SEVENTEENTH-CENTURY ‘TREASURE’ FOUND IN ROYAL SOCIETY ARCHIVES: THE \textit{LUDUS HELMONTII} AND THE STONE DISEASE

by

\textsc{Ana Maria Alfonso-Goldfarb$^{1,2}$, Márcia Helena Mendes Ferraz$^{1,2}$ and Piyo M. Rattansi$^{2,*}$}

\textit{1CESIMA (Center Simão Mathias for Studies in the History of Science), Graduate Program in the History of Science, Pontifical Catholic University of São Paulo, Rua Caio Prado 102, 01333-000 São Paulo, SP, Brazil}

\textit{2Department of Science and Technology Studies, University College London, Gower Street, London WC1E 6BT, UK}

Our archival researches at the Royal Society reveal that a small envelope attached to a 1675 letter from an Antwerp apothecary, A. Boutens, contained a sample of the ‘Ludus’ prepared as a remedy for the ‘stone disease’ then sweeping through Europe, which was first announced in J. B. van Helmont’s \textit{De lithiasi} (1644). After examining the fascination with the medical use of the \textit{Ludus} (which required the ‘alkahest’ for its preparation) and the tenacious efforts to procure it, we trace the \textit{fortunae} of two other \textit{ludi} in England, brought to and offered by Francis Mercurius van Helmont during his English sojourn. Both eventually found their way to the geologist John Woodward, one of them through Sir Isaac Newton. Finally we show how the allure of the \textit{Ludus helmontii} vanished, with transformations in mineral analysis and reclassifications from Woodward to John Hill.

\textbf{Keywords:} ‘stone disease’; \textit{Ludus}; alkahest; Helmont; Oldenburg; Hartlib

A continuing theme in medical literature since antiquity, \textit{lithiasis}, in its manifestation as kidney and bladder stones, claimed an immense number of lives in seventeenth-century Europe. The ‘stone disease’ made no distinction between rich and poor, old and young. Its victims included many whom we now recognize as deeply involved in an emerging ‘new science’. It is scarcely surprising that so many applied themselves to the search for a cure, or at least an effective means of relieving the tormenting pain it inflicted. Among the many cures suggested, one took pride of place among all others: the \textit{Ludus helmontii}.

Our historical researches on this topic led us to a surprising result. In a small envelope, attached to a letter (figure 1) preserved in the Royal Society archives, reposes what may be one of the last surviving examples of that magisterial remedy.\textsuperscript{1} The envelope, and the yellowish, pungent powder it contained, had already gained the attention of two well-known historians of early modern science, A.R. and M.B. Hall, when compiling their

\textsuperscript{*}Author for correspondence (ucrhpmr@ucl.ac.uk).
edition of the correspondence of the first secretary of the early Royal Society, Henry Oldenburg. They believed they had good grounds for classifying the contents as nothing more than a sample of pyrites. However, the letter to which it is attached explicitly suggests a very different identification: that of a preparation containing the *Ludus helmontii*, the enigmatic material promoted by J.B. van Helmont as the sovereign cure for the stone disease and sought after eagerly throughout Europe.
The letter, dated 2 June 1675, was from a Belgian apothecary from Antwerp, Augustin Boutens, who wished to resume an interrupted epistolary exchange with Oldenburg begun eight years earlier. It was initiated by Oldenburg, who wrote to Boutens on 11 November 1667, praising him for his ‘especial inclination for that solid Philosophy which is founded upon observations and experiments and which we are trying to establish here by means of the Royal Society’. He was among those chosen few who had made ‘indefatigable attempts to discover the secrets of nature by the better way of chemistry’, one of those ‘men of sense’ who did not impose ‘vulgar prejudices’ or speak ‘dogmatically’ but subjected all matters to a thoroughly critical examination, the same method whose supreme expositor was ‘our excellent Mr. Boyle in his Sceptical Chymist’. Oldenburg urged Boutens to continue to ‘discover more and more of the admirable Treasures of nature, to which chemistry, rightly used, is the best possible key’, assuring him that the Society would be happy to share Boutens’s discoveries, and on its part was ‘ready to serve you in return in any way possible’.

After this preamble, Oldenburg went on to make a specific request to the Belgian apothecary: ‘We know that the Helmontian Ludus is found abundantly near your city. I warmly beg you to send us a quantity by the aid of some friend going from thence to London by sea.’

Oldenburg wished Boutens to supply detailed information about the Ludus he had requested: its precise location, at what depth under ground, whether cubical in shape or not, whether the ‘correct method’ of preparing it was known in Antwerp, and their ‘experience of the effects of that preparation’.

