



Project  
**MUSE**<sup>®</sup>

*Today's Research. Tomorrow's Inspiration.*

---

## "Summus atque felicissimus salium": The Medical Relevance of the Liquor alkahest

Paulo A. Porto

Bulletin of the History of Medicine, Volume 76, Number 1, Spring 2002, pp. 1-29 (Article)

Published by The Johns Hopkins University Press  
DOI: 10.1353/bhm.2002.0038



 For additional information about this article

<http://muse.jhu.edu/journals/bhm/summary/v076/76.1porto.html>

---

“*Summus atque felicissimus salium*”:  
The Medical Relevance of the  
*Liquor alkahest*

PAULO A. PORTO

**SUMMARY:** This paper analyzes the development of the concept of alkahest from its origins in the Paracelsian corpus to its mature form in the works of Joan Baptista van Helmont (1579–1644) and his successors. Historians of science have usually focused on the chemical aspects of the alkahest, taking into account especially the claims that it was a substance capable of dissolving all kinds of matter. This paper shows the medical implications of the alkahest: it was not only a “solvent,” but an important means of revealing nature’s secrets and of producing medicines. The properties ascribed to the alkahest fit perfectly within Helmontian theories about matter, disease, and cure.

**KEYWORDS:** alkahest, J. B. van Helmont, chemical philosophy, iatrochemistry, seventeenth-century chemistry, seventeenth-century medicine, preparation of medicines

The *liquor alkahest* had moments of glory and of decadence. Beginning as an obscure invention of Paracelsus (1493–1541), it was widely praised throughout the seventeenth and eighteenth centuries as one of the most important secrets described by the Belgian physician Joan Baptista van Helmont (1579–1644). However, as time went by, it gradually fell into oblivion—and it even became an object of mockery for chemists, being reckoned as one of the fantastic dreams of alchemists. The German

I am grateful to Prof. Dr. Ana Maria Alfonso-Goldfarb (Pontifícia Universidade Católica de São Paulo, Brazil) and Prof. Dr. Lawrence M. Principe (Johns Hopkins University) for reading and commenting on earlier drafts of this paper, and for their valuable suggestions. Special thanks to Prof. Principe for his help with translations and for sharing useful bibliographical material. This research has been supported, at different times, by grants from the Brazilian agencies *Fundação de Amparo à Pesquisa do Estado de São Paulo* (FAPESP, proc. 98/06209-7) and *Conselho Nacional de Desenvolvimento Científico e Tecnológico* (CNPq), which are gratefully acknowledged.

chymist<sup>1</sup> Johann Kunckel (1630–1703), for instance, considered the idea of the alkahest ludicrous, and argued: “If the alkahest dissolves everything, it should dissolve the vessel which contains it.”<sup>2</sup> In this paper, I aim to discuss not only the important role played by the alkahest in Helmontian theories about matter, but also to focus on a point that has not received much attention from historians of science: the significance of the alkahest in Helmontian medical theory.

In the twentieth century, some historians tried to discover if any chemical substance could exhibit at least some of the properties attributed to the legendary alkahest. Ladislao Reti, for example, studied in detail some recipes involving the alkahest, and affirmed that no single chemical substance could dissolve the wide variety of substances listed by van Helmont (charcoal, stones, plants, metals, etc.). After citing the attempts of other scholars to discover the chemical nature of the alkahest, Reti advanced his own theory, by making free correlations between writings by Paracelsus, van Helmont, Robert Boyle, and a fourteenth-century alchemical manuscript about a *sal alkali* capable of dissolving bodies. Allowing to van Helmont “a margin of poetical or, in this case, chemical license,” Reti concluded that—in spite of some “exaggerated successes” ascribed to the alkahest—some of the recorded operations could have been performed with an alcoholic solution of potassium hydroxide.<sup>3</sup>

More recently, Bernard Joly wrote an extensive study on the origins and development of ideas about the alkahest in the seventeenth, and

1. Throughout this paper, I use the terms *chymistry*, *chymical*, and *chymists* in the sense suggested by Lawrence Principe and William Newman in their recent paper “Alchemy vs. Chemistry: The Etymological Origins of a Historiographic Mistake,” *Early Sci. & Med.*, 1998, 3: 32–65, on p. 41: “since all the topics we today associate under the two terms ‘alchemy’ and ‘chemistry’ were indiscriminately classed under either term by early modern writers, we advocate the use of the archaically-spelt *chymistry* to express inclusively the undifferentiated domain. This usage will help evade the potential arbitrariness and consequent misunderstandings evoked when the terms ‘alchemy’ and ‘chemistry’ are used casually in reference to activities between the time of the Reformation and the end of the seventeenth century.”

2. Johann Kunckel, *Collegium Physico-Chymicum Experimentale, oder Laboratorium Chymicum* (Hamburg, 1716), pp. 506, 527, cited in John R. Partington, *A History of Chemistry* (London: Macmillan, 1961), 2: 367; Kunckel, *Philosophia chemica experimentis confirmata* (Amsterdam, 1695), p. 229, cited in Bernard Joly, “L’alkahest, dissolvant universel, ou quand la théorie rend pensable une pratique impossible,” *Revue d’Histoire des Sciences*, 1996, 49: 305–44, see especially p. 309.

3. Ladislao Reti, “Van Helmont, Boyle and the Alkahest,” in Ladislao Reti and William C. Gibson, *Some Aspects of Seventeenth-Century Medicine and Science* (Los Angeles: William Andrews Clark Memorial Library, 1969), pp. 3–19, quotation on p. 9.

especially in the middle of the eighteenth, centuries, in which he stated that the survival of these ideas until the middle of the eighteenth century was due to the “persistence of alchemical theories in the work fields of chemistry.”<sup>4</sup> According to Joly, the failures to obtain the alkahest in the laboratory were not enough to reject entirely the background of ideas that generated this sort of a concept—even if the properties ascribed to the alkahest seem “absurd” to us—because there was not a new theory capable of replacing the old ones in a satisfactory way.

Also recent are the studies of William Newman on the alkahest and other related subjects in van Helmont’s theory of matter.<sup>5</sup> Newman aims to show that Helmontian alkahest theory derives from the ideas about *mercury* in (Pseudo-)Geber’s *Summa perfectionis*. Moreover, the extreme antiquity of some alchemical ideas related to the theme certainly contributed to the elaboration of the conceptual backgrounds of both authors. When dealing with the work of George Starkey (1628–65), Newman makes a detailed analysis of the laboratory processes described by the “American alchemist,” among whose main concerns was the preparation of the alkahest. Thanks to the relatively clear accounts left by Starkey, Newman was able to explain, in the light of present-day chemistry, what substances were used by Starkey in his efforts to prepare the alkahest. However, we cannot say that Starkey’s alkahest was the same as van Helmont’s.

This paper is intended to put the *liquor alkahest* in its original Helmontian context, clarifying its meaning as an important concept within van Helmont’s medical and chymical theories. I intend to show the origins of the concept and to establish connections with older alchemical traditions. Moreover, I aim to show that the alkahest was far more than a “solvent” in the modern chemical sense. By analyzing van Helmont’s work, one can see that the alkahest was not a mere chemical used in the manipulation of matter: within the context in which its existence was devised, it was an important means for preparing medicines and for unveiling some of the deepest secrets hidden in natural bodies. The operations involving the alkahest were important evidences of the elementary character of water; but even this extraordinary feature is less important than the fact that only through the alkahest would the

4. Joly, “L’alkahest” (n. 2), p. 305.

5. William R. Newman, “The Corpuscular Theory of J. B. van Helmont and Its Medieval Sources,” *Vivarium*, 1993, 31: 161–91; idem, *Gehennical Fire: The Lives of George Starkey, an American Alchemist in the Scientific Revolution* (Cambridge: Harvard University Press, 1994), pp. 146–51, 175–88 (focusing on van Helmont’s influence on George Starkey).

physician be able to cure hitherto “incurable” diseases, and to prepare a medicine for prolonging human life.

Van Helmont’s ideas on the alkahest were taken up by later authors, such as Johann Glauber and Robert Boyle, among many others. By briefly reviewing these authors’ works, I hope to show that the complexity of the Helmontian alkahest continued. Although Boyle’s main interest in the alkahest seems to be related to his theory of matter, we cannot overlook the fact that medicine was a very important point in his work (as Barbara Kaplan has argued).<sup>6</sup> Glauber—whose work was essential to the medical reforms that the Hartlib circle hoped to initiate—also saw the alkahest as the key to wonderful medicines. His personal views about this liquor suggest that van Helmont’s alkahest was not a single substance, as some historians of chemistry assume, but rather a whole class of substances related in some way. Moreover, if we consider the alkahest only as the “universal solvent” (as van Helmont also described it), we run the risk of confusing the idea of the alkahest with the *modern* idea of a solvent—which would be to lose an important part of the complexity of the Helmontian concept, and of its original medical background.

## The Historical Background

The works of Paracelsus, van Helmont, and their followers were developed in a period of profound queries about medicine in Europe. Many events contributed to an atmosphere of uncertainty and to attempts at reformation. The recovery of ancient medical texts in their original Greek; the discovery of new plants and animals in the East and West Indies; and the appearance of new diseases, such as scurvy and syphilis, as well as devastating epidemics, were some of the ingredients in this boiling cauldron.

