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Robert Boyle's "Chymist": Critiques of Chymical Identities in the Seventeenth Century

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ABSTRACT

The discussion of Boyle's The Sceptical Chymist has been, generously, contentious. Its place in historiography, once characterized by a clear split between Alchemy and Chemistry, has been muddled, first through the addition of the category "chymistry" and later by the study of other chymical practitioners operating around Boyle's time who used evidence-based practices. Reexamination of Boyle's intent is necessary to accurately define the Sceptical Chymist's role in the foundations of modern chymistry.

This paper analyzes Boyle's discussions regarding other chymical practitioners within the Sceptical Chymist to understand what disqualified some from being chymists in Boyle's eyes. I argue that Boyle's definition of a chymist is shown to require three qualifiers. Firstly, it must be based on practice, and chymists must experiment and not solely reason. Secondly, a chymist's work must be for philosophical purposes and not simply the attainment of material results. Finally, a chymist's findings must be with solid reasoning as opposed to obedience to doctrine.

Of his place within the historical narrative, I argue that rather than being a trailblazer who invented a revolutionary new field, the traits that comprised his "chymist" were commonplace among his contemporaries. Boyle's chymist is a syncretic identity, not a synthetic one, and his work is a culmination of the contributions of practitioners before him

INTRODUCTION

For centuries, Robert Boyle's *The Sceptical Chymist* was the definitive guide to what defines the Chemist. Within his magnum opus, Boyle adopts the role of a skeptic against the field of chemistry, tearing down the old masters to make way for the new (whom he prophesied to usher in). Despite once being hailed as the arrival of modern chemistry, as well signifying the victory of logic over alchemical pseudoscience, *The Sceptical Chymist*'s importance within contemporary study of 17th-century scientific philosophy has

been steadily eroded.[1] This is most shown in the coining of the term "Chymist" as not simply an anachronistic spelling of chemist, but instead uniquely referring to chemical practitioners transitional period between alchemy and modern chemistry, separating Boyle from his former legacy. Perhaps this denigration is a rightful fix to a centuries-old mistake. As Principe attests of the tome, "Its fame was thrust upon it by retrospective attempts more than two centuries after its publication to locate a revolutionary moment for chemistry."[2]

Despite concerted criticism, not all of *the Sceptical Chymist's* former lustre has been dulled. *The Sceptical Chymist* is widely considered one of the first attempts to elevate the status of chymistry to equivalent pedigree as other scientific fields by using chemistry as a framework to produce not just medicaments, but to understand the natural world.[3] In contemporary studies of chemistry and the history of science, *The Sceptical Chymist* regularly appears as a critical historical node in the unification of the divergent groups working under similar principles.

To the extent Boyle's work bears significance on contemporary scholarship in the history of chemistry, it is his extensive taxonomy of scientific classes that provides the greatest insight into a period of transition from Alchemy to Chymistry. The term "Chymist" was coined to better represent the gulf of distinctions between *Alchemy* (as an art or natural science lacking empiricism), and *Chemistry* (as defined by Lavoisier and characterized as quantitative and practical).[4] However, the use of chymist to solely describe the transition "from alchemy to chemistry" is inaccurate,[5] and reexamining Boyle's work will provide important depth and granularity to the grey space between these classifications. The chymistry of the 17th century was characterized by the newfound epistemology of chymical principles and the introduction of Baconian experimental philosophy. Yet it is "Alchemy" in modern parlance that has been characterized as a natural science, with roots in astronomy, natural history, and physics,[6] further complicating the division between alchemy and chymistry. Boyle, for example, is considered an alchemist by the historian who defined the term "chymist".[7]

While it is recognized that different practices, philosophies, and theories were utilized by a variety of practitioners, there was little work done on their evolution prior to the introduction of Boyle's chymistry. As of late, increased attention has been paid to these distinct groups. Shapin has discussed the laborants working unseen for prominent naturalists and how they were responsible for many experiments,[8] and Principe has developed the role of artisans within Alchemical enterprises, such as the metallurgical

[1]Lawrence Principe, "In retrospect: The Sceptical chymist," Nature 469 (January 2011): 31, https://doi-org.proxy.library.upenn.edu/10.1038/469030a.