Oldenburg named the informant who had first brought Boutens to his attention as a ‘Mr. Jeffreys’, residing then at Breda as an agent of the English Crown. Boutens replied on 23 November 1667, confirming that Jeffreys had indeed paid him a visit in Antwerp several months earlier and had mentioned the Ludus during their conversation. Boutens had thereupon fetched and presented to him a piece of that material from his own stock, promising to send him more during Jeffreys’s sojourn in Breda, on condition that he would obtain for him from London books by members of the Royal Society, three of those he named being by Boyle (The Origin of Forms, Experimental History of Cold and On Light and Flame) and one purportedly by Thomas Willis, a Medica practica. Boutens, however, had never received a response from London, and was now repeating his offer through Oldenburg. As soon as he received the titles already mentioned to Jeffreys, Boutens promised to dispatch, by the very same messenger who delivered the books, ‘a hundred pounds or more’ of the Helmontian Ludus, as well as a complete description of its location, the depth at which it was to be found, and ‘the method I myself use in medicine with the virtues which I have found by experience’.

Oldenburg was sufficiently interested in Boutens’s offer to find room for it in an already crowded agenda and read it out to the Fellows attending a Royal Society meeting on 19 December 1667. The response was overwhelming. The attendees had been asked to indicate the amount of Ludus each required, and a manuscript of the minutes noted that a very large shipment indeed must be ordered, if the total demand was to be met. Although it has not been possible so far to locate the letter of request from Oldenburg to Boutens in the Society’s archives, it must have been dispatched, because Boutens’s reply of 16 May 1668 shows that he had not only gone to great lengths to satisfy the demand by sending no less than 150 pounds of the Ludus, but had supplemented it with...
20 pounds of pyrite (then known as the ‘Paracelsian Ludus’) together with a great deal of information about the two ludi. However, when Oldenburg read that letter to the fellows more than a month later, he was able, surprisingly enough, to produce only ‘a little piece of the stone called Ludus helmontii’. 

We can only speculate about the fate of the rest of the large shipment of ludi. Had much of it been lost on its way to London? Had it perhaps been all too liberally distributed among Fellows who had requested it? The Ludus finds no mention again in the published or manuscript minutes of the Society. However, as we show below, there is a great deal of evidence that the Helmontian Ludus remained a focus of great interest for the Royal Society both before and after this exchange of letters and the promises of its barter between Oldenburg and Boutens.

In the next section we explain how and why the Ludus attained a position of such significance as a cure for the stone disease.

**FROM LUDUS PARACELSI TO LUDUS HELMONTII**

Paracelsus (ca. 1493–1541) may have been the first to introduce Ludus as a ‘stone against the stone’. A thorough description of such a material was first given by J. B. van Helmont in his *De lithiasi*, although he enlarged the scope of its action to include any stony concretion within the body and, at the same time, made a very significant addition to the ingredients needed to prepare it: the alkahest. According to Helmont, it was necessary to employ the Liquor Alkahest, which would transform the Ludus into a deliquescent salt, entirely freed from earthy residues. More precisely, after turning it into a volatile tingeing salt, the alkahest would be able to uncover the original seminal qualities contained in the mineral Ludus. However, as a result a formidable difficulty had been added to what otherwise may not have seemed an unduly complicated procedure: the necessity of procuring the true alkahest if the process was to succeed. Nevertheless, the extraordinary effort demanded was fully justified, because even a small amount of the salt thus obtained would rapidly dissolve any concretion whatsoever within the human body. The rationale that Helmont offered for such an extraordinary consequence rested on a different view of stone formation within the human body from that to be found in Paracelsus. For Paracelsus it was caused by deposition of matter that ought normally to have been excreted. Helmont believed that the process involved the action of a ferment, namely that seminal spirit that prepared the ‘earth’ for its transformation into a concretion within the body (as did, for example, the volatile urine-salt).

Two agents were therefore involved in the formation of stones within the body. One corresponded to the seminal principle or the ‘seeds’ already present in urine or other body fluids, possessing the potentiality to convert it into concretions. Its actualization required a combination of the ‘seeds’ with a second agent, the ferment, a spirit *odorific* or *putrefactus*, that originated in excrement and was present in small amounts within certain organs (such as the kidneys). The stone formation itself would still require an imbalance between ‘Archei’, most often caused by external agents. In sum, although ‘seeds’ and a certain amount of the excitatory ferment was ordinarily present in the kidneys, stone formation occurred when urine was corrupted by an external agent, or as a result of some bodily idiosyncrasy. Helmont remarked that long experience had convinced him that it
was impossible to undo the combination of ‘seeds’ with the ferment involved in stone formation without using such an agent as the Ludus prepared with the alkahest.\textsuperscript{23}

As already noted, Helmont had warned that only a chosen few had been blessed by God with the knowledge of the secret of making the alkahest. Was the same true of the preparation of the Ludus? Helmont’s account described the Ludus in its native state as no other than the well-known cube-shaped pyrite, which Paracelsus had given the name of Ludus because it was shaped like dice or ‘play-stones’.\textsuperscript{24} He had found it to occur in subterranean deposits 40 feet deep at the margins of rivers, notably the Scheldt in his native land. In its natural state it was a very hard substance, rich in ‘sulphur’ and ‘vitriol’. Once extracted and exposed to the atmosphere, the vitriol decayed forthwith, rendering the Ludus friable. It therefore seems that in his account of the transformation of pyrite into the clay-like material that he considered to be the Ludus, van Helmont had recourse to Paracelsus’s definition of pyrites. Some other seventeenth-century authors held views different from that of van Helmont, eventually concluding that pyrite was one of the metallogenic principles, taking into account its decomposition into sulphurous materials.\textsuperscript{25} In sum, Helmont identified it as a friable and clay-like material, corresponding to a variety of pyrite that was no other than the Paracelsian Ludus. This helps to explain why the Halls identified the material attached to Boutens’s 1675 letter as powdered pyrite.\textsuperscript{26}