From this context Paracelsus emerged, willing to destroy the medicine traditionally taught in the universities, and to rebuild the whole field upon different bases.<sup>7</sup> Paracelsus synthesized a peculiar approach to the study of nature and of the human being, by reworking a variety of elements from different origins (alchemy, metallurgy, Hermeticism, folk medicine, astrology, biblical tradition, etc.). He was a controversial figure, and polemics arose wherever he passed. His influence, however, was mainly posthumous: as his manuscripts were published, adherents and

6. Barbara Beigun Kaplan, “*Divulging of Useful Truths in Physick*”: *The Medical Agenda of Robert Boyle* (Baltimore: Johns Hopkins University Press, 1993).

7. On Paracelsus, see Walter Pagel, *Paracelsus: An Introduction to Philosophical Medicine in the Era of the Renaissance*, 2d ed. (Basel: S. Karger, 1982).

critics multiplied. The general outlines of Paracelsus's thinking made possible a wealth of interpretations. Although his followers have been grouped together under the denomination "chymical philosophy," one can find many differences among them, since each author emphasized a different aspect of his master's work.<sup>8</sup> In general, however, one can say that to the Paracelsians it seemed possible to understand the whole universe through chemistry, and thereby to achieve the means to destroy the new (and old) diseases.

Van Helmont was one of the physicians who, frustrated with traditional medicine, adhered at first to Paracelsus and then gradually developed his own original version of the "chymical philosophy." One good example of this process of assimilation and development of a Paracelsian idea within his work is the alkahest. This concept fit perfectly within the demands of contemporaneous medicine, and van Helmont saw it as the key for preparing the most powerful remedies.

### The Origins of the Alkahest: Paracelsus and Other Chymical Philosophers

The word *alkahest* seems to have been coined by Paracelsus, but the concept was fully developed only later by van Helmont. According to Ladislao Reti and Bernard Joly, Paracelsus mentioned the alkahest only once in his writings, in *De viribus membrorum*, where he discussed—among other issues—the diseases that affect the internal organs.<sup>9</sup> The chapter devoted to the diseases of the liver makes reference to an excellent medicine:

There is, also, the liquor alchahest,<sup>10</sup> which possesses great force and efficacy in preserving and fortifying the liver, as well as in preserving against all forms of dropsy that come from the vices of the liver. . . . And even if the liver was already ruined and destroyed, [the alchahest] itself plays the role of the liver, as if this had never been ruined nor destroyed. Thus, whosoever of you labors in medicine ought to strive with the greatest zeal to learn how to prepare the alchahest in order to turn away the many diseases that arise from the liver.<sup>11</sup>

8. This is shown by Allen G. Debus in *The Chemical Philosophy*, 2 vols. (New York: Science History Publications, 1977).

9. Reti, "Van Helmont" (n. 3), p. 6; Joly, "L'alkahest" (n. 2), p. 314.

10. As already noted by Joly, in "L'alkahest" (n. 2), different authors used different spellings for the word *alkahest*. In the text, I use van Helmont's spelling; in the quotations, however, I respect each author's own version.

11. Paracelsus, *Bücher und Schriften* (Basel: Huser, 1589–91), vol. 1, bk. 3, pp. 8–9, cited in Joly, "L'alkahest" (n. 2), p. 314. The last phrase of this quotation was reproduced, in

This short quotation suggests that, for Paracelsus, the alkahest was merely a medicine against liver diseases. But as I shall show, van Helmont's alkahest was a much more complex concept.

There is no consensus on the origin of the word *alkahest*, and Paracelsus left no hint about its etymology. Some of his successors, however, made efforts to unveil its genesis. George Starkey, for instance, wrote that the "name first given by Paracelsus in the Germane tongue, sounding as much as all Spirit, *Al-gehest*," was a reference to its property of being almost unalterable.<sup>12</sup> Johann Rudolph Glauber (1603–70) recognized his ignorance of the origin of the word, but made some guesses about it: *alkahest* could be the same as *alkali est*; however, it could also have originated from the German *Al gar heis*, or *Al zu hees*—which, in van Helmont's "Brabantick Idiotism [*sic*], which was the Mother Tongue of the Author," could sound like *altho-haes*, or "very hot."<sup>13</sup> An author in England, who wrote a treatise on the alkahest under the pseudonym "Cleiodophorus Mystagogus," gave an explanation similar to Starkey's:

This word . . . comes from the *Belgian* tongue, or better, *High-Dutch*; in Holland or Flanders, where van Helmont lived, *Geest* is the same as saying *Spirit* in English, and in the *German* tongue, it is much higher and guttural, being expressed *Alchaest*, which means *whole spirits* or *all spiritual*.<sup>14</sup>

Kunckel, who considered the whole idea absurd, formulated his own scornful version: for him, alkahest came from the German *alles Lügen heisset*, or *alles Lügen ist*—"it is all lies."<sup>15</sup>

The Paracelsians who flourished before van Helmont did not give much importance to the alkahest, but introduced small changes in the original idea. One can note this by analyzing some of the Paracelsian

---

Latin, in George Starkey, *Liquor Alchaest, or a Discourse of That Immortal Dissolvent of Paracelsus and Helmont* (London: W. Gademan, 1675), title page. Both references were used for my translation.

12. George Starkey, *Pyrotechny Asserted and Illustrated* (London: R. Daniel for Samuel Thomson, 1658), p. 17.

13. Johann Rudolph Glauber, *The Works of the Highly Experienced and Famous Chymist Johann Rudolph Glauber . . .*, trans. Christopher Packe (London: Thomas Milbourn, 1689), part 1, p. 152.

14. Cleiodophorus Mystagogus (pseud.), *Trifertes sagani, or Immortal Dissolvent . . .* (London: William Pearson, 1705), p. 35. According to Karin Figala, Cleiodophorus Mystagogus was the pseudonym of an apothecary, William Y-Worth: see Karin Figala, "Zwei Londoner Alchemisten um 1700: Sir Isaac Newton und Cleiodophorus Mystagogus," *Physis: Rivista Internazionale di Storia della Scienza*, 1976, 18: 245–73, see especially pp. 253–57.

15. Kunckel, *Collegium physico-chymicum experimentale*, p. 506, cited in Joly, "L'alkahest" (n. 2), p. 309.

dictionaries published in the sixteenth and early seventeenth centuries. In his *Dictionarium Theophrasti Paracelsi*, Gerhard Dorn wrote: “The Alkahest is said to be prepared mercury. Some think it to be tartar; however, the idea of the author is easily understood from his description of its preparation.”<sup>16</sup> Martin Ruland, author of *Lexicon Alchemiae*, curiously listed two different spellings for the term, resulting in two separated entries. His definition of *alkahest* is identical to Dorn’s, but some lines below, one reads: “Alchahest is a mercury prepared as a remedy for the liver.”<sup>17</sup> Both authors agree in defining the alkahest as a mercury preparation; but Ruland follows Paracelsus more closely by associating it with a hepatic medicine.

Joly claims that Michael Toxites (1523–87) was the first to link the alkahest with mercury, in his *Onomastica* (1574), by associating the quotation from *De viribus membrorum* with a passage from the Paracelsian treatise *De gradibus*, which describes a liquor of mercury as a remedy for the liver.<sup>18</sup> There could be at least one more reason for the identification of the alkahest with a preparation of mercury: Walter Pagel shows that Paracelsus believed that both mercury and the alkahest were remedies against dropsy.<sup>19</sup> In any case, one can see that the alkahest was first mentioned in a medical context. Moreover, it was a remedy with restricted (though important) virtues, for none of these authors connected it with a “universal elixir,” nor with the preparation of the Philosophers’ Stone.

Van Helmont’s alkahest was quite different from Paracelsus’s. Before dealing with the transition from the Paracelsian concept to the Helmontian one, I shall outline the main properties that van Helmont ascribed to the alkahest. This will enable me to show that the Belgian physician built a very elaborate chymical theory around the alkahest—a theory that was intended to take part in a broad medical system that was, in fact, a system for explaining the whole universe.

## The Alkahest as the “Universal Solvent”: Its Action upon Matter

Although van Helmont did not write a treatise specifically on the alkahest, he scattered several references to this liquor throughout his writings.

16. Gerard Dorn, *Dictionarium Theophrasti Paracelsi* (Frankfurt, 1584; reprint, Hildesheim: Georg Olms, 1981), p. 14.

17. Martin Ruland, *Lexicon Alchemiae* (Frankfurt: Zachariae Palthenii, 1612; reprint, Hildesheim: Georg Olms, 1964), p. 26.

