did not require any salary. This fear of technology was related to the fear of science and how scientists were perceived in the nineteenth century. As Daniel Dinello states, the "growing suspicion of technology exploded in the Luddite rebellion. This subversive movement of workers urged and practiced the destruction of factory machines because they caused extensive unemployment. In this uneasy atmosphere, the scientist and his spreading technology began to provoke distrust and fear" (40). Although the Luddites[16] were mainly against machinery, they began to be associated with a general critical attitude towards scientific progress. There is not a direct relationship between their views and the authors of mad

[16] There is not a certain information on the origin of the word Luddite; however, it is generally argued that it derives from the name of a textile worker's apprentice called Ned Ludd. It is believed that in 1779, Ludd destroyed two machines where he worked, and as a result his act of violence became an example for people whose jobs were at stake because of the extensive use of machinery. In the nineteenth century, a group of people who called themselves "Luddites" began to destroy machines as an act of dissent, claiming their leader as the heroic Ned Ludd.

scientist narratives, but the suspicious attitude towards science that was reflected in such narratives forms a parallel with the technophobia of the Luddites.

In addition to the revolutionary atmosphere caused by technological inventions, there were also groundbreaking developments in science prior to the emergence of nineteenth-century mad scientists. The most challenging experiments of the late eighteenth century were made in life sciences, electricity, and chemistry, which would become the main subjects of the mad scientist narratives of the subsequent decades. Hence, it is essential to mention the developments in these sciences in order to accurately analyze the role of fictional mad scientists in nineteenth-century British literature.

Firstly, within the domain of life sciences, some polemical experiments were made to prove that life could reproduce without sexual intercourse and without the intervention by God. These experiments which were conducted on polyps, seeds, worms, and snails showed that some parts of the organic body, and even a whole body, could replicate itself. The belief that each animal organism had a soul was thus shown to be disputable. Especially Abraham Trembley's experiment with a little polyp (*Hydra*) was "the most notorious scientific novelty of the century, for it dramatically cast doubt on widespread assumptions about how animals reproduce and, more generally, on the nature of life itself" (Broman 187). This experiment's implications were seen as atheistic by many commentators because they contradicted with the description of life and its reproduction in Genesis, or in other religious texts and teachings. Other experiments that followed Trembley's were also faced with accusations of atheism. One such experiment with living organisms was made by John Needham, Georges Louis Leclerc, and Comte de Buffon, resulting in a suggestion that living matter had the potential "to organize itself seemingly without the participation of divine influence or even the presence of a "soul" (anima) commonly believed to separate animals from plants" (Broman 188). These experiments were polemical because they seemed to revolutionize the knowledge in respect to the bodies of living organisms. Although the experimenters did not change the nature of any organism, as bioengineers do now, they still uncovered some distressing facts that contradicted religion and aroused the temper of religious authorities. Their experimentation with bodies would also turn into more controversial practices in the nineteenth century, and would result in mad scientist

figures that disrupt the unity of human and animal bodies in pursuit of scientific knowledge.

Although there were many crucial developments in the life sciences, more prominent scientific fields of the period were electricity and chemistry, which require a deeper analysis as they shaped the figure of the nineteenth-century mad scientist in significant ways. Chemistry is essential to the narratives of mad scientists because of its affiliation with alchemy and of its various negative connotations. As Schummer argues in his article "Historical Roots of the 'Mad Scientist:' Chemists in Nineteenth-century Literature," chemists have always been the antagonists of good science. For Schummer, there are two main causes for the representation of chemists as mad scientists:

> On the one hand, chemistry was the prototype of the experimental laboratory sciences that exploded in the nineteenth century and induced an ongoing fragmentation and specialisation of knowledge, which posed a serious threat to any ideas of the unity of knowledge. On the other hand, literary representations of chemists could easily draw on the well-developed literary figure of the medieval "alchemists," which was already loaded with moral, social, metaphysical and religious criticism. (100)

In other words, chemists (and their former relatives, alchemists) were seen as sinister figures because they epitomized a threat both towards the unity of knowledge and towards the dominant scientific ideology and morality of their time. Consequently, authors of the nineteenth century "related chemistry to atheism, materialism, nihilism, and hubris, and eventually reinforced the negative view by transforming the 'mad alchemist' to the mad scientist" (Schummer, "Historical Roots" 101). This new mad scientist figure was constructed as a threat to religion, spirituality and to the unities of knowledge, matter, and human body. In another work that explores the negative image of chemistry, Schummer and his fellow editors contend that "popular associations with chemistry range from poisons, hazards, chemical warfare, and environmental pollution to alchemical pseudo-science, sorcery, and mad scientists" (Schummer et. al, *Public Image* 1). The association of alchemy and chemistry with mad science has been so persistent that it surpassed literary representations and continued even in cinema. In his analysis of all the movies that include mad scientists, Peter Weingart asserts that

“[c]hemistry is the iconic discipline of the ‘mad scientist’ reflecting the alchemical imagery that was prevalent until recently (and can still be identified) in the depiction of science in films”, and goes on to say that “[i]f one looks at films in which chemistry is a subject, the largest single segment of them shows the discipline being in conflict with ethical values” (Weingart, “Chemists” 31). The unethicalness of chemistry is of course related to its ancestor alchemy, but it is also related to the modern developments in the science and to the practices of electrochemists in the late-eighteenth and early-nineteenth centuries.

The eighteenth century was the age in which chemistry began to take its modern form. John H. Brooke asserts that in that century, “when claims were pressed both for its emancipation from alchemy and for its autonomy, [chemistry] would be defined as the science that dealt with the decomposition and recomposition of material substances” (Brooke 432). This transformation was so crucial that it is often dubbed as the Chemical Revolution. J.D. Bernal summarizes this transformation of science in the eighteenth century as “the transition of the mathematical-astronomical-medical science of the seventeenth century to the chemical, thermal, and electrical science” (506). Although chemistry was becoming a more acceptable practice, it still could not shake off being seen as a dangerous practice that aims to manipulate the order of nature. After all, “[s]cientific chemistry has been called the outcome of man's attempts to produce gold artificially and to explain its occurrence in the earth's crust” (Read 252). Hence, it would not be wrong to say that without the attempts of earlier alchemists to turn other metals into gold, there would be no modern chemistry. Like alchemists, chemists were also involved with the transformation of metals; they were in a sense creators or manipulators. Therefore, like the alchemist, “[i]n seeking to surpass nature by making new things, the chemist ran the risk of censure for usurping divine prerogatives” (Brooke 434). This is why the view of chemistry was not a wholly positive one, and the new chemists of the eighteenth century were up against a long tradition of being seen as heretics.

The endeavour to purify alchemy/chemistry from the accusations of heresy and make it concordant with religion dates back to chemist William Gilbert, who “present[ed] his work as a true art that is congruent with and even determined by the earth itself” in an age when most people believed that “the art of alchemy depends on

the superficiality of 'vain imagination'" (Spiller 48). Gilbert defended his practice by stressing its connection to the natural operation of nature which is designed by God. Hence, conducting chemical experiments meant comprehending and praising God's art. A century later, another chemist also tried to redeem chemistry by associating his theories with theology. It was Joseph Priestley (1733-1804), who was both a chemist and a theologian, best known as the discoverer of the element Oxygen. Like Gilbert, Priestley thought that chemistry contributed to our understanding of nature and God. He was "[c]ommitted to the belief that nature was an interconnected system designed to promote human happiness," and "saw chemical research as one way of revealing the connections" (Brooke 435). Interestingly, however, Priestley also saw knowledge and science as the tools used for opposing authority. His warning to authorities of his time is worth mentioning, because it sums up the reasons for the general uneasiness concerning the developments in science. In Priestley's own words: "This rapid process of knowledge, which, like the progress of a wave of the sea, of sound, or of light from the sun, extends itself not this way or that way only, but *in all directions*, will, I doubt not, be the means, under God, of extirpating *all* error and prejudice, and of putting an end to all undue and usurped authority in the business of religion, as well as of *science*" (xxiii). He even goes as far as to assert that "the English hierarchy (if there be anything unsound in its constitution) has equal reason to tremble even at an air pump, or an electrical machine" (xxiii). His foreboding on the future of religion and the state can be read both as a warning of the dangers of science and as a remark that states the obvious; if science keeps advancing, it will overthrow even the highest authorities. As Priestley's ideas indicate, science was becoming more and more threatening and accordingly it began to receive more serious criticism from various fields.

In addition to the life sciences and chemistry, electricity was also a notorious subject of the eighteenth century, and maybe the most significant science of the age. Figures like Luigi Galvani (1737-1798) and Alessandro Volta (1745-1827) laid the foundations of electricity with their experiments which would influence Giovanni Aldini (1762-1834) and Humpry Davy (1778-1829), who were the inspirations for the fictional Victor Frankenstein. Galvani experimented on frogs, stimulating their muscles by applying electric, upon which their dead bodies twitched and (presumably) came alive. In 1791, he published his essay titled "De Viribus Electricitatis in Motu Musculari

Commentarius" ("Commentary on the Effect of Electricity on Muscular Motion"), which advocated the belief that electricity was the vital force that moved beings, and "animal electricity," coined in this essay, became a popular notion despite Volta's later oppositions to its credibility. Galvani believed that an electric fluid ran through human body just as it ran in his artificially constructed chemical jars. Hence, a dead body could be revived if it was provided with electricity that it needed to function. Galvani and Volta's experiments[17] were important not only for their practical outcomes such as electric generators and batteries, but also for the fact that they linked electricity with chemistry. As James Penny Boyd wrote at the end of the nineteenth century (in 1899), after Volta's discoveries, chemistry "became linked indissolubly with electricity and electrical effects. The two novel and charming sciences, hitherto separate, were henceforth to cooperate in those majestic revelations and magnificent possibilities which so signally distinguish the nineteenth century" (23).

### 2.1. Electrochemistry's Alchemical Associations and Galvanism

Although the experiments with electrochemistry seem unique to the eighteenth century, they were in fact not the first of their kind. Like chemistry, electricity also had its roots in alchemical practices. In his article on the history of electricity, Dennis Stillings informs the readers that alchemy and electricity have always been intertwined:

> It was commonly assumed in alchemy that matter contained within it light or fire (that was often invisible) as an active principle. Electricity was the "ethereal fire," the "desideratum," the "quintessential fire," the *medicina catholica*, the "cheap thing to be found everywhere," the long-sought panacea. These terms were all used to characterize the nature and properties of the alchemical philosophers' stone. ("Electricity" 439)

In the eighteenth century, some electrical devices could create static electric, and those devices resembled the terellas used by alchemists. In fact, as Stillings states, "one of the earliest electrical generators was constructed from an alchemical alembic" (Stillings,

[17] Luigi Galvani and Alessandro Volta's experiments with electricity and electrical reactions included electrochemical cells (called galvanic cell, or voltaic cell) which extracted electrical energy from the reactions of metals inside the cells. Volta's studies eventually led to the production of the voltaic pile, which is regarded as the first durable electrical battery. It was also used as a tool for electrolyzing chemical compounds, resulting in a series of discoveries of new chemical elements such as sodium, potassium, and calcium.

"Electricity" 440). These electrical devices "spectacularly demonstrated how sparks of fire or light could be elicited from various kinds of matter, including even water, it seemed natural to suppose that truths foreshadowed in alchemy had been confirmed" (Stillings, "Electricity" 440). The implication of the generation of electricity by human beings, then, was obvious: because electricity was associated with alchemy and it was a vitalizing force, then it could be used to make alterations to natural processes such as bringing dead organisms back to life, or empowering living beings. Electricity's spiritual connotations were also mentioned by Newton, who was intensely interested in alchemy. In the second edition of his book *Principia*, Newton talked about a being called *spiritus*. For many decades it was not certain what he meant by that word. However, after years of debates, "[t]he Halls discovered some preliminary drafts, which they published for the first time, that suggested that the 'spirit' that Newton had in mind was an aspect of the new science of electricity then being developed by Francis Hauksbee" (Buchwald and Cohen xi). Newton's view, therefore, echoed that of the earlier alchemists who also saw electricity as a spirit or a life-giving agency.

When towards the end of the eighteenth century electricity entered into the domain of chemistry, it became a more powerful and intimidating force. Alchemists sought to prolong life and to attain immortality, but no record shows their success in doing so. Their aims were only dreams that could hardly become real; therefore, they were not taken so seriously especially after the Scientific Revolution, and in literature they were constantly satirized. New chemistry combined with electricity and galvanic experiments changed this view profoundly. In 1803, Galvani's nephew Giovanni Aldini performed a historical public experiment in London on the dead body of a Newgate prisoner. What people witnessed shocked them, since the body moved when applied electricity. It was stated in the "Newgate Calendar" that

> M. Aldini, who is the nephew of the discoverer of this most interesting science, showed the eminent and superior powers of galvanism to be far beyond any other stimulant in nature. On the first application of the process to the face, the jaws of the deceased criminal began to quiver, and the adjoining muscles were horribly contorted, and one eye was actually opened. In the subsequent part of the process the right hand was raised and clenched, and the legs and thighs were set in motion. Mr. Pass,

> the beadle of the Surgeons' Company, who was officially present during this experiment, was so alarmed that he died of fright soon after his return home. (n.pag.)

Such was the effect of a galvanic experiment. It was further stated in the same journal that Aldini "had made use of galvanism also in several cases of insanity, and with complete success. It was the opinion of the first medical men that this discovery, if rightly managed and duly prosecuted, could not fail to be of great, and perhaps as yet unforeseen, utility" (n.pag.) The experiment not only showed that galvanism could reanimate life if developed better, but also that it could be used to treat mental disorders. Both usages of the technique disrupted the moral status of humans, since they included the application of electricity on the body of a person without his/her consent, with possible irremediable results. Like alchemy, galvanism threatened the sacred mortality of human life and penetrated into forbidden zones; thus, its impact on people was not so positive.

At the beginning of the nineteenth century, electrochemistry was probably the most popular of the sciences. Works of Galvani and Volta reached to other countries including England, in which a new scientific society named the Royal Institution of Great Britain had just been found. The members of the Royal Institution, including its founder Henry Cavendish (1731-1810), Michael Faraday (1791-1867), and later James Dewar (1842-1923) were all (electro)chemists and contributed much to the development of modern electrochemistry. However, there was one figure among them named Humphry Davy, who stood out as a more famous public figure and influenced the mad scientist stereotype – especially Victor Frankenstein – more than his contemporaries.

### 2.2. Humphry Davy: The Controversial Electrochemist

Born in 1778, Humphry Davy was first interested in poetry in his early youth, but later his attention moved to electricity and chemistry. Like his contemporaries in Germany, he also became a poet-natural philosopher, and he even painted portraits that were regarded valuable in his time. Thus, Davy can be seen among the last examples of a versatile, sophisticated man of science. He is also among the first examples of paid scientists; he was "engaged in the service of the Royal Institution in the capacity of assistant lecturer in chemistry, director of the chemical laboratory, and assistant editor

of the journals of the institution," and was paid "a salary of 100L. per annum" for his job (Jones 317). At the institution, he had his own laboratory in which he conducted electrochemical experiments that turned him into one of the pioneers of electrochemistry. Through electrolysis, Davy identified such elements as sodium, potassium, calcium, and magnesium. He also gave public lectures which became very popular and turned him into a well-known and acclaimed public figure. Moreover, like Watt, Davy was an inventor as well as a chemist; he built the Davy lamp – one of the prototypes of the electric light bulbs of the late-Victorian era – which was not so effective in illuminating the environment, but was still important in laying the basics of incandescence. Despite his contributions to technology, Davy was not well-liked by all people. As David Knight says of him, "brilliant and enigmatic, he was one of the most respected and most disliked men of science" (1). Davy was a celebrated man among his colleagues and among common people; but he was also notorious for his challenging ideas and his interest in galvanism, which put him in a morally dubious position.

Although Davy was given a laboratory and instruments by his institution and he invited his fellow experimenters to observe him, making his science open and collaborative (Baconian), as a young man he also had a passionate side which made him see science as a godlike power. This feature brought him closer to the negative alchemist image than that of the modern chemist one. In his award-winning book *The Age of Wonder: How the Romantic Generation Discovered the Beauty and Terror of Science*, Richard Holmes mentions this passion of Davy regarding the power of electricity and chemistry. He states that Davy "put before his audience a vision of human civilisation itself, brought into being by the scientific drive to enquire and create" (127). This drive to enquire and create is described in Davy's own words as follows: "[science] has bestowed on [man] powers which may almost be called creative; which have enabled him to modify and change the beings surrounding him, and by his experiments to interrogate nature with power, not simply as a scholar, passive and seeking only to understand her operations, but rather as a master, active with his own instruments" (qtd. in Holmes 127). The way Davy likens science to the powers of God – thus, making the scientist a kind of creator himself – calls to mind the denouncements of the alchemists by the medieval Christian church that saw them as imitators of God. Hence, what Davy expresses is in fact a very old conception that dates back even before

the Middle Ages; the conception that a human being could dominate nature with the power of knowledge. It can in fact be traced back as far as the invention of fire, which is accepted as the first chemical reaction triggered by a human subject – in other words, the first chemically "created" substance – that gave humankind the power to "modify and change" nature. Although in the nineteenth century chemistry was still seen as a more controversial discipline than other sciences such as physics, astronomy, or geology, which were not involved in direct manipulation of nature, Davy did not refrain from following his dream of mastering the art of transmutation of elements. However, he was also aware of (electro)chemistry's polemical position and like many of his predecessors he often mentioned the divine role of chemistry to indicate that it could be reconciled with religion.

Davy's attitude towards religion changed as he aged and lost his youthful zeal. His brother and collector of his works John Davy mentions in 1839 that "in youth [Humphry Davy] considered reason all-sufficient, whilst in later life he mistrusted it, as inadequate, and built his faith on internal or instictive feelings" (19). While describing Humphry, John talks about the famous electrochemist's former "presumptuous and daring" attitude as one of an inexperienced youth, and connects his older "modest" self who had "religious hope and faith" to his increased knowledge (20). In the same manner as Newton's biographer, John Davy tries to exalt his brother by pardoning his heretic ideas and practices – by relating them to his "youth" – and highlights his religious side to put him among the "good" men of science. Indeed, Humphry Davy was saved from becoming a real example of a mad scientist by his own actions rather than his brother's explanations. He was known to continuously include spiritual and religious elements in his lectures and his sympathy for religion was often interpreted as his inclination towards natural theology, or more specifically towards chemico-theology. As Brooke mentions, "[i]n preaching the virtues of chemistry to a more fashionable audience at the Royal Institution in London, Humphry Davy had no difficulty developing a natural theology. The affirmation of divine purpose in the laws of nature was a unifying theme throughout his lectures" (436). An eyewitness in one of his lectures, "[a] French tourist, Louis Simond, described Davy's electrifying lecture technique [...] Though his ideas were so radical, he noted that Davy was careful to make conventional references to the beauties of divine creation" (Holmes 128). Although Davy inspired fictional mad

scientists, he was in fact very careful about not being labelled as a heretic, and he mostly had positive reactions to his famous lectures.

Following Davy, there emerged more controversial chemists in Europe such as Friedrich Wöhler, who "had produced an organic compound, urea, artificially. This has often been seen as a crucial break-through in the elimination of vital forces, allowing a more materialistic and secular science of organic chemistry to develop" (Brooke 436). Before Wöhler's experiment, it was believed that there were two different kinds of compounds: organic and inorganic. The belief was that organic compounds could never be produced artificially from inorganic ones by human beings; they "could be made only in plants or animals by a mysterious vital force that could not be replicated in the laboratory" (Ramberg 170). When Wöhler declared that he had produced an organic compound in his laboratory, this vitalist belief was greatly challenged. Both traditional scientists and religious circles were offended by the fact that a human being could replicate what naturally occurred in living beings. This crucial scientific development became a major factor in the shift in scientists' authoritative position in this century as it became clear that science was capable of creating organic entities, an aspect which was attributed only to God. Another man of science that became a controversial figure in the nineteenth century was Andrew Crosse (1784-1855), a rather amateur electrochemist who "earned a reputation as an 'atheist, a blasphemer, a reviler of religion' for claiming to use an electrochemical process to create a living insect, *Acarus electricus*" (Stillings 441). Crosse himself responded to these accusations by stating that declaring one's observations should not make him a heretic and he is in no position to liken himself to God by any means. He explained himself by saying that "I have been termed a self-imagined Creator. Man can neither create nor annihilate … The chemist plays with the substances brought under his notice; he decomposes; he recomposes; he is a humble imitator of Nature" (354). Although Crosse aimed to save his reputation and deflect the threats towards his life by humbly reducing electrochemistry to imitation of nature, the reactions towards his experiment indicated that science, especially electrochemistry, was still scrutinized by pious aristocrats and scientific circles in early-nineteenth century.

## 3. Science and Scientists in the Nineteenth Century

It would not be fallacious to assert that science characterized the nineteenth century. Often called "the Golden Age of Science" (Spangenburg and Moser xvii), the nineteenth century was an era full of innovations. Science was practically everywhere; it began to be more intermingled with daily life than ever before. As Victoria Carroll indicates, "in the early nineteenth century, for the first time, scientific knowledge became available for mass consumption by non-specialist audiences from across the social spectrum through an explosion of lectures, exhibitions, books, libraries, magazines and clubs" (3-4). New inventions and their public displays, and periodicals that described scientific knowledge with simple language made science more accessible to lay people. As a result, science became a "cultural property" and a "part of consumer culture" (Morus 97-8); but this did not mean that there was only popular science in this period. Although science became a part of daily life and reached almost everyone, at the same time it became more complicated and more specialized. Common people went to exhibitions and public displays of experiments, but they only saw the consequence; the underlying complex knowledge behind such displays only belonged to the scientists who conducted them.

The nineteenth century is also referred to as the period of "scientific consolidation," which started "when science parted company from religion and forged links with industry" (Morus 93). Since progress and utility were the governing concepts of this era, the companionship of science and technology was seen more crucial for the development of the country than science-religion companionship. In this century, science was also intermingled with politics and education. As Priestley predicted, science became a tool in political wars; "Victorian natural philosophy was the property of a Liberal Anglican elite" (Morus 93) and it was often used against religious and political authorities. Education also became more inclined towards science than literature: "In the nineteenth century, as Western economies became more industrial than agricultural, educational reformers protested that the traditional curriculum of Greek and Latin literature—which had given aristocrats and gentry the 'stamp of the educated man'—failed to prepare the new professional classes for modern life" (Otis xviii). Hence, for the first time in ages, the authority of the ancients in education was being seriously questioned. The new mode of life required practical and material skills,

not a philosophical background. Human beings were turning into tools; all of them had to contribute to the progress of the British Empire which had become the largest in the world.

The effect of Romanticism on science, philosophy, and literature began to diminish towards the middle of the nineteenth century, when realism and empirical knowledge gained more influence. Correspondingly, there occurred a transition from natural philosophy to modern science, with the latter becoming an independent field in itself, and this was also "the period in which many branches of science began to undergo a gradual process of specialization" (Carroll 3). As Heather Ellis' remarks, "British science in the nineteenth century was very keen to make the point that scientists occupied distinct fields of knowledge which were separate from traditional literary and theological scholarship" (791). This meant that there was no longer a need for science to ingrain itself into another, more authoritative discipline in order to look more prestigious. The attitudes of the men of science likewise changed; "in comparison with the epoch around 1800, in the subsequent part of the nineteenth century scientists grew increasingly less interested in philosophy and in becoming philosophers in natural science" (Engelhardt 22). Most of them aimed to become professional scientists that were occupied with the rational, objective study of nature, rather than taking up science as a hobby.

Towards the mid-nineteenth century, many men of science tried to free science from the constraints of religion and philosophy, and establish it as a separate, reliable, specialized discipline. For the most part, their endeavours were successful and finally science became a professional occupation and its practitioners began to get paid[18] for their scientific work. Nineteenth century is also important for being the century in which the word "scientist" was coined by science historian William Whewell. As Cartwright and Baker inform, the word was first used in 1833, when

> at a meeting of the British Association for the Advancement of Science (BAAS), the poet Samuel Taylor Coleridge objected to the word

[18] Although the general agreement asserts that scientist were paid in the nineteenth century, there are also opposing views. Nicholas Russell, for instance, argues that "it was difficult to be paid as a scientist in the early 19th century. Charles Babbage complained vociferously that there was no such thing as a scientific career in 1830 and Norman Lockyer was still declaring in 1873 that 'there is absolutely no career for the student of science as such in this country'" (216). Such scientists usually had an extra job such as journalism, but this does not negate the fact that they were also getting paid for their science, though insufficiently.

> philosopher to describe the activities of the BAAS members and someone at the meeting suggested "scientist." A year later the word "scientist" first appeared in print in a review of Mary Somerville's book *On the Connexion of the Physical Sciences* by the Victorian polymath William Whewell. In this review Whewell (who coined many scientific words such as anode, cathode, and ion) considered alternative terms for scientists such as *nature-pokers* and *nature-peepers*, which (we may be relieved to know) he rejected. Even so, the term scientist did not catch on until near the end of the century. (xvii)

Whewell's coinage of the word "scientist" had many implications, the most important being that science was no longer seen as a part of philosophy. Scientists were no longer natural "philosophers;" their work was to be completely objective and did not have to be consolidated with philosophical or religious doctrines. Another implication of the word was that scientists from then on were regarded as professionals. As Charlotte Sleigh explains, Whewell's "neologism referred to a group of men who wanted a name to reflect the fact that they took their scientific interests seriously, analogous to serious artists. In adopting this name, they were also distinguishing themselves from the wider reading public who simply consumed science" (Sleigh 13). Scientists, therefore, were no more aristocratic hobbyists, nor were they amateur practitioners who only had a general knowledge about science through reading popular scientific magazines.

As science became more prestigious and scientists finally had a title to distinguish them, the expectations of society and professional institutions from scientists also changed. The number of people who were engaged in scientific activities was excessive, but not all of them were regarded as reliable sources of information, or professionals who contributed to the progress of science. As Morus notes, what actually mattered in nineteenth century was "where scientific authority lay" (95); hence, the figure of the scientist and his affiliation was more important than the science he conducted. Reliability of knowledge depended on who relayed that knowledge and where, and to whom" (Morus 95). Like alchemists of earlier ages, some scientists might be regarded as fraud if their names were not associated with reliable sources, or if their characters were unfavourable. Therefore, a scientist had to have a good reputation, a morally good character, and preferably good relations if s/he wanted to be taken

seriously. Among the "good" men of science, the tradition of referring to older authorities to defend themselves against the accusations of doing improper science still continued in the nineteenth century as also observed by Laura Otis who states that "[w]hen nineteenth-century scientists quoted Greek and Roman authors, they defined their knowledge as 'cultured' and therefore non-threatening" (xix). This indicates that although many centuries had passed since the Middle Ages, people still – consciously or unconsciously – correlated benign scientific practices with the teachings of ancient Greek philosophers. Anything new that was the product of an uncultured individual was received with suspicion.

Hence, it can be argued that nineteenth-century scientists had to have a good education of the Greek and Roman philosophy and literature as their natural philosopher counterparts did in the previous ages. "Many nineteenth-century scientists" says Otis, "were effectively gentlemen scholars and received the same classical education as literary writers from élite backgrounds. Those scientists who did not come from the socially privileged classes had even more to gain by establishing reputations as men of humane learning" (xix). In addition to being "cultured," they were also required to have a gentelmanly character. Heather Ellis explains that "[i]t was not, though, simply the possession of a particular set of specialised knowledge and skills which was seen to define and distinguish the professional scientist in this period. He must also be seen to display a particular character; after all, to adopt the title 'professional' is not simply to claim a particular social status, but to claim a particular type of character as well" and this character had to be "clear-headed, independent, rational" (Ellis 781). Thus, not only Aristotelian, but also Baconian aspects of science and scientists were still influential in this period. Like Bacon, Victorian experts thought that people who studied science tended to develop traits such as "[h]umility and selflessness" (Ellis 786) as a result of their continuous work for the betterment of humanity. Moreover and most importantly, scientists were still expected to be faithful individuals. Whewell[19], the person behind the

[19] Whewell himself frequently referred to a divine and benevolent creator while explaining the operations in nature. In his book *Astronomy and General Physics, Considered with Reference to Natural Theology* (1833), he wrote: "Who constructed […] the earth with its productions, the atmosphere, and the ether? Who fitted them into each other in many parts, and thus made it possible for them to work together? We conceive there can be but one answer; a most wise and good God" (141). Despite the work of some scientists to liberate science from the constraints of religious thinking, this non-secular scientific approach to nature represented by Whewell was still the dominant attitude of the century.

coinage of the title of their profession, thought that a good scientist should also be faithful to Christian doctrines. He also defended scientists against the charges of heresy by presenting them as people who reveal the greatness of God. As Sleigh informs, "[b]y sketching in a theological basis for science – that leap into the mind of God – Whewell implied that the set of people with the right kind of scientific abilities were not political radicals and atheists" (85); on the contrary, they were people who could see that universe could not have been designed by any entity but God. In short, both scientific circles and common people expected the scientist to be a faithful and reliable gentleman as well as an intellectual professional.

British society's expectations from scientists went hand in hand with their actual fame and success. Nineteenth century became an age when Britain outpowered other countries in many fields of science. Important scientists of the century were mostly British and were specialized in chemistry, electricity, or both. The major ones include the electrochemist Michael Faraday, who rose to prominence from being the lab assistant of Humphry Davy; James Clerk Maxwell (1831-1879), whose work on electromagnetism was a breakthrough in science and laid the basis for modern physics along with William Thomson (Lord Kelvin) (1824-1907) and James Prescott Joule's (1818-1889) work on thermodynamics and John Tyndall's work on diamagnetism. The influence of these figures on the history of Britain and human history in general was immense, and it is an indicator of the power of the new scientists to affect people's lives in significant aspects. People could see the direct results of the works of these men in the form of various electrical devices including batteries and light bulbs, steam engines, thermometers; but also in the form of more complex weaponry especially towards the end of the century. Besides contributing to the design of the tools for daily usage, their science was also powerful because these people had a vast knowledge of electrochemistry and physics; a knowledge which helped them in the manipulation of natural elements.

Accordingly, it was the nineteenth century when "scientists," not alchemists or natural philosophers, began to appear in literary works as powerful figures who, if lost the way of morality, could become major threats for humanity. As the long history of condemning alchemy reflects, chemistry had always had negative connotations; therefore, chemists already had a bad reputation in society. However, after mid-century,

there were new branches of science whose practitioners became as controversial as chemists. As Frank M. Turner remarks, "[b]y the second quarter of the nineteenth century substantial developments in geology, physics, biology, physiological psychology, and philosophy of science challenged or cast into doubt theological assumptions and portions of the Bible" (357). Biology especially became more and more threatening for Christianity as its experts found in nature traces of ancient organisms whose existence defied the creation narrative of the Bible. It was a time when "[t]he old comforting certainties of purpose and the human place in nature were slowly being eroded by evolution" (Sleigh 1), and not surprisingly, towards the end of the nineteenth century (or the late-Victorian era), mad scientist narratives – especially those of H.G. Wells – began to include traces of evolutionary theories, most notably Darwinism.

### 3.i. Scientist as a "Heretic:" Charles Darwin

The idea of evolution was not put forth first by Charles Darwin (1809-1882); in fact, it had been a concern of physiologists, geologists, and naturalists since the eighteenth century[20]. In addition to Charles's own grandfather Erasmus Darwin[21] (1731-1802), the most important men of science in the development of the idea of evolution were the French naturalist Jean-Baptiste Lamarck (1744-1829), who argued that environmental changes cause transformations in species, these transformations may be inherited by following generations, and that species evolve towards more complex life forms – an idea that was inspired by alchemical transmutations –; and the Scottish geologist James Hutton (1726-1797), who put forward the theories of uniformitarianism

[20] Until the eighteenth century, natural philosophers believed in the concept of the Great Chain of Being, which organized all beings in a hierarchical order from the low forms of stones and rocks to the very top which is occupied by divine beings and finally God. This chain was regarded as a fixed structure; each being was created for a certain purpose and there was no possibility of lower forms to turn into a higher one. This dogmatic belief began to be questioned towards the end of seventeenth century, when "in 1686 John Ray had defined the modern concept of species, based on descent from a common ancestral type" (Spangenburg and Moser 87), and in the eighteenth century many important figures of science were talking about concepts such as preformation and epigenesis, which would lead the way to the theories of evolution.

