


# Non-living naturalia in Clusius's correspondence, Part II. Minerals, strange stones, fossils and earths as objects of exchange in the *respublica litteraria* around Clusius

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## RESEARCH ARTICLE

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### ABSTRACT

Carolus Clusius (Charles de l'Écluse, 1526–1609), one of the most renowned naturalists of sixteenth-century Europe, was a versatile man of letters. One of his fields of interest neglected in scholarship is his attitude and activities around what was called *fossilia* at that time, and what can today be called non-living *naturalia*: metals, gems, various strange “stones”, fossils or medicinal earths. Such *naturalia* appear several times in his correspondence. This two-part study reviews how Clusius took part in the collecting, exchange and discussions about these inorganic objects in the European *respublica litteraria*. He could even be involved in geological or palaeontological issues of his age. The investigation not only throws light on the activities of Clusius and some of his correspondents, but also taps into the broader topic of communication and exchange in the Literary Republic of the time, and may even contribute to the history of the natural sciences in the period. Some of the non-living *naturalia* Clusius was interested in (like “Saint Ladislaus's coin” or the medicinal earth of Tokaj) could be found in Hungary and he looked for them by way of friends in that region (it is known that one of his most important patrons was the Hungarian aristocrat Boldizsár Batthyány). For reasons of space, the present study has been published in two parts: Sections 1–3 appeared in the previous issue, while Sections 4–7 are published in this one. A map to the entire study is included at the end of the present part.

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## KEYWORDS

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## 4. MINERALS AND CLUSIUS'S SAXONIAN RELATIONS

In the following sections we continue to explore Clusius's interests and activities relating to non-living *naturalia* by focusing on specific categories of intriguing inorganic objects that emerge from documents concerning Clusius. First the basic category of such *naturalia* will come into spotlight: valuable minerals in their natural form<sup>1</sup> that can be either metallic (for instance silver ores) or non-metallic (for instance gemstones). In the following I will use the word “mineral” in this sense (that is, from the collector's perspective, and not in the sense of “mineral kingdom” as opposed to “animal” or “plant kingdom”). In sixteenth-century Latin correspondence the word *metallica* is frequently used in this sense.<sup>2</sup> What we call minerals could be in Agricola's terms “metals”, “congealed juices”, “composite objects” and most types of “stones”. “Stones” with a curious shape and special types of earth do not belong to our category *minerals*; these will also be interesting for Clusius and his contemporaries, and the relevant sources deserve to be treated separately, in the later sections of this study.

Minerals were standard representatives of the inorganic part of nature in sixteenth-century “museums” or “Wunderkammern”, and have been sought for by private collectors well into our modern times. Beyond possible practical uses and economic value, they are beautiful to look at; these coloured, translucent bodies, shining and glimmering, often displaying splendid geometrical forms, represent in a most spectacular way the “wonders of nature” ardently sought after by a host of Renaissance scholars. In Clusius's correspondence, specimens of minerals appear several times as highly valued objects requested or sent by fellow men of letters – and interestingly, they were almost always asked for or sent by friends living or staying in Saxony (see the map, Fig. 10, at the end of the study), a region rarely mentioned in the Clusius literature.

The Electorate of Saxony, with Wittenberg among its universities and with the *Erzgebirge* (Ore Mountains) among its mountains, stood out from the states of the Holy Roman Empire not only as the cradle of Reformation, but also as the richest principality, with a fast developing industrial and mining complex. The region had grown famous for its silver quarries as early as the twelfth century; while from the end of the fifteenth century onwards the pace of opening new quarries in the Ore Mountains region increased. Beyond silver, the production of which remained the most important line, a number of other resources were also produced including

<sup>1</sup>What interest us in this study are not artificial objects made of these materials – like coins or gemstones polished for jewels – but specimens collected as natural objects.

<sup>2</sup>On the other hand, (*res*) *metallica* could have a more general meaning, covering all valuable inorganic *naturalia*. After all, the meaning of the Latin terms *metalla*, (*res*) *metallica* depends on the context, and I always took into consideration the context when translating the relevant passages into English.



metals or metallic minerals like gold, copper, iron, lead, tin, zinc or cobalt, but also materials that were categorised under “stones” or “earths”, like clay, limestone or granite.<sup>3</sup> In close interaction with the development of the mining industry, Saxony became central to the birth of the geosciences or “mountain sciences”,<sup>4</sup> hallmarked by the already frequently mentioned Georgius Agricola, the humanist and naturalist whose oeuvre determined the development of these sciences for centuries. In *The History of Mineral Collecting*<sup>5</sup> (a standard review volume of the field), half of the highlighted first-generation, mid-sixteenth century collectors come from Saxony: this indicates well the region’s role in the history of mineralogy in the broader sense.