18. Joly, “L’alkahest” (n. 2), pp. 315–16.

19. Pagel, *Paracelsus* (n. 7), pp. 142, 201, 366.



Sometimes it is mentioned under other names—as, for instance, *universale solvens*, *dissolvens immutabile*, *ignis aqua*, *ignis gehennae*, *summus atque felicissimus salium*, *liquor unicus*, and *liquor exiguus*. The contexts in which these names appear allow us to conclude that they apply to the same concept. According to van Helmont, the alkahest was a liquor capable of dissolving any material substance without leaving residues. In this process, it would not undergo change either in quality or in quantity, while the substance to be dissolved would be reduced to its *primum ens* (first being)—a state in which it would retain its specific virtues (e.g., its medicinal properties) and would be free of any impurities: “the one onely and same Liquour alkahest, doth perfectly reduce all tangible Bodies of the whole Universe into the first life of the same, without any changing of it self, and diminishing of its virtues.”<sup>20</sup>

The possibility of obtaining a universal solvent is one of the traditional alchemical themes that van Helmont assimilated and reworked. The “dissolution” of a substance to its “primary matter” was generally recognized as one of the steps in alchemical work. Two examples from very popular alchemical treatises will serve to illustrate this point. In *Turba philosophorum*, one of the characters stresses the necessity of including, during the alchemical process, a “water” that changes the whole into “water”; and this was not rainwater, but a “permanent water,” or “water of gold.”<sup>21</sup> Thomas Norton, in the verses of his *Ordinall of Alchimy*, also suggests the importance of “liquors” in alchemy.<sup>22</sup> In van Helmont’s work, however, there is an important difference: the alkahest is not related to the Philosophers’ Stone or to the transmutation of metals into gold. Nevertheless, it is related to the preparation of medicines, as we will see later.

According to van Helmont, the alkahest would perform dissolution and purification by dividing another body into tiny particles—although not so tiny as to extinguish its specificity (i.e., destroy the *seminal properties*

20. J. B. van Helmont, *Ortus medicinae* (Amsterdam: Ludovicum Elzevirium, 1648), p. 334 (henceforth *Ortus*). This quotation (along with subsequent ones) is from the English translation by John Chandler, *Oriatrike, or Physick Refined* (London: Lodowick Loyd, 1662), p. 329 (henceforth *Oriatrike*).

21. Arthur E. Waite, ed. and trans., *Turba philosophorum, or Assembly of the Sages* (New York: Samuel Weiser, 1970), pp. 114–18.

22. Thomas Norton, *The Ordinall of Alchimy*, in *Theatrum chemicum britannicum*, ed. Elias Ashmole (London, 1652; reprint, New York: Johnson, 1967), pp. 76–81. Besides these examples, many others can be cited. For an ancient use of “solvents” among Semitic alchemists, in connection with the transmutation of metals into silver and gold, see Ana Maria Alfonso-Goldfarb, *Livro do Tesouro de Alexandre* (Petrópolis: Vozes, 1999), pp. 126–49 et passim.

or characteristics of each body).<sup>23</sup> It is important to point out that, in van Helmont's theory, if a body continued to be divided into increasingly small parts, the ferments responsible for its specificity would finally be destroyed, and the substance would be reduced to elementary water.<sup>24</sup> Partial "subtilization" of bodies, on the other hand, could change some of their properties, but they would remain essentially the same. Van Helmont cited gold as an example: one can take thin leaves of gold, grind them, mix them with other substances—such as *sal armoniack*, antimony, and mercury sublimate—and, after a series of operations, including heating in a retort, an "Oil of a light red colour" is obtained, which "is easily reduced into its former weight and body of Gold. . . . [The] gold doth not change its antient nature, by so many manglings; nor doth by any meanes loose its own seed."<sup>25</sup>

These ideas can be related to the theory of *minima naturalia* of medieval Scholasticism, according to which, although matter could be infinitely divided into smaller parts, at a given level the particles would no longer be able to support the form of the original body. Such ideas had been in circulation since antiquity, and in the twelfth century they were espoused by thinkers such as Roger Bacon and Aegidius Romanus. The theory of *minima naturalia* was well known in van Helmont's time, and he must certainly have been acquainted with it.<sup>26</sup>

According to van Helmont, the action of the alkahest was due to its "microstructure": its particles were homogeneous, and the smallest possible in nature (except for the particles of the elements: water and air). Alkahest particles were able to pierce and divide any other bodies, without suffering any "re-action" from the dissolved body. This means that the ferments of other substances could not affect the alkahest, and it could be recovered unaltered after the operation.<sup>27</sup>

23. *Ortus* (n. 20), p. 68; *Oriatrike* (n. 20), pp. 64–65.

24. Van Helmont develops this theory to explain the origin of rain and other atmospheric phenomena; see "Progymnasma Meteorii," in *Ortus* (n. 20), pp. 66–73; *Oriatrike* (n. 20), pp. 63–70.

25. *Ortus* (n. 20), p. 68; *Oriatrike* (n. 20), p. 64.

26. This question was studied by Newman, "Corpuscular Theory" (n. 5), pp. 176–77.

27. "[R]eligion is amazed or astonished at the finding of a latex or liquor, which being reduced to the least Atomes possible to nature, as loving a single life, would despise the Wedlocks of every ferment" (*Ortus* [n. 20], p. 116; *Oriatrike* [n. 20], p. 115). In another passage, van Helmont stated: "[T]he chiefest and most successfull of salts, is that which reacheth unto the utmost bound and subtilty in Nature, which passeth thorow all things, and in acting doth alone remain immutable, and the which doth at pleasure through a ready obedience, resolve other things, and melts and makes volatile all rebellious matter, even as hot water doth snow" (*Ortus* [n. 20], p. 474; *Oriatrike* [n. 20], p. 473). It is worth

The idea that “subtilization” (or division into smaller particles) causes transformations in matter appears in various Helmontian theories. For instance, the acid ferment in the stomach effects digestion by dividing food into “atoms” (i.e., small parts) that afterwards form the chyle.<sup>28</sup> The proposed “mechanism” for the action of the alkahest, described in terms of tiny particles piercing matter, was echoed by other chymical philosophers who followed Helmontian tradition. Examples may be found in Mystagogus’s and Starkey’s books on the alkahest.

### The Alkahest and the “Circulated Salt”: In Search of the *Primum Ens* of Everything

It is difficult to reconstruct the path that guided van Helmont from the Paracelsian concept of the alkahest to a very different one. I will focus on some points that may help us to understand van Helmont’s elaboration of the concept.

One can find van Helmont speculating about a “universal solvent” in a letter to Marin Mersenne (1588–1648), dated 15 January 1631. The letter suggests that he was answering several questions formulated by Mersenne in an earlier message. One question was about the possibility of separating the “principles” that constituted matter by using the “force of fire” or some other “force.” Van Helmont replied that it was not possible to separate the “principles” by fire alone, and cited charcoal as an example: even after prolonged heating, it was not divided into “principles.” Nevertheless, there was a solvent capable of transforming every body into volatile matter:

There is a certain universal solvent that dissolves, changes, separates, and reduces all bodies. . . . To such a point that an herb so dissolved, may be completely distilled, and will leave neither coal nor residual ashes in the bottom. . . . In the aforementioned solvent there is a very powerful destruction

---

noting how van Helmont uses expressions resembling the alchemical tradition. The idea that the alkahest dissolves bodies in the same fashion that hot water dissolves snow is analogous to a description of the “mercury of the philosophers” given by the Polish chymist Michael Sendivogius (1566–1636): “You must seek for some hidden thing, out of which is made (after a wonderful manner) such a moisture, or humidity, which doth dissolve gold without violence, or noise, yea so sweetly and naturally as ice doth melt in warm water” (Michael Sendivogius, *A New Light of Alchymy*, trans. John French [London, 1674], p. 50).

28. “[A]s often as a Body is divided into finer Atomes than the necessity of its substance doth bear, a transmutation of that Body doth also continually follow. . . . And so meats in the stomach are resolved through the ferment of the place being seasoned with a sharpish quality” (*Ortus* [n. 20], p. 115; *Oriatrike* [n. 20], p. 115).

of every thing; in relation to it, the elements are impotent, and even fire is of no importance or force.<sup>29</sup>

Here, van Helmont did not call this solvent “alkahest”; however, he said that Paracelsus knew of it: “Paracelsus, in the book *De renovatione et restauratione*, calls this solvent *dissolved salt*, or *circulated salt*, and it is the *primum ens of salts*.”<sup>30</sup>

Later, in the *Ortus medicinae*, van Helmont again related the alkahest to Paracelsus’s “circulated salt” when discussing the *arcana* (secrets) of Paracelsus—that is, medicines with remarkable properties:

His Liquor alkahest is more eminent, being an immortal, unchangeable, and loosening or solving water, and his circulated Salt, which reduceth every tangible body into the liquor of its concrete or composed body.<sup>31</sup>

This excerpt is not clear about the exact relation between the alkahest and the “circulated salt”; it may suggest that they were two different substances, although closely related. However, other passages in which van Helmont described the alkahest as a “salt,” or else depicted the “circulated salt” with properties identical to the alkahest, indicate that he used both terms with the same meaning.<sup>32</sup> Examination of what Paracelsus wrote in the work alluded to by van Helmont will help us to understand why van Helmont was so interested in the alkahest.

In *De renovatione et restauratione*, Paracelsus discussed how “the process which brings a destroyed, corroded or consumed substance back to its youth and perfect essence” applied to metals,<sup>33</sup> but his final goal was to focus on human health and longevity. He therefore discussed the processes of aging and of getting ill, and finally recommended medicines that would help the “renovation and restoration” of the human body. Among these medicines, he emphasized the *primum ens* of several substances (minerals and plants), a concept that he did not clearly explain. One can speculate that this *ens* was a primitive state of a given body, not yet “coagulated” in its final form. Moreover, the *primum ens* was somehow

29. Marin Mersenne, *Correspondance*, ed. Cornelis de Waard, vol. 3 (Paris: Presses Universitaires de France, 1946), p. 33.

30. *Ibid.*

31. *Ortus* (n. 20), p. 790; *Oriatrike* (n. 20), p. 805.