[21] Although there are debates on Erasmus Darwin's influence on Charles' theory of natural selection, it is agreed that his book *Zoonomia, the Laws of Organic Life* (1796) is a great contribution to the development of the idea of evolution. E. Darwin was both a physician and a poet, whose "use of current science in verse was immensely influential on the poets who followed him, including Blake, Wordsworth, Coleridge, Shelley, and Tennyson primarily" and Mary Shelley even "acknowledged Darwin as the source of her Frankenstein idea" (Gossin 99).

and deep time, which argued that the Earth and the universe was much older than it had been known and the same geological processes had been repeating themselves on earth for aeons. As a result of the work of these two men, the concept of evolution became one of the main issues of nineteenth-century science. Scottish geologist Charles Lyell (1797-1875), who was regarded as a major figure in the history of British science, followed and advocated Hutton's theories and brought them together with his own arguments on the age of the earth in his influential book in three volumes, *Principles of Geology* (1830–33). Although Lyell's book had some contradictory assertions, he still did not promote the idea of biological evolution, as "in nineteenth century, evolution was almost as dangerous to put forth as Copernicanism had been in Galileo's day" (Spangenburg and Moser 83). Hence, Lyell held back from declaring his views on the subject of evolution, writing to John Herschel in 1836 that he left the idea "rather to be inferred, not thinking it worth wile to offend a certain class of persons by embodying in words what would only be a speculation" (qtd. in Ruse 84). This approach shows that scientists were still cautious in declaring their revolutionary ideas in the nineteenth century. Their reputation as good scientists depended partly on their conformity with religious and moral values.

Darwin was not as reluctant as Lyell in speaking about evolution; hence, he turned into a more threatening man of science than his geologist and naturalist predecessors. Although Lyell personally did not support biological evolution, he was the major figure behind Darwin's evolutionary theories. When Darwin as a young man sailed on the survey ship HMS *Beagle* in 1831, the captain of the ship gave him the first volume of Lyell's *Principles of Geology*. Upon reading the book which proposed that the Earth had been going through slow transformations – which can be deduced from observing geographical layers – for thousands of years, Darwin became convinced that this idea of the evolution of the Earth could also be applied to the species that live on it, including human beings. On his voyage Darwin visited several parts of the world including South America and Australia, and collected fossils and specimens to support his ideas which slowly but confidently turned into a theory. After writing about his findings in many articles, in 1859 Darwin decided to publish his theory of natural selection in book form, but first he sent its abstract to Lyell who deemed it "advisable to publish" (Darwin, *Origin* 1). In the same year, the book was published under the name

of *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* and instantly attracted the attention of Victorian readers as it was written in a plain language and used many convincing examples based on Darwin's collections.

Darwin was an educated man whose ideas were taken seriously; thus, when he talked about evolution it became a serious subject. As Spangenburg and Moser point out, Darwin's method was truly Baconian; he "had collected voluminous evidence, and now had spent time reflecting on it and analysing it" (90). Such method was often hard to challenge and many naturalists were quickly convinced by *Origin of Species*, but Darwin's ideas were so threatening for men of faith that they attacked it in various forms. The book soon resulted in the emergence of many debates on its religious implications, because "the key concepts for natural theologians seeking to display God's workings in the material world were *design* and *creation*. Darwin, on the contrary, was trying to precipitate a theory based on *production* and *mutation*" (Beer xvii). In other words, Darwin was claiming the exact opposite of the Biblical creation narrative and ignoring God's constant intervention in the production of species. In the book he asserted that "a naturalist, reflecting on the mutual affinities of organic beings, on their embryological relations, their geographical distribution, geological succession, and other such facts, might come to the conclusion that each species had not been independently created, but had descended, like varieties, from other species" (*Origin* 2). Contradicting natural theology, this claim offered a new definition of human life in accordance with other organisms that surround it.

In his second influential book *The Descent of Man, and Selection in Relation to Sex* [22] (1871), Darwin applied the theory of natural selection to human beings for he thought that "man must be included with other organic beings in any general conclusion respecting his manner of appearance on this earth" (1). Thus, the human being was no longer at the higher levels of the chain, but it was a part of an indifferent nature. Such shift in the position of humankind in the chain of being was very radical at that time.

[22] As a result of the negative reactions towards *Origin of Species*, Darwin was initially reluctant to publish *The Descent*. In its introduction he states that "[d]uring many years I collected notes on the origin or descent of man, without any intention of publishing on the subject, but rather with the determination not to publish, as I thought that I should thus only add to the prejudices against my views" (1). However, as he thought that it was a requisite of a true scientist to stay objective and not be offended by religious criticism, Darwin decided that he had to publish his findings despite their controversy.

Dinello even argues that "Darwin's evolutionary theories resulted in humanity's biggest ego-smashing since Copernicus knocked the earth from the center of the universe" (40). Such "ego-smashing" had never been accepted easily and Darwin had too much opposition to confront. One example was the American naturalist Louis Agassiz (1807-1873), who strongly opposed to Darwin's theory of natural selection and "proposed a periodic intervention by the Creator in an attempt to explain the apparent changes and evolution in plant and animal species" (Spangenburg and Moser 94). The opposition of Agassiz indicates that not only theologians but also scientists were disturbed by the implications of Darwin's theories; he was a true heretic[23].

The impact of Darwin's theory on both culture and literature was immense, especially the claim known as the "survival of the fittest.[24]" In *Origin of Species*, Darwin proposed that in nature there was a constant struggle to survive; "as many more individuals of each species are born than can possibly survive; and as, consequently, there is a frequently recurring struggle for existence," he wrote, "it follows that any being, if it vary however slightly in any manner profitable to itself, under the complex and sometimes varying conditions of life, will have a better chance of surviving, and thus be *naturally selected*" (5). The general interpretation of this statement was that it was not God who decided the fate of living beings, but it was nature, which acted rather randomly. In other words, chance more than fate was the deciding factor. The natural selection argument had many inferences that Darwin did not intend to relay in *Origin of Species* or *The Descent of Man* and it was often construed along with Herbert Spencer's more strict theory of the survival of the fittest. Firstly, these two arguments were interpreted by religious sections as the scientific basis for social progress. As Cartwright and Baker state, "the established Church in Britain found theories of *progressive*

[23] Darwin's own statements on his religious belief can be found in his various personal writings including a 1873 letter that he wrote to an unnamed correspondant, in which he opposes to being called an atheist and declares that the word "agnostic" is more suitable for defining his position. The letter reads: "In my most extreme fluctuations I have never been an Atheist in the sense of denying the existence of a God. I think that generally (and more and more as I grow older), but not always, that an Agnostic would be the more correct description of my state of mind" (qtd. in Frankenberry 130).

[24] Contrary to popular belief, it was not Darwin who first used the phrase "survival of the fittest." It was used by English sociologist and anthropologist Herbert Spencer in his article "A Theory of Population Deduced from the General Law of Animal Fertility" (1852). Darwin later borrowed the phrase from Spencer in order to express his theories better, and included it in the 6th edition of *Origin of Species* (Cartwright and Baker 196). However, the way these two men used the phrase was rather different. Darwin used it in terms of adaptation of species to their environment, while Spencer stressed the element of strength in the struggle for life. Although he used the word "fittest," what Spencer defended was in fact the survival of the strongest.

*evolution* more congenial to their teachings than Darwin's *natural selection*, because they suggested that history (natural and human) led up to this point of attainment. History was therefore teleological, meaning that it had an endpoint in sight, that it had meaning and direction" (199). Secondly and connected to this point of view, there emerged an attitude called Social Darwinism[25], whose proponent was Spencer himself. As a strong follower of Darwin, Spencer argued that biological species and society were analogous; hence, Darwinian evolution could be applied to the social structures. Correspondingly, in his "system of Social Darwinism, the cultural organization of society directly corresponded to its intellectual, psychological, or 'mental development' (judged, of course, by the standards of Europeans like Spencer)" (Cartwright and Baker 200). In this case, Europeans could scientifically justify their imperialist approach towards Eastern cultures, which were less "evolved" than the Western ones. This justification "should be seen in the context of a long nineteenth-century scientific debate about race, particularly deriving from anthropometrical (human measurement) surveys taken around and after the American Civil War" (Cartwright and Baker 200). Despite Darwin's indifference towards politics, his theories turned into a scientific legitimization of colonization and resulted in many more disparaging attitudes towards people from different races.

Darwin was the most influential man of science in the second half of the nineteenth century and he is often dubbed as "the most famous scientist between Isaac Newton and Albert Einstein" (Roberts 106). Indeed, *Origin of Species* was the first major scientific book since Newton's *Principia*, but on its publication Darwin did not become a hero like Newton; on the contrary, he turned into an antagonist of faithful, moral scientists, and as George Levine states, he still "lives in public consciousness within an adjective describing a brutally competitive and mechanistic world, and as the author of a controversial theory that has made him to many the Antichrist" (Levine, *Darwin* 1). Contrary to Newton's exaltation in poetry and prose, Darwin did not receive

[25] In *Encyclopedia of Literature and Science*, Pamela Gossin defines Social Darwinism as "[a] social and political ideology in which competitive struggle in the natural order is taken as a model for social interaction" (441). Social Darwinists argued that social progress could be possible if state had little intervention in issues such as poverty, healthcare, and business, allowing people to compete with each other. This way, the weak would be eliminated and only the fittest ones would remain in society. Social Darwinism was a very dangerous idea that justified racism and even genocide when applied to international politics.

any complementary lines from contemporary poets, but instead he was insulted many times in the form of cartoons showing him as an ape. Although Darwin's ideas were mostly criticized, he also had dedicated supporters such as T.H. Huxley,[26] who defended evolution even more zealously than Darwin, which earned him the famous nickname "Darwin's Bulldog." Still, the majority of religious and scientific circles accused Darwin of disregarding moral values and disrupting the sacredness of human life. Darwin did not affect the figure of literary mad scientist directly like Galvani or Davy as he was more a collector than an experimenter. What manifested itself in literature was his theory and its application to society, or the fictional visions of the future based on his arguments of natural selection. Hence, it can be argued that after Darwin, biology took its place next to (electro)chemistry and anatomy among the intimidating sciences. As Stiles discerns, "crazed biologists abounded in late-Victorian fiction" (324), probably as a result of the alleged "threat" of Darwinism and Darwinist scientists. At the end of the century, science had become more eminent than most of other disciplines and "in the 1870s, and especially 1880s, scientists (as they shortly began to call themselves) became more assertive in their efforts to dominate moral culture" (Sleigh 141). This change in the authoritative position of science and scientists found much place in the literature of the period.

### 3.ii. Responses from Nineteenth-Century Literature to Science and Scientists

Following the tradition of Romantic poets, Victorian poets also regularly responded to science and to the scientists of the age. Many well-known poets including Alfred Tennyson, Gerard Manley Hopkins, Matthew Arnold, George Meredith, Thomas Hardy, and Robert Browning included traces of Victorian sciences in their poems, especially references to the debates on evolution and Darwinian natural science. The common theme in the poetry of the period was the clash of old moral and religious values of the British (or, more broadly Western) culture with the new sciences which

[26] T.H. Huxley was a prominent biologist of the nineteenth century and one of the most dedicated defenders of science against it dogmatic opponents. He became a well-known public figure through his lectures on various scientific subjects and most importantly through his disputes with religious authorities. In 1860, he joined a famous debate with the bishop Samuel Wilberforce who was backed up by biologist Richard Owen, an adversary of natural selection. Huxley defended Darwinian evolutionary theory againts Wilberforce and Owen and tried to prove that human beings were related to apes. His success in this debate is referred to by Holmes as "[t]he most mythologised moments in the history of Darwinism" (75).

overthrew those values with observation, experimentation, and proofs of God's absence in natural activities. Most of the poets responded to findings and theories of the scientists with a pessimistic approach, seeing men of science as the cold rationalists who revealed the cruelty and indifference of the natural world. Some of them, like Hardy and his less-known contemporary James Thomson, viewed the world-after-Darwin as a Godless world in which "only atheism made sense" (Holmes 84). Meredith's poems had a more Social Darwinist outlook; the recurring theme in them was "the image of life as a battle" which was "derived from the Darwinian notion of the struggle for life" (Holmes 56). The poems of Matthew Arnold and Alfred Tennyson, on the other hand, reflected science as an uncontrollable menace to religion, morality, and arts.

Alfred Tennyson had a melancholic tone in his poems which were concerned with the conflict between faith and science. Even before Darwin published *Origin of Species,* Tennyson had been highly troubled by the works of geologists and naturalists on the age of the Earth and humanity. It is apparent in his poem "In Memoriam A.A.H." (1849) that he read about the studies of scientists and knew a lot about new developments. The poem starts with interrogating the relationship between God and Nature; the most discussed issue of the era:

> Are God and Nature then at strife,
> That Nature lends such evil dreams?
> So careful of the type she seems,
> So careless of the single life.
> [...]
> Who trusted God was love indeed
> And love Creation's final law—
> Tho' Nature, red in tooth and claw
> With ravine, shriek'd against his creed. (78-80)

The first line refers to the clash between science and religion, which was incited by the natural scientists of the age. Tennyson reveals that unlike God who created everything with love, nature is careless and unmerciful; it is "red in tooth and claw." Since it is science that revealed this cruelty and scientists were the mediators of the ideas such as the survival of the fittest or struggle for life, then these two agents were the real causes

of savage and immoral tendencies if they occurred in society. As Carwright and Baker remark, "in the middle of the nineteenth century, many felt like Tennyson that the old certainties were being swept away and that a new basis, or none at all, must be sought for religious faith" (182). It was feared that when faith vanished and science remained the only means for deciphering and dominating natural phenomena, human values would no longer prevail.

Matthew Arnold likewise showed concern for the rise of rational scientific thinking in his poetry, his critical essays, and his debates[27] with prominent figures that supported secular science such as T.H. Huxley. In his poem "Dover Beach" (1867), which resembles "In Memoriam" in many aspects, Arnold reflected science and scientists as the antagonists of faith – typical of his pessimistic viewpoint towards the theories of evolution – and voiced his longing for the past when scientists still had not lifted the veil of beauty and exposed nature's stark realities. He wrote:

> The Sea of Faith
> Was once, too, at the full, and round earth's shore
> Lay like the folds of a bright girdle furl'd.
> But now I only hear
> Its melancholy, long, withdrawing roar,
> Retreating, to the breath
> Of the night-wind, down the vast edges drear
> And naked shingles of the world. (86)

By declaring the retreat of "the sea of faith," Arnold implies the triumph of science over religion in interpreting nature. Poetry no longer seemed efficient as well since most entities of the world became "naked;" meaning that their secrets were uncovered by science. The feeling that all values were being eroded was intensely epitomized in

[27] In 1880s, there was an ongoing discussion between T.H. Huxley and Matthew Arnold on the role of science in culture and education. In *Science and Culture* (1880), Huxley argued that "for the purpose of attaining real culture, an exclusively scientific education is at least as effectual as an exclusively literary education" (qtd. in Otis 5). For Huxley, criticism in the nineteenth century could not be done properly without learning about physical sciences. In *Literature and Science* (1882), Arnold responded to Huxley and defended literature against science. He argued that literature, or, humanism could also be scientific, as "all learning is scientific which is systematically laid out and followed up to its original sources" (qtd. in Otis 7). Arnold did not reject science altogether, but he criticized the attitudes of the scientists who wanted to make science the sole agent in the progress of humankind. For Arnold, classical education that included literature, arts, religion, and history was as necessary as scientific education if humanity wanted to retain its culture and morality in the future. In short, he argued that if science disregarded cultural values it would make humans "less human."

"Dover Beach," which "was a reflection on a cultural clash not just between science and theology but also between science and all of the arts" (Sleigh 1). Arnold's attitude in this and his other poems came to define a literary outlook for years to come, defined as "Arnoldian pessimistic humanism" (Holmes 55) which was incorporated by other poets such as George Meredith, who was also much concerned with science's dominance over human life.

In addition to poetry, nineteenth-century prose fiction was extremely responsive to scientists and scientific developments they initiated. As Nicholas Russell asserts, "[f]iction writers picked up these developments, and scientific ideas permeate the work of writers in the literary canon. Nearly every leading 19th century writer was influenced by the positivist philosophy enshrined in the practice of science, and by the new knowledge produced especially in geology, biology and astronomy" (205). As such, there were traces of new sciences and technologies in the novels of major Victorian authors such as Charles Dickens, George Eliot, Elizabeth Gaskell, Thomas Hardy, George Gissing, and later H.G. Wells, who would become one of the forefathers of science fiction. Just as the poets of the Romantic era, some authors were quite interested in the scientific and technological innovations of the age – which they incorporated into their novels – and followed scientific journals very closely[28]. Besides the elements of the popular debates in geology and biology, there were several representations of men of science[29] in the realist novels of the period, such as Thomas Hardy's "main scientific protagonist, Swithin St. Cleve in *Two on a Tower*" and "[t]he scientific characters in the later novels by Gissing and Wells" who "take up science as an occupational profession, an activity from which they hope to make a living" (Russell 206). Except for Wells, none of the authors focused on the scientific practices of their characters who were

[28] George Eliot was avidly interested in science. She "read not only conservative geologists like William Buckland and John P. Smith but also popularizations of general science by Mary Somerville and John P. Nichol – perhaps absorbing something of scientific method from Bacon" (Fleishman 18-9). Thomas Hardy had an interest towards both biology and astronomy which reflected itself in most of his novels. H.G. Wells studied science; in fact, he was the student of famous biologist T.H. Huxley, from whom he learned Darwin's evolutionary theory and applied it in his fiction.

[29] In the realist novels of the period, doctors or surgeons were more apparent than experimenter-scientists who were the main protagonists of mad scientsist narratives. Russel informs that "the most famous fictional 19th century medical researcher is Tertius Lydgate in Eliot's *Middlemarch* (1871), and he is similar to his fictional contemporary in *Wives and Daughters*, Hollingford's surgeon, Mr. Gibson. Hardy also has a medical natural philosopher (a figure rather similar to Henry Knight), Edred Fitzpiers in *The Woodlanders* (1887)" (210). Doctors or surgeons were more social people compared to the solitary experimenters, therefore they could be more easily incorporated into realist novels which explored the lives of several different characters.

scientists, but they mostly reflected their relationships or daily struggles. For instance, in Gaskell's *Wives and Daughters*, there is a natural philosopher, Lord Hollingford, who has a private laboratory. The novel includes a detailed description of his appearance and manners, but the readers are only given superficial information concerning what experiments he conducts in his laboratory. His neighbours only know that "he had made one or two discoveries, though in what direction they were not quite sure" (38). These kind of depthless representations probably resulted from the authors' lack of correspondence with real scientists or their insufficient knowledge on actual scientific practices. More detailed portrayals of scientists appeared not in realist novels, but in proto-science fiction ones which began to increase in number towards the end of the century.

### 3.iii. Early Science Fiction in the Nineteenth Century

There is no agreement[30] among the historians of science fiction on when and where it first appeared; however, it is commonly acknowledged that the first prototypes of science fiction narratives were either written in late-nineteenth century by the authors of the post-industrial era such as Jules Verne and H.G. Wells, or even before that, by Mary Shelley whose *Frankenstein* (1818) is often seen as the first example of a science fiction novel. According to both views, early science fiction was a nineteenth century product. Paul K. Alkon remarks that "[t]here is consensus that *Frankenstein*, *Twenty Thousand Leagues Sea*, *The Time Machine*, and a few other early works" could be included among early science fiction league (Wolfe 195) and for Everett F. Adam, science fiction as a genre or a subgenre "does not exist until the nineteenth century" (Wolfe 195). There are many factors behind the emergence of science fiction in this particular century, including rapid advancements in science and technology, positivist discourses of progress, and imperialism[31]. Adam Roberts, who is among the major

[30] In *The History of Science Fiction*, Adam Roberts assembles different opinions on the history of science fiction under three titles: "a long history stretching back at least to 1600; a history that takes Mary Shelley's *Frankenstein* (1818) as its starting point […] and a history that begins with American magazine editor Hugo Gernsback (who coined the term 'science fiction' in 1927)" (38). Science fiction tropes have been included in literary texts for centuries and can be found in recognized literary works like Thomas More's *Utopia* (1516), Francis Bacon's *The New Atlantis* (1624), and Jonathan Swift's *Gulliver's Travels* (1726).

[31] Some scholars argue that science fiction flourished in Britain after it became the most powerful empire in the world. The relationship between imperialism and sf is interorgated in Istvan Csiscery-Ronay, Jr. in his article "SF and Empire" (2003), Patricia Kerslake in her book *Science Fiction and Empire* (2007),

names that elaborate on the history of science fiction, argues that "as the nineteenth century progressed, advances in science were changing the way human beings thought about their position in the cosmos, with profound implications for the development of SF" (106). New scientific probabilities fascinated many authors and prompted them to contemplate on the possible developments in science. Such fascination displayed itself in the form of fictional future narratives – utopias or dystopias – that imagined posterity as a more developed species that co-evolved with science and technology. This attitude is best analyzed by Fredric Jameson who asserts that "SF marks the moment in which a society realizes that it has a future, and that it is itself in its very nature and structure becoming, a vast being in perpetual continual change and transformation" (15). In other words, science fiction narratives emerge when the ideas of change and progress through science become prevalent and writers want to explore those ideas in fiction. This was exactly what happened in the nineteenth century; the British society became aware that it has a future.

Although science fiction works mostly depict alternative (or future) worlds, voyages to the Moon, fictional technologies and mad scientists, they are in fact reflections on the real issues of the age in which they are written. As prominent science fiction author and critic Ursula Le Guin argues, the main attribute of science fiction is not creating imaginary worlds, but thought-experiment on real events. In her words, its aim "is not to predict the future […] but to describe reality, the present world;" namely, "[s]cience fiction is not predictive; it is descriptive" (n.pag.). For Le Guin, then, science fiction can only depict the future or fictional spaces based on present events and science fiction authors can only carry out "thought-experiments" depending on what they know about the present. This aspect of science fiction makes it a suitable mechanism for investigating connotations of new scientific developments and their possible effects on social and political status of a country. Despite the fact that in the early twentieth century science fiction turned into a more popular mode of literature that foregrounded adventure and suspense, in the nineteenth century it was more focused on serious

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John Rieder in his book *Colonialism and the Emergence of Science Fiction* (2008) and David Seed in his article "The Course of Empire: A Survey of the Imperial Theme in Early Anglophone Science Fiction" (2010). On the one hand, the Empire gave inspiration to science fiction writers who began to publish invasion stories; on the other hand, it was criticized harshly through the usage of science fiction tropes. Imaginary countries and planets became metaphors of the British Empire or its enemies, while aliens became metaphors of the British people or the foreign races that they feared.

scientific and social issues. Therefore, Le Guin's definition can be applied to that period in which science fiction was more a critical tool than an established genre. The works of Shelley, Stevenson, Wells, and other authors of proto-science fiction made use of science fiction elements primarily to comment on the situation of science and scientists of their age, as well as on social norms and morals.

In the nineteenth century and maybe for the first time in British literature, science fiction tropes became the focus of some certain stories that aimed to investigate the inherent dangers of science. In addition to the mad scientist stereotype which is the focus of this thesis, there were other tropes that allowed the criticism of science and the most common ones were the alternative-world and future-world tropes[32]. One of the best examples of this type might be Edward Bulwer-Lytton's *The Coming Race* (1871), which can be seen as a warning of humanity's co-evolution with technology. In the novel there is a force called Vril, which is intended by Lytton "for electricity, developed into uses as yet only dimly guessed" and this force can be used by an evolved species named "the coming race," who, "though akin to us, has nevertheless acquired by hereditary transmission, etc., certain distinctions which make it a different species, and contains powers which we could not attain to through a slow growth of time" (466). Lytton's vision is a dark one as it combines the two most controversial areas of science in the nineteenth century: electricity and evolutionary biology. In his own comment on the novel, Lytton first shows his knowledge of electricity, or more precisely galvanism, by remarking that "some bodies are charged with electricity like the torpedo or electric eel, and never can communicate that power to other bodies" and goes on to present his own theory which brings together electrochemistry and evolution: "I suppose the existence of a race charged with that electricity and having acquired the art to concentre and direct it in a word, to be conductors of its lightnings" (466). Although the novel does not include an individual mad scientist figure, its treatment of the people who are endowed with the power of science is very similar to those of mad scientist narratives. As such, Lytton thinks that such a developed race with scientific potency "would not amalgamate with, but destroy us" (466). This means that if science was at the hands of

[32] Most noted examples that make use of these tropes include Samuel Butler's *Erewhon* (1872), William Henry Hudson's *A Crystal Age* (1887), Elizabeth Burgoyne Corbett's *New Amazonia: A Foretaste of the Future* (1889), and William Morris's *News from Nowhere* (1890).

over-ambitious egocentric people, it would most probably bring about the end of humanity.

Future-world trope was incorporated often to speculate on the use and abuse of science by future societies and how it would benefit or harm humanity in general. These narratives usually focused on groups of people rather than on individuals. Mad scientist narratives, on the other hand, focused on the abuse of science by an intelligent person who had great knowledge and skills. They reflected the professional, individual scientists whose number gradually grew throughout the century. While realist fiction of the nineteenth century – as in the example of Gaskell and Hardy's novels – incorporated scientists as characters, they did not focus on the details of their studies or the influence of their personalities on their scientific work. In proto-science fiction texts that included mad scientist figures, however, the main concern was the scientist and his experiment. Unlike those of their fictional evil alchemist predecessors and of their contemporaries in realist novels, the personalities of the modern mad scientists were depicted in more detail and they were the main characters of the story. It was revealed why they chose their practice, what they aimed at in their experiments, and how they tried to achieve their goals. This depth of character added a more serious tone to their stories and prevented the fictional scientists from looking like comic figures as in the satires on alchemists and natural philosophers. This new image of a more serious, modern scientist and the narratives he appeared in had some common characteristics that came to define the mad scientist stereotype of nineteenth century, which would become the prototype of all fictional mad scientists of the following ages.

## 4. The Mad Scientist

As the nineteenth century marked the beginning of a new era for science and technology, literature of the period responded with reviving an old trope and appropriating it to the new age of modern developments. One of the main concerns of the era was that with the acquisition of scientific knowledge, the scientist's authority would surpass those of the state and the Church. As a result of this concern, "the master narrative of the scientist" reflected him as "an evil and dangerous man," and, as Haynes argues, "[t]his simplification underlying contemporary mythology of knowledge arises from fear of the power and change that science entails, leaving many people feeling

confused and disempowered" ("From Alchemy" 243). As the fear of science came to be more serious, the representations of scientists changed from foolish experimenters to menacing geniuses. In the previous centuries, the critique of scientists was carried out through the usage of caricature, which "represents the attempt to curtail fears about scientists by mocking their experiments as trivial or unsuccessful" (Haynes, "Whatever" 33). Main examples of this approach would be "Chaucer's hapless alchemist, the gullible virtuosi of the Restoration stage, oblivious to the world around them and Swift's Projectors of Laputa (Haynes, "Whatever" 33). In contrast to these examples of satire and mockery, nineteenth century authors used more austere depictions of scientists and their mad scientist narratives usually had catastrophic endings. Drawing on older traditions, nineteenth-century mad scientist combined all of the negative characteristics of men of science from evil alchemists to the arrogant, obsessive natural philosophers. Consequently, there emerged certain common traits among various mad scientist stories of the nineteenth century, which imply that the authors shared and reflected similar anxieties regarding science and scientists of the era.

### 4.i. Recurring Themes in Nineteenth-Century Mad Scientist Narratives

Before specifying the personality of the mad scientist, it would be convenient to go through the persisting themes in mad scientist narratives of the nineteenth century. The first and foremost element of such narratives is the inclusion of a controversial scientific practice, most notably (electro)chemistry, physiology (vivisection) or biology. In his analysis of the sciences that are incorporated into mad scientist films (and their forerunners, novels), Peter Weingart comes to the conclusion that the recurring ones are "medical research, psychology, chemistry, biology, and genetics," which "emphasize experimentation on living objects as the dominant method for gaining knowledge" ("Power Maniacs" 284). As such, mad scientists of the nineteenth century are likewise trained in these sciences; when they are still students all of them show an interest towards a controversial practice, which foreshadows their unethical acts as master practitioners in the future. Their experiments usually elicit alchemical imageries as the scientists constantly meddle with chemical substances that they do not abstain from applying on human body (even on their own). Just as alchemists sought to transmute

matter, prolong their lifespan, or to obtain immortality, fictional mad scientists of the nineteenth century also have similar hopes and they try to actualize them with the help of chemistry. New electrochemical experiments of the late eighteenth century such as galvanism showed that life could be reanimated after death and the new atomic theory in chemistry unravelled the basic components of elements, which led the authors to explore the possibility of corporeal transformations. Consequently, mad scientist narratives emerged as a platform to inquire into scientific practices that violated the sacred unity of body and mortality of human life.

The fact that most mad scientists of the nineteenth century disturb human and animal body has religious undertones since such disruption means that they are meddling with God's revered artifice. As Weingart again emphasizes, in mad scientist narratives "[i]t is apparent that modification of, and intervention into, the human body, the violation of human nature, and threats to human health by means of science are depicted as the most alarming aspects of scientific inquiry" ("Power Maniacs" 279). Mad scientists as experimenters or practitioners are inclined to combine their (electro)chemical knowledge with the study of human anatomy. This practice is again inspired by the real experiments of the age such as those of "radical anatomists" who, through dissection, "'observed' evidence for the theory that humans were descended from other mammals –that they therefore had no souls, and that no one need therefore obey the Church or any other government connected with it" (Sleigh 84). This idea was alarming for human beings as well as animals, since it proposed that organic bodies did not have any soul, they were not "divine;" therefore, they could be treated as mechanical objects of experimentation. When chemistry – which was already endowed with negative connotations – was combined with this rational approach towards the human body, such experiments as Claude Bernard's occurred. Bernard was "a famous French physiologist who worked on the chemistry of the body, which he called 'experimental medicine,'" and he was "a keen experimentalist and vivisectionist, altering chemical levels and physical conditions in animal bodies to see what would happen" (Sleigh 112-3). Scientific operations like this one turned animal and human bodies into objects of inspection, causing fictional scientists likewise to explore their limits, and possibilities of changing their form. Consequently, major fictional mad scientists of the age such as Victor Frankenstein, Henry Jekyll, Griffin, and Dr. Moreau

experimented on organic bodies, aiming to reform, transform, or merge them, just like the way alchemists worked with the chemical elements.

In fictional reactions to science, such inconvenient scientific experiments always result in catastrophe caused by the scientist's inability to control the outcome of his experiment, which is another common theme in mad scientist narratives. It is almost certain that in all stories that include a mad scientist, someone dies by means of the scientist's successful or unsuccessful attempt at creating a living being or a potion, device, or so on, and it is very likely that the scientist himself dies in the end. The prototypes for this characteristic of the nineteenth-century mad scientist narratives are (again) alchemist stories that depict transmutation attempts gone out of control and the Faust myth in which the title character acquires divine powers but ends up harming those around him and finally gets punished. The Faust myth also proposes that too much power brings destruction to the one who tries to contain it. In Marlowe's version this proposition is furnished with moral warnings against desiring too much knowledge as in those myths of the fall of Adam and Eve from Eden and the opening of Pandora's Box. In Goethe's *Faust*, however, losing control of scientific knowledge is modernized through the use of chemistry by Faust's assistant Wagner, who creates a homunculus that soon starts to rebel against him. Therefore, in this version "[t]he obvious moral is that chemists, if they successfully apply their skills, lose control over their own creations. As compared to their extremely powerful skills, chemists' capacities to understand, foresee and evaluate the effects of their own doings are very poor because they lack the deeper understanding of a more comprehensive philosophy of nature" (Schummer, "Historical Roots" 107). Despite their differences, both versions are shaped on the premise that (scientific) knowledge is inherently resistant to human authority and its products have their own way of developing once being created by the human agent.

This fear of the loss of authority is embodied in a recurring figure in all mad scientist narratives: the monster. Christoph Rehmann-Sutter explains that in scientific context, "a monster is a malformed organism constructed by mad (or otherwise misguided) scientists or engineers and possibly able to become dangerous. Frankenstein's nameless creature is the prototype thereof" (273). Although the monster is usually imagined as a separate being that is created through a scientific experiment by the scientist (as in *Frankenstein* and *The Island of Dr. Moreau*), there are also cases in

which the scientist himself turns into a monster (as in *Dr. Jekyll and Mr. Hyde* and implicitly in *The Invisible Man*). Despite their differences, both conceptions of the monster have a common "moral strategy" which is "to describe an evil that wears the face of science and then to show how to combat it" (Toumey 412). In this respect, the monster can be understood as the embodiment of the evil inherent in science. By materializing this evil, authors make it possible to fight and destroy it, albeit with casualties. Moreover, the monster physically and intellectually represents the scientist's failed attempt at playing God; it neither has a pleasing look, nor is it intelligent. But most importantly, it mirrors the sinful nature of humankind by displaying rebellious and murderous attitudes, and eventually taking on their own creators. In brief, the monster represents both the possible dangerous outcomes of scientific endeavour and humankind's inner wish to rebel against authority by making use of the power that is given to them by their creator.

