

## Walter Charleton's Theory of Matter: How Politics and Scientific Societies Influenced his Works

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*This paper investigates how the politics and the scientific societies influenced Walter Charleton's matter theory. Initially, the study refers to two different historical theories of analysis of Charleton's theory of matter, explaining, through the analysis of his most well-known works, why these historical perspectives are both correct. Next, the study undertakes a close reading of Charleton's life, with the aim of explaining why he divorced himself from the alchemical doctrines in public, while he continued to use the alchemical terms. Investigating his life, the study shows how he was influenced by the politics, religion and scientific communities of his era. As Charleton, a Royalist, lived in the period of the Interregnum and Restoration and his major goals were to acquire a position and funds from the College of Physicians and Royal Society. Finally, the study provides a different historical view about Charleton's eclecticism, which is used to his theory, in order to be part of the "elite" of scholars in England. This study concludes that Charleton's matter theory can be considered hybrid of vitalistic and mechanistic philosophy and is an example of how the scientific theories, in the late seventeenth-century, began to differentiate from the old ones.*

### Introduction

The last decades, research in the field of history of alchemy is increasing rapidly. Many historians of science study the relationships of alchemy to medicine, philosophy, religion and theories of matter. Particularly, the vitalistic corpuscular theories are of great interest to researchers, as they can help us understand how the alchemical theories have influenced the development of both chemistry and other disciplines. The last years, one of the most important actors of these investigations is Walter Charleton (1619-1707). Although Charleton was a physician, many historians of alchemy study him, because not only did he create his own particle theory, but he also was one of the first English scholars, who dealt with the corpuscular theories and translated the works of Pierre Gassendi (1592-1655) and Jan Baptiste van Helmont (1580-1644) introducing and making the theories of matter widely known to the wider English speaking public.

Charleton is a controversial figure among the historians because of the differences, which exist in his matter theory. On the one hand, the majority of historians support that his theory belongs to mechanistic philosophy, for the reason that he was influenced by Pierre Gassendi and was a supporter of the Epicurean philosophy. On the other hand, the last years some historians, who

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have studied his works, like Piyo Rattansi, explain that his theory can be considered vitalistic, as he was studying the alchemical theories and was inspired by them. The purpose of this article is to analyze these two different historical opinions explaining why both views are correct and to investigate the reasons of why his corpuscular theory constitutes a controversial subject providing a different historical opinion.

In order to achieve this purpose, the methodological tools, which were used, were the study of primary sources as well as the secondary literature. Initially, Charleton's book "*A Ternary of Paradoxes*", books and articles of great historians were studied, with the purpose of understanding his corpuscular theory and how it changed between his early and latter works. Through the secondary literature and comparative history, Charleton's life, the eclecticism of his works, and the two different historical views on his theory were examined in an effort to propose a different historical exegesis of how the politics and scientific societies influenced his matter theory.

### **The Different Historical Perspectives about Charleton's Theory of Matter**

In the seventeenth century the iatrochemistry and the corpuscular theories dominated and inspired many scholars in England. The doctrines of *semina rerum*, *minima naturalia* and the distillation of *spirits* had an important role not only in alchemy, but also in medicine and natural philosophy. The atomic theories were used by many physicians, in order to explain the function of the human body, and were considered the beginning of movement and life; and many natural philosophers tried to explain the world with the aid of the atoms. One of the most important physicians, who was interested in the atomic theories, is Walter Charleton.

Charleton was well informed about the particle theories and translated important works introducing the atomism to England. Nowadays, the majority of historians consider his theory mechanistic, stemmed from the fact that he embraced the Epicurean philosophy and Gassendi's reformed atomism supporting that it was both philosophically sound and theologically acceptable<sup>1</sup>. Indeed, Charleton was a follower of Pierre Gassendi and his two most important works "*The Darkness of Atheism Dispelled by the Light of Natures*" (1652) and "*Physiologia-Epicuro-Gassendo-Charltoniana: or a Fabrick of Science Natural, Upon the Hypothesis of Atoms*" (1654) were based on Gassendi's work and were created so as to present and defend the revived Epicurean atomism. Charleton's "*The Darkness*