32. In general, scholars have assumed that “alkahest” and “circulated salt” were used synonymically by van Helmont: see Reti, “Van Helmont” (n. 3), pp. 9–10; Newman, “Corpuscular Theory” (n. 5), p. 181; Joly, “L’alkahest” (n. 2), p. 318.

33. Paracelsus, “The Book Concerning Renovation and Restoration,” in *The Hermetic and Alchemical Writings of . . . Paracelsus the Great*, ed. and trans. Arthur E. Waite, 2 vols. (New York: University Books, 1967), 2: 124.

concealed within the mature body, since it could be extracted from the body. It exhibited its virtues in a more powerful way than the body from which it was extracted, especially the virtues of renewing and restoring the human body.

The final part of *De renovatione et restauratione* is devoted to recipes for preparing the *prima entia* of several substances, and it is in this context that the “circulated salt” finally enters the scene. This substance was needed to extract the *prima entia* of minerals (Paracelsus suggested gold or antimony), although it is not included in the recipes for precious gems, herbs, and liquids. There is only one mention of the “circulated salt” in this treatise, and there is no explanation of what it is, or how to prepare it.<sup>34</sup> There is no suggestion that it is a universal solvent, since it appears in only one recipe. What probably attracted van Helmont’s attention was the possibility of obtaining the *prima entia* of bodies, which carried extraordinary medicinal virtues. In a very free interpretation, he gave prominence and properties to the “circulated salt” that Paracelsus had not ascribed to it.

In another treatise, the *Archidoxis*, Paracelsus gave instructions for preparation of the “circulated salt,” with the following justification:

Because there’s frequent mention made in our *Archidoxis* of *First Entities*, and whereas the chiefest foundation is hidden in them, we will together therewith briefly adjoin the preparation of our water of *Circulated Salt*, which is thereto requisite, but was omitted.<sup>35</sup>

The recipe following this quotation involves gem salt and “spirit of wine,” among other substances, and several laboratory operations.<sup>36</sup> Once again, this treatise does not give the “circulated salt” the importance that van Helmont saw in it—although, once again, it appears related to the extraction of *prima entia* from bodies. Paracelsus’s statement that the use of the “circulated salt” was omitted from former parts of the text may have suggested to van Helmont that a great secret was concealed here. There is a passage in the *Ortus medicinae* that reinforces this thesis. Van

34. *Ibid.*, 2: 130–36.

35. Paracelsus, *Archidoxis: Comprised in Ten Books . . .*, trans. J. H. Oxon (London: W. S., 1660), p. 146.

36. *Ibid.*, pp. 146–48. It is difficult to identify the final product of this preparation using the rationale of modern chemistry. T. P. Sherlock, in “The Chemical Work of Paracelsus,” *Ambix*, 1948, 3: 60, says that Paracelsus’s *circulatum* derives from John of Rupescissa, and it is common alcohol; however, Sherlock does not mention *sal circulatum*, or “circulated salt.” Reti, in “Van Helmont” (n. 3), p. 10, affirms that Paracelsus’s *circulatum maius* was common alcohol, and he therefore concludes that “circulated salt” must be an alcoholic solution. For the aims of the present paper, however, this point is of no relevance.

Helmont believed that venomous substances could be changed into medicines by means of proper chymical operations. According to him, Paracelsus knew about this, since he was capable of preparing a remedy from antimony:

For Paracelsus laudably attempted that thing in his tincture of the Life of Antimony; yet was he silent, or knew not that the same thing was to be done in all Poysons of living Creatures and Vegetables whatsoever, by their own circulated Salt: For truly all the Poyson of those perisheth, if they shall return into their first Beings [*prima entia*].<sup>37</sup>

In other words, in the same fashion that the “circulated salt” was used to turn antimony into a medicine, it could also be used to transform all kinds of venomous substances into medicines.

In the *Archidoxis*, Paracelsus described the preparation of several entities—such as quintessences, arcana, magisteries, specifics, elixirs, and extrinsics—for which he claimed medical properties, but what defines each of these entities is not always clear in the text. In the fourth chapter of the tenth book, one can find an example of this terminological obscurity: the title reads “Of the first entities: and first of the extraction of the quintessence, or first ens, of common mercury,” which in the text he also called an arcanum; Paracelsus seems here to be associating the idea of *primum ens* with quintessence.<sup>38</sup>

The reading of other Renaissance and medieval authors shows that this association was not exactly new. Conrad Gesner (1516–65), in *The-saurus Euonymi Philiatris de remediis secretis*—one of the most important treatises on distillation of the period—described quintessence as

the chief and the heavenliest power or vertue in any plant, metall, beast, or in the partes thereof, which by the force and puritie of the hoale substaunce, not by any elimentall or sensible qualitie (although it be not without qualities) conserveth the good health of mans body, prolongeth a mans youthe, differeth age, and putteth away all manner of diseases.<sup>39</sup>

Gesner made several references to Raymond Lull and John of Rupescissa in connection with quintessences, pointing to Lull as the pioneer in

37. *Ortus* (n. 20), pp. 466–67; *Oriatrike* (n. 20), p. 465.

38. Paracelsus, *Archidoxis* (n. 35), pp. 148–49.

39. Conrad Gesner, *The Treasure of Evonymus*, trans. Peter Morwing (London: John Daie, 1559), pp. 94–95. On the idea of quintessence in Gesner and other authors of the period, see Maria Helena Roxo-Beltran, *Imagens de magia e de ciência: Entre o simbolismo e os diagramas da razão* (São Paulo: EDUC-FAPESP, 2000).

writing on this topic.<sup>40</sup> According to Lull, the quintessence was produced by the distillation of wine. It was also possible to obtain the quintessence from other materials—minerals, plants, or animals. These materials should be ground, allowed to putrefy, and then submitted to a series of distillations. The quintessence of wine could also be used for extracting the medical virtues of other substances.<sup>41</sup>

Paracelsus, however, criticized Lull's doctrine of the quintessence, not believing that he was extracting the true quintessence from the bodies. Paracelsus claimed that his own results, as described in *Archidoxis*, were far better than Lull's.<sup>42</sup> According to F. S. Taylor, Paracelsus probably never used the word *quintessence* to denote the product of the distillation of wine; instead, he used *alcool vini*.<sup>43</sup> Whatever names were used, one can observe that Paracelsus's and van Helmont's search for the *primum ens* of bodies followed a medieval and Renaissance tradition: the laboratory separation of a part of a given body that would concentrate its more essential, characteristic, and useful properties. This was put into practice by apothecaries and physicians in search of more powerful medicines, and the procedures were explained on a theoretical level through the supposition of such entities as *quintessences* or *prima entia*.

## The Alkahest in van Helmont's Chymical Medicine

Van Helmont was particularly interested in the medical virtues of the *prima entia* of substances, and, as we have already mentioned, for him the "circulated salt" or alkahest was required to prepare them. According to him, the *primum ens* was a state in which a body was free of all its "original blemishes" (i.e., impurities, heterogeneity), and so it was able to show its native virtues without offering any risk to human health. As *prima entia*, the bodies exhibited remarkable medical properties. This aspect was fundamentally important for van Helmont, for he was concerned about the fact that common chymical operations could destroy the medical

40. Roxo-Beltran, *Imagens* (n. 39), p. 67; F. S. Taylor, "The Idea of the Quintessence," in *Science, Medicine and History*, ed. E. A. Underwood, 2 vols. (London: Oxford University Press, 1953), 1: 247–65, see especially p. 255. In this case, it probably was not the historical Raymond Lull, and the references may be from pseudo-epigraphic texts. On this and other aspects of "quintessences" in the Lullian corpus, see Ana Maria Alfonso-Goldfarb, *Da alquimia à química: Um estudo sobre a passagem do pensamento mágico-vitalista ao mecanicismo* (São Paulo: Nova Stella-EDUSP, 1987), pp. 148–51.

41. Roxo-Beltran, *Imagens* (n. 39), p. 24; Taylor, "Idea" (n. 40), 1: 255–58.

42. Pagel, *Paracelsus* (n. 7), p. 244.

43. Taylor, "Idea" (n. 40), 1: 263.

properties of plants. He offered scammony as an example: if boiled with acids, this plant would lose its pharmaceutical properties.<sup>44</sup> Thus, the alkahest was a very important tool for pharmaceutical operations: it was a safe, nondestructive means for obtaining the medical virtues of “simples.”

Van Helmont criticized sharply the traditional techniques of preparing remedies. For instance, he condemned the practice of adding honey or sugar to medicines. Apothecaries justified this procedure by claiming that it made the remedies more acceptable to the taste, more powerful, and more durable.<sup>45</sup> Nevertheless, van Helmont had his own arguments. Although good-tasting to healthy people, sugar was prejudicial to the digestion of the diseased; that is, by disturbing the work of the digestive ferment, the sugar could decrease or even destroy the beneficial effects of the medicine. Moreover, he believed that the traditional procedures to avoid the corruption or putrefaction of the remedies were inadequate, because they could “castrate” the virtues of the medicines. The only way to reveal the most profound secrets of nature, and the true medicine, was through *pyrotechny*, or chymistry. Thus, by means of the alkahest, it would be possible to solve the problem of the preservation of the remedies: “Alchymical speculations have taught me, that a small liquor may be prepared, which keeps the Crasis of simples uncorrupted, without a forreign or hurtful seasoning.”<sup>46</sup>

As we can see, the alkahest was a fundamental tool for investigating nature. In the Helmontian project, such investigation would reveal the true causes of diseases and the means to cure them. By using the alkahest it would be possible to prepare a variety of medicines. For example, a medicine for urinary calculus (*duelech*) could be made by dissolving a mineral named *Ludus* with the alkahest.<sup>47</sup> The dissolution of “pretious Pearles called *Unions*” (*uniones*) would give a “Spermatial Milk” capable of curing consumption, palsy, and other diseases.<sup>48</sup> However, van Helmont considered the alkahest to be more than a means for preparing specific medicines; it was a remedy against each and every disease.