In addition to these established themes, the most important aspect of mad scientist narratives is the setting which is invariably a secret laboratory; the modern version of the private den of the alchemist. The threat of science, argues Weingart, "is dramatized by being associated with the image of the scientist as pursuing the quest for new knowledge in secrecy, outside the controls of academic institutions and peers" ("Power Maniacs" 279). As such, "[d]angerous research is taking place outside official institutions such as university laboratories and government facilities (although they house their share of dangerous practices), and hidden from the critical observation of the scientific community" (Weingart, "Power Maniacs" 284). The private laboratory, therefore, is the perfect place to be occupied with "forbidden" scientific practices that mostly include interferences with and manipulation of natural processes. The laboratory of the mad scientist is often situated in the cellar or in the underground and has a dark atmosphere with a chaotic design that includes flasks, ignition tubes, batteries and coils, operating tables, chains, collars or handcuffs (for living test subjects), and so on. There might be traces of the scientist's older experiments which imply that he has been working to achieve his goal for a long time. The main function of such laboratories is to underline the fact that science could be a deadly instrument at the hands of individual practitioners who are not monitored by an authority that takes into consideration the social and moral repercussions of the experiment in question. Hence, if not discovered

by an outsider, the secret laboratory remains as the place where science keeps creating malignity.

### 4.ii. Characteristics of the Nineteenth-Century Mad Scientist

The personality and aspirations of the protagonist are as essential in mad scientist narratives as the setting and themes. Some critics even argue that the character of the scientist is more important than the dangerous scientific knowledge he acquires and applies. One such critic is Susan Sontag who remarks that "[w]hen the fear of science is paramount... the evil has no attribution beyond that of the perverse will of an individual scientist" (223). Christopher P. Toumey also asserts that mad scientist stories "convey the argument that rationalist secular science is dangerous, and their principal device for doing so is to invest the evil of science in the personality of the scientist" (411). This attitude reflects the fear towards the figure of the rational scientist who has the potential to push the limits of science to the extreme when conducting his experiments to achieve the result he wants. Previous depictions of evil alchemists were more superficial and less serious since they were usually the objects of mockery. This might stem from the fact that no serious outcome of alchemy was seen in society. Despite its potential to do so, alchemy did not produce any abominations that threatened the world and humankind; hence, alchemists were seen as would-be manipulators and masters of nature. As science developed into its modern and more secular form at the end of the eighteenth century, scientists also began to be taken more seriously. Nineteenth century was an age in which most people had already experienced demonstrations of dissections of animal and human bodies, galvanic experiments on corpses, and other controversial practices. Thus, it is not surprising that such demonstrations evoked a rather menacingly serious image of scientists which was then incorporated into fictional texts.

As in themes, there are also recurring similarities in the characters of nineteenth-century mad scientists. The foremost common feature is the fact that all of them have more than average intelligence which makes it easier for them to create or invent beings that a scientist with regular intelligence cannot. Weingart opines that this high intelligence, or genius, is usually "associated with ethically problematic ways of gaining knowledge" ("Power Maniacs" 284), because of the general belief that geniuses possess

a more rational vision towards all things than emotional or ethical. Genius, therefore, generates a cold rationality in the behaviour of the mad scientist that overlooks moral values. Although rationality was revered by the forbearers of modern science such as Francis Bacon and the Enlightenment natural philosophers, in the nineteenth century it was approached with suspicion since people began to experience the severity of its consequences. Still, scientists continued to follow this rational approach as science became independent from religion and the state. "In espousing internationalism," states Heather Ellis, "scientists were also practising what may be termed a 'politics of distance', working to ensure their independence from alternative agendas set by government or by the state, more broadly" (788). This meant that more scientists started to reject the regulations that were put forward by different authorities. Furthermore, later in the nineteenth century, the term "objectivity" gained significance. For Victorians, it "implied a kind of knowledge that was untainted by human concerns, and therefore morally neutral" (Sleigh 45). In other words, objective approach was related by many people to the understanding of science as a "cold" practice that had nothing to do with cultural or moral values. In this respect, cold objectivity of the fictional genius scientists was employed as a prerequisite of their morally corrupt personalities.

As well as being immoral rationalists, fictional mad scientists of the nineteenth century are also characterized by their extreme obsession. The mad scientist's "obsessive focus on his research," argues Haynes, "rendered him contemptuous, even oblivious of society's norms and relationships" ("Whatever" 33). Hence, mad scientists usually cross the line that separates moral and objective science since their overt infatuation with their scientific practice causes them to turn to unethical methods. Obsession also enkindles their madness as their attitude alternates between making scientific research for the progress of science and following their own passions feverishly; a dilemma that results in neurotic behaviours. Haynes contends that illustrations of neurotic attitude in scientists was not first seen in the nineteenth century; "[o]bsessive involvement in science was also linked to madness by numerous eighteenth-century writers and artists" including the painter William Hogarth ("From Alchemy" 247). In one of his paintings titled *In the Madhouse* (1763), Hogarth portrays two patients in Bedlam (a notorious mental hospital in London) that were once men of science. This knowledge can be deducted from their depiction in the scene; even in a

mental hospital they still try to observe the stars and make mathematical calculations. Nonetheless, obsession of such scientists as astronomers or mathematicians is not so dangerous compared to those of chemists, anatomists, or biologists seeing that their practices do not involve operations on living beings. Obsession and madness become dangerous when the scientist turns his gaze to human or animal subjects. Because he cannot take into consideration the ethical stance of such subjects as a result of his passionate preoccupation with his experiment, the consequence is always disastrous. As Haynes also notes, "narratives depicting scientists as obsessive seekers after knowledge have emphasized the reversal of expectation and the disaster of success due to the scientist's failure to foresee the consequences attendant on achieving his goal" (Haynes, "Whatever" 32). Namely, fervent quest for knowledge makes mad scientists blind to the outcomes of their actions. Even though some of them start with good intentions, their passion may change the flow of events in the opposite direction and furthermore, on the way to success they may gradually become corrupted as they gain more scientific power.

The moral corruption of mad scientists is associated also with their hubris, which is a timeless theme in all narratives that include an unquenchable desire for knowledge. It is an indispensable personality trait of nearly all mad scientists starting with Faustus, their early modern progenitor. As Schummer explains, "[h]ubris or presumption, in the sense of comparing one's own capacities with those of the divine creator, is an issue deeply rooted in the peculiarities of Christian theology;" just as God created human beings in his own image, humans have the potential to imitate "the creator's creation" ("Historical Roots" 116). This potential imitation of God, however, has always been suppressed by stories, myths, and religious texts that condemn it as the greatest mistake and sin. For instance, in the Middle Ages alchemists were condemned because "medieval theologians strictly confined alchemy in particular and technology in general to the imitation of nature, to the effect that alchemists tried to investigate and apply the secrets of the divine creation in their laboratory" (Schummer, "Historical Roots" 116). Consequently, the self-confidence of alchemists who believed that they could master the elements and achieve immortality developed into the hubris of modern mad scientists who had similar ambitions but more advanced scientific techniques. Moreover, Haynes suggests that the mad scientist exemplifies "intellectual hubris" ("Whatever" 33), which

means that he sees his genius as a gift that separates him from others and feels that he has to make use of that gift to unlock the mysteries of nature. Such hubris also makes him self-centered and his confidence in his own ability to exceed the possibilities of science clouds his sensibility and his care for other people.

As a consequence of his obsession and hubris, the mad scientist turns into a solitary figure that isolates himself from the society and spends most of his time in his laboratory. This isolation is voluntary since he needs not only to be away from everyone in order to keep his experiment secret, but also to be more occupied with his work than with socializing. In all his motives, the primary interest of the mad scientist is his study and this priority he gives to the scientific experiment results in his lack of concern for the well-being of people around him. As Schummer likewise points out, "[t]he next step of madness, the step towards moral perversion, is hurting or killing other people as a result of one's scientific obsession and hubris" ("Historical Roots" 122). This hurting or killing might be indirect as in the case of Frankenstein's monster or Mr. Hyde, where the scientist has no control over the product of his experiment. Still, he is the primary agent in the murders because it is his ambition and reluctance to give up his study that harms people. In other cases, murder could be direct as exemplified in Dr. Moreau and Griffin's violent actions towards human and animal beings. Haynes argues that mad scientists are most of the time "suppressing human affections" and they are "ruthless in their idealism, prepared to sacrifice humans, animals and safety in their reckless pursuit of knowledge" ("Whetever" 34). This applies better to such fictional scientists as Dr. Moreau and Griffin, who show no affection towards the living beings that they vivisect and murder.

In some instances, the mad scientist can be so idealist that the sacrifice to science may even include his own body. Schummer contends that "[w]hereas the mad alchemist in his obsessive search for the philosophers' stone harmed primarily himself (his health, wealth, and social status), the new mad scientist did harm primarily to other people through his obsession with playing God" ("Historical Roots" 126). Although this argument is partly true, it does not apply to all mad scientists in the nineteenth century. Indeed, cases of self-harm occur very frequently in mad scientist narratives and their number increases towards the end of the century. Such fictional scientists as Dr. Jekyll and Griffin apply the product of their experiment on their own bodies regardless of its

potential negative consequences. This self-experimentation[33] echoes the practices of real men of science (mostly chemists) like German electrochemist Johann Wilhelm Ritter (1776-1810) who administered a Voltaic pile filled with electric current to all parts of his body. As Alex Boese notes, "Ritter kept pushing onward — increasing the current to dangerous levels, forcing himself to endure longer periods of time, and using opium to dull the pain. As a result, his health suffered" and he died at the age of thirty-three (n.pag). Another famous example is Humphry Davy, who self-experimented by breathing nitrous oxide to see its effects on human body, after which he became seriously ill and "was forced to recuperate in Cornwall" (Musselman 4). It is no coincidence that both fictional mad scientists that conduct self-experiments are chemists like Ritter and Davy. Although there is no certain information on the influence of these particular real scientists on fictional ones, it can still be suggested that literature of the period was clearly conscious of the unconventional scientific practices and of the men who applied electricity and chemical substances on themselves.

Aside from their own obsessive ambitions and questionable practices, what makes mad scientists appear as evil beings is the presence of their benevolent colleagues. All mad scientist narratives have a foil character that possesses an opposite personality and emphasizes the negative features of the protagonist. In *Frankenstein* it is Professor Waldman, in *Dr. Jekyll and Mr. Hyde* it is Dr. Lanyon, in *The Invisible Man* it is Dr. Kemp, and in *The Island of Dr. Moreau* the narrator can be seen as the foil to the evil scientist he describes. These foils are constructed so as to reflect Baconian characteristics that contradict with the hubris, self-involvement, obsession, and secretiveness of the evil mad scientist. As such, the foils are modest, professional scientists that are usually associated with an institution, performing their job as the state and society requires of them. Unlike the mad scientist, they are content with what they have, do not have big ambitions, and have no intentions of overachieving. They represent "ancient conceptions of philosophic disengagement and heroic selflessness" which "was undermined by the professionalization and bureaucratization of scientific research and teaching" (Shapin 178). In other words, they stand for an ideal image of a

[33] For a detailed information on the history of self-experimentation, see Stuart Walker Strickland's *The Ideology of Self-knowledge and the Practice of Self-experimentation* (1997), Lawrence K. Altman's *Who Goes First?: The Story of Self-experimentation in Medicine* (1998), and for a vast collection of all self-experimenters see Arsen P. Fiks's *Self-experimenters: Sources for Study* (2003).

moral scientist that remained in the past; i.e. the periods before the emergence of secular-rational sciences. Hence, it is possible to name such foil characters as anti-mad-scientists, or, "ethical scientists" as Toumey calls them (415). While mad scientists "personify the evil of the institution of science," Toumey notes, ethical scientists personify "the conscience of science" and they "caution mad scientists to cease their experiments and return to conventional morality. However, this is often a device for underlining the amorality of the mad scientists, who typically reject the ethical advice, and sometimes murder those who personify it" (415). The ethical scientists in fact voice the concerns of nineteenth-century people regarding the practices of the scientists of their age. The rejection of the ethical scientist's advice means rejection of social values and the final punishment of the mad scientist for rejecting such values brings order to disorder. However, the fear still remains in the real world as science gradually gets more in conflict with ethics.

It is apparent that the nineteenth-century literature produced a proto/stereo-type of the mad scientist that had common characteristics in all narratives he appeared. Most of these recurring features were the tropes that were borrowed from older narratives, but they were adapted to the new scientific atmosphere of the nineteenth century. Authors who predicted the new science's consequences no longer resorted to satire for criticism, nor did they try to give Faustian moral lessons with religious undertones. Mockery of alchemists and natural philosophers turned into dark visions of science gone out of control which were reflected in the works of Shelley, Stevenson, and Wells. Therefore, the new mad scientist was a reflection of newfound fears which were indeed ancient, but were also incited more than ever by rapid scientific advancements that fascinated and bewildered people at the same time. The end of the eighteenth century saw the Chemical Revolution, during which many chemists reformed the science in significant ways. The result of this revolution would be fictional chemists like Dr. Jekyll and Griffin, whose mastery on chemical substances would turn them into monster/murderers. Volta's revolutionary experiments with electricity, along with those of Galvani, Aldini, and Davy would reflect themselves in literature in the form of the fictional electrochemical experiment of Victor Frankenstein. Darwin's contributions to the theories of evolution, natural selection, and the survival of the fittest arguments

changed people's vision of themselves, and accordingly they were the major subjects of one of the famous mad scientist narratives of the age: *The Island of Dr. Moreau*. The following chapters thoroughly analyse these narratives and their portrayal of the mad scientist stereotype.

## CHAPTER III

## VICTOR FRANKENSTEIN: THE PROTOTYPICAL MAD SCIENTIST

Mary Shelley's *Frankenstein, or the Modern Prometheus* (1818) is one of the most canonical texts of English literature and maybe of Western literature in general. Its persistent effect on literature, culture, science, and many other areas is related to its timeless subject matter: the fall of an obsessive and ambitious overreacher who brings disaster to his loved ones and to himself as a result of his failure to make good use of scientific knowledge. Similar figures to Victor Frankenstein found place in myths and literary works before; but it is *Frankenstein* which treats the man of science in a modern manner and this aspect highlights the novel's innovative role in literature. Moreover, the fact that its references to the real scientific discoveries and practices of the period are not just background information but the backbone of the novel makes it one of the first examples of proto-science fiction works that explore the relations between the changing scientific/technological atmosphere of the period and the longstanding cultural/traditional values of Western society. Science fiction author and critic Brian Aldiss deservedly calls *Frankenstein* as "the first great myth of the industrial age" (23), while Helen Haste sees it as "the primary modern medium of [Prometheus] myth" (117). They both refer to its being the pioneer of a new tradition of modern myths that abandon a purely religious or metaphysical depiction of the acquisition of forbidden knowledge and treat it in a rather secular framework. Indeed, *Frankenstein*'s relation to the scientific and technological developments of late-eighteenth and early-nineteenth centuries is probably the most direct of its time. It has many allusions to the experiments of prominent electrochemists, to vitalist debates, practices in anatomy and life sciences; and most importantly, its protagonist Victor Frankenstein is the amalgamation of the men of science[34] (natural or experimental philosophers and proto-scientists) of the period.

Hence, it is not surprising that *Frankenstein* includes the prototype of a fictional mad scientist, a fact which is supported by many critics who have analysed the novel in accordance with its relationship to the radical sciences of the age. For Marilyn Butler,

[34] Possible influences of Victor Frankenstein include primarily Giovanni Aldini and Humphry Davy, Erasmus Darwin, Joseph Priestley, Andrew Ure, Johann Wilhelm Ritter, Henry Cavendish, William Lawrence, and probably a number of less known men of science.

the novel can be interpreted as "an early version of the modern myth of the mad scientist" (404), while Christopher Toumey dubs it as "the first mad scientist narrative" (417) and sees Victor Frankenstein as the figure on which most of the twentieth-century mad scientists are based. Roslynn Haynes similarly regards Victor Frankenstein as the first example of a new tradition of modern mad scientists including "Dr Jekyll and Dr Moreau to Dr Strangelove and Dr Wilde who are perpetrators of horror" ("Whatever" 32). Another critic Joachim Schummer also focuses on Frankenstein's controversial role as a chemist and argues that "*Frankenstein* not only stands out as the first modern anti-modern mad chemist novel, but it is also the most radical one" ("Historical Roots" 121). This consensus on the role of Frankenstein as a pioneer rests both on his learning – he studies modern chemistry and anatomy, and specializes in both of them enough to surpass his teachers – and his practices; namely, dissection and galvanism which are seen as operations that disregard conscience and morality.

*Frankenstein* is indeed a milestone in literature as it uses a realist mode to draw attention to a common conflict of its time and its plot is rich with elements that provide examples for the future explorations of the same theme (of science-morality conflict). The novel opens in the epistolary form, with the letter of a captain named Robert Walton who tells his sister of his journey to the North Pole. Several letters later, he starts to talk about a Genovese man who appeared sick and tired on a sledge near their ship. After regaining his health, the man introduces himself as Victor Frankenstein and begins to tell about his life: his childhood in Geneva, his early interest in alchemy, his scientific education in Ingolstadt, his meeting with chemistry professor Waldman who had a profound effect on his thoughts about modern chemistry, and of course about his galvanic experiment of animating a dead human body. As Frankenstein relates how his revived-creature goes on to murder his brother, best friend, and wife, Walton notes down everything he says, including the Creature's story which he had narrated to Frankenstein. Walton eventually learns that Frankenstein was following the Creature to kill him and their chase brought them to the northernmost parts of the earth. In the end, Frankenstein dies without being able to kill the Creature, who appears on the ship next to the dead body of Frankenstein and laments his death despite hating him. The novel ends with the Creature riding his sledge into the north, possibly to die. Despite its Romantic and gothic undertones, which was the result of Shelley's connection with the

Romantic poets including her husband Percy Byshhe Shelley, *Frankenstein* in fact foregrounds problems caused by the passionate pursuit of scientific knowledge. In this sense, "although safely within a Romantic chronology," argues Janis McLarren Caldwell, *Frankenstein* "is often regarded as atypically Romantic, or even anti-Romantic, with Gothic trappings surrounding elements of incipient science fiction" (2). The fact that it introduces the first modern mad scientist also supports this claim. The incorporation of secular and rational elements along with a proto-scientist figure whose actions disrupt the science/ethics relation makes the novel closer to science fiction than any other form of literature of the period.

As a mad scientist narrative, *Frankenstein* becomes a crucial text for both literary and historical studies when it is read within the early-nineteenth century context. The atmosphere of the period can be discerned from the first reviews of the novel, which focused not on its Romantic or gothic aspects, but on the scientific ones. *Edinburgh Magazine* accepted that "it ha[d] an air of reality attached to it, by being connected with the favourite projects and passions of the times" (231). As a result of its inclusion of controversial sciences, however, the novel was condemned for having heretic undertones. Even before its publication, *Frankenstein* met with suspicious attitudes. William St. Clair informs that the novel was initially rejected by publishers when Percy Shelley gave it to them, telling them it was one of his friends who wrote the novel (248). The publishers shunned *Frankenstein* not because they did not trust Shelley, or thought that the novel would be commercially unsuccessful, but because they "were well aware that the narrow constituency of readers upon whom their livelihoods depended was, for the most part, conservative, indeed reactionary, in its political and religious opinions" (St. Clair 249). For such conservative readers, "[t]he notion that the dead could be made to live again by manmade agency was, it was suggested, atheistical and blasphemous, a secret attack on the central tenet of Christianity" (St. Clair 249). The novel was finally accepted by the publishing house called Lackington and its copies were sold rapidly as the readers showed an immense interest. However, this high interest did not mean that the book was admired. In fact, as stated by Susan E. Lederer and Richard M. Ratzan, *Frankenstein* "was not universally loved" (460); the scientific operations and the monstrous result were rather seen as bizarre and unrealistic, and far from having "any useful lesson of conduct, morality or

manners" (460), which were regarded as the aspects that made a novel favourable at the time. Although the "accusations of impiety which greeted the publication of *Frankenstein* may surprise us today," remarks Chris Baldick, "it seemed to some of Mary Shelley's first readers that the novel was calling into question the most sacred of stories, equating the Supreme Being with a blundering chemistry student ("Reception" 180). Thus, it can be said that the representation of the first mad scientist indeed succeeded in creating disturbance among readers and critics[35].

One rather positive review of the novel, which belongs to Sir Walter Scott, is very significant and more informing than the ones that reflect common public reactions. Scott tries to situate *Frankenstein* outside the romantic stories whose main aim was to evoke various emotions of the readers through the usage of supernatural elements. For Scott, *Frankenstein* is "a novel, or more precisely a romantic fiction, of a nature so peculiar" (219). At the time the novel was written, science fiction, or "scientific romance" as Wells called his works, was not in usage. Therefore, it is understandable that Scott could not find any words to describe the novel, but the word "peculiar." It is understood from his following comments that Scott tries to underline the modern and mature aspects of *Frankenstein*, instead of seeing it as the work of a bizarre imagination as other critics do. He sees it as an example of "a more philosophical and refined use of the supernatural in works of fiction […] in which the laws of nature are represented as altered, not for the purpose of pampering the imagination with wonders, but in order to shew the probable effect which the supposed miracles would produce on those who witnesses them" (220). With these words Scott might have accidentally made one of the earliest definitions of science fiction. Although he uses the word 'miracle,' he acknowledges that the characters in the novel act "according to the rules of probability" (221) and adds that the readers "grant the extraordinary postulates which the author

[35] The reviews of the novel included very harsh criticism as in the example of John Croker's comments in *Quarterly Review*'s January issue in 1818, which said that the work presented "a tissue of horrible and disgusting absurdity" (218). Croker continued by declaring the author of the novel "mad," just as its protagonist Frankenstein: "The dreams of insanity are embodied in the strong and striking language of the insane, and the author, notwithstanding the rationality of his preface, often leaves us in doubt whether he is not as mad as his hero" (218). In another review in *Edinburgh Magazine*, it was declared that the novel was "bordering too closely on impiety" (231). As "[w]e are accustomed, happily, to look upon the creation of living and intelligent being as a work that is fitted only to inspire a religious emotion," wrote the reviewer, "the expression 'Creator,' applied to a mere human being, gives us the same sort of shock with the phrase, 'the Man Almighty,' and others of the same kind" (236).

demands as the foundation of his narrative, only on condition of his deducing the consequences with logical precision" (221). These "probability" and "logical precision," which are at the core of *Frankenstein*'s plot, are the aspects that make the novel predictive and critical rather than naively fanciful. The fact that it is nourished by real scientific events and speculates on the future ones marks its radically investigative nature.

As its immediate reviews indicate, *Frankenstein* is strongly attached to real scientific events which are referenced in the novel. However, the general twentieth-century attitude[36] in the studies of *Frankenstein* has been to overlook the scientific context of its narrative. Joachim Schummer draws attention to the lack of focus on the scientific professions that are included in the novel and remarks that "[s]trangely, the reference to chemistry has received little attention in the hundreds of existing *Frankenstein* interpretations" ("Historical Roots" 119). Considering that chemistry is at the core of the novel and it is the practice that prompts Frankenstein to pursue his galvanic experiment that triggers the main sequence of events, it is indeed "strange" that there are not many references to it. A similar point to Schummer's is made by Maurice Hindle, who notes that "early-nineteenth century science had much more of an impact on the genesis and substance of *Frankenstein* than is normally noticed, or even allowed, by literary critics" (29). This is again interesting as *Frankenstein* is undeniably a product of the scientific atmosphere of the late-eighteenth and early-nineteenth centuries. It would be wrong to read it without considering the developments of science and technology in those periods, for the novel was purposefully written as an ethical exploration of progress. Moreover, one significant aspect of *Frankenstein* that is often overlooked is that it stands as a threshold between classical and modern practices of science and therefore between old and new narratives of evil, mad alchemist/scientists in Western literature. It interrogates the relations between Enlightenment rationality and

[36] Until recent decades, the criticism on *Frankenstein* included a rich repertoire of approaches including feminist, postcolonial, postructuralist, psychoanalytic, and so on. There are many studies that have made feminist analysis of the novel, primarily Anne K. Mellor's book *Mary Shelley: Her Life, Her Fiction, Her Monsters* (1988), Sandra M. Gilbert and Susan Gubar's 1978 article in *Feminist Studies* titled "Mary Shelley's Monstrous Eve," and others. Some articles like Peter Brooks' "Godlike Science/Unhallowed Arts: Language and Monstrosity in Frankenstein" explored the use of language in the novel, while some focused on the role of the monster and saw the creature as a representation of inferior races, one example being H. L. Malchow's "Frankenstein's Monster and Images of Race in Nineteenth-Century Britain" (1991). Even though their focus is different, all of these (and many other) studies are important in the history of *Frankenstein* studies.

Romantic passion; in fact, the combination of these two factors is what constitutes the features of its mad scientist. Hence, examination of *Frankenstein* in detail would reveal how, as science was transformed into a modern and secular practice, the mad scientist also took its modern form as a response towards new conflicts between science and ethics, science and religion, and science and art.

One of the essential characteristics of mad scientist narratives which was introduced by *Frankenstein* is that they include a scientific practice or experiment that is regarded dangerous or at least controversial at the time of their publication. Therefore, the historical backgrounds of mad scientist narratives may be seen as important as the fictional texts themselves. The environment in which Mary Shelley conceived her story reveals much about the scientific connotations in the novel. Shelley herself gave details on the origin of *Frankenstein* in her introduction to the 1831 edition[37] of the novel. It is revealed by her that "in the summer of 1816 [she and her husband Percy Bysshe Shelley] visited Switzerland, and became the friends of Lord Byron" (166) and they started to spend time in Byron's Villa Diodati in Geneva. There were two other people in their friendly group: Byron's private physician John William Polidori and Mary's half-sister Claire Clairmont. As Mary Shelley recounts, the summer was exceptionally cold, dark, and rainy, and they often read ghost stories to complement the gloomy atmosphere of their surroundings (166). On one of such days, Byron proposed a ghost story competition and he, Percy Shelley, and Polidori began writing individual stories, while Mary Shelley waited for inspiration. Her idea for the story began to be shaped after she listened to "the conversations between Lord Byron and [Percy] Shelley" in which they discussed "various philosophical doctrines" such as "the nature of the principle of life, and whether there was any probability of its ever being discovered and communicated" (Shelley 168). Shelley's inspiration, therefore, was not mainly the old ghost stories, but the developments in modern science. She stated that the poets "talked of the experiments of Dr. Darwin[38] […] who preserved a piece of vermicelli in a glass

[37] Thirteen years after the publication of Frankenstein, Shelley revised it and republished it under her own name with her own introduction (the first edition had a Preface written by her husband Percy B. Shelley, making people assume that he was the author). Despite Shelley's claims that there were not major changes in this late edition, critics often comment that the "corrections" made to it reflect the changing attitude of both British society and Shelley herself towards scientific developments. In this thesis, quotes from both editions are used as Frankenstein's role as a mad scientist remains crucial in each of them.

[38] Here Shelley talks about Erasmus Darwin, the grandfather of Charles Darwin. Percy Shelley also refers to him in his preface to the first edition of the novel.

case, till by some extraordinary means it began to move with voluntary motion," upon which she thought: "Perhaps a corpse would be re-animated; galvanism had given token of such things: perhaps the component parts of a creature might be manufactured, brought together, and endued with vital warmth" (168). This thought experiment, which is a typical feature of science fiction works, became visualized in Mary Shelley's mind on the same night of Byron and Percy Shelley's discussions. After she went to bed and shut her eyes, she "saw the pale student of unhallowed arts kneeling beside the thing he had put together. [She] saw the hideous phantasm of a man stretched out, and then, on the working of some powerful engine, show signs of life, and stir with an uneasy, half vital motion" (168). Just as Darwin's vermicelli, the student's creature is revived from dead. As her vision reveals, then, what caused the birth of *Frankenstein* was Shelley's exploration of the possible consequences of the experiments of such men of science as Galvani or Erasmus Darwin.

Mary Shelley intended her narrative to be a ghost story, but it turned into one of the most prominent and long-lasting moral tales that warns humanity against the threat of modern science. Although for most of the early-nineteenth century readers *Frankenstein* looked like a novel that had supernatural aspects, the informed readers could form the connections between experiments of distinguished electrochemists with that of Victor Frankenstein. In this case, the horror of the story does not stem from its having an ugly, fantastic monster, but from the fact that such monstrosity could indeed be constructed and revived through scientific operations. As Caldwell remarks, "[t]he monster, after all, is an unlikely candidate for a ghost – constructed by a scientist out of dead body parts into a grossly oversized, undeniably living organism" (25). Cartwright and Baker also argue that "for a horror story, *Frankenstein* is surprisingly secular; there are no ghosts, nothing supernatural, no divine retribution" (146-7). It was not a magician or an alchemist that revived the corpse, but a chemist who was also trained in anatomy. This facet alone is enough to situate *Frankenstein* in a modern and secular framework.

In the earlier fictional evil alchemist or natural philosopher narratives, the conflict was similarly between the accepted scientific practices of the day and the alchemists' supposedly secret workings with the forbidden arts. Aspirations such as producing gold from lead (limitless prosperity) and creating the elixir of life

(immortality) were seen heretical since they meant that the alchemist was trying to achieve Godlike powers. Although the impossibility of achieving those goals through alchemy or chemistry is clear now, until the emergence of modern chemical theories in the late-eighteenth century people had not disregarded the probability of the success of alchemical practices. This belief in alchemical success caused literature to react to that practice by degrading, mocking, or condemning alchemists. Medieval and early modern writers tried to supress fear – if there was any – of science by reflecting alchemists or natural philosophers as comically evil or mad. The fact that there was indeed a lack of serious outcome of their experiments served the authors well as they could satirize them more easily. This tradition experienced a modern shift with the publication of *Frankenstein* whose tone was darker and more serious. However, being a work of a period of transition, *Frankenstein* is not a completely secular text and its representation of science still contains alchemical and theological overtones.

As much as science began to turn into a more secular practice towards the nineteenth century, it was still not free from the influence of the old teachings of natural philosophers and theologians. *Frankenstein* is a product of this transitory period in which natural philosophy was gradually evolving into "science" and natural philosophers were turning into specialists (the word "scientist" was not in usage yet). As such, *Frankenstein* incorporates elements from both pre-Enlightenment scientific practices and from modern electrochemistry, anatomy, and life sciences. As David Ketterer argues, "although *Frankenstein* supposedly eschews the supernatural, magic, or alchemy in favor of modern science as a means of instilling life into dead tissue, the distinction between natural magic and alchemy on the one hand and natural philosophy and chemistry on the other, and that between religion and science, is blurred at every surviving stage of the text" (61). The conflict in Victor Frankenstein's choices regarding the discipline he wants to learn and practice is the reflection of the historical background of Western science. Hence, it can be argued that the decisions that Frankenstein considers in the novel represent the clash between old and new science, which is "pitched as a contrast between the 'modern masters' and old alchemists" (Knellwolf and Goodall 196). This contrast eventually turns into a synthesis of old and new, which becomes the foundation of the novel's main tension.

Shelley makes the transition from alchemy to chemistry plainly visible by tracing Frankenstein's scientific inclinations from youth to adulthood. At an early age, young Victor shows interest in natural philosophy, especially towards alchemy. When he is thirteen years old he finds "a volume of the works of Cornelius Agrippa[39]" (22), the renowned German polymath and alchemist. At first, Frankenstein opens the book "with apathy;" but "the theory which he attempts to demonstrate and the wonderful facts which he relates soon change[s] this feeling into enthusiasm" (22). He is so affected by Agrippa's work that "[a] new light seem[s] to dawn upon [his] mind" and he talks about this revelation to his father, who "look[s] carelessly at the title page of [Agrippa's] book and sa[ys], 'Ah! Cornelius Agrippa! My dear Victor, do not waste your time upon this; it is sad trash'" (22). While Frankenstein's enthusiastic and emotional attachment to alchemy represents the old approaches, his father's reaction to the same subject represents the common attitude towards alchemy in eighteenth century. The readers are further informed about the development of modern chemistry when Frankenstein points out that

> [i]f, instead of this remark, my father had taken the pains, to explain to me, that the principles of Agrippa had been entirely exploded, and that a modern system of science had been introduced, which possessed much greater powers than the ancient, because the powers of the latter were chimerical, while those of the former were real and practical; under such circumstances, I should certainly have thrown Agrippa aside, and, with my imagination warmed as it was, should probably have applied myself to the more rational theory of chemistry which has resulted from modern discoveries. It is even possible, that the train of my ideas would never have received the fatal impulse that led to my ruin. (22)

This statement is significant in two aspects; first, it reveals that the author of the novel is informed about scientific issues and can discern the difference between old and new approaches. Such awareness of real scientific events and their representation in fiction are the basic features of science fiction; therefore, Shelley's technique can be seen as a

[39] Heinrich Cornelius Agrippa von Nettesheim (1486-1535) was a German polymath who became famous with his work on magic, alchemy, and occult, reflected primarily in his trilogy *De Occulta Philosophia libri III* (*Three Books of Occult Philosophy*) (1531-3). Christopher Marlowe also includes his name in his play *The Tragical History of Doctor Faustus*, where Faustus states that he wants to be "as cunning as Agrippa was" (I.i., 111.).

forerunner of the methods used by science fiction authors of later decades. The second crucial aspect is the fact that alchemy is shown as the corrupting force behind Frankenstein's ideals. Because he receives no explanation from his father about the dangers of alchemy, it becomes "the genius that has regulated [his] fate" (22); a statement which foreshadows his catastrophic experiment. Here the word "genius" refers to a kind of demon and this particular word-choice conveys the message that alchemical teachings of old masters include scientific knowledge that is dangerous for humankind and it corrupts the one who occupies himself with it. By putting the blame on the alchemists of earlier ages, Frankenstein tries to evade self-accusation (an act which is repeated by him many times in the novel) and propound the idea that the real evil resides within science, not within the natural philosopher.