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1. Matthew R. Goodrum, "Atomism, Atheism, and The Spontaneous Generation of Human Beings: The Debate over a Natural Origin of the First Humans in Seventeenth-Century Britain," *Journal of the History of Ideas* 63, no.2 (2002): 207-224, on 215.

of *Atheism*" and *Physiologia*" not only intended to present the views of Gassendi's *Animadversiones*" (1649) to the English audience, but they were more than a translation, because he incorporated into its fabric his own atomic theory and he wanted to exonerate atomism of any taint of atheism, as he believed that atomism could provide the foundation for a mechanical philosophy of nature.

Although in the seventeenth century the corpuscular theories were well-known, especially among the natural philosophers, alchemists and physicians, during the 1640's Epicureanism was already a subject of controversy, since it was characterized by atheism and many scholars attacked upon it. Charleton, as a supporter of Gassendi's philosophy, wrote these books in an effort to point out that the atomic philosophy was capable of explaining the flux of nature without harming the religion. The *"The Darkness of Atheism"* established the basic framework for Charleton's system of nature. Initially, he established God's existence and he proceeded to prove God's creation of the universe. In this book Charleton, relying on the argument that the cause of an idea must have at least as much objective reality as the idea, supported that the corporeal entities exist, but unfortunately knowledge of them is limited only to a few of their properties. These properties are *magnitude, figure, situation, duration, gravings or weight, motion and number*.<sup>2</sup> Thus, he explained that clear and distinct knowledge of the material world is restricted to the properties of the atoms and the primary qualities of the body and he tried to stress out that the *"Darkness of Atheism"* was a physical theology, which proved that the Epicureanism is harmless to religion.

In his second book *"Physiologia"* Charleton translated the work of Gassendi and he dealt with the atoms and their properties; size, shape and motion. He claimed that the atoms have the attribute of the first matter and he struggled to show their essential properties. What is really interesting in the *"Physiologia"* is that he made clear that magnitude is the first essential property of atoms. Through this argument he proved that atoms are entities, realities, endowed with certain corporeal dimensions and not mathematical points. In fact, he did the calculation of atoms, like the atoms of a grain of frankincense (777,600,000,000,000,000) and the atoms of magnenus, (secundum altitudinem 720, secundum latitudinem 900, in longitudine 1200, in superficie 648,000 in area 777,6000,000). In the last section of *Physiologia* Charleton explained the motions of atoms and purified and Christianized the atomism of Epicurus and Gassendi, as he stated that the atoms were created by God, who gave them an internal energy.<sup>3</sup>

Hence, with these books Charleton introduced the mechanical philosophy of Gassendi and Epicureanism in England and he Christianized them. For him atomism was the true explanation of the origin of physical qualities and their

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2. Margaret J. Osler, "Descartes and Charleton on Nature and God," *Journal of the History of Ideas* 40, no.3 (1979): 445-456, on 447-455.

3. G. B. Stones, "The atomic view of Matter in the VXth, VXIth, and VXIIth Centuries," *Journal of the History of Ideas* 10, no.2 (1928): on 97-117.

alternatives. He believed to have solved the problem of the so-called "occult qualities" by reduced them to the action of matter in motion.<sup>4</sup> As a result many historians of science support that his atomic theory of motion, size, shape and number belongs to the mechanical philosophy and credit him for making the Epicurean atomism politically respectable for Robert Boyle and Isaac Newton.<sup>5</sup>

Nevertheless, in the last decades the investigations of some historians, like Antonio Clericuzio, bring to light new evidence about Charleton's theory of matter. Several historians of science now claim that his corpuscular theory cannot be considered mechanistic on the grounds that he was interested about the theories of alchemists, (he had studied Paracelsus and Severinus), and was inspired by them and this inspiration can be tracked into his work. In fact, the first books that Charleton published were about alchemy. Before the creation of the "*Darkness of Atheism*" and the "*Physiologia*", Charleton's first book was the "*The Spiritus Gorginicus*" (1650), which is about the formation of stones in the body, the forming spirit and the microcosm macrocosm analogy, based on Paracelsian and Helmontian sources. Then he wrote the "*Ternary of Paradoxes*" (1650), which furnishes an introduction and supplements to his translation of van Helmont's "*Magnetic Cure of Wounds*", and the "*Deliramenta Catarrhi*" (1650), in which included van Helmont's work and he opposed to the Galenic tradition.