Helmont’s description of the Ludus and its location ought to have made it easy to procure the material. However, a great deal of historical evidence, including the exchange between Oldenburg and Boutens, demonstrates that the quest for it, while engaging so many, proved almost as difficult and arduous as that for the Holy Grail. One reason for that was the entrance into the debate of Francis Mercurius, the son of J. B. van Helmont, who had attained fame initially as the editor of his father’s literary remains.\textsuperscript{27} He claimed to possess samples of the true Ludus, but his propensity to become embroiled in controversies during his wanderings over Europe raised doubts about his veracity. A notable example is furnished by the critical comments of Olaus Wormius, the well-known physician and antiquarian, in his Musaeum Wormianum, published in 1655.\textsuperscript{28} In Wormius’s opinion, the Ludus employed by J.B. van Helmont was no other than the cube-shaped pyrite described by Paracelsus. That was quite different from the Scheldt River clay from which van Helmont’s son had derived his samples of the Ludus. To resolve such matters, Wormius had as early as 1646 asked his nephew Thomas Bartholin,\textsuperscript{29} on the eve of his European peregrinatio medica, to gather as much information as he could about the works of the elder Helmont.\textsuperscript{30}

One result of the controversy was to convince many that it was necessary to distinguish two sorts of ludi. One was the cube-shaped pyrite, the Paracelsian Ludus; the other originated in Belgian riverine clay deposits and was the Helmontian one. At a time when laboratory parameters were scarce, provenance was among the few accepted criteria for establishing the authenticity of materials. This may explain why Boutens chose to add several pounds of pyrite to the larger shipment of the Helmontian Ludus, collected at the margins of rivers in the Antwerp area, the very same locations in which the elder Helmont loved to walk and collect his precious materials. Not only was its provenance thereby guaranteed, but Boutens had also furnished the materials needed for comparing the two sorts of ludi.

In assessing why these questions should have been of so much interest, effort and speculation at the time, not only to the newly founded Royal Society but also throughout Europe, we must remind ourselves once more of larger context. The incidence of ‘stone
disease’ seems to have increased markedly in northwestern Europe from the sixteenth century to at least the first half of the eighteenth century, accounting perhaps for one-third of deaths. Its pain is recognized as being among the most excruciating that a human being can experience. Until the early nineteenth century its definitive treatment was lithotomy or ‘cutting of the stone’, done without an effective anaesthetic and carrying a high mortality risk. Other therapies, including the use of powerful acids, alkalis and other solvents, proved unsuccessful and increased suffering when it did not actually cause death. Hence, networks of correspondents stretching from Britain to the continent invested a great deal of time and effort in searching for the components of Helmont’s famous formulation, and a reliable method of preparing it for medical administration to patients.

EARLY RECEPTION OF _DE LITHIASI_ IN ENGLAND

The deep interest taken in the elder Helmont’s work by many of those associated with the emergence of new science in England, at least since the mid 1640s, is now well known and documented. Less familiar is the depth and intensity of widespread interest in his remedy for the stone disease. It was only at that time, when his life was drawing to a close, that the Belgian natural philosopher was able to publish and spread his ideas after the long silence imposed on him by the Inquisition. Particularly relevant for the present study is the publication in 1644, the year of his death, of _Opuscula medica inaudita_, which included four treatises, one of which was _De lithiasi_.

The first news of the publication of van Helmont’s _Opuscula_ seems to have reached England in a letter sent from The Netherlands on 3 August 1644 to the ‘universal intelligencer’ Samuel Hartlib, by Henry Appelius, a member of his circle, and a relative of John Dury. On 24 January of the following year, Appelius wrote again to describe the titles of the four treatises included in _Opuscula_, and to urge careful attention to their contents. In that same year, Sir Cheney Culpeper sent Hartlib a letter with the list of Helmont’s writings being considered for posthumous publication, in which he also drew attention to what he considered the numerous treasures contained in the volumes already published, while conceding that they were not always easy to comprehend. Among them was the celebrated ‘universal solvent’, reputed to heal the hitherto incurable stone disease. Culpeper wondered how far the younger Helmont would be able to help to elucidate his father’s often very obscure ideas, being heir to his countless manuscripts, although he then went on to add that in his judgement neither father nor son fully recognized the true worth of the treasures they held in their hands.