Alchemy might be threatening in theory, but its lack of practical outcome makes it less menacing and important as can be discerned from Frankenstein's father's sardonic reactions. However, alchemy becomes dangerous when its objectives are merged with the practicality of modern science and the main theme in the novel is the exploration of this dangerous combination. Thus, in addition to alchemy, *Frankenstein* is full of conscious references to the critical developments in chemistry, electricity, biology, and anatomy, which were the most controversial scientific disciplines of the period. Electrochemistry's place in the novel is especially important as it provides Frankenstein the means to revive his creature. The operations Frankenstein applies on the corpse are not improbable considering the real scientific experiments of the time. Anne K. Mellor asserts that "[i]t is clear that *Frankenstein* was influenced by the experiments with galvanic electricity in the first decades of the nineteenth century" (205); however, the influence in fact dates far more back to Volta and Galvani's experiments in the eighteenth century and to the new understanding of human body as a mechanism that moves with the same laws of those of machines. As Elizabeth Green Musselman explains, "Luigi Galvani's connection between electrical and nervous impulses and Johannes Muller's law of specific energies both emphasized the the body's similarity to a machine powered by imponderable forces" (16). This emphasis brought about the argument that human body could be moved by "varying stimuli (e.g., electricity, mechanical pressure)" which can be "applied to a nerve," and have a similar reaction to those of the machines (Musselman 16). Hence, there is no wonder that "[b]y

the mid-nineteenth century, London physician Henry Holland considered it a commonplace to liken nervous power to light, electricity, magnetism, heat, and chemical force" (Musselman 16). Mary Shelley, as her own writings also demonstrate, was highly aware of these scientific discussions within electrochemistry and wanted to explore their implications in fiction. If the nerves in the human body were like wires in a machine, then a dead body could be animated if its nerves were filled with electric power. In the same year *Frankenstein* was published, a similar thought experiment to that of Shelley was put into practice by "the Scottish chemist Andrew Ure (1778–1857)" who "tried to revive an executed criminal by administering electric shocks" (Stillings, "Electricity" 441). This attempt was much alike to Aldini's experiment[40] on an executed criminal, which was one of the influences of Shelley's depiction of the scene where the Creature comes to life; "a convulsive motion agitate[s] its limbs" (35) as if given electric shocks. Therefore, *Frankenstein* "was not, at the time, considered to be outside the realm of possibility" (Stillings, "Electricity" 441) and this proximity to reality was what made it a serious meditation upon and criticism of modern scientific advancements.

In addition to the electrochemical experiments on dead bodies, there is also a reference in the novel to the experiments of Benjamin Franklin, who "demonstrated the electrical nature of lightning with his famous kite experiment—an experiment repeated by Victor in the book" (Cartwright and Baker 141). At the age of fifteen, Frankenstein sees a tree that is struck by lightning and immediately catches fire. He states that "[t]he catastrophe of this tree excited [his] extreme astonishment; and [he] eagerly inquired of [his] father the nature and origin of thunder and lightning" (24). His father replies that what turned the tree into ashes was "Electricity," and describes to his son "the various effects of that power" by making "a small electrical machine, and exhibit[ing] a few experiments" (22). He also constructs "a kite, with a wire and string, which drew down that fluid from the clouds" (22) – a replica of Franklin's experiment. This demonstration affects Frankenstein greatly and he remarks: "This last stroke completed the overthrow of Cornelius Agrippa, Albertus Magnus, and Paracelsus, who had so long reigned the lords of my imagination" (22). As Frankenstein directly observes the outcomes of modern electrochemical experiments, he becomes aware of its rational practicality in

[40] The details of the experiment are given in Chapter II of this thesis.

contrast to the vague promises of alchemy. Upon seeing his son's interest in modern science, Frankenstein's father consequently advises him to study at Ingolstadt where he would learn more about chemistry. Frankenstein enrols at the University of Ingolstadt and starts taking courses on natural philosophy and chemistry.

The lectures that Frankenstein attends at Ingolstadt are again permeated with references to real scientific events and scientists, and even to Shelley's own experiences. Holmes explicates that when Mary Shelley was fourteen years old, her father William Godwin took her to a lecture of Humphry Davy and this event shaped the "preliminary ideas for the novel" (183). Shelley's own interest in Davy's work was reflected in the development of the personality of "[h]er young Victor Frankenstein" who "would also begin as an idealistic and dedicated medical student, inspired by the lectures of the visionary Professor Waldman at Ingolstadt" (Holmes 183). Moreover, "Mary Shelley would eventually draw directly on the published text of Davy's famous 'Introductory Discourse,' in which he spoke of those future experiments in which man would 'interrogate Nature with power… as a master, active, with his own experiments'" (Holmes 183). Gossin also points to the fact that "Frankenstein's obsession with the life-awakening potential of electricity was very likely due at least in part to Mary Shelley's having read Davy's work" (78). The influence of such reading and Shelley's attendance to Davy's lecture can clearly be observed in Waldman's lecture on chemistry which includes "a recapitulation of the history of chemistry and the various improvements made by different men of learning" (28). After giving educational information, Waldman makes his own comments as follows:

> The ancient teachers of this science … promised impossibilities, and performed nothing. The modern masters promise very little; they know that metals cannot be transmuted, and that the elixir of life is a chimera. But these philosophers, whose hands seem only made to dabble in dirt, and their eyes to pour over the microscope or crucible, have indeed performed miracles. They penetrate into the recesses of nature, and shew 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. (28-9)

These words affect Frankenstein so much that he states he "shall never forget" them (28). After the kite experiment of his father, this lecture becomes the second step that moves him closer to modern chemistry. The knowledge he gains from Waldman pushes him towards practicing electrochemistry. However, as much as Frankenstein's interest seems to move away from alchemy, he never loses his teenage enthusiasm towards the promises of old masters.

After the lecture of Waldman, who is the fictional counterpart of Davy, Frankenstein develops an attitude that mixes old science with the new. As the novel incorporates the convergence of the aspirations of alchemists with the opportunities provided by modern science, the consequences of a transfusion between scientific rationality and passion/ambition are explored in both rationalist and Romantic manner. As Shelley explains in her recollection of the night when she thought of the subject matter of her ghost story, the two Romantic poets Lord Byron and Percy Shelley were talking about scientific experiments and discoveries of the age. Like Blake, Coleridge, and Wordsworth before them, these were poets who were curious about science and they could see a connection[41] between the two opposite areas; namely, art and natural philosophy. Percy Shelley especially was "always enthralled by the study of electrical phenomena," and "associated electricity with love, light, and life;" subjects that he included in his closet drama play *Prometheus Unbound* (Cartwright and Baker 141). He was also interested in the vitalist discussions of the age and his thoughts on the subject were effective on Mary Shelley's approach to electrochemistry and its incorporation into her fictional work. Although Victor Frankenstein is a prototype of the modern

[41] The common approach to the Romantic era has been to define it as a period when a group of artists and natural philosophers opposed the rise of scientific rationality and industrial machinery. However, as Peter Dear states, "[i]t is common enough these days to acknowledge relationships between Romanticism and the sciences" ("Romanticism" 329). In *The Romantic Machine*, for instance, John Tresch examines the interrelation between Romanticism and science/technology. He argues that the long held idea that Romanticism opposed scientific and technological developments and instead advocated a return to primitivity is "a false opposition" (1); on the contrary, he sees early nineteenth century as an era when "romantic aspirations shaped mechanical sciences and industry and when new discoveries and devices intensified organic and artistic visions" (1). Hence, the interest of Romantic poets towards science is not surprising. The Romantics were not against scientific development, but they opposed the employment of science as a tool for manipulating nature. What they criticized was the dehumanizing side of science and technology, and it is also what Shelley was concerned about when she imagined Victor Frankenstein.

scientist, his use of electricity as a life-giving material adds a rather vitalist tone to his experiment which is filled with spiritual connotations. Hence, it can be argued that vitalism is as important as mechanical approaches to electricity and its presence in the novel strengthens its discussion of modern science's role in creating and manipulating life.

Vitalism became fashionable towards the end of the eighteenth century as a defining term for the belief that electricity was related to human soul, that it was an animating power which made things move. This belief was the more Romantic counterpart of the mechanistic views of rational thinkers of the eighteenth century; however, it was not a new phenomenon at the time. Before the emergence of the term "Vitalism," argues Engelhardt, there were "the terms '*vis vitalis*', '*principe vitale*', '*fonction vitale*', '*force itale*', 'vital power', 'living principle', 'vitalità'" (12); all referring to a life-giving force like that of electricity. Belief in such force actually dates back to alchemical texts which provided symbols and definitions for modern science. In his preface to Ernst Benz's book *Theology of Electricity* (1989), Stillings remarks that "a great deal of symbolism, and even the nomenclature of alchemy had been carried over into the new electrical theorizing" ("Editor's Preface" x) and "[e]lectricity also still evokes, on an unconscious level, images of … alchemy, Mercurius, and of the elusive vital fluid that transcends the merely mechanical" (xi). This alchemical aspect of electricity gave it its spiritual connotations that persisted until the nineteenth century and embraced by the vitalists. Stillings further argues that electricity expresses "both material and immaterial effects" (xi) and its "ambiguous and paradoxical nature" hindered it from becoming a completely material science (xii), which let "the symbols carried by electricity to drive modern science towards accomplishments that strongly echo the goals of alchemy: the transmutation and spiritualization of matter" (xii). In other words, electricity, or more precisely electrochemistry, was seen as the modern continuation of alchemy since it shared the same goals with the ancient art. Therefore, Frankenstein's choice to follow this particular science – as well as educating himself in the science of anatomy – is not arbitrary; the only way he can realize his dreams of achieving immortality is through electrochemical operations. This combination of vitalist thoughts with modern practices of electricity and anatomy is what makes the science in the novel threatening. As Caldwell asserts, "[t]he vitalist question certainly

pervades the novel, but Shelley seems to hover between philosophical positions. Frankenstein's 'spark of being' does look like Abernethy's[42] electricity, but his charnel-house raids allude to the grave-robbing, dissection, and vivisection popularly associated with radical science" (28). Hence, although the novel constantly alludes to the vitalist discussions, its focus is on the controversial acts of modern science, whose moral ambiguity is reinforced by references to the real events of the time such as body-snatchings[43] and dissection/vivisection experiments on dead or living bodies.

In addition to being the first example of a (science) fictional text that includes allusions to modern scientific developments and contemplates on their possible outcomes for humanity, *Frankenstein* is also a pioneering work for the presence of modern laboratory experiments in mad scientist narratives. Frankenstein's famous experiment at first seems not so secular, since it incorporates electricity as an ambiguous phenomenon instead of showing it as a merely physical force that can be observed and analysed. Although his father's kite experiment represents the approach of secular science with its material application and consequence, Frankenstein's own experiment with the corpse carries vitalist undertones as its narration focuses more on the alchemical and mythical allusions than on the tools and methods used by the experimenter. While describing the process of acquiring the scientific knowledge for reviving dead bodies, Frankenstein does not tell anything about how he did so. Instead, he states that "[a]fter days and nights of incredible labour and fatigue, I succeeded in discovering the cause of generation and life; nay, more, I became myself capable of bestowing animation upon lifeless matter" (32). The vague depiction of his "discovery" has alchemical associations since it is secretly done and Frankenstein talks of a power that resembles that of the elixir of life.

[42] John Abernethy (1764-1831) was an English anatomist and surgeon who was a fellow of the Royal Society. Abernethy believed that electricity was something like a soul that animated human body. Like many of his contemporaries, he was famous for his public lectures on the subject and also for his debates on the nature of life with William Lawrence, another distinguished English surgeon who was also a close friend and private physician of the Shelleys.

[43] Grave-robbing, or "body-snatching," became common towards the nineteenth century as there were strict laws against dissection which hindered the practices of anatomists. For there were not many corpses to work on, "[p]rofessional 'resurrectionists' procured recently dead bodies from graveyards for a fee for anatomists and medical educators" (Lederer and Ratzan 457). This practice gained so much interest that some body-snatchers turned to murder in order to acquire dead bodies to sell. Ten years after the publication of *Frankenstein*, in 1828 the famous Burke and Hare murders occurred, which led the government to pass 1832 Anatomy Act that allowed for a legal trade of corpses. For more information on the subject, see Tim Marshall's *Murdering to Dissect: Grave-Robbing, Frankenstein and the Anatomy Literature* (1995) and Ruth Richardson's *Death, Dissection and the Destitute* (2000).

Despite its alchemical aspects, however, Frankenstein's laboratory experiment indeed represents the secular and rational scientific processes of the age. Even when he is preparing to achieve a seemingly supernatural power, Frankenstein focuses on learning the new knowledge instead of turning to occult texts. He says that he "became acquainted with the science of anatomy: but this was not sufficient; [h]e must also observe the natural decay and corruption of the human body" (31). This means that he is not only interested in dissection, but also in the chemical process of decay, with a rationalist approach. Furthermore, his employment of modern scientific tools makes his operation different from those of alchemists despite the fact that he establishes his private laboratory in "a solitary chamber, or rather cell, at the top of the house" (34) in the manner of an alchemist's workshop. Although in the novel it is not clearly stated through which scientific techniques Frankenstein revives the creature, the elements of the operation can be discerned from the information given in the novel regarding Frankenstein's experiences with his professors, especially the one with Waldman when he takes Frankenstein to "his laboratory, and explain[s] to [him] the uses of his various machines; instructing [him] as to what [he] ought to procure" (29). In this recollection, Frankenstein does not reveal what those "various machines" are, but they are probably (electro)chemical tools since Waldman specializes in modern chemistry. A similarly vague description occurs in Mary Shelley's introduction to the 1831 edition of the novel, where she says that she imagined the Creature as being revived by "the working of some powerful engine" (168). This "powerful engine" is again not specified, but the scientific context of the novel may give clues so as to their definition and function. Namely, Shelley probably talks of an electrochemical apparatus that had been used by Galvani, Aldini, and Ure in their experiments to revive animal and human corpses. Ketterer draws attention to the fact that the lack of specific definition of scientific tools do not make the novel less scientific; on the contrary, "with its references to 'the experiments of Dr. Darwin,' 'galvanism,' and 'the working of some powerful engine' in Mary Shelley's night-time vision, [1831 Introduction] affects the interpretation of the novel by providing it with what might be construed as an sf frame" (Ketterer 70). In this case, Shelley's vision of a powerful engine that revives a corpse is both a reflection of current technology and a prediction of a future one that is more advanced than those used by real experimental philosophers. While real attempts only result in brief

movements of corpses, Shelley's speculative fiction invents a device that can fully animate the body and goes on to explore its fatal consequences.

Although the experiment is at the core of most mad scientist narratives, its aftermath is more important than the process. Indeed, the main conflict in such narratives occurs when the experiment goes out of control. *Frankenstein* again may be seen as the modern forerunner of this trope. As Susan Tyler Hitchcock comments, "[t]he name 'Frankenstein' had become a code word … for new ideas conjured up with good intentions but destined to grow and change beyond all reckoning, ultimately overwhelming those who conceived them" (263). The control Frankenstein has during the process that leads to the experiment is suddenly lost when he finishes the operation and his "tragedy," argues Haynes, "begins at the exact moment of his experimental success, when the Creature comes to life" ("Whatever" 32). In other words, the product becomes independent as soon as it gains life and is able to exist without the supervision of its creator. This harsh truth is realized by Frankenstein who becomes terrified of "his odious handywork" (Shelley 168) and although he becomes successful in his experiments, he escapes from its repercussions. This success-failure paradox alludes to the contradiction between science and morality (or ethics) which increased in the nineteenth century as a result of a series of scientific experiments and discoveries that disrupted "human" values. As such, what *Frankenstein* questions through the outcome of the experiment is whether scientific success is always beneficial for humankind or not. It proposes that the human agent is unreliable because he is prone to making mistakes and even if there is no mistake and everything goes according to the plan, the experimenter still may not be able to maintain his dominance. Or, in Frankenstein's case, he may completely reject taking responsibility. In all cases, in the end the experimenter is left powerless and the result of his experiment initiates a succession of catastrophic events.

In nearly all mad scientist narratives, the deadly result of the experiment is personified with a monster, either literally or metaphorically. Beginning with *Frankenstein*, this trope has been used to indicate both destructive and rebellious nature of the creature/product that is constructed scientifically. In *Frankenstein*, the monster is

a literal figure[44] that scares those who look at him. His creator's first impression of him reveals how repulsive he looks: "I had gazed on him while unfinished; he was ugly then; but when those muscles and joints were rendered capable of motion, it became a thing such as even Dante could not have conceived" (36). Later when Frankenstein sees the Creature again, he remarks that "its gigantic stature, and the deformity of its aspect [is] more hideous than belongs to humanity" (50). The contradiction of his appearance with that of the human form, or any other form that is found in nature, indicates his incongruity and artificiality, while his material existence – in contrast to metaphorical monsters – strengthens the novel's modern outlook by showing that experimental science can indeed produce fiendish creatures that can harm or kill people. This approach is again a reflection of the attitudes towards science in the late-eighteenth century considering the fact that "[i]n the reactionary climate of the 1790s rationalist innovation and reform had been successfully identified with the 'monstrous'" (Baldick, "Assembling" 178). However, monstrosity did not emerge as an aspect of modern scientific innovations; it had also been associated with the practice of alchemy, which was seen as "a *monstrum compositum*, an illegitimate or, more precisely, a *premature* intuitive expression of underlying symbols hopelessly enmeshed within an undiscriminated mixture of psyche and substance" (Stillings, "Editor's Preface" xi). While experimental science's monstrosity resulted from its controversial products, alchemy's monstrosity was considered as a reflection of the more primitive side of human psyche and a rebellion towards regulated knowledge. In *Frankenstein*, both conceptions of the monster are integrated into the text as it combines old anxieties with the new. Thus, the monstrous figure of the Creature becomes an appropriate choice for evoking both the fear of alchemy and the fear of modern science.

Another feature that *Frankenstein* handed down to the mad scientist tradition is the blurring of the distinction between the creator (experimental philosopher, scientist) and the creature (monstrous in all cases). The lack of distinction between the mad

[44] Although the Creature in the novel is depicted as an actual ugly-looking monster, its interpretations in culture range from associating it with particular social/political groups or nations. In her book *Frankenstein: The Cultural History* (2007), Susan Tyler Hitchcock examines various connotations of the Creature. It was used to degrade the acts of politicians (100), to "comment on war" and represent Russians as the monster (102), and sometimes to exalt the working classes by promoting the monster as a heroic figure who rebels against his master (102). Hitchcock shows that *Frankenstein* was and still is a text that provides a modern mythical image for social, political, and economic as well as scientific conflicts.

scientist and his deadly creation points to the danger inherent in both and reflects an even more serious anxiety. In *Frankenstein*'s case, this interrelation has ironically turned into a common mistake made by people who know about the novel through its representations in popular culture. As John Paul Hunter explains, "it is perhaps significant that, as often as not, casual observers confuse the creator with the created: in the novel, the scientist is named Frankenstein and his monster is nameless, but in popular lore the creature often takes on the name of the creator, as is there were no differences in the monstrosity of outcomes" (Hunter ix). It is certainly a prevalent error to refer to the Creature as Frankenstein, but there is some truth to this "confusion," as there are instances in the novel where the creator and the creature indeed intermingle. The first instance is very subtle and occurs in the 1831 edition of the novel. As Walton treats the ill Frankenstein, he realizes that he is getting better and declares that "a new spirit of life animated the decaying frame of the stranger" (16). This statement is very crucial as it draws a parallel between Frankenstein and the Creature, and foreshadows how the "decayed" corpse of the Creature will be "animated" by Frankenstein. Later, in both editions, Frankenstein contemplates on his experiment and admits that the creature is the reflection of himself, and his murderous exploits mirror his own evil deed: "I considered the being whom I had cast among mankind, and endowed with the will and power to effect purposes of horror, such as the deed which he had now done, nearly in the light of my own vampire, my own spirit let loose from the grave, and forced to destroy all that was dear to me" (50-1). Here Frankenstein sees the Creature as his "vampire," meaning his evil ghost; hence, he accepts that the Creature exists both within himself and out of himself, in a way repeating his own destructive experiment. This dual malice of the Creature makes Frankenstein look at him with disgust, fear, or hate, calling him "the demon" (15), "the wretch … the miserable monster … the demoniacal corpse" (36), "the filthy daemon" (50), "vile insect" (67), and "abhorred monster" (68). These hateful, degrading words at first seem to point to Frankenstein's angst towards the creature, but in fact they reflect his own remorse for creating such a monstrous being without thinking about its consequences. Therefore, what the novel does is not only to condemn the innovation itself (the creature), but also to reflect the innovator/scientist as the main cause of scientific evil. In this case, the scientist becomes the real monster.

Although in mad scientist narratives the type of the scientific profession is important, the essential factor is of course the scientist himself. Since these narratives are primarily concerned with the possible (voluntary or involuntary) abuse of science by human agents, the personality, intelligence, and aspirations of the scientist become crucial for the plot. *Frankenstein* and other mad scientist texts of the nineteenth century tend to represent men of science as obsessive geniuses who disregard moral values in their search for higher knowledge. This attitude in fiction is the reverberation of the attitude towards real natural philosophers of the age. Although the men of science in the nineteenth century were still expected to have moral values, it was feared that they would not take morality as seriously as required because according to mad scientists modern science did not need ethical values to restrict it. Hence, unlike earlier critical fiction that incorporated natural philosophers as subjects of mockery or satire, *Frankenstein* represents them as potential threats. It is true that alchemists of the middle ages were feared too, but they were never seen as a direct menace to humanity or religion because the legitimacy of their practice was usually in question. Again, in the satires that included natural philosophers such as *The Blazing World* and *Gulliver's Travels*, the men who were conducting scientific operations were not seen as dangerous because it was thought that their practices did not even contribute to any critical development, let alone to any destructive weapons or monsters. Based on the real natural philosophers of the Royal Society, these fictional men used science for trivial interests. Shelley also based her proto-scientist on real scientific figures, but she did not portray him as a satirical figure. Unlike the petty experimenters in Swift or Cavendish's works, in *Frankenstein* the role of the natural philosopher is more critical since he causes real destruction and even murder.

Another innovation made by *Frankenstein* is its representation of the personality of the man of science in depth. In the earlier narratives, the focus was on the deeds of the alchemist or natural philosopher; there was no precise knowledge about his life or his past. They were flat or symbolic characters, representing a profession or a class. Starting with *Frankenstein*, men of science began to be depicted in more detail, allowing a better analysis of their characters. Moreover, this detailed portrayal made fictional scientists more realistic figures and substantiated the idea that those men of science could also exist in real life; thus, the danger represented in the narratives was

not so far from reality. This in part resulted from the rise of the novel form in literature, which provided a better platform for the exploration of the scientific issues and of the personalities of scientists. In *Frankenstein*, the readers get to know about Victor Frankenstein's past; his childhood, when "[t]he word was to [him] a secret, which [he] desired to discover" (20); his teenage years when he met alchemy, his dreams to overcome death, his ideas on how to do so, his scientific education at Ingolstadt, and so on. Thus, it is shown that his intention to revive a corpse does not form out of nowhere; there are many elements in his life that leads to that experiment. Most of these elements would later become the stereotypical features of following fictional mad scientists.

The first important feature of the mad scientist that raises his authority and power to a threatening level is his intelligence, which reveals itself in his quick and assured success. As such, Frankenstein shows a remarkable progress in his studies: "I … improved so rapidly, that, at the end of two years, I made some discoveries in the improvement of some chemical instruments, which procured me great esteem and admiration at the university" (30-1). Frankenstein advances so swiftly that in a short time he surpasses his masters. Professor Krempe remarks that Frankenstein, a "youngster who, but a few years ago, believed Cornelius Agrippa as firmly as the gospel, has now set himself at the head of the university" (44). His achievements as a student foreshadow the future success of his electrochemical experiment, but at the same time they point to his determination that makes him shun the moral aspects of his practice in order to achieve greater knowledge. *Frankenstein*, then, can be seen a prototype of the mad scientist narratives that associate intelligence and craving for knowledge with a cold rationality. Even as a young boy, Frankenstein "ardently desire[s] the acquisition of knowledge" (27). He states that his "feelings are profound; but [he] possessed a coolness of judgment that fitted [him] for illustrious achievements" (152). The combination of the "desire for knowledge" and "coolness of judgment" is the main force behind the success of his experiment since collecting corpses from graves and charnel houses, dissecting them, and stitching body parts together indeed requires an unemotional, rational approach to science. Frankenstein further reveals his unfeeling attitude when he states that "[d]arkness had no effect upon [his] fancy; and a church-yard was to [him] merely the receptacle of bodies deprived of life, which, from being the seat of beauty and strength, had become food for the worm" (31). Frankenstein's

approach to dead bodies is purely scientific; he sees them as lifeless materials that can be used in his experiment. Such attitude is the main reason behind the inhuman look of his creature which mirrors his own inhumanity. Because Frankenstein focuses on the function[45] rather than the ethical correctness of his experiment, the result becomes monstrous.

In relation with their rationalist approach, another feature of mad scientists is their preference for isolation and secrecy. This trait, which is borrowed from older evil alchemist narratives, reveals itself in the personality of the mad scientist when he begins to envisage his great purpose. In *Frankenstein*, when young Frankenstein reads Albertus Magnus and Paracelsus, he gets influenced by them, but he wants to keep his readings as a secret because alchemy had always been regarded as a forbidden zone. Frankenstein remarks that he "read and studied the wild fancies of these writers with delight" and "often wished to communicate these secret stores of knowledge to [his] father, yet his indefinite censure of … Agrippa always withheld [him]" (22-3). Therefore, he can only talk about his readings to Elizabeth, but "under a promise of strict secrecy" (23). As a result, he decides to "pursue [his] studies alone" (23). While he is a student at Ingolstadt, he still retains his secretive nature and conducts his studies in his private workshop rather than at the university's laboratory. This preference for secrecy implies the improper disposition of his aspirations. Even though he believes that he is working for the benefit of humankind, there is a part of him which thinks that his endeavours are dangerous and unacceptable by society. This is why throughout the novel Frankenstein cannot expose his secret to anyone until he meets Walton at the North Pole. He cannot talk about his creation even to his best friend Henry Clerval whom he loves "with a mixture of affection and reverence that knew no bounds" (44). Frankenstein states that he "could never persuade [him]self to confide in [Clerval] that event which was so often present to [his] recollection, but which [he] feared the detail to another would only impress more deeply" (44). This means that he is aware of the

[45] It is highly probable that Shelley criticizes the utilitarian attitudes of the time, especially that of her father William Godwin, through the ugliness and violence of the Creature. Godwin's perception of science was very much like Frankenstein's; he thought that "humans could be persuaded by reason to act for the general good of mankind if their actions could be guided by the rational utilitarian principle of maximizing total happiness rather than by irrational emotions" (Cartwright and Baker 130). Frankenstein initially acts for the good of mankind and eschews emotions for the sake of rational approach, but he fails. Thus, Shelley shows that when her father's ideas are put into practice, they may not bring benefit to humanity. On the contrary, they might have deadly results.

immorality of his experiment and that he fears losing Clerval as a friend once he exposes his secret to him.

In addition to extreme intelligence, cold rationality, and secrecy, another recurring characteristic of mad scientists is obsession, which causes them to lose their judgment and foresight. Mad scientists are so ambitiously involved in their studies that they usually cannot be aware of the potential danger in their experiments, but they begin to see the negative effects once the experiment is complete. Thus, even though they start with good intentions, they can be disappointed in the end. In *Frankenstein*, "[t]he story is that a 'being' (it became 'monstrous' later) is created out of Frankenstein's obsessive desire to use science for good - the prolongation of life" (Haste 117). Frankenstein's desire that resembles those of the alchemists seems to have no malice in it since it includes overcoming death and providing an immortal life for humankind. However, the element of obsession turns this desire into a dangerous one. In the period Shelley lived through, obsessive and ambitious scientists were not figures of imagination. Humphry Davy, for instance, was known to be a very passionate experimental philosopher, and Frankenstein's "enthusiasm for chemistry has strong parallels with the promising role Humphrey Davy ascribed to chemistry" (Cartwright and Baker 141). As explained in Chapter II of this thesis, Davy saw science, particularly electrochemistry, as a powerful medium that could help humans surpass themselves. He believed in this idea so intensely that he devoted himself to conducting electrochemical experiments without considering their harm to himself and to other people. Frankenstein also sees science as a savior and this is why he puts it above anything else in his life and fully dedicates himself to it. He remarks that he "wished, as it were, to procrastinate all that related to [his] feelings of affection until the great object, which swallowed up every habit of [his] nature, should be completed" (34). It is obvious in this statement that his scientific endeavour turns into the sole occupation of his life and causes him to suppress his emotions.

It can be argued, therefore, that Frankenstein's obsession with his scientific research also renders him more rational and even indifferent towards nature. He recalls that when he was preparing for his experiment, his "eyes were insensible to the charms of nature" (34) as he was always occupied with either collecting body parts at night or spending time in his workshop. Here, in a manner that foreshadows the poems of

Matthew Arnold and Alfred Tennyson, science is shown as the antagonist of sensibility and its indifference towards beauty is foregrounded. There is also an irony in Frankenstein's lack of interest in the happenings around him. He reveals: "[w]inter, spring, and summer, passed away during my labours; but I did not watch the blossom or the expanding leaves — sights which before always yielded me supreme delight, so deeply was I engrossed in my occupation" (35). The irony here is that while Frankenstein aims to create life, he is not aware of the cycle of life in nature. He thinks that he can master life by observing death and decay, but as a result of his obsession he becomes blind towards what matters the most: the life itself. From spring to fall, the birth and growth of organisms are visible to the human eye; yet, one must observe well in order to understand the process of life. This understanding is what Frankenstein lacks and what causes him to create an unnatural, deformed being. He becomes aware of his obsessive attitude only when he faces the result. He confesses that he "had desired it with an ardour that far exceeded moderation; but now that [he] had finished, the beauty of the dream vanished, and breathless horror and disgust filled [his] heart" (36). This realization is repeated again when he says that during the experiment "a kind of enthusiastic frenzy had blinded [him] to the horror of [his] employment," and his "mind was intently fixed on the consummation of [his] labour, and [his] eyes were shut to the horror of [his] proceedings" (118). These statements indicate that although Frankenstein's experiment is scientific, it is fuelled by a blind obsession and passion that contrasts with the main premises of good scientific conduct. What is important here is the role of the human being rather than the scientific knowledge. Shelley demonstrates how science can be a deadly weapon at the hands of an irresponsible genius.

Related to genius and obsession, another feature of the mad scientist is his pride, or his self-confidence in his ultimate success. This hubris theme is in fact not new to *Frankenstein*, but the novel turns this ancient theme into a modern one and paves the way for its future representations in literature, especially in science fiction. While constructing her protagonist, Shelley borrows tropes from older narratives such as the Prometheus myth which gives the novel its full title, the golem and homunculus myths which also describe creation of humanoid beings, and, last but not the least, the Faust myth. The common themes of all these narratives are the unquenchable desire for

knowledge and the attempt to create artificial beings, which goes against some form of authority. Elements from each of these narratives[46] are embodied in Victor Frankenstein, who, even as a young man, is aware of his exceptional mind and skills. He thinks that he is "destined for some great enterprise" and sees himself superior to his fellows: "When I reflected on the work I had completed, no less a one than the creation of a sensitive and rational animal, I could not rank myself with the herd of common projectors" (152). This means that he ranks himself higher than other practitioners of science as he has become a kind of god by creating a being with mind and emotions. Hence, his proud personality and successful background provide the means to discuss the reverberations of the hubris theme in modern science by alluding to the images that have been ingrained into Western culture since ancient times.