Thereupon, Carleton was well informed about the alchemical theories and vitalism, and, certainly, was influenced by them. If we investigate carefully his atomic theory, we will understand that it cannot be considered purely mechanistic. Charleton was a follower of Severinus, Libavius, Sennert and van Helmont and in his works exist a compromise between the Aristotelian and Paracelsian doctrines. In the "*Translator's Supplement*" Charleton verified how important is the magnetism for the cure of the body, like van Helmont did, and for the natural philosophy, as he believed that through the magnetism the problems about the origin of forms, the causes of sympathies and antipathies and the power of imagination can be solved, stating that the action from a distance should not be rejected from natural philosophy "*I am bound to believe that in the magazine of Nature are to be found Agents not obliged to the dull conditions of an immediate Corporeall Contact, but richly endowed with an influential or Radiall Activity*".<sup>6</sup> Even in the work "*The Darkness of Atheism*" he rejected some epicurean doctrines and specified the Creationist view of nature and matter and he supported that the motion is one of the primary properties of atoms, but the matter is active. Furthermore, despite the fact that in the "*Physiologia*" Charleton

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4. Robert Kargon, "Walter Charleton, Robert Boyle, and the Acceptance of Epicurean Atomism in England," *Isis* 55, no.2 (1964): 184-192, on 186-187.

5. Thompson Helen, "Plotting Materialism: W. Charleton's "The Ephesian Metron, E. Haywood's "Fontomina" and Feminine Consistency," *Eighteenth-Century Studies* 35, no.2 (2002): 195-214, on 196-197.

6. Walter Charleton, *A Ternary of Paradoxes: The Magnetic Cure of Wounds, The Nativity of Tartar in Wine, The Image of God in Man*, (London, 1650), 16-17.

did retract his previous adherence to van Helmont's magnetic cure of wounds, he simultaneously referred to the *plastic spirit* or *Archeus* of van Helmont, the particles of which are thin and active. The alchemical spirits have a central role in his works about medicine,<sup>7</sup> especially, via the doctrine of *animal spirits*, he explained the functions of blood and brain.<sup>8</sup> For Charleton alchemy was really important, because, as he stressed out, the alchemical doctrines and experiments can prove the existence of atoms.<sup>9</sup>

Consequently, from this historical perspective Walter Charleton's theory of matter cannot be considered purely mechanistic, as, even in his two most well known works of Epicureanism, he was still influenced by the alchemical doctrines and theories and that is why he used them. The last investigations in his works show that he never followed only the mechanistic philosophy, and that is why several historians of alchemy reveal that his theory of matter has many vitalistic views. However, if we examine closer his works, we will conclude that his theory is more complicated and both of these opposite historical views are correct. For this phenomenon Charleton is a controversial historical figure for many historians.

### How Politics and Scientific Societies Influenced his Works

Although Charleton is best known as the mechanistic author, who introduced the Epicurean atomism, his earlier works, which are spagyric, indicate that he was influenced and supported the Hermetic ideas. In the "*Spiritus Gorginicus*" Charleton made references to Hermetic authors, like Severinus and Paracelsus, and in the "*Ternary of Paradoxes*" he translated van Helmont's essays "*The Magnetic Cure of Wounds*", "*The Nativity of Tartar in Wine*", and "*The Image of God in Man*". In the "*Prolegomena*" he referred to Robert Fludd and Sir K. Digby, clarifying that he was widely conversant with the Hermetic literature believing in some sort of spiritual influential interdependence of various parts of the universe. Therefore, he was not interested only in the Hermetic Art, but he considered himself an alchemist and that is why he praised the learning of Paracelsus and Hermes Trismegistus<sup>10</sup> and portrayed van Helmont as a bold and free spirit. Until the year of 1650, Charleton had embraced Helmontian and Paracelsian philosophy. Nevertheless, in his latter books he turned against Paracelsus's and

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7. Antonio Clericuzio, *Elements, principles and corpuscles, A study of atomism and Chemistry in the Seventeenth Century* (London: Kluwer Academic Publishers, 2000), 92-95.