In van Helmont’s view, diseases were failures of the normal functions of the *archeus influus* (a kind of “spirit” or “force” residing in the body and governing the vital processes as a whole) or of one among the many

44. *Ortus* (n. 20), p. 466; *Oriatrike* (n. 20), p. 465. On the uses of scammony in ancient medicine, see Alfonso-Goldfarb, *Livro do Tesouro* (n. 22), p. 154 n. 220.

45. *Ortus* (n. 20), pp. 462–63; *Oriatrike* (n. 20), p. 461.

46. *Ortus* (n. 20), p. 463; *Oriatrike* (n. 20), p. 462.

47. J. B. van Helmont, “De lithiasi,” cap. 7, in *Opuscula medica inaudita* (Amsterdam: Ludovicum Elzevirium, 1648), pp. 62–63; *Oriatrike* (n. 20), pp. 881–82.

48. *Ortus* (n. 20), p. 480; *Oriatrike* (n. 20), p. 479.



*archei insiti* (“spirits” residing in specific parts of the human body, ruling over an organ, for example). Cure could be attained by pacifying and harmonizing the functions of the afflicted *archeus*; the *archeus* would then return to its normal activities, and would be able to cast out the disturbing invader.<sup>49</sup> Many salts had medicinal properties, and they could act in the different “digestive” levels of the organism. Some salts were able to cleanse the impurities in the stomach, before being subjugated by the local ferment; others only acted on further “digestions,” being diuretics or diaphoretics; others would reveal their virtues only during the production of the feces. However, the “chiefest and most successfull of salts”—the alkahest—was able to penetrate deeply into the organism, volatilizing all impurities that resisted being assimilated by the human body.<sup>50</sup>

A medicine capable of piercing the deeper parts of the organism, giving comfort and strength to the diseased *archeus*, would be a universal medicine. Van Helmont considered that three of Paracelsus’s arcana had this power: tincture of *Lile*, *Mercurius Diaphoreticus*, and the *liquor alkahest*.<sup>51</sup> He believed that the latter had the most remarkable properties. He emphasized this when he wrote that by means of the alkahest, it would be possible to cure even the so-called incurable diseases—like urinary calculus and leprosy. In fact, the alkahest would be the only natural means to cure leprosy; the only alternative possibility would be the direct action of God.<sup>52</sup>

Moreover, van Helmont thought that the alkahest was the only means to achieve a long-sought-after dream of many physicians: a medicine to prolong life. According to him, common remedies could not make our lives longer: they acted by “purifying” the organs and by making the *archei* return to their normal functions, but they could not return the lost “forces” to an aged *archeus*.<sup>53</sup> Not even the alkahest alone, in spite of its spectacular properties, could perform this task: a very special “balsam”

49. On *archeus*, see Paulo A. Porto, “O contexto médico na montagem das teorias sobre a matéria de J. B. Van Helmont” (Ph.D. diss., Pontifícia Universidade Católica de São Paulo, 1998), pp. 9–37; idem, *Van Helmont e o conceito de gás: Química e medicina no século XVII* (São Paulo: EDUC-EDUSP, 1995), pp. 73–78. For details on the concepts of disease and cure, see Walter Pagel, “Van Helmont’s Concept of Disease—To Be Or Not to Be? The Influence of Paracelsus,” *Bull. Hist. Med.*, 1972, 46: 419–54; idem, *Joan Baptista van Helmont: Reformer of Science and Medicine* (Cambridge: Cambridge University Press, 1982), pp. 141–54; Peter Niebyl, “Sennert, van Helmont, and Medical Ontology,” *Bull. Hist. Med.*, 1971, 45: 115–37; idem, “The Helmontian Thorn,” *ibid.*, pp. 570–95.

50. *Ortus* (n. 20), p. 474; *Oriatrike* (n. 20), p. 473.

51. *Ortus* (n. 20), pp. 524, 790; *Oriatrike* (n. 20), pp. 524, 804–5.

52. Van Helmont, “De lithiasi” (n. 47), cap. 9, pp. 80–81; *Oriatrike* (n. 20), p. 901.

53. *Ortus* (n. 20), p. 789; *Oriatrike* (n. 20), p. 803.

was required, which could be prepared from the wood of the Lebanon cedar. Van Helmont wrote that he had made tireless investigations of nature in his attempt to find the suitable source of this balsam. As on a few other occasions, the solution of the problem was revealed in a dream—in which he saw the cedar trees at the top of Mount Lebanon remaining intact after the Flood.<sup>54</sup> The cedar wood, however, could not be ingested in its natural state: it must be dissolved and cleansed from its external impurities, before it could be assimilated by the human body. Ordinary chymical operations were no good here, for boiling or distilling would destroy the balsamic virtues of the cedar wood.<sup>55</sup> The chymical philosopher therefore needed to find a suitable way to separate the *primum ens* of the wood, and this was not an easy endeavor.

Van Helmont's procedure for making this medicine is clear, except for one detail: it required, of course, the use of the alkahest, which was the only means capable of separating the *primum ens* of the cedar wood from its impurities, without destroying its virtues. After a series of separations and distillations, and a period in digestion, a salt was obtained, which "shall thorowly mingle it self with the Water: and it is the first Being of the Cedar."<sup>56</sup> This is an eloquent example of the importance of the alkahest in the extraction of the *primum ens* of substances. It allowed the chymical philosopher to obtain not only medicines for curing diseases, but also the balsam of long life, which could not otherwise be prepared.

### The Preparation of the *Liquor alkahest*: Between the Dream and the Laboratory

It is worth asking if van Helmont ever possessed such a marvelous liquor. Certainly he believed that Paracelsus had been the first to prepare this substance, which van Helmont referred to as the *liquor alkahest* of Paracelsus.<sup>57</sup> He also pointed out that the epitaph of Paracelsus states that the

54. Van Helmont also gave other biblical arguments to justify his choice of Lebanon cedar wood: Noah's Ark was built with this incorruptible wood, and the doors of Solomon's Temple were also made of cedar, covered with gold. See *Ortus* (n. 20), pp. 796–97; *Oriatrike* (n. 20), pp. 810–11 (incorrectly numbered as 809[bis]–810 in the 1662 edition).

55. *Ortus* (n. 20), pp. 798–99; *Oriatrike* (n. 20), p. 812.

56. *Ortus* (n. 20), p. 797; *Oriatrike* (n. 20), p. 811. The idea that the *primum ens* bears the medicinal properties of bodies may also be found in van Helmont's treatises "Pharmacopolium ac dispensatorium modernorum" (*Ortus* [n. 20], pp. 452–69; *Oriatrike* [n. 20], pp. 456–68) and "Potestas medicaminum" (*Ortus* [n. 20], pp. 470–83; *Oriatrike* [n. 20], pp. 469–82).

57. *Ortus* (n. 20), pp. 105, 790; *Oriatrike* (n. 20), pp. 105, 805.

Swiss physician was able to cure “incurable” diseases such as leprosy.<sup>58</sup> As we have already seen, van Helmont believed that these cures were possible only by means of the alkahest. He also mentioned the *elixir proprietatis*—a medicine that Paracelsus claimed could prolong life. Although van Helmont denied that this elixir could have such power, he recognized some kind of healing virtue in it. Concerning the recipe to prepare the *elixir proprietatis*, he wrote:

Indeed *Paracelsus* hath been silent (even as in most of his other Descriptions) as to the addition of the Liquor Alkahest, wherewith the whole matter is presently solved throughout its whole, and the Medicine succeeds according to his Description.<sup>59</sup>

Moreover, references in his tract “Complexionum atque mixtionum elementalium figmentum,” included in *Ortus medicinae*, indicate that van Helmont used the alkahest at least twice to reduce substances to their elemental water. The text of the paragraph entitled “A Handicraft operation of the Liquor *Alkahest*” says, of the first such occasion:

I have known a water (which I list not to make manifest) by meanes whereof, all Vegetables are exchanged into a distillable juyce, without any remainder of their dregs in the bottom of the glasse: which juyce being distilled, the *Alcalies* being adjoynd, it is wholly reduced into an un-savory Elementary water.<sup>60</sup>

On the second occasion:

I have put equall parts of an Oaken Coal, and of a certain water, in a glasse Hermetically shut: in the space of three dayes, the whole Coal was turned by the luke-warmth of a Bath, into two transparent Liquors, divers in their ground and colour. . . . But the dissolving Liquor, remains in the bottom, being of equall weight and virtues with it self.<sup>61</sup>

Although the name is not explicit in these quotations, the title of the paragraph and the properties described leave no doubt that van Helmont was writing about the alkahest. He used both examples to show that, after

58. According to Pagel, Paracelsus “requested burial at the almshouse of St. Sebastian” in Salzburg (*Paracelsus* [n. 7], p. 29); his gravestone is still extant at St. Sebastian Church in that city. Paracelsus’s epitaph was quoted by van Helmont in “De lithiasi” (n. 47), cap. 7, pp. 59–60; *Oriatrike* (n. 20), pp. 878–79. Another English translation is available in Henry M. Pachtter, *Paracelsus: Magic into Science* (New York: Henry Schuman, 1951), p. 290. Van Helmont inferred that one of the “incurable diseases” mentioned in the epitaph as being cured by Paracelsus was *dulelech*.