As its title indicates, *Frankenstein, or the Modern Prometheus* has its origin in the myth of Prometheus and the phrase "Modern Prometheus" reveals a good deal about its plot. Firstly, it indicates that Frankenstein is the human counterpart of the Greek titan Prometheus who also created human beings and granted them mind and soul. In the novel, when Frankenstein starts to gather tools for his experiment, he reveals his aim as "to animate the lifeless clay" (33), which alludes to Prometheus's method of creating humans out of clay. Secondly, it points to the parallel between Prometheus's wish to grant humankind knowledge and Frankenstein's desire to give humankind a gift that would make them more advanced than their current state. Frankenstein aims to "pour a torrent of light into our dark world," to give humans a new hope, upon which "a new species would bless [Frankenstein] as its creator and source; many happy and excellent natures would owe their being to [him]" (33). This is the most obvious instance in the novel that reflects Frankenstein's hubris in his motive to become a godlike figure to humankind. Thirdly, the word "modern" implies that Shelley's myth is a modern reinterpretation of an older one, in which rational science takes the place of religion, alchemy, or magic. Although his ideals are ancient, the mode Frankenstein uses is modern; thus, he can be seen as a modern god. He is not looking for a magical elixir but

[46] Although not mentioned anywhere in the novel or in Shelley's comments, there are subtle references to other ancient Greek stories, such as those of the famous inventor Daedalus, whose inventions usually end up in catastrophe. One story of him includes the construction of a wooden cow for the queen of Crete, who falls in love with a white bull. The Queen eventually gets impregnated and gives birth to a violent human-bull hybrid: the Minotaur. Frankenstein's Creature is no different than the Minotaur, which is likewise a "monster" conceived through science and technology.

a material force – electricity – to give life to a lifeless body, mimicking God's act of giving soul to his creations. He also knows that even though his experiment fails, men of science would eventually find a way to make it possible: "when I considered the improvement which every day takes place in science and mechanics, I was encouraged to hope my present attempts would at least lay the foundations of future success" (33). This belief in progress through science is what gives the new Prometheus his modern aspect.

Another influence on the character of Frankenstein is the golem myth that belongs to Jewish folklore. As Gershom Scholem explains, "[t]he golem is a creature, particularly a human being, made in an artificial way by the virtue of a magic art, through the use of holy names" (736). Although the legend imagines the golem[47] as a human-made being, its creation mirrors the creation of humans by God (or by Prometheus), because the golem, too, is made out of clay. Thus, the golem myth can be seen as a depiction of "man's conceit in competing with God" (Goldsmith 16), making it another myth of hubris. It has a further parallel with *Frankenstein* which is related to its historical development. While "[i]n the earlier golem stories, learned rabbis used their knowledge to shape humanoid beings from clay, then used their spiritual wisdom to invest them with life for a righteous purpose," in later stories "from the seventeenth and eighteenth centuries, impious rabbis created golems to perform menial tasks like hewing wood and hauling water. Subsequently their golems turned violent, forcing their makers to end their lives unhappily" (Toumey 423). Toumey argues that in the latter versions of the Golem myth, "the rabbi's knowledge of artificial life is inherently dangerous" (423) as his creation can turn into a rebellious monster. It is easy to see the similarities between this myth and *Frankenstein,* which is "a secular elaboration of the legacy of the golem" (Toumey 423) like E.T.A. Hoffman's "The Sandman"[48] (1817); also a modern reinterpretation of the golem myth. Just as the first rabbis, Frankenstein

[47] For a detailed study of the golem, see Moshe Idel's *Golem: Jewish Magical and Mystical Traditions on the Artificial Anthropoid* (1990).

[48] E. T. A. Hoffman's short story "Der Sandmann" ("The Sandman") (1817), which alluded to the golem myth, was published a year before *Frankenstein*. In the story, a physicist called Spallanzani and a mysterious alchemist called Coppelius (Coppola) build a female automaton and name it Olimpia. The automaton looks so realistic that the protagonist Nathaniel falls in love with her and later goes mad when he learns that she is just a machine. Being a proto-science fiction work, the short story interrogates the role of the natural philosopher and alchemist in the process of creation, reflecting them as the modern gods as *Frankenstein* does.

begins his endeavour with "a righteous purpose," but his obsession and hubris turn him into an impious person and blinds him to the consequences of his actions. Hence, like the latter rabbis, he is forced to end the life of his creature.

Creation of a humanoid being was not only the occupation of rabbis, but of alchemists as well. As Sean Martin states, "[t]he Golem is synonymous with the alchemical homunculus, the creation of life in the retort" (135). It is not certain when alchemical texts began to include homunculus, but general belief is that it started in the sixteenth century with the writings of Paracelsus, which included "minute living creatures resembling men (called 'homunculi')" (Redgrove 61). Since Frankenstein reads Paracelsus, his idea of reviving a human body probably derives from Paracelsus' instructions to create homunculi through (al)chemical operations. Indeed, as Martin argues, the homunculus myth can be "seen as a proto-Frankensteinian myth," for there was a belief "that alchemists actually produced life in the laboratory" (135). Although there is no historical record of such an event, there were claims that "the seventeenth century Bohemian alchemist Konrad Dippel (1672–1734), whose birthplace was the real Castle Frankenstein … created an homunculus in his laboratory" (Martin 135). Martin asserts that "Mary Shelley based the character of Victor Frankenstein in part on [Dippel]" (135); therefore, his endeavours were not the first of his kind, but an imitation of the works of earlier alchemists. Yet, there is a difference between Frankenstein's and alchemists' roles as creators. Instead of magic or occult, Frankenstein uses scientific methods of electrochemistry to revive his modern golem/homunculus and the sentience of his creature reinforces his powers as the creator. This means that he has surpassed the old masters who could only create miniature humanoids devoid of full human capabilities. Frankenstein's creature is such a successful imitation of God's creation of humans that if he did not look ugly, he would be no different than any other human being.

There are constant Faustian undertones in Frankenstein's hubris as well. Written at a time when the Scientific Revolution was still in process, Marlowe's *Doctor Faustus* reflected the concern towards the new natural philosophy that was gradually moving away from theology. Christa Knellwolf King discusses that the Faust legend of the sixteenth century "reveals the passions, intellectual curiosities, spiritual cravings and moral dilemmas of a period of reorientation and change" (6). Nineteenth century was a

similar period in terms of scientific developments (the rise of modern chemistry at the end of the eighteenth century is often referred to as the Second Scientific Revolution) and even more tumultuous than the sixteenth and seventeenth centuries. Hence, it was convenient at the time to turn to the Faust legend and adjust its imagery to the problems of the nineteenth century. Although Shelley never directly refers to *Doctor Faustus*, the parallels between Faustus and Frankenstein are quite obvious. In the 1831 edition, Frankenstein describes himself "as always having been imbued with a fervent longing to penetrate the secrets of nature" (30) and that "[i]n spite of the intense labour and wonderful discoveries of modern philosophers, [he] always came from [his] studies discontented and unsatisfied" (30). These statements echo Faustus' complaint that his reading and education were not enough to make him surpass himself. He has learned everything about medicine and health; yet, he thinks that even if he becomes a physician, he cannot revive a dead person with his knowledge. In his words:

> Yet art thou still but Faustus, and a man.
> Couldst thou make men to live eternally,
> Or, being dead, raise them to life again,
> Then this profession were to be esteem'd. (I.i., 23-6)

Faustus' aspiration to "raise the dead to life again" is embraced two centuries later by Frankenstein, who, like Faustus, initially resorts to alchemy to find "the philosopher's stone and the elixir of life" (23). He goes through a period of contemplation and consequently accepts that although rational science can explain how things work, it cannot explain the "final cause" of things. In the 1831 edition of the novel, he says that "[t]he most learned philosopher … had partially unveiled the face of Nature, but her immortal lineaments were still a wonder and a mystery. He might dissect, anatomize, and give names; but, not to speak of a final cause, causes in their secondary and tertiary grades were utterly unknown to him" (30). After coming to this realization, Frankenstein complains that that it is impossible to have a glimpse of the place behind nature's impenetratable walls: "I had gazed upon the fortifications and impediments that seemed to keep human beings from entering the citadel of nature, and rashly and ignorantly I had repined" (30). However, when he discovers the wonders of modern science, he begins to accept that it is indeed possible to realize Faustus' and other

alchemists'dreams. Hence, he can be seen as a modern Faustus as well as a modern Prometheus.

Some critics of Frankenstein argue that although the Faust myth hands down crucial elements to the mad scientist stereotype and especially to the character of Victor Frankenstein, it does not designate its modern outlook. Chris Baldick, for instance, asserts that Frankenstein does not resemble Faustus much because there is no "demonic tempter behind [his] transgression" ("Assembling" 181). He explains that "[w]hile Faust's damnation and the Fall of Adam and Eve are brought about by the machinations of Mephistopheles and Satan, Victor Frankenstein has no serious tempter other than himself, his chemistry professor remaining a minor, innocent figure," and "[i]f Frankenstein is any kind of Faust, he is a Faust without a Mephisto, that is, hardly a Faust at all; and if he is a Prometheus, as the novel's subtitles suggests, then he is a Prometheus without a Jove" ("Assembling" 181). Baldick accepts that "[i]t is tempting to jump from the continuing significance of the Faust myth in Western culture to the hasty conclusion that all modern stories of transgression are derivatives of it, but", he warns, "to do this with *Frankenstein* would be to obscure a vital feature of the novel's modernity" ("Assembling" 181). Therefore, it can be argued that the absence of mythical, religious impact and magical elements is the definitive difference of Frankenstein's hubris from those of earlier mad alchemists. This aspect makes him the forerunner of a new tradition of nineteenth-century mad scientists whose individual decisions shape the course of events.

As a result of the combination of these personality traits; namely, cold rationality, obsession, and hubris, mad scientists turn into threatening figures that cause harm to people around them and sometimes even to themselves. This trope has two variations; either the mad scientist himself becomes a murderer, or he creates a murderer. In Frankenstein's case it seems that the second one is pertinent; however, since Frankenstein associates himself with his Creature, he also indirectly becomes a murderer. Even during his toils before the ultimate operation, he harms living beings in the name of scientific progress. It is revealed that he "tortured the living animal to animate the lifeless clay" (33), which means that he conducted not only dissection (on corpses) but also vivisection. His own cruelty towards living beings is passed down to his creation. After he revives the Creature, he admits that he "had turned loose into the

world a depraved wretch, whose delight was in carnage and misery" (50). The Creature indeed turns into a serial killer, beginning with Frankenstein's own brother William. He is not only a violent killer but also an intelligent person like his creator, as he hides William's necklace in the pocket of their family friend Justine, provoking people into believing that Justine is the murderer. In this way, Justine is condemned to death penalty and dies as an innocent girl. Upon this chain of events, Frankenstein declares himself "not in deed, but in effect," as "the true murderer" (63). Later, when Frankenstein rejects the Creature's request to make him a wife, he kills Frankenstein's best friend Clerval and then his wife on their wedding night, causing Frankenstein to declare: "I am the cause of this — I murdered her. William, Justine, and Henry — they all died by my hands" (133). These confessions indicate that *Frankenstein* incorporates both variations of the murderous mad scientist by portraying both Victor Frankenstein and his creature as murderers.

In addition to the people around him, Frankenstein also harms himself in his quest for eternal life. As Cartwright and Baker argue, Shelley "emphasizes the unwholesome aspects of Victor Frankenstein's blinkered scientific rationalism by describing how his obsessions are detrimental to his own health. He becomes physically emaciated, emotionally disturbed, and cuts himself off from the company of friends who could have proffered good advice" (Cartwright and Baker 145). After working ceaselessly "for nearly two years, for the sole purpose of infusing life into an inanimate body," Frankenstein admits that he "had deprived [himself] of rest and health" (35-6). He eventually becomes ill and gets "oppressed by a slow fever," and "[becomes] nervous to a most painful degree" (35). Frankenstein's lack of care for his health brings to mind his contemporaries in real life such as Humpry Davy, Johann Wilhelm Ritter, and probably many less known experimental philosophers who damaged their own bodies in their pursuit for the deeper knowledge of matter. Such attitude conveys the idea that mad scientists do not even pay attention to themselves as what matters the most for them is scientific success. In this way, they appear even more threatening than any other natural philosopher or scientist who pursues science rationally.

The fervent, obsessive behavior of mad scientists is the main reason behind the detriment of their mental health as well. Although the word "mad" in mad scientist does not necessarily mean a literal madness, in most cases the fictional scientists indeed

show signs of insanity which results from their genius and severe obsession with their practice. As Frankenstein is occupied with his study, “a resistless, and almost frantic impulse, urge[s] [him] forward,” and he loses “all soul or sensation but for this one pursuit” (33). After the experiment, Frankenstein starts to develop even more neurotic behaviours as a result of his fear that his secret would be exposed or his creation would bring destruction. He relates the first time when he saw his friend Henry Clerval after the experiment as follows: “I jumped over the chairs, clapped my hands, and laughed aloud. Clerval … saw a wildness in my eyes for which he could not account; and my loud, unrestrained, heartless laughter, frightened and astonished him” (39). This was the first of Frankenstein’s “mad” attitudes which would recur until the end of the novel. He often states that “insanity” possesses him (105, 137), that he sees visions “of filthy animals inflicting on [him] incessant torture, that often extorted screams and bitter groans” (105), and that he “was furious, and burnt with rage, sometimes low and despondent” (137). Upon such behaviour, people start to call him “mad” and even confine him into “a solitary cell” (143). Frankenstein’s madness, then, is not only dangerous for other people but also for himself since it makes him both mentally and physically ill.

Although their own deeds are enough to make mad scientists look evil and insane, in each mad scientist narrative there is still at least one foil character that has the opposite features to those of the mad scientist. These foil characters are usually benevolent scientists who have Baconian traits or a family member/friend who represents moral values. In *Frankenstein,* the Baconian men of science are the professors at Ingolstadt; Krempe and Waldman. Although Krempe’s role is dubious as he initially underestimates Frankenstein, Waldman is represented as the true benevolent natural philosopher. Frankenstein’s first impression of him reveals much about Waldman’s respectable personality: “He appeared about fifty years of age, but with an aspect expressive of the greatest benevolence … His person was short, but remarkably erect; and his voice the sweetest I had ever heard” (28). In contrast to Frankenstein’s youth and inexperience, Waldman is presented as an old wise man who, despite his great knowledge, appears to be humble all the time. Frankenstein states that Waldman’s “gentleness was never tinged by dogmatism; and his instructions were given with an air of frankness and good nature, that banished every idea of pedantry” (30). This modesty

contrasts with Frankenstein's hubristic attitudes and his self-confidence in the power of his own genius. Hence, Waldman's trust in Frankenstein creates an irony considering the fact that he would become an evil scientist, not a benevolent one. He tells Frankenstein that "[t]he labours of men of genius, however erroneously directed, scarcely ever fail in ultimately turning to the solid advantage of mankind" (29), revealing his belief in the ultimate success of Frankenstein as he is a very intelligent student. However, the exact opposite happens in the novel. Frankenstein's labours as a man of genius fail in bringing advantage to humankind, and the reason for this failure is his deviation from the Baconian path; he was not collaborative but secretive, not systematical but obsessive, not moral but unethically result-oriented.

In addition to Waldman, Frankenstein's cousin/wife and best friend also foreground his questionable personality with their benevolent thoughts and attitudes. Elizabeth, who is shown as Frankenstein's cousin in the first edition and as his childhood friend in the 1831 one, is the embodiment of kindness and innocence. She is always distant to Frankenstein's suspicious scientific practices and does not share his interest in alchemy. For her, even being a farmer is more benevolent than any other profession as "[a] farmer's is a very healthy happy life; and the least hurtful, or rather the most beneficial profession of any" (41). This idea creates a contrast with Frankenstein's belief that science is the most beneficial practice. In the end it becomes clear that Elizabeth was right as science turns out to be the most dangerous profession; living close to nature, being a part of it like farmers do is less harmful than aiming to control or manipulate nature. Elizabeth is also the voice that reminds Frankenstein to stay "human." When she sees hatred and revenge in his eyes, she tells him to "banish these dark passions" (1831, 88). Henry Clerval has a similar role in the novel and also represents opposite attributes to Frankenstein. Victor explains that "Clerval was no natural philosopher. His imagination was too vivid for the minutiae of science" and that he was also interested in oriental languages such as "Persian, Arabic, and Hebrew" (44). Clerval's poetic nature and interest in the orient contrasts with Victor's cold scientific thinking, which is typical of the West. As a representation of the Romantic sensibility, Clerval, like Elizabeth, becomes the agent that invites Frankenstein to give up his obsessive behaviours. When Frankenstein becomes "unsocial" because of his studies, "Clerval call[s] forth the better feelings of [his] heart; he again [teaches Frankenstein] to

love the aspect of nature, and the cheerful faces of children" (45). Clerval is the exact opposite of Frankenstein, "a being formed in the 'very poetry of nature'" (111) as Frankenstein calls him. Together they represent the clash between science and poetry (more precisely, art in general) which started in early nineteenth century and continued until the end of it.

Despite its secular outlook, *Frankenstein* still gives the message that a mere human being is not capable of taking the role of God in creation; if he tries to do so, the result is disastrous. Even Mary Shelley herself was frightened by her own idea of utilizing science to revive a dead body. She wrote: "Frightful must it be; for supremely frightful would be the effect of any human endeavour to mock the stupendous mechanism of the Creator of the world" (168). In accordance with the general view of her time (and also of earlier centuries), Shelley saw unregulated science as the antagonist of religion and thought that the only result of imitating God would be an "imperfect[49] animation" (168). Thus, she constructed her plot so as to make her mad scientist repent at the end. Yet, before that she placed traces of Frankenstein's remorse throughout the narrative. Even when he is about to start his experiment, Frankenstein feels "an anxiety that almost amounted to agony" (35), which reveals his reluctance at the last moment. Yet, he still continues his experiment and as his creature comes to life, after which he finally realizes that using modern science to actualize the alchemists' dream has been a fatal mistake. As a result, after reviving the creature Victor is constantly disturbed by his conscience. Upon the deaths of William and Justine his disturbance gets even worse: "The blood flowed freely in my veins, but a weight of despair and remorse pressed on my heart, which nothing could remove. Sleep fled from my eyes; I wandered like an evil spirit, for I had committed deeds of mischief beyond description" (61). His remorse and refusal to take responsibility reflects Frankenstein's dilemma; he is both happy that he is free of crime (it is the Creature who is evil), but he is devastated that he caused the death of two people he loved. Towards the end of the

[49] Shelley's view of the making of the Creature as imperfect can be read in accordance with the earlier views towards alchemy, which "was often condemned as a 'counterfeiting' that could not transform metal but only altered its physical appearance. In his influential *Pirotechnia* (1540), for instance, Vannocci Biringuccio thus asserted that while nature operates 'in things from within,' an art like alchemy instead only 'operates in external and superficial ways, and it is very difficult, even impossible, for her to penetrate things'" (Spiller 48). Like alchemists, Frankenstein can only counterfeit creation; he cannot change things "from within." His act can only be an imitation of creation, and this is why his creature looks to him so unnatural, ugly, and disunified.

novel he gradually comes to accept his guilt and states that "for the guilty there is no peace. The agonies of remorse poison the luxury there is otherwise sometimes found in indulging the excess of grief" (137). And finally, as if aware of his role as a prototypical mad scientist, he declares: "In a fit of enthusiastic madness I created a rational creature" (156). Frankenstein does not live much after this final confirmation of the madness of his deeds. However, before he dies he also warns other aspiring men of science against making the same errors: "Seek happiness in tranquillity, and avoid ambition, even if it be only the apparently innocent one of distinguishing yourself in science and discoveries. Yet why do I say this? I have myself been blasted in these hopes, yet another may succeed" (157). Others would indeed succeed – as fictional late-Victorian progenies of Frankenstein –, but as *Frankenstein* demonstrates, in science success is not always synonymous with good results.

*Frankenstein*'s legacy is one of the most enduring ones in the history of Western literatures. Its fame continued through the nineteenth century and beyond. It has been adapted many times to the stage, the cinema[50] and cartoons. Even people who have never read the novel have an idea on what it is about and especially the experiment part is familiar to everyone through its representation in many forms of visual art. In 1823, five years after the novel was published, people of England met Frankenstein and his creature on the stage. This stage adaptation named *Presumption* was written by Richard Brinsley Peake who dramatized the experiment part so much that Frankenstein's exclamation "It lives!" turned into a famous phrase. Even Mary Shelley, who went to see the play with her father William Godwin, commented on this part of the play by praising it[51]. In the early twentieth century, the novel began to be adapted to cinema. The 1931 version starring Colin Clive as Frankenstein and Boris Karloff as the creature turned into a cult movie; most people became familiar with the story through this movie

[50] According to the study of Roslynn Haynes, there are "at least 23 movie versions of *Frankenstein*" ("From Alchemy" 252).

[51] In her letter to her friend Leigh Hunt, Mary Shelley describes the experiment scene as follows: "the stage represents a room with a staircase leading to Frankenstein's workshop; he goes to it, and you see his light at a small window, through which a frightened servant peeps, who runs off in terror when Frankenstein exclaims 'It lives!' Presently Frankenstein himself rushes in horror and trepidation from the room, and, while still expressing his agony and terror, '____' throws down the door of the laboratory, leaps the staircase, and presents his unearthly and monstrous person on the stage" (Marshall 95). Shelley writes that she was "much amused" by this depiction, "and it appeared to excite a breathless eagerness in the audience" too (Marshall 95).

and its representation of the characters became trademarks for their future depictions. Karloff's look as the "monster" became a stereotype and turned into "an icon of pathos, a ghastly consequence of science going awry" (Haste 114). Although his character was not completely based on the novel version, his face still keeps appearing on some covers of the novel.

Besides its own stage and film versions, Frankenstein influenced other novels and films as well. As Haynes states, Victor Frankenstein and his ancestor Dr. Faustus created the stereotypical features of the mad scientist as "arrogant, power-crazy, secretive, and insane in their pretensions to transcend the human condition and the limits of 'permitted' knowledge" and with these features they become "role models for later unattractive postdoctoral researchers—Dr. Jekyll, Dr. Moreau, Dr. Cyclops, Dr. Caligari, Dr. Strangelove, Dr. Rukh, Dr. Bluthgeld" ("From Alchemy" 245). Peter Weingart also draws attention to the fact that "Shelley's Frankenstein has become the icon of the 'mad scientist' as depicted by filmmakers ever since the 1930s" ("Power Maniacs" 279). Hence, it can easily be claimed that Victor Frankenstein is the prototypical modern mad scientist and *Frankenstein* is an innovative text that establishes the features of the mad scientist narratives that would recur in the following decades of the nineteenth century. Its interrogation of the real scientific atmosphere of the early nineteenth century through certain tropes, some of which are borrowed from mad alchemist stories, become a guide for Robert Louis Stevenson and H. G. Wells's depictions of controversial sciences and evil scientists.

## CHAPTER IV

## LATE-VICTORIAN MAD SCIENTISTS: DR. JEKYLL, DR. MOREAU, AND GRIFFIN

In the late-Victorian period there was an increase in the number of mad scientists in British literature. While there was only one example of a fictional mad natural philosopher/proto-scientist at the beginning of the century, at the end of it there were several mad scientists, the major ones being Dr. Henry Jekyll of Robert Louis Stevenson's *Strange Case of Dr. Jekyll and Mr. Hyde* (1886), Dr. Moreau of H. G. Wells's *The Island of Dr. Moreau* (1896), and Griffin of Wells's *The Invisible Man* (1897). Although these novels are the progenies of *Frankenstein*, they slightly differ from it in their treatment of science and scientists. The secular and rational nature of these three novels puts them into a different tradition from the earlier narratives of mad alchemists or natural philosophers. The first aspect that attracts attention in them is the lack of magical, alchemical, or occult elements; but most importantly, their mad scientists are indeed "scientists,"[52] since the word had already gained its modern meaning by the time the novels were published. This means that Dr. Jekyll, Dr. Moreau, and Griffin were occupied with science professionally and they specialized in particular subjects. Accordingly, they used secular science, not alchemy or any other esoteric practice, in order to achieve their ideals. Moreover, especially in Wells's novels, there are detailed depictions of the experiments made by mad scientists together with scientific explanations of the possibility of such discoveries, which fortify the effect of these narratives when they warn humanity against the abuse of science by scientists with malevolent aims.

It is not surprising to find this kind of transformation in the figure of the mad alchemist/scientist in this particular period when British literature began to be more intertwined with science as the latter became an indispensible part of both industry and people's daily lives. By the end of the century, Britain had already surpassed many countries with the number of both its scientists and the innovations they had introduced. It was "an age richer in inventions than any other" (Claeys xi) and British society was familiar with the many experiments and discoveries made by the scientists of the era.

[52] The coinage of the word "scientist" by William Whewell is explained in more detail in the second chapter of this thesis.

However, science was not always seen as the main agent of progress; it was also regarded as a powerful force that could be used for malevolent purposes. The fact that it began to push limits and clash with ethical values increasingly contributed to its negative reception. Sciences that threateningly disturbed the integrity of the human body such as physiology, biology, chemistry, and physics became the main elements of mad scientist narratives. *Strange Case of Dr. Jekyll and Mr. Hyde* (hereafter *Jekyll and Hyde*), *The Island of Dr. Moreau* (hereafter *Dr. Moreau*) and *The Invisible Man* were the products of an age which witnessed considerable number of science versus ethics debates. Consequently, they included all of the controversial sciences of the late-Victorian era and people's anxiety towards their advancement. Therefore, it is appropriate to examine these three works in conjunction with one another since they share a similar approach towards science and scientists of the period.

The shared theme of all three novels is the abuse of the power gained by a critical scientific discovery, which results in catastrophe both for the people (and animals) around the mad scientist and for himself. In *Jekyll and Hyde*, the readers follow the story of an English doctor called Henry Jekyll who directs his studies towards chemistry in order to produce a compound that will allow him to separate the "good" and the "evil" in his personality. The novella begins with two men talking about the strange occurrences in London. Mr. Utterson, the lawyer, decides to follow the case after people report a monstrous figure called Mr. Hyde who acts violently towards them. Meanwhile, Dr. Jekyll isolates himself from his friends, working in his private laboratory until he loses his health. At first, the monster seems to be a friend of Jekyll as he keeps entering his home and signing checks with his name, but after many incidents it is revealed first in Jekyll's colleague Dr. Lanyon's letter and then in Jekyll's statement to Utterson that Hyde is in fact Jekyll himself. He relates how he prepared a liquid chemical compound, drank it and turned into Hyde. He continues his narrative by telling that in time he lost control of the voluntary transformation, began to turn into Hyde in his sleep, and has been working in his laboratory for a solution to this problem. After struggling to reverse his experiment, Jekyll gives up his body for the last time to Hyde, who prepares a poison (cyanide) to drink before he was caught. At the end Utterson enters Jekyll's cabinet and finds the dead body of Hyde who drank the cyanide (It was popular among the spies at the time to drink cyanide when they were about to be

caught). Utterson deduces from “the crushed phial in the hand and the strong smell of kernels that hung upon the air ... that he was looking on the body of a self-destroyer” (39). It is not certain if Jekyll prepared a poison for Hyde in order to trick him into killing himself, or Hyde prepared it to kill himself in order to escape justice and prison. In both cases, the scientist causes his own death.

An analogous body-transforming science and self-experimenting mad scientist is found in Wells’s *The Invisible Man*. As in *Jekyll and Hyde*, here the events take place after the scientist has achieved his goal and the process of his preparation is depicted later. The story begins when a mysterious man wrapped in white cloth, wearing big blue goggles arrives at an inn in Iping where his presence creates first wonder and then anxiety. He introduces himself as “an experimental investigator” (10), has very rude manners, and is obsessed with his chemical tools which arrive in crates to the inn. He constantly studies in his room, sometimes goes out at night, talks and even swears to himself. After a while his unconventional behavior and looks start to disturb the owners of the inn and other people who inquire into his grotesque appearance. The man finally reveals that he is invisible by taking off his clothes and escapes after a struggle that leaves people injured. Later he initiates a minion called Mr. Marvel to use him to steal money and obtain certain books that include the formula for his invisibility. However, Mr. Marvel manages to escape and pits the police against the invisible man who has to brawl again in order to save himself. He gets injured and ends up in the home of his former school friend named Dr. Kemp to whom he reveals himself to be Griffin, the gifted chemistry student. Upon this revelation, Kemp becomes interested in Griffin’s experiment, but he is also aware that he is a wanted man and a potential murderer. He calls the police while Griffin sleeps and makes him narrate his story until the policemen arrive. Kemp and the policemen fail to capture Griffin, but they declare a city-wide state of emergency. People lock their doors to keep Griffin out and hungry. Filled with revenge, Griffin comes back to kill Kemp, but is caught by people who beat him to death. When he dies, his body slowly becomes visible, revealing an albino man with a beard. Although Griffin does not commit suicide like Jekyll/Hide, the cause of death is still his own scientific discovery which he abuses.

*Dr. Moreau* is more similar to *Frankenstein* than these two novels in terms of the practice of his mad scientist; however, in other terms which will be analyzed in this

chapter, it is the part of a late-Victorian mad scientist tradition. As Annes Styles asserts, "[t]he first draft of *Moreau*, with its deleted references to *Frankenstein* and its structural resemblance to *Jekyll and Hyde*, suggests that Wells self-consciously situated his novella within this emergent tradition of mad scientist fiction" (323). Unlike Dr. Jekyll and Griffin, Dr. Moreau is not a self-experimenter, but he experiments on animals in order to turn them into human beings. The novel opens with a letter of a man explaining his uncle's extraordinary experience on a remote island. The narration then shifts to the uncle named Edward Prendick who relates that the ship he was on (*Lady Vain*) sank and he was saved by a captain whose ship (*Ipecacuanha*) was transporting various animals to an island. On the ship, Prendick meets and befriends a man called Montgomery who happens to be in charge of the transportation process. Montgomery has a grotesque-looking companion called M'ling that looks like an animal but also like a man. The captain gets angry at M'ling and other grotesque creatures on his ship, and when he gets drunk he argues with Montgomery who eventually decides to leave the ship with the creatures. Shortly after they leave with a boat, Prendick is thrown into the sea but is saved by Montgomery and his company. When they arrive on the island Montgomery has talked about, Prendick sees more grotesque creatures and he also meets Dr. Moreau who ordered the animals. Dr. Moreau gives Prendick a room in his house, but Prendick is disturbed by a sound that is made by a suffering animal. Later he remembers that he had seen the name of Moreau in newspapers; he was a notorious vivisectionist who had been banished from England for his unethical experiments. After spending more time in Moreau's house, Prendick begins to hear human sounds from his dissecting room and decides to act. However, Moreau explains the true nature of his experiments. He says that he is transforming animal bodies into human bodies through surgical but also chemical methods. He thinks that his last experiment will be the best, but the puma he is working on breaks loose and eventually kills him. Later Montgomery also gets killed by one of the beast people. Upon these events, Prendick is left alone on the island and observes the degeneration of beast people into mere beasts. He makes a boat to escape from the island and on his way is saved by a ship. He returns to his country, feeling traumatized by what he has experienced.

These novels did not create much uproar when they were published since the late-Victorians were used to seeing literature and science intermingle. They were not as

astonished by the explorations of potential scientific developments in fictional works as the readers of early-nineteenth century. For instance, it was written about *Jekyll and Hyde* in *Birmingham Daily Post* that "[t]he attempt which is made here to unite strange men – the strangeness of a Frankenstein story or an old Greek myth – with modern science, leaves no stranger impression on the mind than a sense of the ingenuity of the writer" (94). Moreover, in the review of *Jekyll and Hyde* in *The Times* of London, it was accepted that although the science in the novel was not plausible for that time being, it might be in the future "[f]or we are still groping by doubtful lights on the dim limits of boundless investigation; and it is always possible that we may be on the brink of a new revelation as to the unforeseen resources of the medical art" (97). These reviews show that the readers and critics of the late-nineteenth century were more open towards the inclusion of speculative science in fictional works. However, there was still incredulity towards the authors' aim in constructing their mad scientist narratives. In a 1896 review of *Dr. Moreau*, it was written that "[t]he horrors described by Mr. Wells in his latest book very pertinently raise the question how far it is legitimate to create feelings of disgust in a work of art.… It has, we observe, been suggested in some quarters that Mr. Wells was animated by a desire to expose the repulsive aspect of vivisection, but we do not believe it" (qtd. in Agruss 279). This disbelief is a result of the popular confusion of the author with the characters in the book. The fact that Wells depicts an evil scientist that abuses his scientific ingenuity did not mean that he supported such actions. On the contrary, he was highly critical of the abuse of science and as Steven Best and Douglas Kellner argue, "[w]hile [Wells] frequently championed science and technology as great vehicles of progress, he also provided prescient warnings of their misuse and abuse. In particular, he anticipated that science and technology could create mutations in the human and generate new species" (n.pag.). This is why both of his mad scientists are obsessed with corporeal transformations and his novels delve into the conflicts between science and ethics.