8. Antonio Clericuzio and Piyo Rattansi, *Alchemy and Chemistry in the 16th and 17th centuries* (London: Kluwer Academic Publishers, 2013), 67.

9 Clericuzio Antonio, *Elements, principles and corpuscles*, 96-97.

10. Andrew J. Mandelsohn, "Alchemy and Politics in England 1649-1665," *Past & Present* 135(1992): 30-78, on 33.

van Helmont's theories, as in public he denoted van Helmont "*Hairbrann' d*" and the Paracelsians "*stupid admirers of that Fanatick Drunkard Paracelsus*". Even so, investigating carefully his works, we realize that he never abandoned these alchemical theories and the Hermetic influence can be tracked in his later works in the points where the limitations of the mechanical explanations are.<sup>11</sup> The atoms to which Charleton referred in his last books, like "*Natural History of Nutrition, Life, and Voluntary Motion*", are qualitative *minima*, as he was trying to explain the atoms of blood with the terms of *vital spirits* and *vital heat*. Thus, when Charleton wanted to explain the generation of the humans and animals and the human body, he understood that these phenomena cannot be explained in terms of mechanistic theory and, even when he had refused in public the Helmontian and vitalistic theories, he, simultaneously, accepted and used these concepts.<sup>12</sup>

On the surface Charleton rejected the fundamental doctrines of the Hermetic philosophy, but he was continuing to borrow alchemical ideas. That is why his theory of matter is controversial. At this point the most crucial question for a historian of alchemy is why he did this. Why did Charleton want to divorce himself from the alchemical tradition in public, despite the fact that he continued to make use of the alchemical terms?

Trying to answer this query, some historians support that Charleton denied the alchemical tradition, because of a political and religious order. Some others explain that Charleton's philosophy of nature is an example of early modern eclecticism, while he wanted to reconcile the Aristotelianism with the modern view of his era and he was influenced from both vitalistic and mechanical ideas keeping what he needed, so as to create his own theory. However, in order to answer this question, we should take under consideration these two opinions and examine not only his works, but also his life and the era in which he lived.

To start up with, Walter Charleton was born on 2 February 1620 in the rectory at Shepton Mallet. He was interested in medical practice and entered the Magdalen Hall, Oxford on 3 July 1635. He took up medicine and was granted the D.M in January 1643; and almost immediately he was appointed physician-in-ordinary to Charles I. One of Charleton's friends was Viscount Brouncker, who was a gentleman of the privy chamber to Charles I, and vice-chamberlain to his son, Charles, Prince of Wales, probably helped him catch the attention of his royal master. In the war years Charleton met many Royalists, who were interested in medicine and natural philosophy and who joined the court at Oxford.<sup>13</sup>

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11. Nina Gelbart Rattner, "The Intellectual Development of Walter Charleton", *Ambix* 18, no.3, (2013): 149-168, on 150-154.

12. Nina Gelbart Rattner, "The Intellectual Development of Walter Charleton", on 157-162. See also Justin E. H. Smith, *The Problem of Animal Generation in Early Modern Philosophy* (England: Cambridge University Press, 2009), 131-136.

13. Lindsay Sharp, Walter Charleton's early life 1620-1659, and relationship to natural philosophy in mid-seventeenth century England," *Annals of Science* 30, no.3 (2006): 311-340, on 312-318.

Consequently, it is easy to realize that Charleton was a supporter of the king and the Crown. In 1648 Charleton stayed in the senior royal physician, Sir Theodore Turquet de Mayerne (1573-1655), who was an exponent of iatrochemistry and was influenced by the work of Paracelsus and Jean Baptist van Helmont. Since Charleton occasionally worked as his assistant, we can state that he was inspired from his teacher and Sir Theodore de Mayrerne was the main cause that Charleton became a believer in the alchemical therapy of Paracelsus and van Helmont.