The governmental support of mining received a new impetus under Elector Augustus (r. 1553–86) who had a firm control over the related branches of the economy. He himself was an avid collector of underground treasures: his *Kunstkammer*, that came to include more than ten thousand items, had a large section of Saxon minerals.<sup>6</sup> In general, the elector supported the arts and sciences and, from a confessional point of view, the “Philippists”: the circle of Wittenberg intellectuals with a Melancthonian background, including Caspar Peucer, Hubert Languet or Georg Cracow, had a marked influence at the court.<sup>7</sup> The most powerful intellectual was Johann Jenitz, the chief secretary who stood always at his ruler’s side, and who even handled his correspondence.<sup>8</sup> As will be seen, the intellectual elite around the elector will greatly overlap with the circle of Clusius’s Saxony-based friends or contact persons.

The following investigation will adumbrate the role of minerals in Clusius’s correspondence and relations, and will at the same time throw light on how Clusius liaised with members of the Saxonian elite. The overview will not be exhaustive, all the less so since we can only rely on sporadically surviving sources and little previous literature. Clusius’s Saxonian relations have not been directly addressed in scholarship, most of the relevant letters have not been edited, for several correspondents there is hardly any literature at all, and the identification of sixteenth-century Latin mineral names is also problematic on occasion.<sup>9</sup>

At the present state of research the earliest pieces of evidence of inorganic *naturalia* sent to Clusius come from the correspondence between Clusius and Kaspar Peucer (1525–1602), the renowned church reformer, humanist and naturalist. Peucer studied and then lectured, among

<sup>3</sup>From the literature of mining in sixteenth-century Saxony, here I only mention Wagenbreth and Wächtler (1990) and Wilsdorf and Quellmalz (1971) as examples for review works (not to mention the extensive Agricola-literature, which overlaps with this issue).

<sup>4</sup>*Montanwissenschaften*, a German term also used today, covers well the branches of science that were central in Agricola’s oeuvre, and that are now called metallurgy, mineralogy, geology, mining techniques, or palaeontology, among others.

<sup>5</sup>Wilson (1994).

<sup>6</sup>On Augustus’s special interests in mining and mineralogy, see e.g. Wilson (1994), 228–29, or Falke (1868), 159–218.

<sup>7</sup>Hermann (2007), 246–247.

<sup>8</sup>Officially, he was one of the *Geheimsekretäre* and not even a *Rat* (councillor), but in practice he was the most influential secretary and councillor, with the power of a chancellor. On Jenitz see Hermann (2007), 250–254.

<sup>9</sup>In the identification I basically rely on the notes and registers in Hoover and Hoover (1912), Bandy and Bandy (1955), and Fraustadt and Prescher (1958).



other subjects, on medicine at the University of Wittenberg; in the 1560s he became probably the most influential professor at the university, and one of the confidential men of letters of Elector Augustus (at least from 1563 to around 1574).<sup>10</sup> Clusius got acquainted with him already as a student in Wittenberg, where he stayed in the second half of 1549; indeed it is even possible that he was a guest staying over in Peucer's house.<sup>11</sup> It was in that short Wittenberg period that Clusius made friends with Hubert Languet (1518–81): their common mother tongue (French, amidst a predominantly German milieu), their common humanist interests and their similar open-minded character resulted in a close and lasting friendship between them.<sup>12</sup> In 1559 Languet entered the service of the elector as diplomat responsible for Western, notably French matters; he would become a key figure in Clusius's relations to the Saxonian elite.

Between 1560 and early 1562, when Clusius studied medicine in Paris, he regularly met Languet who mediated between him and a number of his "eastern" correspondents, including Peucer. As it turns out from Peucer's first surviving letter to Clusius, dated November 2, 1560,<sup>13</sup> it was probably Clusius who resumed the relationship: Peucer thanks him for the seeds sent via Languet and rejoices over the renewed friendship between them. "In turn, you can expect from me a variety of minerals which are born in the veins of these lands and I know that they will not be unpleasant for you,"<sup>14</sup> Peucer continues. Did Clusius suggest or somehow insinuate that he would not mind actual minerals sent from Saxony, or was Peucer's offer unsolicited? Anyway, Peucer seems to have known Clusius to entertain such interests (*eas scio tibi non ingratas esse*). And indeed, Clusius certainly reinforced Peucer in his intention in the letter he wrote in response in early 1561.<sup>15</sup> The Wittenberg professor answered to Clusius in his letter of May 21 that he was going to collect the minerals and send them to Wechel at the time of the following Frankfurt Book Fair, that is, in October of that year.<sup>16</sup> Andreas Wechel was Clusius's host in Paris, and the Wechels were active as publishers in both Paris and Frankfurt. *Metallica conquiram* means the "acquiring" or even "seeking out" of several different specimens (we do not know whether the types were prescribed by Clusius or not); Peucer's influence and broad network was certainly of great help in completing the task. Indeed, when Peucer sends the *metallica* together with his next surviving letter to Clusius, on March 5, 1562, he refers, on the one hand, to people who helped him in the matter, but on the other hand to the limits of asking for such valuable things or services:

<sup>10</sup>He and other Philippists were branded cryptocalvinists, and in 1576 he was sentenced to prison. On Peucer's life and work in general see e. g. Hasse and Wartenberg (2004), or Roebel (2015).