Although Wells's novels are easily – and anachronistically – categorized as works of science fiction and therefore it is easier to treat some of his works as mad scientist narratives, there is not a consensus on the role and position of *Jekyll and Hyde* in the disputed history of the science fiction genre. The general inclination in the studies of the novel is to read the employment of science in *Jekyll and Hyde* as a plot device to

allow the allegorical exploration of good/evil duality. However, the fact that its protagonist is a man of science and a very competent experimenter stresses the scientific aspects of its critique of the times. Henry Jekyll's transformation is not magical or metaphorical. The readers are shown that the transformation, which is biological and chemical, occurs through the agency of a potion prepared by combining different chemical substances. As in the case of *Frankenstein*, nineteenth-century readers saw this aspect of the novel and even the reviews focused on how the novel employs science. However, the same approach is hard to find in the novel's modern interpretations. As Julia Reid argues, "Robert Louis Stevenson has received little attention from scholars working in the 'interdiscipline' of literature and science, despite possessing suggestive credentials in the shape of his scientific background and interests" (4). She explains that Stevenson "lost his faith as a young man following his exposure to Herbert Spencer's scientific naturalism, and his early interest in the relations of evolutionary science and ethics endured. ... References to Darwin, E. B. Tylor, and Spencer appear throughout his notebooks and letters, and evolutionist rhetoric informs his essays on literary appreciation and creativity" (4) and adds that Stevenson's "relationship with science was much more dynamic than has hitherto been recognized" (5). This means that like Wells, who was in fact a student of T.H. Huxley, Stevenson was also quite familiar with the scientific theories and practices of his time. Therefore, this thesis reads the elements of chemistry and biology in his novel as not merely metaphorical devices, but as references to the real scientific atmosphere of the time.

By the end of the nineteenth century, inclusion of a controversial scientific practice had become the fundamental feature of the mad scientist narratives. Although the personality of the scientist plays a major part in the catastrophic results of the experiments, the sciences that they practice are the elements that create the main tension in the narratives. An astronomer or a geologist, for instance, is less likely to conduct an experiment that challenges the ethical values of humankind than a chemist, biologist, or physiologist/anatomist that works in a laboratory. Thus, it can be said that all fictional mad scientists are specialized in the most contradictive and disturbing practices of their time. Moreover, nineteenth-century mad scientists are usually good at not one but multiple branches. As Stephan Karschay states, "[t]he sciences in the Victorian age cut

across disciplinary and national boundaries in a way that can seem remarkable and surprising from a twenty-first-century perspective" (30). Hence, towards the end of the nineteenth century there emerged interactions between disciplines such as the fusion of electricity and chemistry at the end of the previous century. Geology and biology worked together to form the theories of evolution; physiology, chemistry, and medicine were together effective in new discoveries of diseases and their medical treatment, chemistry also increasingly intermingled with physics, resulting in the development of thermodynamics. However, one of the most controversial combinations was the one between the sciences of the body (physiology, anatomy) and chemistry; or more precisely, application of chemicals to human/animal bodies and vivisection. Thus, late-Victorian fictional mad scientists are specialized in particularly these professions. Dr. Jekyll is an expert in chemistry and he is also familiar with anatomy as he knows which compound would modify his body. Griffin, likewise, starts as a student of chemistry and medicine but later becomes interested in optics and molecular physics. He also studies human physiology in order to make his body invisible. Dr. Moreau is also a kind of an evolutionary biologist in theory and physiologist/surgeon in practice, with sufficient knowledge of chemistry which he applies in his vivisection experiments. Such fusions give a more threatening role to the mad scientists and turn them into menacing figures when they decide to abuse science for their own gain.

In all of the fusions between sciences in mad scientist narratives, chemistry remains as the core element as its timeless controversy still provided material for the late-nineteenth century writers. Nonetheless, its alchemical undertones in literature were less visible compared to earlier depictions of it. The traces of alchemy and alchemists in late-Victorian mad scientist narratives are mainly material rather than spiritual; the fact that all mad scientists work secretly in their private workshops/laboratories and that they are able to transform matter can be seen as a continuation of the tradition of evil alchemist narratives. However, in the new late-Victorian versions there are no traces of magic, astrology, or occult, which had been intermingled with alchemy until the emergence of modern chemistry. Both Dr. Jekyll and Griffin – and to some extent Dr. Moreau, too – are proficient chemists with a great knowledge of chemical substances. They can manipulate matter as they wish, but in completely rational scientific terms. They do not get their initial knowledge from old alchemists as Victor Frankenstein does

since they are raised in a period when modern chemistry was much more established than it was in the eighteenth century.

The importance of chemistry in *Jekyll and Hyde* is usually overlooked as critics have focused on the psychological and metaphorical aspects of Jekyll's transformation and have seen the book as a mystery novel rather than a science fiction one. Although this approach might be credible, it does not fully appreciate the secular and rational nature of the novel. Jekyll is a not an alchemist or a magician, but a scientist. It can be seen clearly in his depiction of his experiment: "I purchased at once, from a firm of wholesale chemists, a large quantity of a particular salt which I knew, from my experiments, to be the last ingredient required; and late one accursed night, I compounded the elements, watched them boil and smoke together in the glass" (50). In addition to the purely chemical nature of his experiment, his transformation is also certainly a chemical and corporeal one as his body indeed changes its shape; it is not only a psychological transformation for Jekyll. Prominent author Vladimir Nabokov asserts that *Jekyll and Hyde* is not "some kind of a mystery story," or "a detective story … [n]either is it a parable nor an allegory" (184); but it is, he argues, "a phenomenon of style" (184) based partly on plausibility. Thus, Stevenson had "to make the magic potion a plausible drug based on a chemist's ingredients and to make Jekyll's evil side before and after the hydization a believable evil" (Nabokov 185). Achieving plausibility is a crucial element of both science fiction in general and mad scientist narratives in particular for it increases their effect as warnings against the real dangers of science. Hence, Jekyll's description of his experiment with references to powders bought from a chemist and boiling chemical compounds generates a more plausible explanation for his corporeal metamorphosis.

It can be argued, therefore, that in *Jekyll and Hyde* Stevenson's choice to use chemistry as a means to transform one's body is consciously made. He states in his essay "A Chapter on Dreams" that he decided to write *Jekyll and Hyde* after a dream[53] which included a hideous looking man (Hyde) whose body is competely changed after drinking a chemical compound (127). This event echoes Mary Shelley's conception of *Frankenstein* after a dream she had which was influenced by the scientific debates of his

[53] Stevenson's own relation of the dream is as follows: "I dreamed the scene at the window, and a scene afterward split in two, in which Hyde, pursued for some crime, took the powder and underwent the change in the presence of his pursuers. All the rest was made awake, and consciously" (127).

husband and friends. Another resemblance between the two novels is that *Jekyll and Hyde* has multiple versions; however, the first draft of it is lost. Graham Balfour explains that the initial manuscript was burnt by Stevenson upon his wife's criticism that his story was too rational and not allegorical enough (78). It is understood that Stevenson's first intention was to shape his story around material scientific phenomena as the focus of his dream was "the transforming powders" and although "the powder was condemned as too material an agency," Stevenson "could not eliminate" it, "because in the dream it had made so strong an impression upon him" (Balfour 78). The contents of the first draft can never be known, but from the reactions of Stevenson and his wife it can be inferred that it was a more science-fictional text than the second allegorically inclined version. The impact of scientific possibilities on Stevenson's imagination as he wrote the first draft is the reverberation of Shelley's similar inspirations. Both authors take into consideration the power of chemical knowledge and how it could be used to manipulate the nature of human beings.

Chemistry is also the main profession of the protagonist of *The Invisible Man*. Griffin states that he was once a student of chemistry at the University College but later developed an interest in physics. He studies the nature of light and comes to the conclusion that objects can be made invisible if their molecules are altered in a way to prevent them from absorbing and reflecting light. He uses chemicals to transform the molecules of first inanimate objects, then a cat, and finally himself. It is easier for him to turn invisible because he is an albino (the colour white is easier to be made invisible). His chemical proficiency can be inferred from the collection of substances he has; "little fat bottles containing powders, small and slender bottles containing coloured and white fluids, fluted blue bottles labelled Poison, bottles with round bodies and slender necks, large green-glass bottles, large white-glass bottles ... The chemist's shop in Bramblehurst could not boast half so many" (17). Moreover, he is after his notebook which contains his formula to produce a drug that alters the body to become invisible. Griffin's way of using chemistry to alter the components of human body correlates with how Jekyll uses them. It becomes clear that this resemblance is not coincidental when the role of Dr. Moreau is also considered. Although Dr. Moreau defines himself as a biologist and is not a professional chemist like Jekyll and Griffin, he still has enough knowledge of the profession. When performing surgical experiments on animals,

Moreau works with chemicals to transform their bodies. Prendick smells “the peculiar smell of carbolic acid” (50) that is diffused from Moreau’s laboratory. Later Moreau himself explains that “[i]t is not simply the outward form of an animal which [he] can change. The physiology, the chemical rhythm of the creature, may also be made to undergo an enduring modification” (72). Modifying the chemicals of the body seems to be a common theme in all three novels, which may bring about the conclusion that one of the major fears of the late-Victorian period was science’s, especially chemistry’s intrusion into organic bodies, both human and animal.

As a result of the inclusion of chemistry in nineteenth-century mad scientist narratives, there emerged a common trope which is still used today: the private laboratory filled with chemical appliances and technological devices. Jekyll, for instance, prepares his chemical compound in a laboratory situated in “a certain sinister block of building” which “thrust forward its gable on the street” and “showed no window” (8). As in all mad scientist narratives, the look of the laboratory (or the building) correspond to the evil experiment that is taking place inside of it. Here Jekyll’s apartment is “sinister” just as his monstrous side, and the fact that Hyde “mostly comes and goes by the laboratory” (18) indicates that the mad scientist’s laboratory is a place where always something monstrous happens. It is stated that Jekll bought the sinister house “from the heirs of a celebrated surgeon; and his own tastes being rather chemical than anatomical, had changed the destination of the block at the bottom of the garden” (25). As he is a chemist, he transforms the old “dissection rooms” of the surgeon into a laboratory “laden with chemical apparatus” (25). There are also stairs in his laboratory “mounted to a door covered with red baize” which opens “into the doctor's cabinet” (25). This means that Jekyll has one more private room inside his laboratory which he hides from everyone. In it, he keeps his tools that allow him to transform himself; there are “glass presses, furnished, among other things, with a cheval-glass and a business table” and “three dusty windows barred with iron” (25). His cabinet, then, is hidden from both inside and outside of the building in order to hide the “traces of chemical work” from his friends and colleagues who occasionally inquire into his studies.

Griffin and Moreau also have their own private laboratories. As a student of chemistry, Griffin first uses the university’s laboratory for his studies, but he does it at

night when no one is around. He eventually becomes disturbed by the constant inquiries of his fellows and decides to establish a private-laboratory in "a room in London ... a big ill-managed lodging-house in a slum near Great Portland Street" and fills it with his chemical appliances" (104). After having an argument with his landlord over the secrecy of his practices, he burns down the house and moves his laboratory to another room that he hires at an inn in Iping. His luggage, which arrives after him, contains "a dozen or more crates, boxes, and cases, ... glass bottles" (14). There were also "a number of test-tubes and a carefully packed balance" (17). All these tools point to his aim to establish a mini-laboratory at the inn. Since he is too helpless and poor at that time, Griffin cannot buy an isolated house and as a result he is always anxious that people would find out and interrupt his experiments. Unlike Griffin, Dr. Moreau can indeed find an appropriate place to construct his laboratory; he sets it up on a remote island which is not visited by any people. Moreau's workshop is designed as more suitable for surgical experiments than chemical ones. Like the former model of Jekyll's laboratory, it is referred to as a "dissecting-room" and has "a curious faint odour," which is defined by Prendick as an "antiseptic odour" typical of dissecting-rooms (35). Moreau's laboratory adds another element to the trope which was borrowed from the texts that depict alchemists' private workshops or dens. In *Dr. Moreau*, instead of devices for chemical experiments, the laboratory includes tools for vivisection of large animals; it resembles more to a torture room than a laboratory which increases the horror it evokes.

Vivisection was indeed one of the most controversial subjects of nineteenth-century Britain. It had been "routinely induced privately by professional scientists on the Continent" (Agruss 264) for many decades until it finally arrived in Britain after mid-nineteenth-century. It was a very common practice in France and Germany because "in order to elucidate the functions and activities of body parts and living systems, experimental physiology relied heavily on vivisection – that is, experiments on live, often nonanesthetized animals" (Agruss 265). This was contrary to the practice of dissection which was applied on cadavers and only gave a limited information about the workings of the body. When during the 1850s British physiologists adapted vivisection, it immediately became a polemical issue. As David Agruss informs, "vivisection was not part of wider discussions about animal rights in Britain prior to the late 1850s and

not at the forefront of these discussions until the 1870s" and there were two crucial events that revealed the cruelty towards animals through science (266). The first one was a manual book for physiology students called *Handbook for the Physiological Laboratory*, edited and published by John Burdon-Sanderson in 1873. "The handbook," Agruss explains, "contained numerous detailed instructions on how to carry out classical physiology experiments on live animals," but it failed "to mention the use of anesthetics," which caused a great disturbance and uproar among people, along with the anxiety that it might "suggest unlimited vivisectional opportunities for a young new generation of experimental physiologists" (266). This anxiety was reflected in a review of the book in 1876, which saw its publication "as the introduction into England of a new moral contagion" (qtd. in Arguss 267). The second important event

> was a demonstration by French experimental physiologist Eugéne Magnan at the annual meeting of the British Medical Association in Norwich in 1874, during which he injected absinthe into the thigh of a restrained dog, causing the dog obvious excruciating pain, inciting outrage among certain members of the audience, and subsequently arousing a growing wave of disgust among a now coalescing and growing antivivisection movement. (Agruss 266)

As such, vivisection turned into a practice which was condemned by the majority and it was an example of how far science and scientists could go in order to achieve knowledge.

Wells started to write *Dr. Moreau* twenty years after the heyday of the debates on vivisection, but the issue was still an irritating one for the public. Hence, when designing the character of Moreau, Wells brought together elements from the practices of the real figures such as John Burdon-Sanderson, Eugéne Magnan, François Magendi[54], Professor Hermann of Zurich[55], and many other practitioners of vivisection

[54] François Magendi (1783-1855) was a French experimental physiologist who "argued against animism and vitalism, and urged experimentation on animals, thus causing outrage among the protectors of animals. Magendi viewed the body as a complex machine and animals as nothing more than automata" (Claeys 74). For Magendi, since animals were automata they could not feel pain; thus, vivisection was not unethical.

[55] Frances Power Cobbe (1822-1904), a prominent nineteenth-century Irish anti-vivisection activist, refers to this particular German vivisectionist in her book *Vivisection and Its Two-Faced Advocates* (1882). As quoted by her, Prof. Hermann claimed that "[t]he advancement of science, and not practical utility to medicine, is the true and straightforward object of all vivisection. No true investigator in his researches

to create a threatening evil scientist figure. Moreau's experiments are indeed unpleasant and devoid of sympathy as he performs surgery on living animals that scream in pain throughout the operations. It is probable that Moreau uses the new technique of antiseptic surgery developed by English doctor Joseph Lister (1827-1912) in order to reduce the infection risk, but he never applies anaesthesia which also had been in use at the time of the novel's publication. In Britain, chloroformed anaesthesia was being employed during the mid-nineteenth century and even Queen Victoria was anaesthetized while giving birth to two of her children. This means that Moreau, who is a professional surgeon and physiologist, could easily apply it on animals during his experiments, too, but he does not use it. Instead, he lets the animals suffer while he works on their bodies. Prendick hears "[a] sharp, hoarse cry of animal pain" (37) followed by a more painful howl and "a series of short, sharp screams" (37). Prendick cannot stand the screams of the animal and escapes outside, but he realizes that "[t]he crying sounded even louder out of doors. It was as if all the pain in the world had found a voice" (38). Such exaggerative descriptions of the tortured animals illustrate the extreme cruelty of vivisection.

Moreau's experiment does not stop with the vivisection of animals. After days of struggling to get used to the cries of the tortured puma, Prendick starts to hear human voices instead of animal ones and decides to act. He enters into Moreau's laboratory and sees "something bound painfully upon a framework, scarred, red, and bandaged" (50). It is later revealed by Moreau that he was still working on an animal, but he was able to give it human form. Although Prendick is persuaded by Moreau's explanation that he was not operating on a man, the scene implies that Moreau's cruelty towards animals could be directed towards human beings, too. This implication becomes even more serious when the historical context of the concept of "pain" is taken into consideration. As Claeys explains, in the nineteenth century "[s]ensitivity to pain was attributed to higher evolutionary creatures—men feeling more pain than women. Non-Europeans, following eugenic ideas, were thought of as having little capacity to feel pain" and even "[b]abies were thought to have no capacity for pain, no emotions and no mind to interpret their experiences, in other words, as pre-human" (77). Animals were near to

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thinks of the practical utilization. Science can afford to despise this justification with which vivisection has been defended in England" (qtd. in Otis 215). Cobbe justifiably shows these sentences as proofs of the lack of conscience and moral values in scientific practices of the time.

the bottom of this hierarchical structure, therefore their capacity to feel pain was often disregarded in the discussions over vivisection. In *Dr. Moreau*, even the small implication of vivisection being performed on a human being suddenly puts Prendick – who has been rather passive to the cruelty towards animals – into action because human beings, especially men, are the most sensitive to pain according to the dominant ideology of his time. As Moreau experiments, the animals take the human form and he still keeps experimenting even though they start to make human-like sounds such as "groaning, broken by sobs and gasps of anguish" (50). This graphic description of human suffering reinforces the cruel disposition of Moreau, who threateningly reminds Prendick that "[y]ou forget all that a skilled vivisector can do with living things" (71). Moreau's experiments are not only a serious critique of the practices of real vivisectionists of the time, but also a warning against the possibility that human beings might be the objects of vivisection, too, because there are scientists who know no boundaries when it comes to obtaining knowledge.

However controversial the practice is, what makes it turn into a dangerous element in mad scientist narratives is in fact the result, or rather, the success of the experiment. Success has a different connotation in novels that include a mad scientist because the actualization of a potentially hazardous plan brings more harm than good; hence, success turns out to be a failure in the end. In most cases, the mad scientist is initially unaware of the inherent danger in his studies, or he overlooks it for the sake of achieving his ultimate dream. It is when his experiment becomes successful that the scientist gradually begins to realize he will eventually lose control of his work. After becoming Hyde, for instance, Jekyll first finds the transformation invigorating and enjoys every moment of being evil. However, it is not long before he becomes aware of the fault in his experiment. He reveals that "although [he] had now two characters as well as two appearances, one was wholly evil, and the other was still the old Henry Jekyll, that incongruous compound of whose reformation and improvement [he] had already learned to despair. The movement was thus wholly toward the worse" (52). What Jekyll means here is that his aim to separate two identites, good and evil, failed because he only extricated the evil constituent from the "compound" (the chemical allusion here is probably intentional). Hence, he can only get worse, but not better, and he cannot even control the process. At first, he turns into Hyde voluntarily by drinking

the potion, but later he begins to transform involuntarily: “I had gone to bed Henry Jekyll, I had awakened Edward Hyde ... I was slowly losing hold of my original and better self, and becoming slowly incorporated with my second and worse” (54-5). As a solution Jekyll decides to socialize, to live a “normal” life with his friends; yet, after two months of abstinence from the potion, “at last, in an hour of moral weakness, [he] once again compound[s] and swallow[s] the transforming draught” (56) and turns into Hyde. This time, however, Hyde starts to take over so much that he has to take “a double dose” in shorter intervals (it begins to be effective for only six hours) to turn back into Jekyll (60). As these examples demonstrate, Henry Jekyll is a viable example of a scientist that loses his authority over his own experiment. When his lack of willpower is combined with his scientific amtibition, the result becomes deadly both for him and for the people around him.

The same theme can be found in *The Insivible Man* in which Griffin initially aims to make use of the transformative power of chemistry and the optical illusions of physics for his own good, but ends up experiencing unexpected side-effects. When he realizes that invisibility is possible, he imagines he can do whatever he wants with the power. However, as he begins to have difficulties adapting to life as an invisible man, he realizes that he no longer has control and he cannot even turn back to being visible. He confesses: “The more I thought it over, Kemp, the more I realised what a helpless absurdity an Invisible Man was--in a cold and dirty climate and a crowded civilised city. Before I made this mad experiment I had dreamt of a thousand advantages. That afternoon it seemed all disappointment” (138). Like Jekyll’s, Griffin’s experiment turns harmful both for him and for the people around him. He cannot walk naked in cold weather, people keep hitting him unintentionally, he cannot even eat food without revealing his invisible face. In short, the “success” of his experiment in fact means failure for him: “I had become a wrapped-up mystery, a swathed and bandaged caricature of a man!” (139). Losing the authority turns him into a more violent person and he begins to abuse his power. At the same time, however, he tries to undo what he did to himself but fails because there is never a restoration in mad scientist narratives. Once the experiment goes out of control, it does not stop until destroying its maker.

Moreau’s experiments similarly end with a catastrophe that results in the deaths of both himself and his assistant. As Prendick’s narration proceeds, Moreau’s command

of the Beast People decreases continuously until finally he loses his complete authority on them. Moreau wants to create human beings out of animal bodies but he never truly achieves his aim; instead he creates grotesque hybrids which act savagely and need to be frightened occasionally. Although Moreau works hard to keep them in human form both physically and mentally, the hybrids always "revert. As soon as [Moreau's] hand is taken from them the beast begins to creep back, begins to assert itself again" (78). In other words, he can only maintain his authority while he is operating on the creatures. As soon as they are released they have to be observed and tamed continuously in order to be kept non-violent. Moreau manages to preserve his dominance until he experiences what every mad scientist has to go through; his own creation becomes an uncontrollable, violent agent. Moreau talks about one of his previous experiments in which he was trying to make "a Thing." However, the thing escapes "by accident" and Moreau states that he "never meant it to get away. It wasn't finished. It was purely an experiment" (77). The thing gets killed by Montgomery, but Moreau does not learn a lesson from that experience and continues his operations. In his last experiment he goes further and works longer on a puma which eventually escapes like the thing. The puma is made so strong that while escaping it tears "the fetter out of the wall" (154), a scene which foreshadows its violent actions in the following chapters. Moreau chases the puma with the hope of killing it, but himself becomes the prey. The puma eventually kills Moreau in the most savage way; his "[o]ne hand was almost severed at the wrist and his silvery hair was dabbled in blood. His head had been battered in by the fetters of the puma" (165). His brutal death is a result of his similarly brutal experiments. Like Hyde and Griffin, Moreau becomes the victim of his own scientific pursuit.

It became an established tradition of all nineteenth-century mad scientist narratives after *Frankenstein* to epitomize the catastrophic outcome of the experiment with a monstrous figure which is both violent and disobedient. Although Frankenstein's creature is the prototype of this figure, late-Victorian examples are depicted as more violent, more grotesque, and (physically and mentally) less developed. The reason behind this primitive turn in the depiction of the scientifically-created monster is probably the rise of the discussions about degeneration in both within and without

biology[56] in the last decades of the century. The first ideas on the inherent bestiality in human beings began to emerge with "the Darwinian revolution" which "weakened claims about the uniqueness of human beings and blurred the absolute qualitative differences that had been considered to exist between humans and animals" (Rowan 788). After this shift in the perspective towards the position of humanity in nature, there emerged arguments of reverse-evolution, or devolution. As Stephan Karschay argues, "Darwin's theory can be read as accommodating the spectre of its own inversion," meaning that "evolutionary theory in itself contains the very notion of biological regression" (30). Therefore, it was easy to develop theories within Darwinism that argued for a "species degeneration;" namely, the emergence of the "creeping barbarism" in human beings (Claeys xvi). In Darwinian terms, degeneration can "be pictured as a species' evolutionary development reeled off in reverse " (30). The influence of this theory can surely be observed in the portrayal of monsters in late-Victorian mad scientist narratives. All three novels that are analyzed in this chapter include monsters which are similar to "degenerates;" people who "were not only perceived as members of an alien 'race' but often as monstrous freaks of nature who belied humanity's claim to evolutionary perfection" (Karschay 3). In *Jekyll and Hyde* and *Dr. Moreau*, this monstrosity is physical, mental, and behavioural, while in *The Invisible Man* the monstrosity of the character can be discerned from his mindset and actions as he is physically invisible. However, his invisibility can also be seen as a freakish aspect of him since it is unnatural and rather bizarre for the people around him.

Physical bestiality is the prominent feature of Mr. Hyde who is the monster figure in *Jekyll and Hyde*. As Gossin states, "Mr. Hyde represents the latent beast in Stevenson's Dr. Jekyll" (251); hence, in appearance he seems to be more like an animal than a human being. In fact, he looks like an ape or one of the "less evolved" ancestors

[56] Degeneration was not only seen as a "bestial devolution" in the evolutionary biological sense, but also as "a decline in human mental and moral potential" (Gossin 251) in psychological sense. The major representative of the theory of degeneration outside biology was French psychiatrist Bénédict Augustin Morel (1809-1873), who "advanced his formative definition of degeneration as 'a pathological deviation from an original type' in his *Traité des dégénérescences* in 1857" (Karschay 30). Moreover, degeneration also became a subject in thermodynamics when the theory of the heat-death of the universe, based on the second law of thermodynamics which was developed by Rudolf Clausius and William Thomson, was put forward by scientists. The scientific conception of entropy later spread outside science and was explored in art and literature of the time. For more information on the various interpretations and explorations of degeneration, see *Decadence, Degeneration, and the End: Studies in the European* fin de siècle (2014) edited by Marja Härmänmaa and Christopher Nissen.

of *Homo sapiens* such as Neandertals. Utterson remarks that "the man seems hardly human! Something troglodytic[57], shall we say?" (17). Here Utterson draws attention to Hyde's primitive look and associates it with his moral corruption, which is a typical late-Victorian approach that is influenced by the theories of degeneration. Utterson asks himself; "is it the mere radiance of a foul soul that thus transpires through, and transfigures, its clay continent?" and claims that he sees Satan's signature upon [Hyde's] face" (17) when he looks at him. It can be understood from Utterson's reaction that the author of the novel, Stevenson, is referring to the theories Cesare Lombroso[58] (1835-1909) who became famous for associating crime with the physical appearance of a person in his book *L' homme criminel* (*Criminal Man*) (1876) and who was one of the late-Victorian theoreticians[59] of degeneration that "brand[ed] degenerates as a separate race and a potential hazard to society" (Karschay 2). Lombroso saw a connection between the physiology of a human being with his/her inclination to commit crime and argued that "the most horrendous and inhuman crimes have a biological, atavistic origin in those animalistic instincts that, although smoothed over by education, the family, and fear of punishment, resurface instantly under given circumstances" (91). He also wrote that "criminals resemble savages and the colored races" (91). It is easy to notice the connection between Lombroso's claim that biology determines the malevolent aspects of a person and Stevenson's choice to give Hyde a savage look which corresponds to the evil within him.

The same influence of degeneration on the formation of the monster figure is found in *Dr. Moreau* which explores the insistent bestiality in all animals including human beings. As a student of T.H. Huxley, Wells was a writer who truly and literally explored the possibilities of Darwinian biology in his fiction; "[h]e was one of the first

[57] Troglodyte is the scientific term that corresponds to the cave men, "hypothetical early human(s) who dwelled in caves, particularly during the Pleistocene epoch and especially in the northernmost latitudes" (*Cambridge Dictionary* 88).

[58] Cesare Lombroso was Professor of Psychiatry and Criminal Anthropology in the University of Turin. During his time as a prison physician in Italy, he analyzed hundreds of prisoners in order to put forward a theory for recognizing and treating criminality in people. He was famous for introducing the concepts of "born criminal" and "criminal insanity."

[59] Other important name alongside Lombroso was Max Nordau (1849-1923), whose book *Entartung* (*Degeneration*) (1892) famously included a criticism of Oscar Wilde and showed his eccentric life as a sign of degeneration. Karschay notes that the "nineteenth-century experts on degeneration" such as Nordau had a "positivistic orientation … with their relentless accumulation of data, their insistence on empirical methods, and their strong taxonomical drive" (3). Hence, they saw their theory as scientific and argued that the degenerates should be regarded as diseased people who should be cured.

literary authors to achieve success by depicting the human species in an explicitly Darwinian guise" (Jonsson 296). As such, animals in *Dr. Moreau* are represented hierarchically; the hybrids who are further away from humans in evolutionary ancestral tree are less intelligent and more savage, while Prendick's "ape-like companion" is able to talk and count, and is described as "little better than an idiot" (56). Since in Darwinian evoutionary theory humans share the same ancestor with other apes, human-ape hybrids are the most intelligent of Moreau's creations. In addition to evolutionary theories, the novel is also predominated by the theory of devolution. Moreau's experiment is based on "the acceleration of Darwin's laws of evolution through surgery and behavioral conditioning" (Levine 17); however, he overlooks the possibility that the beast may eventually overcome the human. Prendick is not as ignorant as Moreau towars that fact that the hybrids are more prone to devolve than to evolve. He observes that the beast people "stumbled in the shackles of humanity, lived in a fear that never died, fretted by a law they could not understand; their mock-human existence, begun in an agony, was one long internal struggle" (95). Here the evolutionary process is reversed along with its hindrances; just as degeneration theorists saw degenerates as the obstacles in the way to evolution, the reverse-evolution theory in the novel suggests that humanity is an obstacle in the way to devolution. This becomes more clear when Prendick begins to be aware of "the 'stubborn beast-flesh'" which causes Moreau's creations to revert "very rapidly" (123). After Moreau – who has been preventing the degeneration through constant intervention – dies, the hybrids indeed revert to their former selves. By the time Prendick escapes the island all of the creatures have already become animals with no trace of humanity.

Darwinism and degeneration also influence the formation of Griffin's monstrous side, just as that of Jekyll's. However, unlike Hyde, it is not Griffin's appearence that is animalistic, but his behaviors. Claeys asserts that Darwinism is "dual-edged, supportive of the enlightening propensities of empiricism and the scientific method on the one hand, but also of the predominance of the darker forces of animality and instinct over reason on the other" (Claeys xv). This duality is best represented in the monstrosity of the late-Victorian mad scientists because they represent both "empiricism and the scientific method" and "animality and instinct." After Griffin – who had been a follower of empirical science – becomes invisible, he turns into a kind of a monster and his

actions begin to be more violent and primitive. This change brings forward the argument that even though a human being might be a rational scientist, he may still revert to a more primordial form when he gives in to the beast within him. In Griffin's case, the bestiality appears as soon as he feels threatened by other human beings around him. He is aware that his experiment carries an inherent menace and this awareness makes him also evil in return because he wants to protect his creation, which is in fact himself as an invisible monster. Griffin's savage behaviour even when he is in his room irritates the innkeeper Mrs. Hall who hears "a concussion and a sound of bottles ringing together as though the table had been hit, and the smash of a bottle flung violently down, and then a rapid pacing athwart the room" (18-9). Griffin is usually agitated throughout the novel, but he becomes even more violent when he is hungry or when his life is threatened. Just after he realizes that he is about to be found out by a man, he hits him in the head and ties him up, claiming that the man "made [him] wild" (135); in other words, brought forth the savage inside him. The first thing that Griffin does after he neutralizes the man is to find food "to satisfy [his] hunger" (135). Such instinctive and fierce behaviour indicates Griffin's predisposition towards degeneration as he is unable to repress the animal within him.