[2] Lawrence Principe, "In retrospect: The Sceptical chymist," 31

[3] Ibid.

[4] Ferdinando Abbri, "Alchemy and Chemistry: Chemical Discourses in the Seventeenth Century," *Early Science and Medicine* 5, no. 2 (2000): 214, http://www.jstor.org/stable/4130477.

[5] Ibid., 255.

[6] Lawrence M Principe, "Alchemy Restored," *Isis* 102, no. 2 (2011): 311, https://doi.org/10.1086/660139.

[7] Lawrence M Principe, "Alchemy Restored," 309.

[8] Steven Shapin, "The Invisible Technician," *American Scientist* 77, no. 6 (1989): 554 http://www.jstor.org/stable/27856006.

analysis of transmutation.[9] While there has been some study of Boyle's critiques of his predecessors, the analysis is splintered. Golinski claims Boyle's critiques are against ambiguity, while Clericuzio contends that the critiques were directed against chemists who had "failed to provide the philosophical interpretation of experiments."[10] The flaws within both these arguments are that they still treat the chymists before Boyle as one homogenous group, and all critiques by Boyle are directed uniformly across the pre-chymical field. This paper, however, will establish that their claims are directed towards two differing groups of pre-Boyle practitioners and are simultaneously true.

Boyle's connection with experimental philosophy is key to understanding his taxonomical methodology. Boyle views experimental philosophy as "affording some reformation, or other kind of improvement to the Trade."[11] He intends to bring the field of chymistry under this experimental model. However, those he views as unworthy of having a place within the sciences dominate the chymical landscape. Boyle's creation of *the Sceptical Chymist* is a result of, and in opposition, to these unworthy practitioners, advocating for the identity of the "chymist" based on the traditions of experimental philosophy.[12] Understanding what Boyle views as necessary to become a chymist further defines the identity of experimental philosophers.

The modern lineage of chemists can be traced back directly to Boyle's ideal chymist. To understand what he saw and why he felt the need to react so strongly is critical in tracing the legacies of the field he fathered. As Principe explains of the reason behind the earlier misinterpretations of *The Sceptical Chymist*, "few cared to wade through Boyle's prose and still fewer took time to recognize his motives."[13] A reckoning of Boyle's motives within *The Sceptical Chymist* is long overdue. In this paper, it will be established that Boyle's critiques in the Sceptical Chymist are targeting problematic practices by chymical practitioners in an array of adjacent fields, the characterization of each group and their flaws, and how his own synthesis of the "chymist" identity derived from these critiques.

THE IDENTITIES: CHYMICAL PRACTITIONERS

The separation between Alchymists, Chymists, and their related fields was murky in the 16th century. Differing groups working off of the same phenomena (and shared theories) had both distinct aspirations and distinct practices within their respective works. Consider a few conundrums of classification: Is Paracelsus himself a Spagyrist or a Chymist? What about van Helmont? Boyle describes them as the

[9] Lawrence M. Principe, "Goldsmiths and Chymists: The Activity of Artisans within Alchemical Circles," in *Laboratories of Art*, ed. Sven Dupré, Archimedes (Springer International Publishing, 2014), 177, https://doi.org/10.1007/978-3-319-05065-2_7.

[10] Gary V. Chipman, "Robert Boyle and the Significance of Skill and Experience in Seventeenth-Century Natural Philosophy" (master's thesis, University of North Texas, 2000), 93-94, https://digital.library.unt.edu/ark:/67531/metadc2652/.

[11] Robert Boyle, *Some considerations touching the usefulness of experimental natural philosophy* (Oxford: H. Hall for R. Davis, 1671), 30, https://archive.org/details/someconsideratio02boyl/.

[12] Marie Boas, "An Early Version of Boyle's: Sceptical Chymist," *Isis* 45, no. 2 (1954): 153, http://www.jstor.org/stable/227359.

[13] Principe, "In retrospect," 31.

"patriarch of the spagyrists."[14] Daniel Sennert, however, is referred to as the "great champion of it [Chymical doctrine]"[15] despite writing a majority of his work on medicine, not chymistry. Biographical taxonomies of scientific history are indebted to the web of connections identified by Boyle, which makes accounting of his classifications all the more important.