<sup>11</sup>Hunger (1927), 15.

<sup>12</sup>Summarily on Clusius's role in Languet network see Weck (1995), 120–122.

<sup>13</sup>As already indicated in Part I of this study, if I only provide the date of a letter to Clusius, it means that the letter can be found at the Library of the University of Leiden (Clusius-collection).

<sup>14</sup>*A me vicissim differentias metallorum, quas nostrae in his terris venae gignunt, expectabis, et eas scio tibi non ingratas futuras esse.* "Expectabis" is hard to translate to English; in contemporary correspondence, Latin verbs in future tense in such context usually indicate a courteous kind of imperative: "Do expect..." or "Please expect..."

<sup>15</sup>According to Clusius's notes on Peucer's Nov. 11 letter, he received it on Jan. 17, 1561, and responded (it is not indicated when).

<sup>16</sup>*Metallica conquiram et mitto proximo mercatu Francofortense ad Wechelum.*



“Now I send certain mineral fragments to you and Sir Gupilius, that man of excellent repute, which I ask you to share between yourselves. I would have sent more and bigger ones, if our circles had not taken it badly to be charged by this task. But other [minerals] will follow.”<sup>17</sup>

It is not specified who the *nostri*, “our men” or “our circles”, were; it must certainly have meant Peucer’s elite circles in Wittenberg and beyond. Gupilius is Jacques Goupyl (ca. 1525–1564), professor of medicine in Paris, one of Clusius’s teachers. Peucer does make Clusius feel that he is asking quite a favour – indeed, from the way he speaks, it is hard to imagine that he acted fully of his own accord, without Clusius asking for certain specimens in any of his (now lost) letters. No wonder that Goupyl, the professor of medicine – and thus Peucer’s colleague in Paris – is included among the addressees of the „metallic” package: after such valuable things were at last collected and ready to be sent to Paris, Peucer used the occasion to build his network by involving more than one man. The outer circumstances of the transaction also indicate that it was a fairly special occasion: the whole procedure lasted around a year and a half<sup>18</sup> and the transfer needed a safe route and trustworthy mediators.<sup>19</sup>

Beyond the material value of the items being sent, which was undoubtedly high, it was also noteworthy that Clusius received minerals in exchange for seeds and herbs. The most customary and typical objects of exchange in the correspondence between Clusius and another physician / naturalist (like Joachim Camerarius the Younger, Georg Purkircher, Pascal le Coq and so on) were botanical *naturalia*, which Clusius used both to send and receive. Was the pattern „minerals for plants” ever repeated? Still in 1562, Clusius received another offer from Saxony. In a letter dated December 1, 1562, Languet called the attention of his friend (who was already back in the Southern Netherlands) to Johann Jenitz and Valerius Cracow, „chief secretaries” of the elector,<sup>20</sup> who possessed great gardens in which they collected rare plants. They learned that Clusius sent seeds or plants via Languet to Peucer, and now they, too, would like to receive some; Languet had already warmly recommended Clusius to them. “They promised that if they received something outstanding from you, in turn they would send any mineral that you [Clusius] indicate would be precious to you.”<sup>21</sup> Apparently, they learned from Languet or Peucer that Clusius liked minerals, otherwise they would not have offered *metallica* right at the beginning. Unfortunately, no further letter seems to have survived that would inform us about the development of this connection with the high dignitaries – and thus with the court –, but Clusius certainly did not miss the opportunity for networking in general and acquiring *naturalia* in particular. Valerius Cracow was a confidential chamber secretary, and Jenitz, as seen above,

<sup>17</sup>*Mitto nunc autem fragmenta quaedam metallica tibi et Clarissimo viro D. Gupilio, quae ut partiamini inter vos oro. Missem plura et maiora, nisi onerari se hac curatione nostri graviter tulissent. Sed sequentur alia.* The word *curatio* means here a duty that needs time and care to fulfil, which is felt burdensome (*se onerari...*)

<sup>18</sup>As seen above, the first known mention of the *metallica* was in Nov. 1560, and the letter with the package was finally sent in March 1562.

<sup>19</sup>As seen from the letter of May 21, 1561, Peucer wanted to use the Wechels’ well-trodden routes and send the *metallica* first to the Frankfurt Book Fair, which only took place in October of the year.