In addition to degeneration, fear of the disturbance of corporeal unity of human body also had an effect on the representations of the monster in late-Victorian mad scientist narratives. Towards the end of the century, sciences gradually turned to human body which became an object of secular study thanks to the Darwinian revolution. Since the body was not as sacred as before, there was a general anxiety that it could be deformed or develop into something inhuman as a result of increased scientific interference. Thus, physical deformity turned into one of the common themes of the fictional works of the era, especially of mad scientist narratives which explored the adverse effects of scientific developments. In *Jekyll and Hyde*, Hyde's outward aspect represents the physical deformity caused by chemical agents which enhance the animalistic features of Jekyll's body, turning it into a grotesque figure. When Enfield tries to describe Hyde to Utterson, he says that "[h]e is not easy to describe … He's an extraordinary-looking man, and yet I really can name nothing out of the way" (11). Enfield cannot grasp or "name" Hyde's appearence because Hyde does not fit into any designated category; yet, Enfied still tries to describe him: "There is something wrong

with his appearance; something displeasing, something downright detestable. … He must be *deformed* somewhere; he gives a strong feeling of *deformity*, although I couldn't specify the point" (11, italics by me). Later in the novel, the narrator states that not only Enfield but also all people who encounter Hyde have the same opinion: "Only on one point, were they agreed; and that was the haunting sense of unexpressed deformity with which the fugitive impressed his beholders" (24). In addition to deformity, people also observe an abnormality, inhumanity, or inorganic features in Hyde. Lanyon states that "there was something abnormal and misbegotten in the very essence of the creature that now faced [him]" (45) and the narrator explains that Lanyon "thought of Hyde, for all his energy of life, as of something not only hellish but inorganic" (60). One can observe in people's reactions towards Hyde that his figure generates uneasiness because it represents the fear of deformity which is probably harboured in the unconscious of the onlookers. As a mad scientist narrative, then, *Jekyll and Hyde* makes the point that creatures that are conceived by an ill-managed scientific experiment have an uncanny look and people almost always feel that what they see is something familiar but at the same time alien or unnatural.

The mad scientist's act of conceiving a creature which turns out to be physically deformed and inorganic is the legacy of *Frankenstein* and this trope was handed down by Shelley to the authors of the late-Victorian period. Among all the works that are examined in this chapter, *Dr. Moreau* is the most loyal to *Frankenstein* in its representation of the monster. Moreau's main occupation is surgery; vivisection, grafting[60], and combining different body parts, and his aim is to create beings in the human form. Nonetheless, like Frankenstein's creature, Moreau's hybrids turn into grotesque monsters rather than looking like human beings. Prendick remembers the first time when he read about Moreau's experiments in a newspaper under the title "The Moreau Horrors!" (46). His experiments are horrifying for people because their objective is to modify bodies and this objective implies the production of unnatural, grotesque chimeras, or in Moreau's explanation, of manufacturing monsters through

[60] Graft is "[a]n isolated portion of living tissue that is joined to another tissue, either in the same or a different organism, the consequent growth resulting in fusion of the tissues" (Daintith 367). Although grafting is usually applied to plants to produce graft hybrids (or chimeras), it may also be used on animals or humans. Moreau explains "that it is a possible thing to transplant tissue from one part of an animal to another, or from one animal to another; to alter its chemical reactions and methods of growth; to modify the articulations of its limbs; and, indeed, to change it in its most intimate structure" (108-9). What Moreau actually aims to do is to form a human body through grafting animal tissues into one another.

grafting (108). When Prendick actually encounters a hybrid (M'ling) for the first time, he describes him "a misshapen man, short, broad, and clumsy, with a crooked back, a hairy neck, and a head sunk between his shoulders" (14). He uses depictions that can be attributed both to a human being and to an animal. Just as Enfield cannot describe Hyde, Prendick fails to categorize M'ling but he can only grasp his deformity: "In some *indefinable* way the black face thus flashed upon me shocked me profoundly. It was a singularly *deformed* one" (14, italics by me). Other features that attract Prendick's attention are "the grotesque ugliness" and the "repulsive and extraordinary face" of the creature (15). As a being that is created artificially by a scientist, M'ling can only look "extraordinary" and "unnatural" to Prendick who remarks that "it gives [him] a nasty little sensation … It's a touch— of the diabolical, in fact'" (52). What Prendick tries to convey is the uncanny feeling that the creature evokes in him. Prendick is lucky not to have encountered the real freak of science, which is Moreau's "thing." While relating its escape and death to Prendick, Moreau cannot give any name to it because there is no word in any human language to define it. Yet he attempts to describe it as "a limbless thing, with a horrible face, that writhed along the ground in a serpentine fashion" (118). This "thing" might be one of the most striking representations of a scientifically-created "freak" in the mad scientist narratives of nineteenth century.

Despite his invisibility, Griffin also manages to look grotesque when he puts on clothes and uses bandages to ironically hide the invisible parts of his body, including his face. The moment he appears at the inn for the first time people start to feel uneasy because he is an odd figure with a "white-bound head, the monstrous goggle eyes" (9). People can never get used to his looks and they always sense that there is something wrong with his appearance. Mrs. Hall thinks that he might have had an accident that disfigured him (5) and her husband keeps referring to Griffin as his "grotesque guest" (12), while Henfrey, the man who comes to fix the clock in his room, thinks that Griffin's figure with a "bandaged head and huge blue lenses" is "uncanny-looking" (11). This feeling of uncanny, which is typically generated by the monsters of the mad scientists, in fact results from the intrusion of science into natural phenomena. Wells is able to create this sense by both depicting the invisibility of Griffin as an uncanny element – people can hear or feel him, but cannot see him; therefore define him –, and making his visibility grotesque by having him borrow clothes from a theatre. His

appearence seems outlandish because he has to use props to make his nose and eyes visible. Paradoxically, his attempts to hide the unnatural result of his experiment turns him into a disliked person as the narrator reveals that "people in Iping, on the whole, agreed in disliking him. His irritability, though it might have been comprehensible to an urban brain-worker, was an amazing thing to these quiet Sussex villagers" (23). In addition to his own grotesque nature, Griffin creates grotesque beings through his experiment. Before working on himself, Griffin experiments on a cat, yet he fails to make it completely invisible because of the "pigment stuff … at the back of the eye in a cat" called "*tapetum*" (107). As a result, the cat's body becomes invisible but not its eyes, giving it an eerie look. Like Moreau's "thing," the cat becomes a freak that is created through a scientific operation.

Apart from the unethical scientific practices that produce monsters and freaks, the second essential element in mad scientist narratives is the scientist himself, whose personality and actions determine the outcome of the experiment. The prominent attributes of the British culture in the Victorian period were "[t]he British constitutional model, the spirit of gentlemanly conduct, innovations in science and technology, the great British navy" (Claeys xi). Of these four elements, the second and third ones were the main concern of mad scientist narratives that explored the conflicts between the two; namely, scientific discoveries and the behaviours of the scientists. In the nineteenth century, science was held in higher esteem than any other age that preceded it and it was seen as the major instrument of progress if used wisely. However, there was also a suspicion towards the attitudes of the scientists who were becoming more professional and secular but at the same less sentimental. Late-Victorian mad scientist narratives explored this conflict by showing how the new sciences could excite a rational, intelligent scientist and prompt him to stop caring about gentlemanly conduct as it had no use in his studies. Consequently, the rise of professional sciences resulted in a slight shift in the representarion of the mad scientist as the authors of the *fin de siécle* reflected the scientist as a more sinister, violent, and less remorseful person than their early-century counterparts.

The first important aspect of a mad scientist's personality is his high intelligence which makes the mad scientist a threatening figure because it is his intellect that helps him to be successful in his experiment in the first place. Without exception, all fictional

mad scientists of the nineteenth century have remarkable brainpower; they are able to achieve results that their colleagues only dream of achieving. In *Jekyll and Hyde*, Dr. Jekyll is described as a man with "an honourable and distinguished future" (47) and his titles are listed as "M.D., D.C.L., L.L.D., F.R.S., etc." (13). This means that he is both a Doctor of Medicine and Doctor of Laws, and also a fellow of the Royal Society of London, which is one of the most esteemed titles a scientist could receive. As a prodigious chemist, Jekyll is able to produce his own chemical compounds successfully. The narrator states that the powders he use are his "private manufacture" (43) and it is this individual skill that allows him to blend together his trasformative liquid. Similarly, Dr. Moreau is an exceptional figure among his colleagues. Prendick remarks that Moreau is "a prominent and masterful physiologist, well-known in scientific circles for his extraordinary imagination and his brutal directness in discussion" (34). He also has many publications on various subjects; he has published "surgical works and editions of the Latin and Greek classics" (32) and articles on "some very astonishing facts in connection with the transfusion of blood, and in addition was known to be doing valuable work on morbid growths" (34). With this information about his outstanding background, it is made clear by Wells that Moreau can indeed forge living and breathing hybrids as he has sufficient intelligence and knowledge to create them. Wells's other mad scientist Griffin is also portrayed as a highly intelligent person. He is in fact a young prodigy who excels among his fellow students and wins "the medal for chemistry" (88). He also mentions the fact that he was younger than Dr. Kemp when he earned the award; thus, it is not surprising that he has surpassed Kemp in his scentific studies and is able to turn himself invisible, a phenomenon that was thought impossible by all scientists of his time.

In mad scientist narratives, genius individuals are always dedicated to science more than any other thing in their lives. Thus, the main conflict in such narratives stems from the scientist's inability to show affection towards fellow human beings, animals, or even towards himself because his priority is always the rational scientific endeavor which he follows obsessively. As Anne Stiles argues, the two main stereotypes that shape the late-Victorian mad scientist are "the alchemist" – not in the medieval but in the Faustian framework – who "obsessively pursues arcane intellectual goals redolent of ideological evil" and the "unfeeling scientist who has 'suppressed all human affections

in the cause of science'" who is "clearly a legacy of Shelley's Victor Frankenstein" (323). Stiles remarks that Moreau and Jekyll are the examples of this combination, but Griffin can also be added to her list. In *Jekyll and Hyde*, although Henry Jekyll's choice to separate the evil in him might be interpreted as an emotional decision, it actually means that he aims to (ab)use science for his own curiosity. Jekyll is not sure if he can indeed turn into someone else but he is curious to know. Therefore, although at first he hesitates to "put this theory to the test of practice" and knows "well that [he] risked death," he still follows the procedure as "the temptation of a discovery so singular and profound, at last overc[omes] the suggestions of alarm" (50). In other words, even the probability of a scientific breakthrough is more important to Jekyll than his own life. As such, in order to make that scientific discovery, Jekyll keeps repeating the experiments until he achieves the result he wants. He keeps "an ordinary version-book" that contains "little but a series of dates" and Lanyon observes that those dates "covered a period of many years" (44). Along with "the record of a series of experiments" found in his drawer (44), these documents indicate that Jekyll has been working obsessively on a singular subject for a long time. It can also be understood from his lack of going out that Jekyll obsessively devotes his life to scientific investigation and experimentation.

A similar inclination can be observed in Griffin's attitudes. His perception of life is so rational and unemotional that he puts science above any kind of human relationship in his life as he thinks that only science can answer his questions and make him satisfied. Consequently, he dedicates himself to making a discovery that would make clear the possibility of invisibility: "Optical density! The whole subject is a network of riddles--a network with solutions glimmering elusively through. And being but two-and-twenty and full of enthusiasm, I said, 'I will devote my life to this'" (99). After making this decision, Griffin goes as far as stealing money from his own father in order to acquire the tools he needs for his research. His father shoots himself because "the money was not his" (104), and upon this event Griffin goes back to his hometown to organize his father's funeral. However, as his mind is still on his "research," he does not give any attention to the preparation of the funeral: "I did not lift a finger to save his character. I remember the funeral, the cheap hearse, the scant ceremony, the windy frost-bitten hillside, and the old college friend of his who read the service over him--a shabby, black, bent old man with a snivelling cold" (105). Later he even admits that he

"did not feel sorry for [his] father," which proves his utmost indifference towards his family (and friends), whom he sees as "inane" beings compared to the "reality" of his scientific study (105). His attachment to his study creates a contrast with how indifferently he behaves towards human beings. When he is occupied with his experiment he becomes "so absorbed in his work, pouring little drops out of the bottles into test-tubes," that he does not become aware of the people around him (17). Mrs. Hall notices that Griffin works "very fitfully. Some days he would come down early and be continuously busy" (21). Griffin himself says that he works "like a nigger" (99), which gives the meaning that he works hard and that he has become a slave of his own obsession.

Moreau is another example of the obsessive "unfeeling scientist." He is known as a very dedicated scientist and even though he is condemned by the society and driven away from his homeland, he does not stop experimenting. It is revealed by Prendick that Moreau chose pursuing his investigations over "his social peace … as most men would who have once fallen under the overmastering spell of research" (34). This description, which denotes that Moreau has fallen under the dominance of his study, complements Griffin's statement that he has turned into a slave. Another resemblance between the two characters is their excitement when they decide on what scientific study to pursue. After he realizes that he can indeed create hybrids and even human beings out of animals, Moreau gets extremely enthusiastic: "You cannot imagine what this means to an investigator, what an intellectual passion grows upon him! You cannot imagine the strange, colourless delight of these intellectual desires!" (75). Moreau feels "passion" and "desire" for science as though it is his lover and zealously dedicates his life to his study. He states that he has been studying "for twenty years altogether—counting nine years in England— … and there is still something in everything I do that defeats me, makes me dissatisfied, challenges me to further effort. Sometimes I rise above my level, sometimes I fall below it; but always I fall short of the things I dream" (78). Moreau is never satisfied because he always craves more knowledge and more authority. It can easily be claimed that he lives to obtain greater scientific power and nothing else is more significant for him in his life.

Since Moreau is dauntlessly devoted to science and has a completely rational approach towards life, he sees animals as test subjects to work with rather than as

sentient beings that can feel pain. When a new animal (the puma) arrives at his island, he states that he is "itching to get to work again—with this new stuff," and as he says this "[h]is eyes gr[o]w brighter" (31). A new animal for Moreau means new scientific experience since he thinks that he learns something different with each operation and develops himself as a surgeon. Once he starts experimenting, he sees the puma as "no longer an animal, a fellow-creature, but a problem" (75). Because he regards animals as experimental objects and scientific problems to be solved, Moreau feels no horror when he is operating on them and tells Prendick to "spare [him] those youthful horrors" when he voices his discomfort about vivisection upon seeing the "cut and mutilated" puma which is still alive (70). As Prendick insists on the cruelty of vivisection, Moreau asserts that for the rational scientist pain "is such a little thing! A mind truly opened to what science has to teach must see that it is a little thing" (74) and then confesses: "Sympathetic pain,—all I know of it I remember as a thing I used to suffer from years ago" (75). It can be inferred from his words that Moreau sees emotions as obstacles on the way to achieve true scientific knowledge. Hence, for him sympathy is an illness that hinders him from working with a "healthy" mind. In addition to sentimentality, another obstacle for Moreau is ethics. He reveals to Prendick that he has "never troubled about the ethics of the matter" (75) because it would prevent him from continuing his studies. This instance brings to mind the letter of anti-vivisection activist George Hoggan (1837-1891) written to the Society for the Prevention of Cruelty to Animals in order to draw attention to the insensibility of certain scientists. Hoggan wrote: "Were the feelings of experimental physiologists not blunted, they could not long continue the practice of vivisection. They are always ready to repudiate any implied want of tender feeling, but I must say that they seldom show much pity; on the contrary, in practice they frequently show the reverse" (qtd. in Agruss 269). If this letter was not written in 1875, one could be able to claim that Hoggan was describing Moreau. Nevertheless, the opposite can still be argued as Wells clearly makes a reference[61] to Hoggan and many other anti-vivisection activists in his novel and his fictional mad scientist Dr. Moreau indeed represents all of the real unfeeling vivisectionists of the Victorian age.

[61] Prendick informs that the reason behind Moreau's exile is the article of an editor who revealed his unethical vivisection experiments and "appealed to the conscience of the nation" (34), just as Hoggan appealed to the conscious of the SPCA.

Their obsession with science not only makes the mad scientists indifferent towards living beings around them, but also towards themselves. One of the defining characteristics of mad scientists is their inclination towards self-experimentation and self-harm. They are so intrepid in their studies that they may go as far as applying the experiment on themselves without regarding the possible deadly consequences. In Jekyll's case, the aim of the experiment in the first place is to administer it on his own body, since the object of study is himself. After many attempts to produce the potion, Jekyll finally decides to drink it and immediately experiences "racking pangs … a grinding in the bones, deadly nausea, and a horror of the spirit that cannot be exceeded at the hour of birth or death" (50). After the transformation, he comes to himself "as if out of a great sickness" (50). Lanyon also observes the painful transformation of Jekyll and narrates it in his letter to Utterson as follows: "He put the glass to his lips and drank at one gulp. A cry followed; he reeled, staggered, clutched at the table and held on, staring with injected eyes, gasping with open mouth" (47). Such severe suffering after self-experimentation is also observed in Griffin's metamorphosis which gives him unendurable pain. After he takes "the drugs that decolourise blood" (113), Griffin begins to experience a "horrible" transformation. He says that he "had not expected the suffering. A night of racking anguish, sickness and fainting. I set my teeth, though my skin was presently afire, all my body afire; but I lay there like grim death" (112). The fact that both scientists readily venture upon such insensible self-experimentation reveals how obsessive they are about achieving success.

Another characteristic of the mad scientist that is related to his insensibility is his preference for isolation and secrecy. This feature is best observed in their choice to work alone in hidden places and their refusal to form close relationships with people around them. Instead of becoming a part of a scientific community and working in public institutions, late-Victorian mad scientists construct their own laboratories in order to study alone and secretly. They do not tell anything about their studies to their friends and colleagues either. Jekyll, for instance, keeps his experiment secret from Utterson and only tells him that "this is a private matter, and I beg of you to let it sleep" (20). He later reveals to Utterson that he "mean[s] from henceforth to lead a life of extreme seclusion" and asks him to let him "go [his] own dark way" (30). When Utterson comes to visit Jekyll in spite of his decision to isolate himself, Jekyll's butler

Poole greets him and says: “You know the doctor's ways, sir … and how he shuts himself up. Well, he's shut up again in the cabinet” (32). As the novel proceeds Jekyll becomes more and more secluded and finally locks himself away completely. Instead of sharing his scientific problems with his colleagues, he aims to solve them by himself and eventually dies alone.

Dr. Moreau and Griffin likewise adopt secluded lives. Moreau’s choice to establish his house and dissecting rooms on a faraway island is a sign of his extremely asocial and secretive character. However, it is not only his personal choice to leave England; he is in fact “howled out of the country” because of his unethical operations (34). Like Jekyll, Moreau rejects working with his colleagues and disagrees with them most of the time on scientific subjects. This is why he works better alone. Moreover, he even disregards the presence of Prendick when he arrives on his island. It is his assistant Montgomery who accompanies him all the time. Even when they eat dinner, “Moreau, who was singularly solitary in his habits” does not join them (80). Another noteworthy feature that Moreau has which is also shared by Jekyll and Griffin is the fact that he “was unmarried, and had indeed nothing but his own interest to consider” (34). Late-Victorian mad scientists are not only unmarried, but they do not have any potential wives as Victor Frankenstein does either, and there is not an instance in all three novels when the mad scientist is interested in a woman. Lack of female figures in these narratives indicates the scientists’ indifference towards romantic relationships as well as sexual ones. Since they are not easily attracted to the opposite (or the same) sex, it is easier for them to live and study alone for long periods as Griffin does when he conducts his studies in “three years of secrecy” (104) without making any intellectual or emotive transactions with his friends. After he moves to Iping, he says that the reason behind his moving there is “a desire for solitude” (10) and that he does “not wish to be disturbed in [his] work” (10) because the thinks that he can only achieve his aims when he is isolated from people; “[i]n all my great moments,” he says, “I have been alone” (103). Thus, he persistently seeks solitude everywhere he goes.

The distance of mad scientists from other human beings is partly related to their awareness of their own unique intelligence. Because of this awareness, they are predisposed towards seeing themselves at a higher place than “ordinary” human beings; therefore, they abstain from forming much contact with them. Moreover and more

importantly, they think that with their exceptional skills they can achieve through science powers that only a God could have. This self-confidence in their success clouds the mad scientists' ethical view. As Peter J. Rabinowitz argues, "on the whole, good scientists prove they are good scientists by their moments of doubt - as a consequence, moments of doubt confirm their ethical quality" (208). Over-confidence and lack of doubt are dangerous traits that might lead the scientist to perform unethical deeds. Moreover, these traits usually pit them against their pious colleagues and also against religion in general as in the example of Dr. Jekyll's notorious disrespect towards the authority of the Bible. His colleague Lanyon sees Jekyll's studies as heretical while his friend Utterson notices that Jekyll has "a copy of a pious work" which he "annotated, in his own hand, with startling blasphemies" (40). These blasphemies are Jekyll's scientific findings that prove good and evil, which are put together by God in living beings, could be separated. Jekyll, like Frankenstein, wants to change God's laws because he is not content with them. He thinks that God's decision to put two opposite personalities – moral and primitive – in one body was a mistake and he wants to correct it through science: "If each, I told myself, could but be housed in separate identities, life would be relieved of all that was unbearable" (49). Jekyll believes that his plan would be a better version of God's plan for the world and humanity and he is also sure that he can realize this plan with his intelligence and chemical skills. When he is transformed into Hyde, however, Jekyll becomes the antagonist of God. In a manner that echoes Mephistopheles, Hyde offers forbidden knowledge to Lanyon, inviting him to become powerful like himself. Hyde tells Lanyon, "if you shall so prefer to choose, a new province of knowledge and new avenues to fame and power shall be laid open to you, here, in this room, upon the instant; and your sight shall be blasted by a prodigy to stagger the unbelief of Satan" (46). Unlike Jekyll, Lanyon rejects this temptation and chooses humility. This difference between them becomes more evident when Jekyll accepts that he was tempted by the power of knowledge; "in my case," he says, "to be tempted, however slightly, was to fall" (56). The pride, or hubris to be more precise, of Jekyll is one of the most crucial faults in his personality because it brings his eventual downfall. Hence, it can be argued that even though *Jekyll and Hyde* is a secular text, the influence of the "Faustian overachiever" trope is visible in it, which proves that it is still a preeminent element of mad scientist narratives in late-Victorian period

The same Faustian undertone is also discernible in Wells' works; however, his mad scientists are completely secular versions of that old myth because of Darwinian influence. As a student of T. H. Huxley, Wells ingrains Darwinism into all of his fictional works and *Dr. Moreau* and *The Invisible Man* are no different. As Claeys explains, Darwinism "was deeply unsettling to theologians and moral philosophers in particular, but increasingly also to the wider public … Christ became man, but man fell even further, from angel to ape. God became a mere hypothesis, or gave way to the worship of power" (Claeys xv). Thus, the concepts of man and God have different connotations for Wells. His mad scientists worship power, not in a religious but in a scientific way. At first there seems to be religious undertones of Moreau's creation of hybrids. He starts with the sheep, but fails. Then he goes on with a gorilla "and upon that, working with infinite care and mastering difficulty after difficulty," he makes his "first man. All the week, night and day, [he] mould[s] him" (76), like the "moulding" of man from clay by God. However, it is made clear that Moreau does not regard creation as a spiritual act and he does not attribute any divinity to the human body. He says that he "might just as well have worked to form sheep into llamas and llamas into sheep" (73). Moreau wants to change the form of animals not because he wants to be a God of new species (like Frankenstein), or because he sees a fault in the creation of the human form (like Jekyll). If he is a God, he is a different kind; the God of a Darwinian age. As Emelie Jonsson states "[t]he character of Moreau, 'as remorseless as Nature,' embodies both evolution's aimless exploration of 'the plasticity of living shapes' and the cruel Creator implied in the universe's grimace" (306). Unlike Hyde, he does not work on erasing the bestiality in human beings, but the one in animals by turning them into human beings. This twisted aim looks like it would fail even in the beginning, yet Moreau still tries: "First one animal trait, then another, creeps to the surface and stares out at me. But I will conquer yet. Each time I dip a living creature into the bath of burning pain, I say, 'This time I will burn out all the animal; this time I will make a rational creature of my own'" (78). Moreau's creations never turn into rational beings that he desires because they lack what Frankenstein's creature had: a vital spark, or more precisely, a spirit. As a Darwinian god, Moreau tries to mould humans only physically but he never thinks of breathing any "spirit" into them.

Another Faustian aspect of Moreau is his curiosity, which leads him to be tempted by the possibilities offered by science. He meddles with the animal body because he is curious; because he wants to see how far science can go. He says to Prendick: "You see, I went on with this research just the way it led me … I asked a question, devised some method of obtaining an answer, and got a fresh question. Was this possible or that possible? … I wanted—it was the one thing I wanted—to find out the extreme limit of plasticity in a living shape" (75). At first he really achieves a godlike position among his creations. Prendick has a theory that "after animalising these men, [Moreau] had infected their dwarfed brains with a kind of deification of himself" (59). The hybrids indeed see Moreau as their god and they chant the same lines continually:

> 'His is the House of Pain.
> 'His is the Hand that makes.
> 'His is the Hand that wounds.
> 'His is the Hand that heals. (59)

It is clear from their chanting that they regard Moreau as an omnipotent being. Not only the hybrids but also his assistant Montgomery deifies Moreau because of his great skills in science. This is why after Moreau is killed by the puma, Montgomery finds it hard to believe that he is dead. Prendick does "not think it had ever occurred to [Montgomery] that Moreau could die" because Montgomery "had been strangely under the influence of Moreau's personality (106). The fact that even his assistant Montgomery believes Moreau is a kind of god does not prevent him from getting brutally murdered by his own creation. Like Jekyll/Hyde, his unyielding nature makes him go too far in his studies, which brings his downfall in the end.

Griffin is also a self-confident scientist who thinks that he is no ordinary man partly because of his profession. He thinks that "common men, even common mathematicians, do not know anything of what some general expression may mean to the student of molecular physics" (99). Moreover, he has complete trust in his intelligence and thinks that he can achieve great fame and power through his brilliant discovery. He does not talk about his work to anyone because he wants to "flash [his] work upon the world with crushing effect and become famous at a blow" (102). He is also proud that he has discovered such a godlike scientific power as invisibility: "I

beheld, unclouded by doubt, a magnificent vision of all that invisibility might mean to a man--the mystery, the power, the freedom. Drawbacks I saw none" (103). These sentences reflect the over-confident character of Griffin who indeed turns into a kind of an omnipresent God when he reaches his goal to become invisible. The narrator occasionally calls him as "the Voice" when he is out of his clothes because he cannot be seen while he can be heard anywhere. This power makes him have a sense of exaltation and he feels "as a seeing man might do, with padded feet and noiseless clothes, in a city of the blind" (116). Conscious of the greatness of his capability, Griffin chooses to use his powers to create authority over people and gradually turns into an evil figure like Hyde. He even picks a minion for himself to do errands. He says to him: "I've chosen you … You have to be my helper. Help me--and I will do great things for you. An invisible man is a man of power" (52). With the help of his invisibility, Griffin can be anywhere, watching everyone all the time. Therefore, his minion Mr. Marvel has no choice but to obey him. Griffin does not stop with recruiting minions; his ultimate aim is to rule all Britain, starting from Port Burdock. He writes to Kemp that "Port Burdock is no longer under the Queen, tell your Colonel of Police, and the rest of them; it is under me--the Terror! This is day one of year one of the new epoch--the Epoch of the Invisible Man. I am Invisible Man the First" (153). As these sentences indicate, Griffin is a perfect example of a scientist corrupted by too much scientific power. He thinks that he can become an emperor and rule people with terror; yet, this over-confidence brings his end when he stubbornly pursues Kemp, believing that no one can hurt him, but falls into the trap of townspeople who together beat him to death.

As can be seen in the examples, their hubris and lack of religious/moral values might turn mad scientists into figures who like to perform evil deeds just for the sake of malice and for testing their limits because they want to make use of their godlike powers. This aspect makes them different from early-nineteenth century mad scientist Victor Frankenstein who always carries a sense of guilt and remorse with him throughout the novel. Hence, it can be argued that in the late-Victorian period mad scientists, especially the ones in the fiction of Wells, began to be depicted as pure evil beings, with little or no remorse. Moreover, both Stevenson and Wells made use of Lombrosian criminology which was popular at their time to highlight the evil nature of their mad scientists. Lombroso asserts that born criminals are characterized by "lack of

moral sense … absence of remorse … self-importance, and, finally, an underdeveloped concept of divinity and morality" (91). All three mad scientists have these traits; therefore, they are all criminals. This means that they are less likely to abstain from violence than an average human being. Another aspect of Lombroso's theory on criminality is his argument of criminal insanity. In the third edition of his book *Criminal Man*, Lombroso "not only introduces the term born criminal but also reconfigures the relationship between criminality and insanity. … he concedes that crime and mental illness merge in the morally insane, individuals who appear normal in intelligence but are unable to distinguish between good and evil" (Gibson and Rafter 10). In other words, for Lombroso insanity did not mean lack of intelligence, but lack or moral sense. Therefore, the madness of the late-Victorian mad scientists can be read as a moral madness which is reflected in their violent actions towards other living beings and in their inability to feel remorse for hurting or killing them. These two features make them truly evil beings.

Such violent acts are performed by Jekyll when he turns into Hyde; the reflection of the evil within him. The fact that Jekyll narrates his story even when he is Hyde proves that Hyde is not a second personality within himself, but a name he gives to himself when he acts violently. Nabokov asserts that *Jekyll and Hyde* is not a novella about split personality or doppelgängers, but one that depicts only one person who does good and evil when he wishes. According to him, Jekyll is "a composite being, a mixture of good and bad … [h]e is a hypocritical creature concealing his little sins" (185). Thus, when Jekyll says "*I knew myself*, at the first breath of this new life, to be more wicked, tenfold more wicked … Edward Hyde, alone in the ranks of mankind, was pure evil" (50-1, italics by me), he in fact talks about his own feelings, not Hyde's. He attacks people for no other reason than acting violently, he can easily kill innocent, defenseless, or old people such as M.P. Sir Danvers Carew, whom he beats to death with a cane (22). After he kills the M.P. as Hyde, Jekyll feels little remorse but later the feeling goes away and is "succeeded by a sense of joy" because as Jekyll, who is Hyde's "city of refuge," he could not be accused (57). Jekyll uses his good side to hide the evil and rejects his crimes, saying "I can scarce grant that I committed it" (53). Blaming Hyde for his crimes means that Jekyll does not suffer morally. Jekyll/Hyde, then, is an appropriate example of a morally insane criminal. There are references in the

book to this kind of insanity by directly referring to both Jekyll and Hyde as "mad" or "insane" people. When Jekyll performs passionate or mad acts, Utterson does "not like his friend's feverish manner" (25) and Lanyon also thinks "[u]pon the reading of [Jekyll's] letter" that his "colleague was insane" (43). When Mr. Guest talks about Hyde, he says that "[t]he man, of course, was mad" (27). Both Jekyll and Hyde are called mad when they are frantic or savage, not when they are mentally ill. Thus, they can be regarded as fictional illustrations of Lombroso's morally insane criminals.

Dr. Moreau's madness is also associated with his lack of moral sense and remorse. While conducting his "wantonly cruel," unethical vivisection operations (34), he does not feel any sympathy towards the animals. He is of the opinion that "[t]he study of Nature makes a man at last as remorse-less as Nature" (75). As a result of having a Darwinian point of view towards the nature, he decides to adopt its cruelty which is directed towards animals and humans equally. Thus, like the nature, Moreau makes no distinction between hurting animals or humans and continues vivisecting the creatures even after their bodies partly turn into human bodies. His cold-blooded experiments are never approved by people with conscience such as the captain of *Ipececuanha* who calls Moreau as a "lunatic" and his island as an "infernal island" (16). Similarly, Prendick associates Moreau's malice with his aimless cruelty which is a sign of his madness: "Had Moreau had any intelligible object, I could have sympathised at least a little with him. ... But he was so irresponsible, so utterly careless! His curiosity, his mad, aimless investigations, drove him on" (95). Prendick thinks that Moreau's experiments are pure evil since they have no utility; they are only conducted because Moreau wants "to find out the extreme limit of plasticity in a living shape" (75). Moreau's experiment is both violent and useless (for humanity); hence, he is not a Baconian or Benthamite[62] scientist. Jeremy Bentham (1748-1832) thought that vivisection should not be prohibited if its outcome would be useful for mankind. Nonetheless, if it is performed for the sake of mere sadism, than the performer is an evil scientist. He wrote that he did not have "any objection to the putting of dogs and other inferior animals to pain, in the way of medical experiment, when that experiment has a

[62] This word is an adjective used for aspects that are related to Jeremy Bentham's utilitarian philosophy. According to Bentham's understanding of utility, "the proper end of action is to achieve the greatest happiness of the greatest number" (Blackburn 41). Utilitarian philosophy was mainly applicable to the happiness of human beings, not that of the animals which could be sacrificed for the progress of humankind.

determinate object, beneficial to mankind, accompanied with a fair prospect of the accomplishment of it. But I have a decided and insuperable objection to the putting of them to pain without any such view" (qtd. in Agruss 267). Prendick's comments reveal that Dr. Moreau's approach to vivisection corresponds to the second one in Bentham's explanation. Therefore, Moreau's experiments are categorized as useless and evil even for the defenders of vivisection like Bentham.