In addition, he registered himself at the College of Physicians in June 1649 and in early 1650 was a period of reconciling himself to the new government, something which helped him to extricate the problems arising out his support for the king. So, Charleton was able to set up his medical practice in Russell Street, Covert Garden. In the same year he was proposed and elected as a candidate in the College of Physicians and embarked on his publishing career with his first three books (*The Spiritus Paradoxes*, *Ternary of Paradoxes*, *Deliramenta Catarrhi*). These books established him in the medical world and show us that he was inspired by specific alchemists. However, in the end of 1650 the books received severe and negative critics, which plagued him not only as a writer but also as a doctor. Therefore, his reputation as a private doctor was called into question<sup>14</sup> and maybe this is one of the reasons why in the following years Charleton refused the alchemical therapies in public. As these critics could have influenced negative his position into the College of Physicians and, along with this position, the funds and the prestige that he wanted to gain through this scientific community.

In 1652, as we analyzed above, with the publishing of the "*The Darkness of Atheism*" Charleton criticized in public the Paracelsian and Helmontian doctrines and supported the mechanistic philosophy of Gassendi, although, in his writings we can track Hermetic ideas. That indicates us that he had never really distanced himself by them, so there should be a different explanation of his public denial. May this explanation can be tracked on 4 July 1655, when he failed to secure a fellowship of the College of Physicians, probably because he had supported iatrochemistry or Epicureanism, which for most intellectuals still smacked of atheism and immortality. Probably in 1656 he was appointed physician-in-ordinary to Charles II in exile, and he was asking help from patrons. While in 1664 he undertook a series of presentations to the Royal Society on the brain.<sup>15</sup> That means that he was interested about his prestige in the scientific communities and he was trying to acquire his colleagues and patrons' favor by supporting what was acceptable by them.

What is really interesting is that after the Restoration Charleton' s career

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14. Lindsay Sharp, "Walter Charleton's early life 1620-1659", pp. 319-323.

15. Walker Matthew, "Architecture, Anatomy, and the New Science in Early Modern London: Robert Hooke's College of Physicians," *Journal of the Society of Architectural Historians* 72, no.4 (2013): 475-502, on 478-481.

reached its zenith, since he was one of the earliest fellows of the Royal Society being elected on 15 May 1661. Also, in December 1664 he became one of the seventy-four honorary fellows of the College of Physicians and gained a full fellowship in 1676. After this he became a prominent member of the College and president in 1689, 1690, 1691. Even though his career went really well, in 1691 he suffered a great adversity and in 1707 he died in London as a poor person. Unfortunately the historians do not know yet why he died under these terrible circumstances, as he had noble friends and patrons, but we comprehend that probably the politics was one of the main causes for his poorness and, as some historians support, for the controversy which exist in his theory.

Charleton lived the periods of the Interregnum and Restoration, where there was a huge upheaval and rearrangement that affected both the political and social life of England as well as the development of "science"<sup>16</sup>. During the civil wars of the English Revolution the political situation was constantly changing and the alchemical occult theories were considered primarily and necessarily radical and equated with radical politics and religion, as after 1649 alchemy became identified with the subversion of political and religious order.<sup>17</sup> Especially the doctrines of Paracelsians and Helmontians were used to provide the content of a radical political programme and after 1650 were named sectaries. Although Charles I and Charles II had their own alchemists and supported them and Charleton, at least at first, believed that chemistry could contain private Royalist political meaning, in 1650, probably had fled to atomism, because of the dangers of van Helmont's Hermetic alchemy.<sup>18</sup> Nevertheless, it should be noted that the turbulent political system is not the only main cause of his public denial of alchemy.