These facts furnish further evidence of the central role that Hartlib occupied in the web of information around van Helmont’s work. It is worth noting that he himself fell victim to the stone illness at the beginning of the 1640s, and it was that malady which eventually was to cause his death in 1662. As a result, not only do Hartlib’s extant manuscripts, papers and letters bear witness to the assiduous exchange of information between Britain and mainland Europe, but they also furnish a veritable roadmap of the quest for a cure for the stone disease. In addition to the initial information provided by Appelius and Culpeper, Hartlib’s papers also bear testimony to his unrelenting search for the _Ludus_ and other similar materials through those who were then reputed to be experts in laboratory operations, including his son-in-law, Francis Clodius, as well as Johann Moriaen (ca. 1591–1668), his
emissary in Holland, and others well known at the time, among them Joachim Poleman and, of course, Robert Boyle.37

Suffering the torments of pain that made him test almost any and every kind of possible cure, which could prove as unpalatable as it was dangerous, Hartlib had to wait a long time before receiving at last the wonderful Ludus, as he informed John Winthrop in a letter sent in 1660: ‘Ludus helmontij hath been used by me but I have spent it all but am promised to have more and farr better made’.38 Indeed, in December 1661 Moriaen sent a German Helmontian physician, Otto Faber, to London with a case full of medicines for Hartlib, including one pound by weight of the ‘true Ludus paracelsii’ similar to the Antwerp variety and located strictly by Helmont’s instructions.39

Dr Faber had previously served as physician to the Court of Sulzbach, where Francis Mercurius and his lifelong companion, the physician Tobias L. Kohlhans, performed several functions for the Count Palatine.40 Dr Kohlhans had a crucial role in the matter of the Helmontian Ludus, too. He had already, in his doctoral dissertation—a section of which was later to be presented by Oldenburg to the Royal Society—compared van Helmont’s alkahest to an ‘animal alkahest’. This was the name that Kohlhans gave, by analogy, to the lymphatic fluid discovered in those vessels by Thomas Bartholin—the nephew whom Wormius had commissioned to gather information on van Helmont’s work.41 In turn Bartholin attached sufficient importance to Kohlhans’s suggestion to include in his epistolory collection the letter from a close associate informing him of Kohlhans’s doctoral dissertation soon after it was presented at Heidelberg University.42

Curiously enough, and certainly not by chance, Kohlhans, too, had arrived in England at about the same time as Faber, and also attended to Hartlib’s malady, among his other tasks. Indeed, in a letter dated October 1661, Dury informed Hartlib that he had learnt of a unique medication against the stone disease, which would be sent by their common friend, the well-known Dutch ‘collegiate’ Peter Serrarius, through Colehans (sic), a professor of medicine, whose single acquaintance in England was Oldenburg. Dury describes the medication as a white powder, whose elaboration he attributed to a Dr Reusner in other letters. He further wrote that Kohlhans had also mentioned another ‘specific’ medicine against the stone, which he had learnt from a famous gentleman—presumably the younger Helmont—made of flint stones, designated by the elder Helmont a variety of the Ludus.43 The formulation being guarded as a great secret, Dury admitted that he had not been able to learn anything more about it, and begged Hartlib to try to persuade Kohlhans to impart the details, and to entrust the formula to someone as experienced in laboratory operations as Poleman.44

Unfortunately, far from having the effect expected of it, Dr Reusner’s white powder made Hartlib even more ill. Excruciating pain compelled Hartlib to discontinue its use, as indicated by his correspondence with Serrarius and John Worthington (Hartlib’s correspondent in Cambridge) between the end of 1661 and the beginning of the following year. That set of letters is worthy of closer examination, because it includes several links with the quest for van Helmont’s magisterial formula.45

Thus, in a letter written by the end of 1661, Hartlib told Worthington that Kohlhans had retired to the countryside, after making a remark in passing on a formula against the tertian fever, and others on some aspects of Bartholin’s work. Hartlib expressed the hope of learning more about both topics soon—probably upon Kohlhans’s return to London.46 In another letter to Worthington written a few days later, Hartlib discussed the possibility
of obtaining some *Ludus* via Boyle to enable Poleman to prepare Helmont’s famous remedy for the stone. That was because he had received a letter from Serrarius asking him to warn Kohlhans about the poor results from Reusner’s remedy. In fact, in a series of letters written to Hartlib from November 1661 to January 1661/2, Serrarius apologized for the noxious effects of Reusner’s remedy and promised to send in the meanwhile the ‘brave *Ludus*’ he had found, as soon as possible. Finally, in his last letter of January to Hartlib, Serrarius wrote that he had sent the *Ludus* through an emissary. If Serrarius did send the promised shipment, however, it probably did not reach its addressee in time, because Hartlib died about a month later.

Constituting the hub of an intense exchange of intra-European information, the *Ludus* almost ceased to be mentioned in the letters of Englishmen after Hartlib’s death. However, as we already know, it returned to some prominence in 1667, when a little box of the Helmontian *Ludus* was supposedly sent to London by Boutens—or perhaps through another agent suggested by Jeffreys—in July. A letter sent also in the same month by Serrarius to Oldenburg may hint at the involvement of the ubiquitous Kohlhans in this episode, as it reported his just having sent a package to Oldenburg through an agent.