Griffin's madness is likewise an immoral and remorseless one. As "an intensely egotistical and unfeeling man" (151) with a "brutal dream of a terrorised world" (148), Griffin is indeed one of the most dangerous and fierce mad scientists in the history of British literature. Although at first he hurts people because he has to, later it turns into a habit and he even begins to enjoy it. He sets "to smiting and overthrowing, for the mere satisfaction of hurting" (66). As he spends more time being invisible he thinks of going further than just hurting; he starts to plan murder. He tells Kemp that "invisibility, in fact, is only good in two cases: It's useful in getting away, it's useful in approaching. It's particularly useful, therefore, in killing … Invisible Man, Kemp, must now establish a Reign of Terror … He must issue his orders ... And all who disobey his orders he must kill, and kill all who would defend them" (142-3). Although Kemp disagrees with Griffin and calls the police to arrest him, Griffin escapes and decides to put his plan in action by killing Kemp first, demonstrating Lombroso's theory that "morally insane repay hatred with hatred. Even when the cause is slight, they react with anger, envy, and vengeance" (Lombroso 215). However, Griffin cannot restrain himself and kills someone else before he attempts to kill Kemp. He narrator explains that Griffin "used an iron rod dragged from a broken piece of fence. He stopped this quiet man, going quietly home to his midday meal, attacked him, beat down his feeble defences, broke his arm, felled him, and smashed his head to a jelly" (150). This violent attack echoes Hyde's murder of an innocent man in a similarly brutal way. Another similarity can be observed in the way Kemp refers to Griffin. Kemp says that Griffin is "not only invisible, … but he's mad! Homicidal!" (96), and later adds that he is "inhuman. He is pure selfishness. He thinks of nothing but his own advantage, his own safety" (150). He relates all of these features to his being "mad," which in fact means that he is morally insensible and villainous.

In all of the major late-Victorian mad scientist narratives, there is a foil scientist or a friend whose benevolence contrasts with the evil character of the mad scientist. Contrary to the moral madness of the mad scientist, these foils are "healthy individuals," whose actions, according to Lombroso, are "determined by motives and desires that do not clash with the collective good" (220). Accordingly, "healthy" foils of mad scientists in fiction are social, gentlemanly, respectable Christian people with good conduct and moral values. In *Jekyll and Hyde*, there are two people that correspond to this figure: Mr. Utterson and Dr. Lanyon. Utterson is shown as a devout man whose "custom of a Sunday" is "to sit close by the fire" and read "a volume of some dry divinity" (12). It is stated that "[h]is past was fairly blameless" which contrasts with Jekyll's sinful past and Utterson becomes even more benevolent when it is revealed that "he was humbled to the dust by the many ill things he had done, and raised up again into a sober and fearful gratitude by the many that he had come so near to doing" (19). This is again a reference to Jekyll's personality; unlike Utterson, Jekyll does not want to accept the ill things that he has done and repent, but he wants to redirect his sinful side to a different personality that he creates. Utterson does not only become a foil to Jekyll by his personality and actions, but he also advices Jekyll to lead a "normal" life. He stresses that Jekyll stays "too much indoors" and tells him: "You should be out, whipping up the circulation like Mr. Enfield and me ... Come, now; get your hat and take a quick turn with us" (32). This call to senses reminds Henry Clerval's advices to Victor Frankenstein and just like his predecessor Jekyll is not affected by his friend's words and pursues his experiments fervently. The real foil to Jekyll, however, is Dr. Lanyon who is Henry Jekyll's "colleague and old school-companion" (41) and a scientist with whom Jekyll "may have differed at times on scientific questions" (42). Unlike Jekyll who mostly lives away from his friends, Lanyon lives in "Cavendish Square, that citadel of medicine" (13) where many prominent scientists reside and collaborate. The choice of the living place of Lanyon indicates that he is a true Baconian man of science; he does not hide his studies and he is a part of a community. Moreover, he thinks that Jekyll's practices are "scientific heresies" (20) because they do not comply with the "good science" that is agreed upon by respected scientists. In this sense, Lanyon becomes the voice of sensible and moral science while Jekyll's studies represent immoral and heretical science.

Griffin's foil Dr. Kemp is another example of the fictional benevolent scientist. He is older and more experience than Griffin, and has a much more serene personality. He is described as "a tall and slender young man, with flaxen hair and a moustache almost white, and the work he was upon would earn him, he hoped, the fellowship of the Royal Society, so highly did he think of it" (77). Unlike Griffin, Kemp wants to be appreciated with his scientific success rather than forming authority on people by using brutal force. He also rejects solitary life and wants to be a part of a community of scientists who work for the advancement of science. These aspects are the opposite of those of Griffin who works secretly and alone, and uses his experiment only for his own benefit. Kemp wants Griffin to reveal his work to the public and tells him, "[d]on't be a lone wolf. Publish your results; take the world--take the nation at least—into your confidence" (143). However, Griffin does not listen to him and keeps his power only to himself. Another contrast between the characters is the fact that while Griffin is usually frantic, Kemp is a rational and calm man. He is "no believer in voices" (86) and even when Griffin approaches him invisibly, "[h]e does not appear to have been either very much frightened or very greatly surprised" (87). Moreover, despite his interest in the science behind Griffin's invisibility, Kemp does not approve any of Griffin's decisions or actions. When Griffin says that he knocked a man on the head, Kemp reminds him that his act goes againts "[t]he common conventions of humanity" (134). He constantly reminds Griffin, who denies that he is a robber and a potential murderer, of the evil in his deeds. Kemp's voice, like the voices of all benevolent scientists in mad scientist narratives, represents the voice of morality and conscience.

The foil character in *Dr. Moreau* is the narrator Edward Prendick and partly Moreau's assistant Montgomery. While Prendick and Montgomery are conversing, it is revealed that Montgomery "did [his] Biology at University College" (11) and later Prendick tells Moreau that he studied natural history and biology; he "spent some years at the Royal College of Science, and had done some researches in biology under Huxley" (29). It is understood that both of them are educated in science as Moreau does; however, they do not share Moreau's bad traits. Much as Montgomery assists Moreau in his animal trade, he feels disturbed by his vivisection experiments. Prendick notes that Montgomery always "had been in a state of ill-concealed irritation at the noise of the vivisected puma" (38). However, Prendick also thinks that Montgomery is "tainted"

because of "[h]is long separation from humanity, his secret vice of drunkenness, his evident sympathy with the Beast People" (97). Montgomery indeed has good relations with the hybrids because he feels sorry for them. When Prendick gradually realizes how cruelly the animals are treated and how it is not their fault to be who they are, he starts to understand Montgomery's point of view. As Jonsson remarks, "[w]here Moreau sees a quasi-teleological vision of spiritualized evolution that he can influence, Prendick sees suffering creatures that would have been better off as beasts unconsciously guided by instinct" (308). In other words, Prendick believes that one should not interfere with the lives of any being in nature even though they act with their instincts. Moreau's anthropocentric view that the beast should be conquered by the human is thus challenged by Prendick who accepts that both animals and humans have their own place which should not be disturbed by science.

There is a slight twist to the benevolent scientist figure in *Dr. Moreau* which can be expected from a work of late-Victorian British literature. Wells adds an implication to his narrative that each of the seemingly "good" scientists have the potential of becoming "evil" ones like Moreau. There are latent traits of a mad scientist in Montgomery's personality, but he does not have the cold genius required to become one. He states that he had been "bullied by nurses and schoolmasters at their own sweet will" for sixteen years, and "five in London grinding hard at medicine, bad food, shabby lodgings, shabby clothes, shabby vice, a blunder,— I didn't know any better,—and hustled off to this beastly island" (166). If Montgomery had been a genius as a student like Griffin, he would have followed a different course. Because he is mediocre at medicine, he can only become the assistant of a mad scientist. Another implication occurs at the end of the novel which leaves the readers to question if Prendick is a potential mad scientist, too. In the last chapter, when Prendick goes back to his home, he withdraws himself "from the confusion of cities and multitudes, and spend[s] [his] days surrounded by wise books." He sees "few strangers, and ha[s] but a small household" (208). The most striking detail, however, is given at the end of his explanation when he says that he "devotes" his days "to reading and to experiments in chemistry" (208). It is easy to discern that these are the common traits of a mad scientist and despite his opposition to Moreau's practices, Prendick might become another example of a mad chemist in the future. With this hint, Wells highlights the endurance

of the mad scientist trope; as long as there is a controversial science, there is a possibility that a scientist might abuse it.

*Jekyll and Hyde*, *Dr. Moreau* and *The Invisible Man* are important for the history of mad scientist trope as they continue the tradition of the modern mad scientist narrative in fiction, which was pioneered by Mary Shelley in her *Frankenstein*. As such, they present scientists as the main figures of the narrative and give enough knowledge about their background, personality and aspirations. The authors not only describe the scientific experiment, but also the causes that led to that experiment, strengthening the role of the scientist in the plot. Moreover, they manifest so many similar characteristics that it becomes possible to argue that these mad scientist narratives together establish a sub-genre of (proto)science fiction particularly in late-Victorian period. They all include remorseless malevolent characters who would become the prototypes for the mad scientists of the twentieth century cinema and they share a common theme, that of the corporeal transformation of human/animal bodies, which stand for a modern version of the alchemists' dream of transmuting material bodies. Lastly, but not the least, they represent a complete break from the earlier narratives that included alchemists or magicians by treating mad scientists and their experiments in a secular manner unlike their predecessor *Frankenstein* which included elements of alchemy and natural philosophy. In short, these three novels take the prototypical mad scientist trope from *Frankenstein* and give it its established form which prevails until today.

## CONCLUSION

When the history of the mad scientist narratives is traced, it can be noticed that although its modern form emerged in the nineteenth century, the fictional mad scientist in fact derives from a very old literary trope of the evil alchemist or magician. As explored in Chapter I, its roots go back as far as the Middle Ages, but its seeds were planted even before that with the ancient myths and legends which advised people not to surpass the boundaries of earthly knowledge and not to crave godly powers. There is little difference between the moral of Pandora's Box or the Fall of Adam and Eve narratives that warn against irresponsible curiosity and the modern or proto-modern mad scientist narratives that are analysed in this thesis. In a similar way, there seems to be nearly no distinction between Daedalus's inventions which always end up with catastrophe (the birth of Minotaur, Icarus's death) and the discoveries of Victor Frankenstein, Henry Jekyll, Doctor Moreau, and Griffin who create monsters and whose experiments result in destruction and the deaths of many people. All of these stories echo the timeless warning that humans should be careful when "creating" new objects; otherwise their inventions might bring deadly results.

Claiming that this warning remained in all ages without going through any changes would be erroneous as proved in the chapters of this thesis. Throughout human history, not all knowledge was deemed dangerous and not all radical scientists were seen as evil or mad figures. In this sense, a distinction must be made between sciences that theoretically go against old traditions/beliefs and those that directly disturb moral/ethical values. It should be noted after the arguments in the first and second chapters that fictional mad scientists were not based on real figures such as Copernicus who was one of the most revolutionary men of science, or on Darwin, whose theories likewise affected how humanity viewed the world and themselves. Hence, for the authors of the mad scientist narratives, the real problem must not only be new knowledge that overthrows the old one and disturbs the *status quo*, and even challenges religions. Of course some radical natural philosophers were condemned by religious authorities and some of them such as Giordano Bruno were punished with a death sentence; but their ideas never directly caused alarm among people in the sense of fear or horror. They were only condemned for their thoughts. Copernicus or Darwin challenged God and Christianity with their theories, but in practice they did not pose a

threat towards God's place in the hierarchy of creation with their experiments. Consequently, such real men of science were not the inspiration for the protagonists of mad scientist narratives in the nineteenth century. What the authors presented as threatening figures were men with the power of bringing about change not through a theoretical challenge, but through a material manipulation. The problem was, therefore, not the knowledge itself, but the application of it to corporeal bodies. As Weingart asserts, "[t]he deep-seated fears and expectations connected to our own lives are thus projected into fears and expectations about those fields of science that are concerned with the prolongation, improvement, manipulation, expansion, and termination of life" ("Power Maniacs" 286). In the Middle Ages, these fields of science corresponded to alchemy; in the nineteenth century they corresponded to (electro)chemistry, biology, and physiology. Accordingly, the fictional mad scientists of the age were based on such figures as Galvani, Aldini, Davy, Ritter, Magnan, Magendi, and other controversial experimenters.

In the nineteenth century, scientists began to have more command over nature as they gained more means to control or exploit it. As Drucker elucidates, "[t]he words in which science defined itself remained unchanged: 'the systematic search for rational knowledge.' But 'knowledge' changed its meaning from being 'understanding,' i.e., focused on man's mind, to being 'control,' i.e., focused on application in and through technology" (342-3). The most obvious outcome of this approach was the Industrial Revolution, but it also affected how sciences were applied to the body. People had domination over not only the machines but also over the human/animal bodies which were likewise seen as machines. Thus, when Aldini applied electricity to the body of a deceased criminal and made it twitch, he proved the theory that human body could be manipulated through science. Dissection and vivisection experiments likewise gave authority to the practitioner who cut and stitched together body parts, thus intruding into the sacred unity of the body. Consequently, the progressive, rational, authoritative approach of the Enlightenment natural philosophers and late-eighteenth century experimenters that made modern science possible was at the same time the cause of the emergence of fictional mad scientist figures of the nineteenth century. Although the Enlightenment spirit favoured rationality, after the Romantic revolution rationality was seen as cold and dangerous approach that clouded a person's sensibility. Hence, in order

to be shown evil, mad scientists of the nineteenth century were portrayed as people who had a rational approach towards human life and body, and whose only emotion was their passion towards science. Eighteenth and nineteenth centuries were "centuries in which great things were done at the expense of much human suffering to produce a grandiose but unstable culture" (Bernal 503). Mad scientists were the products of this approach towards culture-production. This is why they can easily sacrifice people and even themselves for the progress of science.

People in nineteenth-century Britain could observe the concrete outcomes of scientific findings which were more crucial compared to those of earlier centuries. Therefore, mad scientists of the nineteenth century were portrayed in a more serious manner than alchemists or natural philosophers of the previous ages. Frankenstein, Jekyll, Moreau, and Griffin were not mocked like the alchemists of Geoffrey Chaucer and Ben Jonson or the natural philosophers of Margaret Cavendish and Jonathan Swift's satires. They were not superficial characters that represented a whole profession, but they were main characters whose personalities were designed elaborately. They were influenced by earlier alchemists and Faust myth, but also by real scientific figures of the nineteenth century such as Humphry Davy and Johann Wilhelm Ritter (who were at the same time self-experimenters). Their malevolence was judged according to Baconian traits; being a good scientist meant working for the benefit of society, collaboration with other scientists, while being a bad scientist meant working in secret for personal gain, making use of science for immoral purposes, and manipulating the natural mechanism of life.

As such, nineteenth century mad scientists acquired some common features that highlighted their cold rationality and disregard for ethical concerns. However, there is a difference between the early and late forms of mad scientist narratives of the nineteenth century. *Frankenstein* still has traces of Romanticism; Victor Frankenstein is fascinated with alchemy, its spiritual aspects, and the godlike powers it offers to humans. He wants to make use of those powers to give mankind the gift of immortality. After failing to create a "perfect human," Frankenstein regrets his decision and becomes mentally and physically ill. His constant fainting as a result of sorrow represents his remorse. Despite the fact that he exhibits many features of the mad scientist trope such as being a genius, working secretly, getting involved in sciences that manipulate the body, and obsession

with a singular experiment, he is still not an insensitive figure who feels no guilt for his catastrophic mistakes. Late-Victorian mad scientists, on the other hand, are more self-centered people and less concerned with what happens to the people around them. They are the products of the post-Darwinian era when "[t]he rapid development of industrialization, physiology, evolutionary theory, and the mental and social sciences challenged the traditional view of people as uniquely privileged beings created in the divine image" (Otis xxvi). In this era, scientist started to have a more secular approach to the workings of the human body and this approach resulted in anxieties concerning the new developments in life sciences which were reflected in the late-Victorian mad scientist narratives that included scientists who put their personal curiosity above the well-being of humankind and have no guilty conscience.

Nineteenth-century mad scientist is such an enduring image that subsequent representations of the figure are all derivatives of Frankenstein, Jekyll, Moreau, and Griffin. In the twentieth century, mad scientists began to appear more in movies than in literary texts. However, there were still some examples of them in British and American literature, especially in science fiction novels and short stories. One well-known example is Herbert West in H. P. Lovecraft's short story "Herbert West—Reanimator" (1922). It is highly probable that Lovecraft was influenced by Frankenstein and Jekyll while designing West as this particular fictional scientist aims to revive dead bodies (which was Frankestein's goal) by injecting a uniquely prepared chemical compound (like Jekyll's potion) into their arteries. Ras Thavas, the Martian scientist in Edgar Rice Burroughs's *The Master Mind of Mars* (1927) is another example. He is a physiologist and surgeon like Moreau, but instead of animals he works on human bodies and transplants brains from older bodies to the younger ones. These two examples show that in 1920s mad scientists were still occupied with manipulating bodies[63].

After the heyday of the developments in physics pioneered by such figures as Albert Einstein, Niels Bohr, Max Planck, and Werner Heisenberg, there occurred a shift in the portrayal of the mad scientists. Fictional mad scientists produced during and after World War II were especially physicists who tried to change the bigger picture; instead

[63] Even though it does not include a particular mad scientist figure, *Brave New World* (1932) can also be shown as a descendant of mad scientist narratives. It depicts how science is used to control all aspects of life, including the creation of human beings. Like Frankenstein or Moreau, scientists in *Brave New World* are able to design living beings as they wish and then put them in bottles to grow and become alive.

of individual human bodies, they were interested in the whole world and its manipulation. De Selby in Flann O'Brien's *The Third Policeman* (written in 1939) is a good example of the mad physicist who aims to engineer his own reality through altering physical laws. A similar figure is Doctor Hoffman in Angela Carter's *The Infernal Desire Machines of Doctor Hoffman* (1972), whose "desire machines" are capable of altering reality by controlling time and space. The mad scientist as surgeon theme re-emerges in another novel of Carter, *The Passion of New Eve* (1977), in which there is a mysterious female scientist called Mother who has an underground laboratory where she transforms the body of the male protagonist into a female body. In Philip K. Dick's *The Three Stigmata of Palmer Eldritch* (1965), on the other hand, several different themes come together. Eldritch is a mad scientist who is able to alter reality like Hoffman, but he does it by using chemicals – a drug he invents called CHEW-Z – just as Griffin's body altering drug. These examples indicate that although after the 1930s physics also became a part of mad scientist narratives, the influence of nineteenth-century (electro)chemists and biologists still persisted in the twentieth century and are effective even in the twenty-first-century literature and film.

Movie versions of the mad scientist were much more popular than novel versions in the twentieth century. The movie versions are also the sources for the common misconception that all depictions of mad scientists include an element of exaggeration which gives them their defining characteristic. They are known to be over-passionate, over-furious, and these features make them look unrealistic. This is in fact an aspect of the mad scientists of the twentieth century cinema. Mad scientists of the nineteenth century fiction, on the other hand, embodied more sensible features since they were conceived as a serious criticism of the developments of the age. There is not a certain reason behind the exaggerated mad scientists in movies which resurrect the earlier narratives and their depiction of alchemists or natural philosophers as caricaturized figures. The most probable explanation would be the visual possibilities provided by moving pictures, which allowed the directors to increase the effect of horror. As such, many movie adaptations of the novels that are analysed in this thesis depict the mad scientists in a more superficial and less realistic way than the novel versions. There is one movie which mocks this attitude towards mad scientists in cinema; Stanley Kubrick's black comedy *Dr. Strangelove or: How I Learned to Stop*

*Worrying and Love the Bomb* (1964), which includes a highly caricaturized ex-Nazi German scientist that helps the Americans to avoid a nuclear attack by Russia. Dr. Strangelove's appearance and attitudes mock mad scientists in movies including many adaptations of Frankenstein, Jekyll, Moreau, and Griffin. Although these figures had exaggerated aspects, they still maintained the common elements of the nineteenth century mad scientist. *Frankenstein* is such an influential text that even "[t]he 'mad scientist' of some forgotten grade-B movie, who seeks to mate the heroine with a gorilla, would appear to be the lineal descendant of Mary Shelley's Victor Frankenstein" (Millhauser 288).

As well as influencing future portrayals, mad scientist narratives of the nineteenth-century also predicted the future of science. The authors included in this thesis asked how far science and scientists can go in modifying human and animal life and explored the answer to this question which still remains as effective as it had been in the nineteenth century. Moreover, the sciences and scientists included in their narratives turned into metaphors for scientific developments of the following ages. For instance, as the pioneer of mad scientist narratives *Frankenstein* "provided imagery and a vocabulary universally invoked in relation to scientific discoveries and technological innovation" (Haynes, "Whatever" 1). *Frankenstein* draws on one of the most powerful and controversial scientific figures in the history of humankind; the alchemist as a creator or manipulator whose main practice is transforming matter, either animate or inanimate. It also draws on one of the most powerful myths; generation of artificial humanoids which was the subject of two major stories; that of the golem and of the homunculus. In both myths, human beings (almost always male members) take on the role of God; they create beings in their own image and then give them souls. Such myths are the sources of inspiration for *Frankenstein* which explores the ethical repercussions of creating a humanoid being. Caldwell informs that "[o]ver the last few decades, the field of biomedical ethics has claimed Frankenstein as its classic narrative, a cautionary tale warning that science divorced from ethics will produce monsters" (29). This shows that *Frankenstein* is a highly relevant text for modern developments in science such as genetic engineering, cloning, building humanoid robots (androids) or cyborgs, and so on.

Consequently, the name "Frankenstein" gained other connotations than referring to a character in the novel. It even began to be used in a different context than the artificial creation of a human being; it turned into a metaphor for all of the possible catastrophic consequences of modern science. As Haynes argues, "fear of the power and change that science entails […] reemerges in the media, most often under the name of 'Frankenstein,' with any new discovery that appears to threaten social equilibrium" ("From Alchemy" 243). One example of such usage of the word is given by Spencer Weart who states that "[i]n radio broadcasts within hours of the Hiroshima bombing, pundits spoke breathlessly of uncanny forces, cosmic secrets and doomsday; the name of Frankenstein was invoked everywhere from street corners to the US Senate" (35). Although Frankenstein has nothing to do with physics or building bombs, his name still appears in news when there is a catastrophe caused by science and technology. Carwright and Baker likewise draw attention to the fact that "many of the products of twentieth century science, such as nuclear power, genetically modified food ("Frankenstein foods"), cloning, and genetic engineering make the questions that Mary Shelley raised more pertinent than ever" (139). There is even a bigger claim made by using the name Frankenstein; Brake and Hook see "Dolly the sheep, named after the prodigiously mammiferous singer, Dolly Parton … as a symbol of the *Frankenstein century*" (214, italics by me). All of these examples; "Frankenstein food," "Frankenstein century," indicate the effect of *Frankenstein* on culture and language of the West in twentieth and twenty-first centuries.

Like *Frankenstein*, late-Victorian mad scientist narratives presented concerns that remained pertinent in the following centuries. Throughout the twentieth century, most mad scientists were modelled on Dr. Jekyll, Dr. Moreau and Griffin. Although *Jekyll and Hyde* is usually read either as an allegorical story that depicts the conflict between good and evil or as a gothic novel that explores the doppelgänger trope, its warnings against uncontrolled science and predictions of chemically induced tranformation are the essential features of the novel. As John Addington Symonds writes in his letter to Stevenson, "[p]hysical and biological Science on a hundred lines is reducing individual freedom to zero, and weakening the sense of responsibility" (99). Here Symonds comments on the science of his period as well as predicting the future of it, just as Stevenson does in his novella. For one thing, *Jekyll and Hyde* foreshadows the

increase in the usage of addictive chemicals as Jekyll slowly becomes dependent on the potion in order to transform himself into a figure who can do whatever he wants. The freedom gained by being Hyde fascinates Jekyll, but he turns into a savage man that kills people; what he does for his own good is disastrous for other people. The chemicals that can manipulate the chemistry of the human body was not only a subject of mad scientist narratives. In World War II, the German soldiers were given drugs that would turn them into super-strong beings like animal brutes. Although Stevenson could not have predicted World War II, he was aware of the possibilities of corporeal manipulation provided by chemistry.

*Dr. Moreau* is also a predictive text like *Frankenstein* and *Jekyll and Hyde*. In the novel, while Moreau talks about the history of vivisection he tries to convince Prendick that science would eventually come to the point of vivisecting animals because it needs to disregard ethics to advance in some way. Thus, Moreau thinks that he is the brave one who indeed took up the practice in order to advance science. Moreau was not wholly wrong because science really has come to a point that reminds Wells's imaginings. As Clayton explains, "[t]he scientific breakthrough Wells imagined in 1896 has become a reality in 2006. In the last few years, the questions raised by the creation of interspecies hybrids, xenotransplants, and chimeras have become pressing enough to prompt the Institute of Medicine (IOM) to issue guidelines covering the ethical constraints on such research" (569). He also informs that "since the mid-1980s, scientists have successfully created pigs with human DNA, transgenic mice, and the first true chimeras, the geep (a goat-sheep hybrid) and a human-monkey mixture made by grafting stem cells from one organism into another," and argues that "Dr. Moreau's Monkey Man seemed a monstrous fantasy at the time, but the questions Wells raised about the ethics of creating chimeras have a new relevance today" (569). Xenotransplantation and chimeras are the main obsession of Moreau, but they are also among the most debated subjects of today since people consider the possibility "that chimeras might breed or that enhanced brains might alter the ethical status of animals" (572). Just as Moreau's hybrids gain consciousness as soon as they are humanized, chimeras of today can also acquire humanoid features which makes experimenting on them an ethically wrong act. Based on these parallels, it is easy to claim that *Dr.*

*Moreau* included a critique that was ahead of its time. What its mad scientist aimed at doing turned into the reality of the twenty-first century.

The pseudo-science in *The Invisible Man* might at first seem the most improbable one, but even invisibility is becoming a reality in recent decades. In his article titled "Invisibility Uncloaked: In Race to Make Things Disappear, Scientists Gain Ground on Science Fiction," Charles Petit talks about a German scientist named Ulf Leonhardt who won a "new award from the Royal Society of Great Britain to further develop his ideas on how to make things in plain sight disappear" (19). This scientist could have easily been Griffin, both with his experiment that similarly intends "to make things in plain sight disappear," and with the possibility that his discovery would earn him a fellowship of RSL (London, in which he experimented, was home to the Royal Society). The article also mentions the technology of "cloaking devices" and how Leonhardt is planning to construct an invisibility device that "should guide light around an object as if nothing were there" (qtd. in Petit 19). This is again similar to Griffin's study which aims at altering the molecules in the body in order to prevent them from absorbing light; therefore, preventing them from being visible. This novel again reveals that Wells's warnings are ahead of his age. Even today it is not certain who will use the technology of invisibility and for what purpose. The anxieties that were at the core of late-Victorian mad scientist narratives persist today.

As science keeps advancing more rapidly than ever, the questions directed at Griffin by his landlord still seem relevant: "What was I doing? Why was I always alone and secretive? Was it legal? Was it dangerous?" (110). The landlord – who represents every human being who is not a mad scientist – is anxious because he sees and hears the devices Griffin works with, yet he does not know how they work or what they will produce. He does not know how far a scientist can go with his scientific knowledge. He wants to go in and observe, but the scientist does not let him interfere; the landlord can only keep his suspicion but never learn or prevent what is to come. This was the anxiety that was at the core of the nineteenth-century mad sciensist narratives which not only voiced the concerns of the people of their age, but also represented a timeless fear that still exists in people's unconscious: the fear of the evil inherent in scientific knowledge and of the potential in each men of science to become a mad scientist when he obtains powerful knowledge.

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# ÖZGEÇMİŞ

Selin Yılmaz lisans eğitimine 2007 yılında Ege Üniversitesi İngiliz Dili ve Edebiyatı Bölümü'nde başlamış ve 2011 yılında bu bölümden mezun olmuştur. 2012 yılında Celal Bayar Üniversitesi'nde aynı bölümün tezli yüksek lisans programına kabul almış, 2015 yılında bu programdan "Appropriation of Science Fiction Elements in Postmodern Fiction as Reflected in Angela Carter's *The Passion of New Eve* and Jeanette Winterson's *The Stone Gods*" başlıklı tezini savunarak mezun olmuştur. Şu anda Ege Üniversitesi İngiliz Dili ve Edebiyatı Bölümü'nde araştırma görevlisi olarak çalışmaktadır.

**ABSTRACT**

Since very early ages, literature has been closely intertwined with science and technology. One of the outcomes of this interaction is the fictional mad scientist figure who represents the dangers inherent in scientific knowledge. Although the modern form of this trope emerged in Britain in the nineteenth century, its roots can be found in the literature of earlier ages. Alchemists were the antagonists in literary works for many ages as a result of their controversial practices that aimed to manipulate nature and obtain the formula of immortality. After the early modern era, natural philosophers who focused on experimenting began to take place in literature, but they were also mocked because their experiments were seen futile just as those of the alchemists. In the nineteenth century, new sciences and technologies brought with them new anxieties, especially the worry of going too far and upsetting the balance between science and religion (or ethics). As scientific knowledge became more extensive and the figure of the scientist turned into a more threatening figure, nineteenth-century British authors responded with borrowing some of the features of evil alchemist or natural philosopher narratives and creating a modern mad scientist figure in order to voice the concerns of their age.

In the light of these, this thesis examines Mary Shelley's *Frankenstein, or the Modern Prometheus* (1818), Robert Louis Stevenson's *Strange Case of Dr. Jekyll and Mr. Hyde* (1886), H.G. Wells's *The Island of Doctor Moreau* (1896) and *The Invisible Man* (1897) as the founding texts of the long tradition of mad scientist narratives. It asserts that these novels can be analysed in two main contexts: firstly, they are affected by the science and literature of the pre-Enlightenment era (encompassing Middle Ages and Renaissance period), and secondly, by post-revolutionary period, encompassing the late-eighteenth century and all of the nineteenth century. As a result, it is argued that the nineteenth-century mad scientist is a reconstruction of the old trope of the alchemist; however, it is also a novel figure, a modernized and secularized version of a timeless archetype that embodies the fear that too much knowledge and the power of transforming elements could result in disaster.

## ÖZET

Edebiyat en eski çağlardan beri bilim ve teknolojiyle iç içe olmuştur. Bu etkileşimin ürünlerinden biri de, bilimsel bilginin içinde barındırdığı potansiyel kötülüğü sembolize eden kurgusal çılgın bilim adamı figürüdür. Bu figür İngiltere'de ondokuzuncu yüzyılda ortaya çıkmış olmasına rağmen, kökenlerine önceki çağların edebiyatında rastlanmaktadır. Doğayı manipüle etme ve ölümsüzlüğün formülünü bulmayı hedefleyen çalışmalarından ötürü simyacılar yüzyıllar boyunca edebi eserlerin antagonistleri olmuşlardır. Erken modern çağdan sonra, deney yapmaya yoğunlaşan doğa araştırmacıları da edebiyatta yer almaya başlamış, fakat deneyleri simyacılarınki gibi sonuçsuz görüldüğü için onlar gibi alay konusu olmuşlardır. Ondokuzuncu yüzyılda yeni bilim dalları ve teknolojilerle birlikte yeni kaygılar ortaya çıkmıştır. Bunlardan en önemlisi bilgi ediminde ve uygulamasında çok ileri gidip bilim ile din (veya etik) arasındaki dengeyi bozma endişesidir. Bilimsel bilgi arttıkça ve bilim adamı daha tehlikeli bir figüre dönüştükçe, ondokuzuncu yüzyıl İngiliz yazarları kötü simyacı veya doğa araştırmacısı anlatılarının bazı özelliklerini ödünç alıp modern bir çılgın bilim adamı figürü yaratarak kendi çağlarının kaygılarını edebiyatta yansıtmışlardır.

Bu bilgiler ışığında, bu tez Mary Shelley'nin *Frankenstein, veya Modern Prometheus* (1818), Robert Louis Stevenson'ın *Dr. Jekyll ve Mr. Hyde'ın Tuhaf Vakası* (1886), H.G. Wells'in *Doctor Moreau'nun Adası* (1896) ve *Görünmez Adam* (1897) romanlarını uzun bir tarihi olan çılgın bilim adamı anlatılarının öncü metinleri olarak inceler. Bu romanlar iki çerçevede incelenebilir: ilk olarak, Aydınlanma Çağı öncesi (Ortaçağ ve Rönesans dönemi) bilim ve edebiyatından, ikinci olarak da bilimsel devrim sonrası (geç-onsekizinci yüzyıl ve ondokuzuncu yüzyılın tamamı) olaylardan etkilenmişlerdir. Sonuç olarak bu tezin tartışması, ondokuzuncu-yüzyıl çılgın bilim adamının kötü simyacı figürünün bir yeniden yorumu olmakla birlikte asıl önemli özelliğinin çok fazla bilgi ve doğayı manipüle etme gücünün bir felaketle sonuçlanacağı korkusunu yansıtan ebedi arketipin modern ve seküler versiyonu olduğudur.