The College of Physicians of London had been founded in 1518 and its primary responsibility was to ensure high standards in medical practice throughout the capital. The same purpose had the foundation of Royal Society in 1660, to which jointed members of the College of Physicians. Its main goal was to promote the scientific thought and to remove the sects that have degraded scientific research and promoted, what we call today, pseudo-science. To be able to do this, the members of the College of Physicians and Royal Society attacked to the followers of Paracelsianism, Helmontianism as well as to the Masons promoting that those followers were not scholars and were harmful for the scientific development of thought.<sup>19</sup> As a result, since Charleton was a member of the College of Physicians and Royal Society, he, probably, recanted his former

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16. It should be mentioned that in the article notions of "science" and "scientists" sometimes are used anachronistically, as the scholars of that era usually did not call themselves "scientists" or always use the term "science", as we do today. However, I use anachronism for the sake of better understanding and convenience.

17. Mandelsohn J. Andrew, "Alchemy and Politics in England 1649-1665", 31, 34, 70.

18. Ibid, 45, 47.

19. P.M. Rattansi, "The Intellectual Origins of the Royal Society," *Royal Society* 23, no.2 (1968): 129-143, on 136.

allegiance to van Helmont and Paracelsus, because their followers were considered members of sectaries.

As it was mentioned above, Charleton wanted a full fellowship from the College of Physicians and his first books received negative critics. Thus, he understood that if he wanted to be acceptable by his colleagues and to receive good critics and funding, he had to publicly reject any relationship with what was considered sect or non-scientific by the other scholars. Of course, he was influenced by the political system of his era and his philosophy can be characterized as an example of early modern eclecticism, given the methodological pluralism in his theory,<sup>20</sup> but the main cause of the public rejection of alchemical occult theories was his participation in the College of Physicians and in the Royal Society and his constant striving to be accepted by the other members.

Consequently, we realize that Charleton never really abandoned his vitalistic ideas and his "shift" from the vitalistic theories to the mechanistic philosophy, even though in his last books he continued to use vitalism, can be explained through the political system and his participation in these two scientific societies. This assumption can be substantiated in his two most important books. In the "*The Darkness of Atheism*" and the "*Physiologia*" Charleton attacked on the followers of Paracelsus and van Helmont, but he did not offer any specific argumentation against these doctrines, which preached those "dogmatists".<sup>21</sup> He only attacked on them and, as many historians support, objected in the notion of sympathies and antipathies as a doctrine of occult qualities. However, in "*Physiologia*" Charleton did not attacked on occult qualities, but he tried to explain them in terms of atomism. In reality he objected to the doctrine of occult qualities used as an intellectual refuge, so as the scholars not to initiate an enquiry. This proves us that he clearly wanted to separate himself from specific alchemists, who were considered dogmatists, but he knew that only through the vitalistic theory of *spirits* was he capable to explain the function of the human body. Charleton's theory can be considered both vitalistic and mechanistic, that means that he followed an eclecticism, with the aim of prescribing a remedy to the perceived threat of a rampant sectarianism and to be acceptable by his colleagues in the College of Physicians. He knew that in order to be a part of the "elite" of those scholars, due to which he would have a career, he had to pay close attention on how he defined his views and theory. What is more, Charleton followed the stream of his time. He believed, as many scholars did, that in order to find the truth he had to seek multiple sources and to try to explain the nature with the help of observation, enquiry, experiments and correct explanation, which is based

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20. Justin E. H. Smith, *The Problem of Animal Generation in Early Modern Philosophy*, 125-126.

21. Eric Lewis, "Walter Charleton and Early Modern Eclecticism," *Journal of the History of Ideas* 62, no. 4 (2001): 651-664, on 661.

on the facts and is not against the God's words.

### **Conclusion**

Charleton is a controversial figure for the historians of science, owing to the fact that his theory of matter belongs to both vitalistic and mechanistic philosophy, is a hybrid. Trying to explain this phenomenon some historians argue that Charleton denied the alchemical tradition on account of the upheaval in politics and religion in the periods of Interregnum and Restoration. While other historians support that his theory is an example of early modern eclecticism. Whereas these opinions are true, the reasons for this hybrid theory are more and for finding them we should focus on his life.