Oldenburg, however, never received Serrarius’s letter or the *Ludus*: he was then in prison, accused of espionage, and everything sent to him from abroad was intercepted. Boyle had volunteered to collect Oldenburg’s mail for as long as he remained in prison. Consequently the little box containing the *Ludus* sent by Boutens found its way to Boyle. This fact is attested to by at least two letters that Oldenburg wrote to Boyle, where he claimed the return of the little box. He asked Boyle to retain a portion of the *Ludus*, to test whether it was the genuine item or not. The rest had to be returned because it belonged to Dr Thomas Sherley, a physician who had left the army not too long before. In fact, a few years later, Sherley published a work on stones in the macrocosm and microcosm, including those formed inside the human body. The extant evidence, however, indicates that Boyle had decided to give a sample of the *Ludus* to John Locke, who thanked him deeply for ‘Helmont’s preparation’ in a letter dated November 1667. By this time, perhaps having tired of waiting so long, Oldenburg decided to make direct contact with the original supplier of the *Ludus*, and sent the letter that initiated an epistolary exchange with Boutens. Thus we return to our point of departure: the correspondence between Oldenburg and Boutens on the Helmontian *Ludus*.

**Francis Mercurius’s dispersal of ‘Helmontian Ludus’ in England**

After having retraced the intense exchange between London and Antwerp, or more precisely between the Royal Society and Boutens, from November 1667 to May 1668, one question remains to be answered: why did the sample of *Ludus* and the recipe for the stone medication sent by Boutens in 1675 (figure 2) attract so little attention?

The most probable, and simplest, answer is connected to the long sojourn of Francis Mercurius van Helmont in England. That story is already well known and fits perfectly well with the new evidence we have presented. Although he was in England originally on a short-term diplomatic mission, it proved to be his longest continued stay abroad, extending through most of the 1670s. In conformity with his nomadic character, after spending a short season at the Court of Charles II he went to Cambridge, where he met the famous Cambridge Platonist Henry More. The latter introduced him to Ezekiel
Foxcroft (1633–75), who was deeply interested in and very skilled in the laboratory arts that had earned the younger van Helmont his reputation. That proved to be an extremely fortunate encounter because Francis Mercurius dictated several prescriptions for Foxcroft to prepare as medications for the celebrated headaches of More’s friend, Lady Conway. Eventually, the younger Helmont became so charmed with Anne Conway that for the first time in his life he settled down, and he remained at her side first as medical consultant, and then as mentor and confidant, until her death in 1679.

Among the many unusual episodes associated with Francis Mercurius during his long stay in England, the one relevant for the present study is his seemingly arbitrary distribution of pieces of his father’s Ludus to whomsoever he pleased. Two such pieces have left historical tracks that—not by chance—involves Fellows of the Royal Society. One piece was, as may be expected, given to Ezekiel Foxcroft, who in turn gave it to one of the great icons of modern science, Sir Isaac Newton. Newton may have performed some experiments with it; he eventually passed it on, in the 1720s, to John Woodward (1665–1728), who was not only an assiduous collector of minerals but was also engaged on a treatise on that subject at the time. Another piece of the Ludus was given to Dr J. Kemp (1665–1717), also a collector, well known for his museum of antiquities and curiosities. Kemp thought that the sample should go to someone particularly skilled in the analysis of minerals; concurring in Newton’s judgement, he also chose Woodward, who thus became the possessor of two pieces of the Helmontian Ludus.

Woodward devoted a full section of his remarkable treatise on minerals to the Helmontian Ludus, which was also designated by that time as a ‘waxen vein’. It begins with a survey of the literature on the Ludus to establish the differences between the Paracelsian and Helmontian varieties as precisely as possible. For that purpose, in addition to the samples of the Helmontian Ludus, Woodward also used a sample of the Paracelsian variety, which was also given to him by Newton. The provenance of each sample being thus secure, and following through with an analysis of the differences between the samples, Woodward...
was able to make several interesting inferences. For instance, the comparison of the Ludus produced by the younger Helmont with samples of English soil indicated that all of them corresponded to one and the same type of clay, with small variations in their colour. More significantly, Woodward was able to establish that the elder Helmont had been guilty of an error when he had classified his clay as a variety of the pyrite used by Paracelsus, the very same error that eventually gave rise to the controversy discussed in this paper.64

About 20 years later, and as a result of further improvement in the precision attained by mineral analysis, the physician and naturalist John Hill (1714–75) criticized Woodward, in turn, for not having furnished a satisfyingly accurate description of the Helmontian Ludus. In Hill’s view, this was because Woodward had not really grasped the true differences between it and English clay: although they belonged to the same genus, they differed as species. Hill devoted much attention to the provenance, formation, and physical and chemical analysis of those materials, which he described in full detail.65 However, in the writings of both Woodward and Hill, the medical uses of the Helmontian Ludus receded into the background, with few allusions to therapeutic applications undertaken in remote locations.66 Contrariwise, from that time onwards, the Helmontian Ludus that had so deeply captivated the imagination of so many famous men of science in the seventeenth century was henceforth classified as a type of Septarian concretion. Hence the term Ludus helmontii survives to this day, but merely as a variety of clay, bearing an odd-sounding ancestral name whose origins are, for most Earth scientists, lost in the mists of time.67 As interest in Ludus as the sovereign remedy for stone disease disappeared, so the memory of its historical origins (figure 3) had faded so much that by the nineteenth century they were attributed to fanciful tales brought back by boastful explorers in ‘medieval’ times.
To understand the fascination it exercised during the seventeenth and eighteenth centuries, we must, as is now widely recognized, try to understand the thought world of the past in its own terms. Would such understanding be significantly enhanced if, after tackling the formidable task of reconstructing and replicating experiments culled from ‘early-modern’ texts, all we learnt was that the much sought-after alkahest was just a simple solvent? Or that the sovereign formula for preparing the Ludus, using the alkahest, would have yielded nothing more than a metallic salt? They offer little assistance when the goal is to understand the complex confluence of ancient and modern traditions, permanence and discontinuity, that inspired such a quest as that for the Ludus helmontii.68