A distinction is necessary between the numerous people who employ chymical doctrine and the identity of "Chymist" as well as a separation between chymists as they are and Boyle's ideal chymist. Therefore, the term "true chymist" shall be used to describe the chymists found within Boyle's aspirations, who attempt to use chymistry to understand the entirety of creation. The term "inferior chymist" is used for those who Boyle considers as working towards the goals of chymists but failing in execution. The term "Chymical Practitioners" will be used for all those who use Chymical doctrine and principles within their work but are not Chymists as such.

DOCTRINAL ATTACHMENT: PERIPATETICKS, HERMETICKS, AND VULGAR CHYMISTS

Peripatericks, Hermeticks, and Vulgar chymists are terms which Boyle uses to describe chymical practitioners whose common flaws involve the doctrines which they were named for. In contrast to modern usage, Peripateticks are not Chymists but instead are described as a distinct lineage working in the field. As Boyle remarks that he is "not satisfied with the vulgar doctrines, either of the peripatetick or Paracelsian schools"[16] showing a clear delineation of the chymical and doctrines, while also separating Peripateticks and Paracelsians as two different traditions. However, seemingly contradicting himself, he also establishes that all chymists follow Paracelsian ideas. When discussing the Chymical principles, Boyle remarks, "Some are common to all mixt bodies, as Aristotle's four elements, or the chymist's *tria prima,*"[17] the *tria prima* being a Paracelsian concept. What then distinguishes Paracelsians from Chymists? A direct comparison Boyle makes is revealing: "For, besides those which the chymists are pleased to name hypostatical, most bodies contain two others, phlegme and earth…Nor will it suffice to object, as the Paracelsians are wont to do, that the tria-prima are the most useful elements, and the earth and water but worthless and inactive; for elements being called so in relation to the constituting of mixt bodies."[18] Accordingly, the inclusion of phlegme and earth distinguishes the Chymist and the Paracelsian. However, while this difference in doctrine is a sign of the difference, it is not simply a matter of doctrine.

Paracelsians, as described by Boyle, refer to those who blindly follow the principles of Paracelsus. Boyle writes that his issue with the continued adherence to the principles is "because much weight has been laid upon this process, not only by Paracelsians, but other writers, some of whom seem not to have perused it

[14] Boyle, *The Sceptical,* 184.
[15] Ibid., 164.
[16] Ibid., 199.
[17] Ibid., 89.
[18] Ibid., 105-106.

themselves."[19] Paracelsians as a separate category are not chymists under his eyes as they do not endeavor to interpret their experiments or to create a model but instead strictly adhere to those made by Paracelsus. Boyle further explains

> that though Paracelsus himself, and some that are so mistaken as to think he could not be so, have ventured to teach…; yet the learned Sennertus, and all the more wary chymists, have rejected that conceit, and do many of them confess, that the tria prima are each of them made up of the four elements…

The chymists reject what is false and philosophize as to what is true based on experimental evidence.

Returning to Peripateticks: there is no such thing as a chymist following the Aristotelian theories, as to follow that theory would mean a failure to correctly interpret experiments. The creation of new and superior theories means that only blind obedience to doctrine would be the cause for the continued use of the inferior. It is this willful ignorance of experimental results that Boyle finds incompatible with the truth-seeking nature of chymists.

The issue with vulgar chymists "is the same upon whose account I think the Aristotelian and divers other theories incompetent to explicate the origine of qualities [sic]."[20] Boyle laments the dissonance between what experiments show and what they reason, and observes the Vulgar Chymists have fallen into a fallacy and need to find new models, "And not confine themselves, and (as far as they can) others, to such narrow principles, as I fear will scarce enable them to give an account (I mean an intelligible one) of the tenth part (I say not) of all the phaenomena of nature."[21] Unlike what established writers claim, Boyle's issue with the "Paracelsians" as he describes them is not simply in unphilosophical and solely practical applications of chymistry,[22] as his critiques are rather that their philosophy is too rigid. Vulgar chymists are chymists nonetheless despite their unphilosophical nature, because they correctly deduced that existing reasoning insufficiently explains the phenomena within experiments. However, they are unable to come up with the correct reasoning, remaining vulgar. Boyle instead advocates for an experimental form of philosophy, where the observations made in the laboratory form the foundation of the theories used to apply the field.