59. *Ortus* (n. 20), p. 799; *Oriatrike* (n. 20), p. 813.

60. *Ortus* (n. 20), p. 108; *Oriatrike* (n. 20), p. 108.

61. *Ibid.*

preparation with the alkahest, later chymical manipulations could easily reduce any bodies back into elementary water.

However, there are also reasons not to believe that van Helmont really owned some substance he could call the alkahest. What is perhaps the most remarkable of his references to this liquor is found in the tract “Potestas medicaminum,” where he describes a dream in which he received a revelation.<sup>62</sup> In the dream, a spirit gave him a bottle labeled *ignis aqua* (fire water)—“a name altogether simple, singular, undeclinable, unseparable, unchangeable, and immortal.”<sup>63</sup> Van Helmont cited many things that he then was able to learn; finally, another spirit took the bottle away from him, and he lamented its loss.<sup>64</sup>

Van Helmont’s account of his dream suggests that the alkahest, which he here called *ignis aqua*, was very important to him. After describing how he received the bottle labeled “fire water,” he wrote that chymistry (*pyrotechnia*) had the keys to open the doors of the palace of knowledge. Then he was led to a garden, where all the “simple” medicines revealed their specific virtues.<sup>65</sup> The bottle with the alkahest was taken from his hands only after a series of revelations about nature. When he at last lost the marvelous liquor, he woke up and perceived that it had all been a dream. We may conclude from this story that van Helmont regarded the alkahest as a fundamental tool to obtain knowledge, since it was only while he possessed this fire water that he could discover the virtues of the “simples.” In other words: the alkahest was a means of doing chymical operations capable of unveiling the specificity of medicines—probably the most valuable prize a chymical philosopher could achieve, in van Helmont’s opinion.

## The Alkahest and the Fire: Similar Agents in the Transformation of Matter

In “Potestas medicaminum,” van Helmont also justified the use of “fire water” as a name for his solvent. He wrote that it would be useless to dissolve gold in *aqua regia* in order to use that metal as a medicine, since the dissolved gold would be dead; instead, it should be dissolved with the

62. *Ortus* (n. 20), pp. 470–83; *Oriatrike* (n. 20), pp. 469–82. Debus quotes this dream in *Chemical Philosophy* (n. 8), 2: 322, 325. He compares it to “alchemical dreams”—a very common theme for adepts of alchemy.

63. *Ortus* (n. 20), p. 471; *Oriatrike* (n. 20), p. 470.

64. *Ortus* (n. 20), pp. 482–83; *Oriatrike* (n. 20), pp. 481–82.

65. *Ortus* (n. 20), p. 471; *Oriatrike* (n. 20), p. 471.

alkahest, which would transform it into a remedy that could clean the whole body “unsensibly, . . . in a unisone tone.”<sup>66</sup> Van Helmont concludes:

At length I perceived, That the liquor alkahest, did cleanse Nature, by the virtue of its own Fire: For as the Fire destroyeth all Insects, so the alkahest consumeth diseases.<sup>67</sup>

There is, therefore, a similarity between actions performed by fire and by the alkahest. Van Helmont stated that fire would “subtilize” or divide substances into minute particles, which, as we have already mentioned, was a way to transmute matter. Indeed, fire was the most important agent for transforming matter. Therefore, the alkahest had its “own fire,” inasmuch as it would also separate particles. In this sense, the alkahest was the fire of chymists, the fire of philosophers, the fire without fire. Concerning this subject, it is interesting to observe the short definition for the expression *liquor alkahest*<sup>68</sup> *Paracelsi* in the glossary at the beginning of van Helmont’s *Opuscula medica inaudita*:

It resolves every visible Body into its first matter, the power of the Seeds being preserved. Concerning this Liquor Chymists do say: *The common People do burn by Fire, we by Water.*<sup>69</sup>

In fact, countless alchemists had already written about an “igneous water” as a step in the preparation of the Philosophers’ Stone. In general, this “water” was associated with the “mercury of the philosophers,” as is evident from many examples in the *Turba philosophorum*.<sup>70</sup> In a seventeenth-century treatise traditionally ascribed to the Polish alchemist Michael

66. *Ortus* (n. 20), p. 480; *Oriatrike* (n. 20), p. 479.

67. *Ibid.*

68. In the 1648 edition of *Opuscula*, this word was misspelled “altahest”; in *Oriatrike*, the translator corrected it to “alkahest.”

69. Van Helmont, *Opuscula* (n. 47), sig. A<sub>4</sub> verso; *Oriatrike* (n. 20), sig. nnnnn<sub>4</sub> verso (emphasis added). Van Helmont also referred to the alkahest as “gehennical fire” (i.e., hellfire)—also a means of purification. See Newman, *Gehennical Fire* (n. 5), p. xiv.

70. For instance: “[K]now ye that quicksilver is a fire burning the bodies, mortifying and breaking up, with one regimen, and the more it is mixed and pounded with the body, the more the body is disintegrated, while the quicksilver is attenuated and becomes living” (*Turba philosophorum* [n. 21], p. 85). After explaining that the alchemical process requires the conversion of whole matter into water, one of the characters of the dialogue says: “This [substance that turns matter into water] is the water which the Philosophers have called Water of Gold, the Igneous, Good Venom” (*ibid.*, p. 117). And in another passage: “Know also that quicksilver is fiery, burning every body more than does fire, also mortifying bodies, and that every body which is mingled with it is ground and delivered over to be destroyed” (*ibid.*, pp. 136–37).

Sendivogius, the preparation of a “mercury” leads to a product whose properties are very similar to the alkahest for, according to the author, “it dissolves all metals and precious stones, etc., since it is *the universal solvent and a miraculous fiery water*.”<sup>71</sup>

Thus, van Helmont was re-elaborating an ancient alchemical theme, with an important difference: his “universal solvent” had no relation to the transmutation of base metals into gold. He was in fact interested in this process—there are at least three passages in his writings describing how he converted mercury into gold with tiny amounts of the Philosophers’ Stone—but in none of these descriptions did he make reference to the use of the alkahest, either in the preparation of the Philosophers’ Stone or in the transmutation itself.<sup>72</sup>

### The Search for the Alkahest: Just a Chemical Problem?

There is another secretive aspect of van Helmont’s account of the alkahest: the lack of information about its preparation. In *De lithiasi*, for instance, he wrote that it was very difficult to prepare the medicine for urinary calculus from the mineral *Ludus*—not because of the *Ludus*, but because of the alkahest needed to transform the mineral into a medicine.<sup>73</sup> He subsequently pointed out that to prepare the alkahest, besides hard work, divine inspiration was also necessary:

no Physitian ever cured the Leprosie, which obtained not the Liquor *Alkahest*. The which, since it is of a most tedious preparation, none, although skilful in art, shall come unto the obtainment thereof, whom the most High shall not by a special gift conduct thither: For he must needs be chosen and endowed by a particular privilege, if he ought to obtain that *Medium* or Mean.<sup>74</sup>

In other passages, van Helmont reaffirmed that the alkahest was a privilege for “adepts”; it could be obtained by “spagyric art,” but only if the Creator revealed it to the philosopher.<sup>75</sup> The theme of the divine origin of knowledge is frequent in van Helmont’s work.<sup>76</sup> The secrecy surrounding

71. Sendivogius, *Processus super centrum universi seu sal centrale*, cited in Z. Szydlo, “The Alchemy of Michael Sendivogius: His Central Nitre Theory,” *Ambix*, 1993, 40: 141 (emphasis added).

72. *Ortus* (n. 20), pp. 671–72, 743, 793; *Oriatrike* (n. 20), pp. 673–74, 751–52, 807.

73. Van Helmont, “De lithiasi” (n. 47), cap. 7, p. 63; *Oriatrike* (n. 20), p. 882.

74. Van Helmont, “De lithiasi” (n. 47), cap. 9, p. 80; *Oriatrike* (n. 20), p. 901.

75. For instance, see Van Helmont, “De lithiasi” (n. 47), cap. 8, p. 68; *Oriatrike* (n. 20), p. 887.

76. On this point, see Pagel, *Joan Baptista van Helmont* (n. 49), pp. 23–26.

the alkahest is typical of alchemical procedures, helping to cloak them from modern analysis.

Moreover, it would be misleading to name the alkahest simply as the “universal solvent” when “solvent” is understood in a modern sense. The properties of the alkahest were described as part of van Helmont’s medical theory and in terms that do not have meaning in modern chemistry: it was a substance capable of revealing and preparing the *primum ens* of bodies; that is, it could cleanse matter and change it almost to the state of elementary water, but the medicinal properties of the body would remain. The alkahest thus belonged to a conceptual background completely different from ours, where the structure and the properties of matter were explained in terms that are alien to the modern chemical thinking. Therefore, one might even wonder if van Helmont was really talking about a single liquor, with a definite chemical composition.