ACKNOWLEDGEMENTS

We thank Silvia Waisse MD PhD for invaluable help and support at all stages of the preparation of the paper; Mr Keith Moore, Head Librarian, and his staff for supporting our archival researches at the Royal Society and providing photographic images of the rediscovered manuscripts; and University College London, Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for research support.

NOTES

1 Early Letters (hereafter EL), B1/120, Royal Society Archive.
4 Because the documents discussed in this paper are mostly related, in some way, to the Royal Society and to England, the seventeenth-century dates are generally transcribed as old style, following Hall and Hall in Oldenburg correspondence (see vol. 1, p. xxiv), except in a few cases where the correspondence was between those on the continent, where the new style is retained and indicated as [NS].
6 First letter from Oldenburg to Boutens, 11 November 1667, EB/O1/48; published in Oldenburg correspondence, vol. 3, pp. 589–591 (French original, pp. 589–590; English translation, pp. 590–591; hereafter we indicate the full set of pages, without distinguishing between original and translation); quotation on p. 590. 
7 Oldenburg correspondence, vol. 3, pp. 589–591, quotation on pp. 590–591; Boutens’s letters are transcribed one after the other in EB/B1/116 (23 November 1667), 119 (16 May 1668) and 120 (2 June 1675); in Oldenburg correspondence they are in vol. 3, pp. 608–609; vol. 4, pp. 412–414 and vol. 11, pp. 329–330; items EB/B1/117 and 118 are partial translations into
English by Oldenburg; these are also reproduced in *Oldenburg correspondence*, vol. 4, pp. 414–415.

8 *Oldenburg correspondence*, vol. 3, p. 591.

9 In the original French, ‘... si on scait à Anvers la vraye methode de la preparer, et l’expérience des effets de cete preparation’; *Oldenburg correspondence*, vol. 3, p. 590, although the English translation on p. 591 omits the word ‘experience’.

10 The letter by Jeffreys referred to by Oldenburg is mentioned in *Oldenburg correspondence*, vol. 3, p. 535, although the editors apparently could not locate the text in the Royal Society archives. Mr Jeffreys was identified as a Londoner at the service of the English Crown in Breda in a letter from Oldenburg to Boutens dated 11 November 1667 (main text and note 1), and also in a letter from Oldenburg to Boyle dated 3 September 1667, note 6, *Oldenburg correspondence*, vol. 3, pp. 589–591, and pp. 471–473. It was at Breda that the English Commissioners signed in that year (1667) the treaty that brought to an end the Anglo-Dutch War, 1665–67. The Halls (see note 2) did not identify Jeffreys further, but he was probably Edward Jeffreys, mentioned in *Oldenburg correspondence*, vol. 6, pp. 419–420, and as ‘Edward Jeffries’ in P. Beeley & C. J. Scriba (eds), *Correspondence of John Wallis* (Oxford University Press, 2012), vol. 3, p. 288.


12 The story of the curious fate of the *Ludus* sent via Jeffreys at the time that Oldenburg was in prison is told below.

13 As the Halls noted, Willis never published a work on general practice; *Oldenburg correspondence*, vol. 3, p. 609, note 2.

14 ‘La method que i’ay moy mesme praticque en La medicine avec Les vertus trouve par experiences’; *Oldenburg correspondence*, vol. 3, pp. 608–609.


16 *Oldenburg correspondence*, vol. 4, p. 415, note 1.


18 Birch, *op. cit.* (note 15), p. 301; from the minutes in JBO 3, p. 228; the letter’s contents are also mentioned in Ms. 703, *op. cit.* (note 15), fos 46v–47r.


21 The role of seeds and ferments in van Helmont’s work is discussed thoroughly and compared with the views of other authors by A. Clericuzio in his *Elements, principles, and corpuscles: a study of atomism and chemistry in the seventeenth century* (Kluwer Academic Publishers, Dordrecht, 2000), at several places, and more particularly in chs 2 and 3; for a broader and somewhat different perspective, see H. Hirai, *Le concept de semence dans les théories de la matière à la Renaissance: de Marsile Ficin à Pierre Gassendi* (Brepols, Turnhout, 2005), esp. about van Helmont, ch. 17.