Boyle also describes learned men as vulgar for continuing to promote these antiquated concepts, as, despite their education, they remain content with clearly contradictory ideas. Daniel Sennert, while a learned man, uses vulgar principles. Sennert, a German chymist, conducted work that was the experimental basis for the development of Boyle's atomism and is often cited during arguments relating to

[19] Boyle, *The Sceptical*, 59.
[20] Ibid., 178
[21] Ibid., 165.
[22] Antonio Clericuzio, "Carneades and the Chemists: A Study of The Sceptical Chemist and Its Impact on Seventeenth-Century Chemistry," in *Robert Boyle Reconsidered*, by Michael Cyril William Hunter (Cambridge University Press, 2003), 82.

the number of chymical principles.[23] Despite referring to Sennert as "the most learned"[24] or "learnedest champion,"[25] he critiques Sennert's argumentations as being too bold without justification. Sennert's argument illustrates this overassertion:

> This grand and leading argument, your Sennertus himself, who layes great weight upon it, and tells us, that the most learned philosophers employ this way of reasoning to prove the most important things, proposes thus…But as for the argumentation itself, 'tis built upon a precarious supposition, that seems to me neither demonstrable nor true.[26]

Despite his respect towards Sennert for defending the *Tria Prima* against the Aristotelians, such as Billich (which shall be mentioned in depth later), his failure is in his inability to prove his own theories or question his doctrine, in a situation where a simple reading is enough to establish sufficient doubt. Heavy emphasis is placed on how Sennert emphasizes the ways of reasoning done by philosophy, as reasoning distinguishes the vulgar from the learned. Despite claiming so, Sennert fails to meet that standard in Boyle's eyes.

Vulgar chymists, Paracelsians, and Aristotelians are blinded by doctrine and thus can not be truly considered proper chymists. While their theories are flawed, the reason for that failure is more pressing to the eyes of Boyle; the attempts at wrangling clearly contradictory experimental results into their established theories, instead of reforming them, are a form of factionalism. Boyle establishes that only upon confronting inconsistencies and reasoning even against established ideas can the learned rise to be true chymists. Boyle's chymist is rooted in reason, not tradition.

CHYMICAL PRACTITIONERS: AN AMICABLE DIVORCE

The role of Spagyrists and their contributions towards Chymical knowledge deserves its own in-depth reading, as their practitioners were often more learned and skilled than their chymistral equivalents, and it was their advances that defined much of chymical progress prior to Boyle. However, Spagyrists are often referred to as "inferior" even in the opening pages of the *Sceptical Chymist,* with the book being explicitly written as advocating for a necessary rejection of their ways in order for the field to progress.[27] Confoundingly however, Boyle seems to simultaneously respect Spagyrists the most. From Paracelsus, who, regardless of some of his less rigorous claims, challenged the Aristotelian ways much to Boyle's

[23] William R. Newman, "Sennert, Daniel," in *Pachymeres - Szilard*, by Charles Coulston Gillispie, et al., vol. 24, *Complete Dictionary of Scientific Biography* (Detroit, MI: Charles Scribner's Sons, 2008), 418-419, accessed July 5, 2025, https://link.gale.com/apps/doc/CX2830906085/GVRL?u=upenn_main&sid=bookmark-GVRL&xid=f3579c98

[24] Boyle, *The Sceptical,* 166.

[25] Ibid., 147.

[26] Ibid., 166-167.

[27] Boyle, *The Sceptical,* 9.

relief,[28] Angelus Sala, a Spagyrist who Boyle acknowledges as "experienced" and who he uses to testify against the canting chymists,[29] and van Helmont, a physician in the 17th century in the Low Countries. Van Helmont's works influenced chymists and spagyrists alike.[30] Boyle says regarding his own relationship with van Helmont that,

> Though I cannot but say on this occasion what (you know) our friend Mr. Boyle is wont to say, when he is askt his opinion of any strange experiment; That he that hath seen it hath more reason to believe it, than he that hath not, yet I have found Helmont so faithful a writer, even in divers of his improbable experiments…[31]

How can one of the "inferior spagyrists" be so trusted and respected by Boyle? In many ways, van Helmont is perhaps the closest person that one can find who qualifies as a direct predecessor to Boyle–contemporaries of Boyle even referred to him as a Helmontian.[32] Why does the father of Chemistry associate with a field he views as lesser? An answer is found by examining the artisans.