Johann Rudolph Glauber was an important chymist of the seventeenth century who admitted the possibility that the alkahest represented a class of substances. He made several references to the alkahest in his writings, and he claimed to have prepared it.<sup>77</sup> According to Glauber, it did not matter if different authors named different substances as alkahest:

for it matters little for diverse Menstruums to be called by the same name, although they do not answer one another in all things. For even as wine is wine, although it come from *Germany, Italy, France* or *Spain*, nevertheless each is wine, although the one exceed the other in strength and relish. . . . The same is to be judged concerning my alkahest: To wit, that if the virtues be agreeable to the name, from whatsoever *Subject* it be extracted, it rightly meriteth the same name.<sup>78</sup>

Glauber also claimed that he had discovered his *menstruum* independently, and for a long time he used it only in preparations involving metals. After a “great student of Helmont” informed him about the virtues of the alkahest, Glauber realized that it could be the same as his “secret *balneum*”; he then discovered other marvelous possibilities for the preparation of plants and animals.<sup>79</sup> He had very good arguments in favor of his alkahest. For instance, the following quotation could serve as an answer to Kunckel’s mockery (formulated, in fact, many years later) about the impossibility of keeping the alkahest in any flask:

77. Glauber, *Works* (n. 13), part 1, pp. 108–10, 152–54, 162–67, 259; part 2, pp. 90, 178, 212–13.

78. *Ibid.*, part 1, p. 162 (emphasis in original).

79. *Ibid.*, p. 108.

It doth not only (which seems a wonder) dissolve vegetables, animals and minerals with those things which come of them, but also the very Glasses; wherefore you must alwaies chuse the strongest glasses for digestion and solution, or in the defect of such, the weaker are to be changed every 6 houres.<sup>80</sup>

In a later work, Glauber identified saltpeter as the “universal salt.” When he referred to “salt-peter,” however, he did not mean just our “potassium nitrate,” but a family of substances that included niter itself, nitric acid (produced by the distillation of saltpeter), and potassium carbonate (produced by adding charcoal to fused niter). Salt-peter would be the “universal solvent” because it could operate in three different ways: (1) as niter “in its own nature”;<sup>81</sup> (2) as a “fixed and igneous liquor”—that is, as a solution resulting from the deliquescence of potassium carbonate;<sup>82</sup> or (3) as an “acid spirit,” our nitric acid.<sup>83</sup> Glauber was concerned with practical uses for the alkahest, especially in pharmaceutical preparations, some of which could not be successfully accomplished without the solvent.<sup>84</sup> Many chymists of this period shared his concern. John Webster

80. *Ibid.*, p. 107.

81. Nowadays, we say that fused salt-peter is a strong oxidant, and therefore very reactive.

82. This is an alkaline solution.

83. “Salt-peter is an universal Dissolvent, and is able to dissolve all the things in the whole World, if it be made use of in three forms or shapes. Whatsoever the acid Spirit thereof, or the Eagle with its sharp Claws cannot effect, its fixed Salt, or the fiery Lyon will accomplish: and whatsoever is impossible to be done by these two, the Griffon which hath its rise from the Eagle and Lyon, will artificially perform” (Glauber, *Works* [n. 13], part 1, p. 406). Here, Glauber referred to common salt-peter as a “griffon,” the legendary animal with the head and wings of an eagle and the body of a lion; he meant that by joining the acid spirit (“Eagle”) with the fixed salt (“Lion”), common niter was produced: “the corrosive Spirit prepared out of Salt-peter by Distillation, and likewise the fix[ed] Salt, are most bitter enemies to each other, which ruinating and slaying one another, and being dead, return agen unto that which they were afore, and partakes of both natures” (*ibid.*). Not all chymists shared Glauber’s idea about a “tripartite alkahestical secret”; Starkey found it “ludicrous, monstrous, stupefying, and a ten-fold lie,” as he expressed in a letter to Boyle dated 16 January 1652 (*Royal Society Boyle Letters*, vol. 5, fols. 131–32).

84. The following quotation illustrates how Glauber considered the alkahest among his other medicinal preparations: “I affirm and confess therefore sincerely, that all and every the invented medicines published by others and my self, how rare and costly soever, are most mean things in my estimation. For this *Universal Key* was wanting to us. For our vegetables and minerals, however by art macerated, cannot be perfectly resolved, and therefore we hitherto have had but part of their vertues. But now we need not much art, labour and cost, to reduce a whole body without corrosives, into the first matter, . . . which cannot be done without this *menstruum*. . . . By this means the most strong Herbs, which without this Preparation are poysons, are matured and purified by the liquor *Alcahest*, so that they may safely be taken against most grievous Diseases” (Glauber, *Works* [n. 13], part 1, p. 108).



(1610–82), for instance, wrote that the alkahest was indispensable for preparing “potable gold,” which he identified with Paracelsus’s *hematina*.<sup>85</sup>

Antonio Clericuzio has pointed out that there was a substantial number of chymists interested in the alkahest during the seventeenth century. Among them were the correspondents of Samuel Hartlib (ca. 1600–1662), a group concerned with practical applications of knowledge. Hartlib was particularly interested in inventions and experiments related to agriculture and medicine, and therefore, also chymistry. Among his writings and letters there are many references to authors who wrote about, tried to prepare, or claimed to make use of the alkahest—including Starkey, Robert Child, Hugh Platt, Frederick Clodius, Johann Brun, Robert Hamilton, Thomas Henshaw, and Thomas Vaughan.<sup>86</sup>

Robert Boyle (1627–91) was very interested in this issue. He was involved in an attempt to prepare the alkahest, discussing with other chymists the best ways to obtain the solvent.<sup>87</sup> As has already been pointed out by Lawrence Principe, Boyle wrote a treatise (now lost) entitled “Of the Liquor Alchahest and Other Analizing Menstruums” before 1680,<sup>88</sup> and what may be an early form of this tract is listed in a 1650s inventory of his writings.<sup>89</sup> In his published texts, one can see that he was doubtful of the possibility of preparing so marvelous a liquor, but he did not consider its existence impossible:

85. “From this root doth spring and arise those medicaments prepared by the alkahest (but not otherwise to be had) that Paracelsus called *Hematina*. . . . These hematine medicines may be had forth of gold and silver; but not without the help of their constructive liquor, or universal solvent: and therefore . . . are not ordained for remedies for the poor; and that scarce one artist of a thousand, can rightly get these rare and excellent medicines” (John Webster, *Metallographia, or An History of Metals* [London: Walter Kettilby, 1671], pp. 188–89).

86. Antonio Clericuzio, “From van Helmont to Boyle: A Study of the Transmission of Helmontian Chemical and Medical Theories in Seventeenth-Century England,” *Brit. J. Hist. Sci.*, 1993, 26: 303–34, see especially p. 312. See also Ronald S. Wilkinson, “The Hartlib Papers and Seventeenth-Century Chemistry,” part 1, *Ambix*, 1968, 15: 54–69; *ibid.*, part 2, *Ambix*, 1970, 17: 85–110; John T. Young, *Faith, Medical Alchemy and Natural Philosophy: Johann Moriaen, Reformed Intelligencer and the Hartlib Circle* (Aldershot: Ashgate, 1998).

87. Robert Boyle, *Some Considerations Touching the Usefulness of Experimental Natural Philosophy* (Oxford: Hen. Hall, 1663), part 2, pp. 82–83; *idem*, *The Works of the Honourable Robert Boyle*, ed. Thomas Birch, 6 vols. (London, 1772), 2: 97.

88. This tract was mentioned in a list of Boyle’s texts, “Tracts Relating to the Hermetical Philosophy,” written ca. 1680; it is also mentioned in his preface to *The Producibleness of Chymical Principles* (Oxford, 1680). See Lawrence M. Principe, *The Aspiring Adept: Robert Boyle and His Alchemical Quest* (Princeton: Princeton University Press, 1998), pp. 63, 125, 184.

89. This early version was entitled “Of the Attempts of the Chymists, an Universal Medecine, the Alkahest and the Elixir”: see Principe, *Aspiring Adept* (n. 88), p. 184.

Indeed what Paracelsus and Helmont relate of their *Alkahest*, . . . with which the later of them, if not both, pretend to be able to reduce . . . stones, vegetables, minerals, animals, etc., into insipid water, is so strange (not to say incredible) that their followers must pardon me, if I be not forward to believe such unlikely things, till sufficient experience hath convinced me of their truth.<sup>90</sup>

After discussing the properties of several solvents, Boyle asked:

Why should it be thought that the Alkahest, or some other *menstruum* wherein Nature is skilfully assisted, and to the utmost highten'd by Art, should not be able to dissolve concretes of very differing textures[?]<sup>91</sup>

Considering that such a solvent could exist, Boyle then speculated about how could it act upon matter. He imagined a mechanism consonant with his corpuscular model of matter; in doing so, he in some sense agreed with van Helmont's idea that the properties of the alkahest were due to the tiny size of its "atoms":

Why may not Nature and Art afford a *menstruum*, whose variety of parts, and figures, and (perhaps also) motion, may give it ingress into bodies of very differing textures?<sup>92</sup>

Elsewhere, Boyle wrote: "it appears not, that the alkahest does . . . work upon bodies otherwise than mechanically."<sup>93</sup> He added that the destruction of the "texture" and "cohesion" between the parts of a body made it volatile.