23 Helmont, op. cit. (note 20), pp. 41 and 50; Pagel, op. cit. (note 19), pp. 191 and 193.


29 Thomas Bartholin was a scion of a distinguished family of Danish doctors, famed for his discovery of the lymphatic system first published in 1653. As discussed thoroughly below, he had an indirect, albeit relevant, role in the web of information delineated in this paper; on Thomas Bartholin, see I. H. Porter, ‘Thomas Bartholin (1616–80) and Niels Steensen (1638–86): master and pupil’, Med. Hist. 7, 99–125 (1963).

30 The correspondence between Wormius and his nephews is referred to in O. P. Grell, ‘In search of true knowledge: Ole Worm (1588–1654) and the new philosophy’, in Making knowledge in early modern Europe: practices, objects, and texts, 1400–1800 (ed. P. H. Smith and B. Schmidt), pp. 214–232 (University of Chicago Press, 2007), esp. p. 221; see the letter dated 24 January 1646 [NS], from O. Wormius to T. Bartholin in O. Worm, Olai Wormii et ad eum Doctorum Virorum Epistolae, medici, anatomici, botanici, physici & historici argumenti: rem vero literariam, linguasque & antiquitates boreales potissimum illustrantes (2 volumes) (s.n., Havniae [Copenhagen], 1751), vol. 2, pp. 731–732, especially p. 732; the requested information was eventually provided in 1647 and 1650 by his other nephew, Erasmus Bartholin, who was in Leyden at that time: see letters from Erasmus Bartholin to Wormius: idem, letter DCCCXV, pp. 974–975, and letter DCCCCXXV (dated 2 June 1650 [NS]), pp. 988–990, esp. p. 990.

31 See references to the works of Maehle, Ellis and Westbury in note 3.


34 The *Hartlib papers: a complete text and image database of the papers of Samuel Hartlib (c. 1600–1662) held in Sheffield University Library, Sheffield, UK*, 2nd edn (2 CD-ROMs, University of Sheffield, ca. 2002) (hereafter *Hartlib papers*), 45/1/12 A; 45/1/23 A; C. Webster has emphasized the significance of those two letters as evidence for the early interest aroused by van Helmont’s work: The Great Instauration, *op. cit.* (note 32), p. 277. However, A.G. Debus had already pointed out equally contemporaneous criticism of the Belgian’s work in Britain, as for example in a work published in 1631 by W. Foster, who was an opponent of alleged cures by sympathy; see Debus, *op. cit.* (note 32), p. 122.

35 Letter from Culpeper to Hartlib, 17 July 1645, *Hartlib papers, 13/94A–98B*; Clericuzio, ‘From van Helmont to Boyle’, *op. cit.* (note 32), pp. 310–311, where he summarizes the letter’s contents and compares the writings already published with the list of those suggested for publication.


38 *Hartlib papers, 7/7/4A–B.*


41 See note 29.

42 Bartholin, *Thomæ Bartholini Epistolarum medicinalium à doctis vel ad doctos scriptarum: centuria II* (Petrum Gosse, Hææ Comitum, 1740), pp. 571–576; the first edition of this book was published in 1663, about a decade after his discovery of the lymphatic system.

43 The assimilation of the Paracelsian Ludus to flint stones is discussed below.

44 Letter from Dury to Hartlib, 17 October 1661; *Hartlib papers, 4/4/36A–B*.

45 The individual letters constituting this set are described in the following notes.


49 Letter from Serrarius to Hartlib, dated 24 January 1662, *Hartlib papers, 7/98/1A–2B*; in that letter and also an earlier one transcribed in the letter to Worthington, anxiety is
expressed concerning the imprisonment of F.M. van Helmont by the Inquisition, allegedly for corrupting the Duke of Sulzbach and harming the interests of the Jesuits, but more probably to extract from him his ‘father’s secrets’. These letters thus reveal not only the concern but also the involvement of Hartlib and his correspondents with some of van Helmont’s closest associates.


52 This assertion is made in Oldenburg correspondence, vol. 3, p. 447.

53 Letter from Oldenburg to Boyle, 3 September 1667, Oldenburg correspondence, vol. 3, pp. 471–473; again Oldenburg says ‘the boxe of ye Ludus is not yet come to ye hands of [Dr Sherley]’, in a letter to Boyle dated 12 September 1667, ibid., pp. 473–475; also a letter dated 17 September 1667, ibid., pp. 476–479, at p. 478, shows Oldenburg’s familiarity with Dr Sherley, who sent his regards to Boyle. Sherley seems to have been an early correspondent of Oldenburg’s: see letters dated April 1656 and note, Oldenburg correspondence, vol. 1, pp. 96–99, where the preparation of the alkahest is already mentioned.

Sherley’s work on stone formation in nature, and more particularly in the human body, entitled A Philosophical Essay declaring the Probable Causes, whence Stones are produced in the Greater World (William Cademan, London, 1672), was published when he was one of Charles II’s physicians. See also A. G. Debus, ‘Thomas Sherley’s Philosophical Essay (1672): Helmontian mechanism as the basis of a new philosophy’, Ambix 27, 124–135 (1980); P. Peck, ‘The ingenious author: a study of Dr. Thomas Sherley (1638–78), physician-in-ordinary to Charles II’, Med. Hist. 6, 266–274 (1962).