Artisans, refiners, metallurgists, and other terms for the tradesmen who worked with Chymical properties. These craftsmen were largely uneducated and learned their trade based on experience and records. Agricola, one such craftsman and a leading metallurgist, wrote De Re Metallica (1530), the sum of all metallurgical knowledge known and described techniques learned in the trade in fine detail.[33] is at odds with Boyle's earlier mentioned dissent against the ignorance of those who used Chymical knowledge solely for practical purposes. At his most antagonistic, claiming that the chymists "complain of him as their adversary", Boyle does not insult Agricola personally and, in fact, cites to his experiments[34] Boyle does not support the conclusions of Agricola, claims the group he embodies views him as an enemy, yet still assigns weight and importance to his work, while not belittling their intelligence. The answer to this paradox is found in his earlier work. Boyle, in *Some Considerations* remarks that Artisans are more reliable than philosophers, for they are not overly influenced by doctrine and tradition, such that their craft would exist only "as to the improvement of the trades themselves."[35] Furthermore, he adopts the idea that "an Investigation into these may not a little conduce, both to the Increase of the Naturalist's

[28] Ibid.

[29] Ibid., 101

[30] Antonio Clericuzio, "From Van Helmont to Boyle. a Study of the Transmission of Helmontian Chemical and Medical Theories in Seventeenth-Century England," *The British Journal for the History of Science* 26, no. 3 (1993): 303-305, http://www.jstor.org/stable/4027400.

[31] Boyle, *The Sceptical*, 50-51.

[32] William R. Newman and Lawrence M. Principe, *Alchemy Tried in the Fire : Starkey, Boyle, and the Fate of Helmontian Chymistry* (University of Chicago Press, 2002), 274

[33] Helmut M. Wilsdorf, "Agricola, Georgius," in Pierre Abailard - L.S. Berg, by Charles Coulston Gillispie, et al., vol. 1, Complete Dictionary of Scientific Biography (Detroit, MI: Charles Scribner's Sons, 2008), 77-78, accessed July 15, 2025,

[34] Boyle, *The Sceptical*, 191-192.

[35] Boyle, *Some considerations*, 31.

knowledge, and the Melioration of those Mechanical Arts."[36] While the artisan's philosophies and models are of no use, their knowledge is better than that of the philosophers.

Thus, if we apply the same principle, an understanding of Boyle's relationship with Spagyists begins to emerge. Boyle says

> when I acknowledge the usefulness of the labours of spagyrists to natural philosophy, I do it upon the score of their experiments, not upon that of their speculations; for it seems to me, that their writings, as their furnaces, afford as well smoak as light; and do little less obscure some subjects, than they illustrate others.[37]

Spagyrists as physicians have an advantage in that their theory and practice are determined solely by their practical results, allowing Paracelsus to forsake the Aristotelians. Van Helmont is praised for his experimental prowess because his role as a Spagyrist has aided him in attaining proficiency in performing chymical experiments, not in spite of it. As Boyle admits himself, van Helmont "was much better versed in the chymical anatomizing of bodies than either Sennertus or I."[38] Van Helmont is also the ideal experimental philosopher in Boyle's eyes. Van Helmont himself states that "an understanding of man and nature is impossible without a knowledge of chemistry."[39] However, van Helmont remains a spagyrist as even his philosophical contributions are to better understand the mechanics of his work.

Boyle's issues with spagyrists is the same that gives them their advantage. While spagyrists are superior at the art of chymistry, their focus is not the same as the chymists. There is simply nothing wrong with the approach of spagyrists except that in Boyle's eyes, the noble search is that which uncovers the nature of the universe, while the theories of the spagyrists are vulgar in that they aim much lower. The separation between Chymist and Spagyrist is an amicable divorce where separation is necessary.