In *The Sceptical Chymist*, Boyle discussed the doctrines of the "four elements," sustained by the Aristotelians, and of the "three principles," held by the "spagyrist" or followers of Paracelsus. Boyle was doubtful of the elementary nature of those entities, and he leaned toward a corpuscular view of matter. Experiments performed by van Helmont are mentioned throughout the text, although Boyle did not agree with all the conclusions proposed by van Helmont to explain his observations. Van Helmont's experiments with the alkahest are frequently mentioned. According to Boyle, they suggested that there could be an "agent" capable of analyzing compound bodies better and less violently than fire.<sup>94</sup>

90. Boyle, *Usefulness* (n. 87), part 2, p. 82; *Works* (n. 87), 2: 97.

91. *Ibid.*, p. 87; *Works*, 2: 99.

92. *Ibid.*, p. 87; *Works*, 2: 100.

93. Robert Boyle, *Experiments, and Notes, about the Mechanical Origine and Production of Volatility* (London: E. Flesher, 1675), p. 26; *Works* (n. 87), 4: 299.

94. Robert Boyle, *The Sceptical Chymist* (London: J. M. Dent, Everyman's Library, 1949), p. 50.

The alkahest could resolve the parts of a compound body into one or more liquids, without leaving a *caput mortuum*, or solid residue. The mixture of these liquids with suitable substances, followed by heating, would lead to their final conversion into elementary water.<sup>95</sup> This was an argument against both Aristotelians and spagyrist, for there was separation neither into four elements, nor into three principles. Subsequently, Boyle also doubted van Helmont's conclusion that the water so produced was the only material element out of which everything was made.<sup>96</sup> Although suspicious of its actual existence, Boyle was able to explain the properties ascribed to the alkahest within his corpuscular model. While these properties might be too good to be true, they were far from impossible within the framework of his ideas.

One chymist with whom the young Boyle discussed the details of the preparation of the alkahest was Starkey. In Hartlib's *Ephemerides*, there is an account, dated 1650, that Starkey and two other chymists were working on the alkahest.<sup>97</sup> However, another account, shortly after, states that Starkey's alkahest was not the same as van Helmont's, but an "approximation."<sup>98</sup> In 1657, Starkey published *Nature's Explication and Helmont's Vindication*, a treatise aimed at criticizing Galenism and promoting medical reforms following the ideas of Paracelsus and van Helmont. Starkey suggested the preparation of several remedies, but remarked that although the alkahest had "infinite vertues," its preparation was very difficult.<sup>99</sup> For this reason, he excused himself for not including in this treatise any "*Alchahesticall* preparations": he said he feared that "young artists" would spend so much time trying to prepare the alkahest that they would not give due attention to more easily attainable medicines.<sup>100</sup> Nevertheless, he promised to deal with the alkahest in two forthcoming treatises: one of them, fully dedicated to the solvent; the other, on *pyrotechny* in general.<sup>101</sup>

In the latter book, *Pyrotechny Asserted and Illustrated* (1658), Starkey wrote that, in a book intended to present "a short systeme of the whole art of *pyrotechny*," he could not fail to include a chapter on the alkahest, for "the most noble and eminent preparations" were performed by

95. *Ibid.*, p. 69.

96. *Ibid.*, p. 75.

97. Clericuzio, "From van Helmont" (n. 86), p. 312.

98. Wilkinson, "Hartlib Papers" (n. 86), part 2, p. 88.

99. George Starkey, *Nature's Explication and Helmont's Vindication* (London: E. Cotes for Thomas Alsop, 1657), p. 294.

100. *Ibid.*, pp. 294–95.

101. *Ibid.*, pp. 296–97.

means of the alkahest; therefore, without it the work would be “lame and imperfect.”<sup>102</sup> He quoted and paraphrased van Helmont many times, and established some connections with earlier alchemists’ ideas. It is curious to see that Starkey took pains to state that the alkahest and the “mercury of the philosophers” were different entities. He considered it “absurd” to take one for the other, and wrote an entire chapter on the differences between the two substances.<sup>103</sup>

The same issue had already been approached in one of the books that Starkey wrote under the pseudonym “Eirenaeus Philoponus Philalethes,” *The Marrow of Alchemy*. This treatise discusses the preparation of the Philosophers’ Stone, or Elixir, and “Philalethes” suggested that its prime matter was a “mercury”; however, by “art” it would be possible to prepare another liquor of rare virtues, named “The Fire of Hell.”<sup>104</sup> Here, “Philalethes” translated into English the expression *ignis gehennae*—one of the names that van Helmont gave to the alkahest. According to “Philalethes,” this “fire” could resolve all concrete bodies into their primeval matter, but was of no avail for producing gold. It was fundamentally different from the “mercury of the philosophers,” for it was capable of destroying the metallic nature of bodies. Nevertheless, “Philalethes” pointed out that through this “fire” it would be possible to prepare noble medicines.<sup>105</sup> The same concern about distinguishing the alkahest from the “mercury of the philosophers” was expressed again, years later, in Cleidophorus Mystagogus’s treatise *Trifertes sagani*.<sup>106</sup>

Starkey’s *Liquor Alkahest*, which was fully dedicated to the marvelous solvent, was published posthumously in 1675. Besides the well-known descriptions of the properties of the alkahest, and praises for its virtues, there are many practical details about the preparation of the alkahest in this book, more than in any of the previous ones. According to Starkey, the mysterious universal solvent was prepared from human urine and was the product of an interaction between a “spirit of urine” and the “spirit of wine.”<sup>107</sup> To explain his observations along the process, Starkey followed

102. Starkey, *Pyrotechny* (n. 12), p. 17.

103. *Ibid.*, pp. 22–28.

104. Eirenaeus Philoponus Philalethes (pseud.), *The Marrow of Alchemy* (London: Edw. Brewster, 1655), part 2, bk. 1, p. 19.

105. *Ibid.*, pp. 19–23.

106. Mystagogus, *Trifertes sagani* (n. 14), pp. 27–44.

107. Starkey, *Liquor Alkahest* (n. 11), pp. 17, 20. There is also a brief treatise on the alkahest, written in the form of questions and answers, in a bilingual edition: *The Secret of the Immortal Liquor Called Alkahest / Arcanum liquoris immortalis ignis-aquae; seu alkahest*, whose author is identified as “Eirenaeus Philalethes”; as in *Liquor Alkahest*, human urine is again indicated as the starting material for preparing the “igneous water.” This short treatise is

van Helmont's theory of matter very closely. What is very clear in Starkey's works is his high esteem for the alkahest, believed to be the most important medicinal substance a physician could obtain.

Besides the ones mentioned here, many other treatises were written on the alkahest in the seventeenth and early eighteenth centuries. They include *Clara fidelisque admonitoria* (Venice, 1661), by Luigi de Conti; *Dissertatio inauguralis medica de alkahest* (Erfurt, 1685), by Johannes Caspar Wedekind; and *L'alkaest ou le dissolvant universel de Van-Helmont* (Rouen, 1704), by Jean Le Pelletier. We may also find references to the marvelous liquor throughout the works of other important chymical philosophers of the period, as in Johann Joachim Becher's *Physica subterranea* (Frankfort, 1667) and Otto Tachenius's *Epistola de famoso liquore alkahest* (1652),<sup>108</sup> for example. Several other authors are mentioned by Bartolomeo Castelli in his *Lexicon medicum graeco-latinum* (1731), which has a full column on the alkahest.<sup>109</sup>

## Conclusion

As presented here, the conceptual framework of van Helmont's work was radically different from that of modern chemists. Therefore, attempts to discover the exact chemical nature of what he named alkahest are probably in vain. Moreover, there is another possibility not to be ignored: some evidence suggests that he never actually possessed the alkahest, but regarded it as a gift that God would reveal to someone who deserved such grace. After all, van Helmont (echoing Paracelsus) announced the future arrival of Elias Artista, who would teach, by word and action, how to cure all diseases.<sup>110</sup>

The alkahest belonged to a conceptual framework that was fundamentally medical: it was not only a solvent, but a key to the secrets of medicine—and, in consequence, a key to the understanding of nature. It was a means to obtain the *prima entia* from material bodies and thereby to abstract their medicinal virtues.<sup>111</sup> Even if van Helmont's contemporaries

---

part of a volume entitled *Collectanea chymica*, ed. W. Cooper (London: William Cooper, 1684), pp. 4–23. The book comprises works by several chymists, including a treatise signed by Starkey himself.

108. On this letter see Joly, "L'alkahest" (n. 2), pp. 325–28.

109. I thank an anonymous reviewer for this reference.

110. Van Helmont, "De lithiasi" (n. 47), cap. 7, p. 64; *Ortus* (n. 20), p. 507; *Oriatrike* (n. 20), pp. 883, 506.

111. Pagel, *Joan Baptista van Helmont* (n. 49), pp. 207–8.

did not fully embrace his system, many of them were prepared to understand that under the name of the alkahest an important secret was concealed. They therefore proceeded to search for it, and discussed its properties. The cases of Glauber, Starkey, and Boyle show how later authors discussed the alkahest theme in medical and chymical ways. The picture presented here points to the fact that the Helmontian alkahest belonged not only to a chymical system, but was an important feature of a system designed to be the foundation of a whole new medical theory.