54 Letter from J. Locke to Boyle dated 12 November 1667 in Boyle, op. cit. (note 37), vol. 3 (1666–67), p. 361. In a footnote, the editors observe that the preparation doubtless corresponded to the Ludus sample sent to Boyle and mentioned in Oldenburg’s letter.


55 He was the original for Mathew Arnold’s poem on the ‘Scholar Gypsy’ (1853), based in Joseph Glanvill’s The Vanity of Dogmatizing (printed by E.C. for Henry Eversden at the Grey-Hound in St. Pauls-Church-Yard, London, 1661); M. H. Nicolson identified Francis Mercurius as the original of the mysterious character in Glanvill’s book; see ‘The real Scholar Gipsy by Marjorie Nicolson’, Yale Rev. 18, 347–363 (1929) and M. H. Nicolson (ed.), The Conway

See, for example, Hall, op. cit. (note 27); S. Hutton et al. (eds), The life of Henry More, by R. Ward (Kluwer Academic Publisher, Dordrecht, 2000); that meeting and numerous others between More and van Helmont Jr are mentioned in Lady Conway’s correspondence: Conway letters, pp. 309 et sqq.

Cf. B. J. T. Dobbs, The foundations of Newton’s alchemy: or, ‘the hunting on the Greene Lyon’ (Cambridge University Press, 1975), pp. 112–114; constantly mentioned in the letters sent by More to Lady Conway, because he was the son of her secretary, Elizabeth Whichcote Foxcroft, see, for example, Conway letters, pp. 217 (identification in note 2) and 226 et passim; K. Figala, ‘Newton as alchemist’, Hist. Sci. 15, 102–137, pp. 103–104 (1997); R. S. Westfall, Never at rest: a biography of Isaac Newton (Cambridge University Press, 1983), p. 288; the discussion on Ezekiel Foxcroft by Dobbs, Figala and Westfall concerns his identification with a ‘Mr. F’ mentioned in Newton’s manuscripts, which is not the case here.

Conway letters, pp. 322–323.


On J. Kemp see F. Hitchin-Kemp, A general history of the Kemp and Kempe families of Great Britain and her colonies, with arms, pedigrees, portraits, illustrations of seats, foundations, chantries, monuments, documents, old jewels, curios, etc. (The Leadenhall Press and Scribner’s Sons, London and New York, 1902), esp. pp. 3 and 18; R. Thoresby, The diary of Ralph Thoresby, FRS, Author of the Topography of Leeds (1677–1724): now first published from the original manuscript (ed. J. Hunter) (2 volumes) (H. Colburn & R. Bentley, London, 1830), esp. pp. 31, 154 and 220, where he comments on his visit to Kemp’s remarkable collection, which also included some of the best-conserved mummies then known. After Kemp’s death, the museum collection was catalogued, but the sample of Helmontian Ludus was not mentioned; as it had by then been given to Woodward; see Monumenta vetustatis Kempiana: ex vetustis scriptorisibus illustrata, eosque vicissim illustrantia; in duas partes divisa: quarum altera mumias, simulacra, statuas, signa, lares, inscriptiones, vasa, lucernas, amuleta, lapides, gemmas, annulos, fibulas, cum aliiis veterum reliquiae; altera nummos, materia modoque diversos, continet (ed. R. Ainsworth and J. Ward) (Typis Danielis Bridge; veneunt a Paulo Vaillant; G. & J. Innys; & J. Osborn, London, 1720).


The Ludus helmontii and the stone disease


66 The Ludus helmontii continued to appear in mineralogical and geological treatises during the nineteenth century, mostly as a synonym for Septaria; see P. Cleveland, An Elementary Treatise of Mineralogy and Geology (2 volumes) (Cummings & Hilliard, Boston, 1822), vol. 1, p. 189; the same author mentions an important use of the calcined Ludus helmontii for preparing ‘Roman cement... which possesses the important property of becoming hard under water’. From this time onwards, the Ludus appears in many ‘technical’ works, mostly associated with ‘Roman cement’, retaining the allusion to Helmont, but sometimes attributing it to a distant time; see A. Ure, Dictionary of Arts, Manufactures, and Mines (Longman, Orme, Brown, Green & Longmans, London, 1839), where he mentions a ‘cement stone’ used to make a hydraulic mortar, adding that the mineral was found in beds of clay, as nodular concretions, that ‘were called by the older mineralogists Septaria and Ludus helmontii’; see entry ‘Mortar, Hydraulic’, pp. 867–869, quotation on p. 868. For a more recent publication see M. C. Hansen, ‘Concretions: the “Ludus helmontii” of the Ohio Shale’, Ohio Geol. (fall), pp. 1 and 2–6 (1994), where the author remarks that the nineteenth-century Professor J. Locke had ‘apparently’ compared the reports of some of his contemporary ‘to the boasts of medieval explorers returning with fanciful tales’, his conclusion being based on the following phrase in Locke: ‘The Ludus helmontii have always been a curious subject to geologists’; see p. 1 of Hansen, and for Locke’s phrase, W. W. Mather, Second Annual Report on the Geological Survey of the State of Ohio (S. Medary, Columbus, OH, 1838), p. 262.