Spagyrists have paved the way for chymistry to develop, but as chymistry evolves, its ideas are no longer intercompatible. The *tria prima*, for example, while clearly antiquated and incompatible with new chymical theories, still helps guide spagyrists as Boyle himself expressed. "I never denyed… that the notion of the tria prima may be of some use, but… by what you now alledge for it, it will but appear / that it is useful to apothecaries rather than to philosophers: the being able to make things operative being sufficient to those, whereas the knowledge of causes is the thing looked after by these."[40] As chymistry evolves, the basic theories that allowed spagyrics to succeed are insufficient for the burgeoning field. As previously mentioned, Boyle does believe in the merit of using philosophy to improve the lives of man, where "Natural Philosophie may be capable of affording some reformation, or other kind of improvement to the trades."[41] Boyle does not forsake the spagyrists. He recognizes their contributions and their

[36] Ibid., 120
[37] Boyle, *The Sceptical,* 166
[38] Ibid. 100
[39] Debus, "Chemists, Physicians," 76.
[40] Boyle, *The Sceptical,* 179
[41] Boyle, *Some Considerations,* 30

influence, but also the need for chymistry to chart its own path that pushes into a different direction, one rooted more in matter and reaction, rather than in medicine.

EGO, HYPOCRISY, AND FRAUD: CANTING CHYMISTS

Boyle's most hated of Chymical practitioners were the so-called "Canting Chymists." Boyle defines this group as "deluding writers"[42] with neither the experience nor reasoning to properly philosophize about the mechanics behind chymistry but do so for fame. These are, in his opinion, perversions of chymists whose aspirations may appear consonant with other chymists, but whose methods disregard standards of requisite proof or experience. The Peripatericks, Paracelsians, and vulgar chymists fail through inadequate reasoning, resulting in complacency, while the canting chymists' failures are born from egos and hypocrisy.

Boyle's critique zeros in on the intentions of the canting chymists. Boyle remarks of these chymists, "For whilst such men are quietly permitted to publish books with promising titles, and therein to assert what they please, and contradict others, and even themselves as they please, with as little danger of being confuted as of being understood."[43] Many different chymists and practitioners are mentioned as examples in how they have overstepped and claimed too much with too little substance. As he writes of Paracelsus and other chymical authors, "those that are so ambitious to be admired by the vulgar, that rather than go without the admiration of the ignorant they will expose themselves to the contempt of the learned, those shall, by my consent, freely enjoy their option."[44] These chymical authors are to be forsaken as they are based on instead of empiricism, the ambition to fake competence among the unqualified.

Boyle's critiques are made in tandem with those of the vulgar chymists and other practitioners, as it is these chymists' limitations, whether through incompetency or inherent, that make any overhaul of the chymical model flawed and thus, any claims of revolution are unfounded. Boyle complains that these chymists "Cry up their own sect for the invention of a new philosophy, some of them, as Helmont, etc., styling themselves philosophers by the fire; and the most part not only ascribing, but as far as in them lies, engrossing to those of their sect the title of philosophers."[45] As previously mentioned, in Boyle's eyes the stagnancy and obedience to the established is the issue in spagyrists. Boyle claims that among the canting chymists, it is not stagnancy but instead, unfounded revolution and the audacity to claim without experimental merit. He continues, "how narrow is this philosophy, that reaches but to some of those compound bodies, which we find but upon, or in the crust or outside of our terrestrial globe, which is itself but a point in comparison of the vast extended universe…"[46] To compare with his own vision of

[42] Boyle, *The Sceptical,* 116
[43] Ibid.
[44] Ibid.,, 114
[45] Boyle, *The Sceptical*, 162
[46] Ibid.

chymistry as a method to explain the universe as a whole and its workings, the ideas of the canting chymists are insignificant yet treated like a great discovery by their authors.