Charleton had studied medicine in one of the most famous universities and he wanted to acquire a career. He was a follower of van Helmont and he criticized the Galenic theory, as Paracelsians and Helmontians did, but he also understood that the majority of scholars wanted to overthrow the alchemy as "non-scientific" and that the members of the College of Physicians would accept him easier, if he had denied in public these alchemical doctrines. Simultaneously, he had many noble and scholars friends and from his travels to French he realized that the mechanical philosophy could help him explain the nature and would be supported by many people.

As a result, in combination with the severe critics, which his alchemical books had accepted, he realized that it would be better to separate himself from the alchemical doctrines and to follow the mechanistic philosophy. His membership in the College of Physicians and in the Royal Society played a great role in this "shift". Nevertheless, he never abandoned the vitalism, as he used it when it was necessary. The investigation of his life and his works show us that he wanted to prove that the occult theories of alchemy are not occult at all and they can be explained by the corpuscular theories. Last but not least, Charleton had comprehended that if he wanted a career, he had to follow the "elite" of science and that the new knowledge will come only if he studied carefully all the sources that existed, included ancient. His controversial theory is an example of how the scientific theories in the late seventeenth-century began to differentiate themselves from the older ones, exemplifying a new form of science and social institution.

## Bibliography

### *Primary Sources and Books*

- Walter, Charleton. *A Ternary of Paradoxes: The Magnetic Cure of Wounds, The Nativity of Tartar in Wine, The Image of God in Man*, 2<sup>nd</sup> ed., revised of 1650, London, 1650.
- Clericuzio, Antonio. *Elements, principles and corpuscles, A study of atomism and Chemistry in the Seventeenth Century*. London: Kluwer Academic Publishers, Boston, 2000.
- Clericuzio, Antonio and Piyo Rattansi. *Alchemy and Chemistry in the 16<sup>th</sup> and 17<sup>th</sup> centuries*. London: Kluwer Academic Publishers, Boston, 2013.
- Smith, E. H. Justin. *The Problem of Animal Generation in Early Modern Philosophy*, Concordia University. Cambridge University Press, August 2009.

### *Scientific Journals*

- Gelbart Rattner, Nina. "The Intellectual Development of Walter Charleton." *Ambix* 18, no.3 (2013): 149-168.
- Goodrum, R. Matthew. "Atomism, Atheism, and The Spontaneous Generation of Human Beings: The Debate over a Natural Origin of the First Humans in Seventeenth-Century Britain." *Journal of the History of Ideas* 63, no.2 (2002): 207-224.
- Kargon, Robert. "Walter Charleton, Robert Boyle, and the Acceptance of Epicurean Atomism in England." *Isis* 55, no.2 (1964): 184-192.
- Lewis Eric. "Walter Charleton and Early Modern Eclecticims." *Journal of the History of Ideas* 62, no. 4 (2001): 651-664.
- Mandelsohn, J. Andrew. "Alchemy and Politics in England 1649-1665," *Past & Present* 135(1992): 30-78.
- Osler, J. Margaret. "Descartes and Charleton on Nature and God." Jul.-Sep., 1979, Vol. 40(3), 445-456, Download by West Bohemia University, 27 November 2019.
- Rattansi, P.M. "The Intellectual Origins of the Royal Society," *Royal Society* 23, no.2 (1968): 129-143.
- Sharp, Lindsay. "Walter Charleton's early life 1620-1659, and relationship to natural philosophy in mid-seventeenth century England." *Annals of Science* 30, no.3 (2006): 311-340.
- Stones, G. B. "The atomic view of Matter in the VXth, VXIth, and VXIIth Centuries." *Journal of the History of Ideas* 10, no.2 (1928) on 97-117.
- Thompson, Helen. "Plotting Materialism: W. Charleton's "The Ephesian Metron, E. Haywood's "Fontomina" and Feminine Consistency." *Eighteenth-Century Studies* 35, no.2 (2002): 195-214.
- Walker, Matthew. "Architecture, Anatomy, and the New Science in Early Modern London: Robert Hooke's College of Physicians." *Journal of the Society of Architectural Historians* 72, no.4 (2013): 475-502.