Another example of this ego is regarding the naming of the principles. Boyle makes the observation of many chymists,

> or I find that even eminent writers… do so abuse the termes they employ, that as they will now and then give divers things, one name; so they will oftentimes give one thing, many names…And those that are so ambitious to be admired by the vulgar, that rather than go without the admiration of the ignorant they will expose themselves to the contempt of the learned, those shall, by my consent, freely enjoy their option.[47]

He continues, writing of how even fellow critics of this behaviour, such as Sennert, also abuse terms themselves. These canting chymists intentionally attempt to take credit by changing terms, claiming theories, or proclaiming their greatness. Clericuzio also identifies this practice; however, his analysis that this is also to elevate the field by promoting philosophy over practical experimentation (similar to Boyle's intentions with the vulgar chymists) is flawed.[48] The canting chymists do attempt through ego instead of experimentation. Boyle dismisses their findings as being invalid under experimental philosophy, for lack of empirical foundation to maintain truth.

Billichus, or Anton Günter Billich is one such canting chymist. Born in 1599, Billich was a German physician and chemiatric. His most prominent works were defenses of the Aristotelian ways against his Paracelsian contemporaries.[49] Billich, recently deceased, was an easy target harboring views that Boyle hated, the perfect strawman for canting chymists as a whole due to his poor work. Gunther's main weakness is in his lack of a foundational basis for his arguments. Boyle sarcastically remarks that "we may hence learn what to judge of the way of argumentation, which that fierce champion of the Aristotelians against the chymists, Anthonius Guntherus Billichius employes, where he pretends to prove against Beguinus, that not only the four elements do immediately concur to constitute every mixt body…"[50] His arguments are not based on experimental evidence but rather, made with the intent to elevate his own status.

According to Boyle, Billich *intentionally* uses subpar reasoning with the intention of proving himself right. He "pretends skill enough in chymistry to reforme the whole art, comes to make good his confident undertaking…he is fain to say things that agree very little with one another."[51] When one's reputation and pride are at stake, it is the field that suffers from sloppy work. Especially antagonizing Boyle is the

[47] Ibid.,113.
[48] Clericuzio, "Carneades and the Chemists," 82.
[49] Joel A. Klein, "Corporeal Elements and Principles in the Learned German Chymical Tradition," *Ambix* 61, no. 4 (2014), https://doi.org/10.1179/1745823414y.0000000002.
[50] Boyle, *The Sceptical,* 170.
[51] Ibid, 173-174.

assertion made by Gunter that "True chymistry does not place itself before medicine, but as a mistress,"[52] a culmination of what is faulty of the Spagyrists and vulgar chymists, an assertion based on inflating his own importance and not reason, poisoning the fruits of his work.

The canting chymists are also related to the fraudulent Alchymists. Boyle writes of them, "I easily believe what he annexes; '*that he had often seen detected many tricks and impostures of cheating alchymists.* For, the most part of those that are fond of such charlatans, being unskilful or credulous, or both.'"[53] It is the same insidious pride that condemned alchemy to being perceived as a pseudoscience for centuries, which chymistry was rife with.

Boyle's critiques of Bilich and the canting chymists are not simply to profess anger at particularly annoying writers that he disagrees with. It is a public condemnation of the intentional malpractice of practitioners who use the field to promote themselves. This behaviour, left unchecked, grows into a plague on chymical practices, eliminating rationality and creating a culture of rampant fraud.

CONCLUSION

Instead of reading Boyle's skepticism towards the field of chymistry as a rejection of what comes before, I have shown how his criticism may better be understood as an attempt to expose the flaws of specific methods and practitioners. *The Sceptical Chymist* isn't a radical departure from the field's constitutive foundations. Rather, Boyle advocates for the unification of the best aspects of each practice into what he believes is a higher cause. Boyle's "Chymist" is not a synthetic identity: it is syncretic.

The historical background of Boyle's *Sceptical Chymist* involves the rapid popularisation of chymistry within society, the increase of physicians following Paracelsus, and the introduction of chymistry within the royal courts.[54] Earlier drafts of *Sceptical Chymist* refer to pressure by learned men for the creation of the publication as acquiescing to the field. Boyle's *Sceptical Chymist* is a reaction to the potential for chymistry to be misappropriated by subpar practitioners, such as medical practitioners simply adopting the newest trends,[55] preventing its rise as an equal of the natural sciences. Boyle explains he began writing *The Sceptical Chymist* because,

[52] Anton Günther Billich, De Tribus Chymicorum Principiis, et Quincta Essentia Exercitatio (Bremen: Villerianum,1621), sigs. 3v–4r: "Vera Chymia Medicinae se non praefert, sed, tamquam dominam, hanc agnoscit, neque veleam, vel philosophiam Veterum hactenus doceri solitam, nullo modo subvertit aut tollit, sed utriusque partim perficit,partim illustrat & exornat." Cited in Klein, "Corporeal Elements," 357.

[53] Boyle, *The Sceptical*, 101-102.

[54] Boas, "An Early," 153.

[55] Harold J. Cook, "THE SOCIETY of CHEMICAL PHYSICIANS, THE NEW PHILOSOPHY, AND THE RESTORATION COURT," Bulletin of the History of Medicine 61, no. 1 (1987): 77, http://www.jstor.org/stable/44433663.

> For I observe, that of late chymistry begins, as indeed it deserves, to be cultivated by learned men who before despised it; and to be pretended to by many who never cultivated it, that they may be thought not to be ignorant of it… Now this I fear may prove somewhat prejudicial to the advancement of solid philosophy.[56]

Reexamining Boyle's identities once more, each one has been compromised through this process, losing focus on the qualities that are necessary to conduct experimental philosophy. He mentions in other sources of the "mere scholars" and "mere chymists" who "are wont to be acquainted enough with nature and trades" and "their curiosity is wont to be too much confined"[57] respectively; and the canting chymists who have the ambition to speak about this new subject without the prerequisite experience. It is not the traditional view of Boyle banishing alchemy and the other practitioners, ushering light and clarity into the world. It is also not simply an evolution of late alchemy into early chymistry as a natural product of introducing Baconian experimental philosophy. The chymical fields were quite familiar with artisanal knowledge, and especially the Spagyrists were well-versed in experimental philosophy.

An argument can be made that he did not even adapt the different elements of practitioners into chymistry, but instead, adapted experimental philosophy for chymical purposes. Boyle certainly promotes the use of experimental data and empiricism against the canting chymists and vulgar chymists. However, Boyle does not mention the term experimental philosopher within *The Sceptical Chymist.* His critiques are indeed directing chemistry into becoming an experimental philosophy. However, experimental philosophy is framed by Boyle as the natural state of chymistry, and the failures of these practitioners are perversions, not steps in its evolution. Experimental philosophy is not the next iteration of chymistry; it is the only acceptable form of chymistry that other practitioners have not yet realized.

Boyle's role is not that of the inventor but the self-proclaimed skeptic, who endeavored to point out the flaws of the establishment not just for his successors, but also for contemporaries around him. This is not an unprecedented suggestion. Previous work has suggested that the evolution of Chemistry is characterized not by transformation but by definition as the domain of chemistry is distilled into its core components.[58] While I reject the idea that the analysis of "chymistry" as a transition is unproductive, the guidance that characterizes this model is seen within *The Sceptical Chymist*. Boyle's contribution above even his theory is direction. Boyle's ideal chymists are not novel in his opinion. They are self-evident, and it is a failure on the learned men who should have known better, as Boyle clears their vision and directs them back to the one true path.

Boyle's identity as the "Chymist" continues to be analyzed as the origin of chemists as we know them today. As our understanding of the complex interactions between different groups of practitioners working

[56] Boyle, *The Sceptical*, 2.

[57] Boyle, Robert. Some considerations touching the usefulness of experimental naturall philosophy. Oxford: H. Hall for R. Davis, 1671: 395. Cited in Malcolm Oster, "The Scholar and the Craftsman Revisited: Robert Boyle as Aristocrat and Artisan," *Annals of Science* 49, no. 3 (1992): 265, https://doi.org/10.1080/00033799200200261.

[58] Abbri, "Alchemy and Chemistry," 217.

during the 17th century evolves, this paper provides a framework based on the already accepted identity of Boyle's chymists. This framework is relative, viewing these earlier identities in comparison to the later chymists, and can allow more complex connections to be drawn within this critical transitional period. As future work continues on demystifying this era of chemistry and the evolution of the field returns into the spotlight, continued study on contemporary perceptions of these identities will be able to create a more empirical and factual understanding of the transition period of chymistry based on this comparative model.

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