<sup>20</sup>...*Joanne Jennitio et Valerio Cracovio praecipuis secretariis Illustrissimi nostri principis...*

<sup>21</sup>*Promiserunt autem si quid eximium a te acceperint, se vicissim missuros ex metallicis quaecumque tibi esse grata significaveris.*



the right hand of the Holy Roman Empire's richest elector. Languet alludes in the letter itself to the great prospects that such connections have in store.<sup>22</sup>

From the year 1566, too, there survived relevant documents with more explicit traces of Clusius's interests. In the introduction to Part I of this study I presented his letters to Johannes Crato and Thomas Rehdiger, both dated November 29, 1566. Clusius shared with Crato how Gessner's *De omni rerum fossilium... liber* aroused his enthusiasm for "stones"; he asked specimens of "eagle's stones" from Rehdiger, and in later letters to Crato he requested from Transylvania "Saint Ladislaus's coins", special round stones that look like petrified gold coins (see the next section). The Wrocław-based Crato stood close to several "Philippist" scholars in Saxony like Peucer or Joachim Camerarius the Elder, and in 1561 he, as well as Peucer, seems to have supported that Clusius be chosen as the *praeceptor* of Thomas Rehdiger.<sup>23</sup> The young Wrocław patrician was brought from Wittenberg to Paris by Languet, who appears to have been in the mediator's role in relation to Crato and the Rehdigers, too. Clusius certainly saw and learned about minerals and non-living *naturalia* in general in a medical context first, both in Wittenberg in 1549 and in Paris between 1560 and 62 (his *Antidotarium* from 1561, which included descriptions of inorganic *naturalia*, has already been mentioned<sup>24</sup>), but the letters from his correspondence referred to in this section do not indicate in any way that he needed the specimens for medical purposes. Rather, the relevant passages adumbrate a general, scientific interest, in Agricola's and Gessner's spirit. He had most probably been familiar with the relevant works of Agricola since his day in Wittenberg or Paris<sup>25</sup> (the only reliable source as to the books he owned is the book catalogue made after his death in 1609, and according to this, he possessed at that time at least Agricola's *Bermannus* and *De re metallica*, and also Christoph Entzelt's *De re metallica*).<sup>26</sup> As he wrote in his 1566 letter to Crato, Gessner's work "once again aroused" his enthusiasm "which had been almost asleep."<sup>27</sup> This manner of expression, together with the above discussed passages from letters written in 1560–62, point toward the early 1560s (or before) as the beginning of Clusius's significant concern for *metallica*. Finding places in Saxony feature most frequently in Agricola's *De natura fossilium* and *De re metallica*, as well as in Gessner's treatise, and this may have easily contributed to Clusius's orientation towards Saxony and its treasures.

The clearest pieces of evidence of this orientation come from his correspondence with Ludwig Camerarius (1542–82), son of Joachim Camerarius the Elder and younger brother to Joachim the Younger. While quite a lot is known to scholarship about Joachim Jr., a naturalist of European renown living in Nuremberg, and his relationship with Clusius – around 200 (!) of his

<sup>22</sup>*Praeter officium quod mihi in ea re praestabis, obligabis tibi duos optimos viros, qui per occasionem tibi et amicis in variis rebus gratificari poterunt.* We do not have further sources about Clusius's and Jenitz's relationship, but our scholar seems to have enjoyed great esteem at Jenitz still in 1580: see Clusius's letter to Joachim Camerarius Jr., Apr. 2, 1580 (ed. in Hunger, 1942).

<sup>23</sup>Hunger (1927), 59.

<sup>24</sup>See the introduction of Part I.

<sup>25</sup>The *Bermannus* appeared first in 1530, the *De natura fossilium* in 1546, and the *De re metallica* in 1555.

<sup>26</sup>See Zanen (2019), 291 and 298.

<sup>27</sup>Ed. Ram (1847), 55.



letters to Joachim Jr. have survived –,<sup>28</sup> we are far less well informed about Ludwig.<sup>29</sup> At any rate, nine letters he wrote to Clusius are extant, and the frequent references to him in the correspondence between Clusius and Joachim Jr. also attest to his and Clusius's familiar relations. In the mid-1570s Ludwig worked as a physician in Annaberg, one of the central mining towns of the Electorate, but he had also visited Saxony several times before and was well connected to its intellectual elite, as is clear from Ludwig Camerarius's first surviving letter to Clusius. According to this letter from July 8, 1566, Clusius had informed Languet that he yearned to learn about and explore minerals in Germany. Ludwig (who knew Clusius at least since May 1565<sup>30</sup> heard about Clusius's inquiry from Languet, and now offers his support in the matter. He knows certain scholars in *Misnia*, the core region of Saxony,<sup>31</sup> who earned great fame for their knowledge in this field. They acquired considerable amounts of such treasures; it is not easy to access any of them, but if Ludwig offers to them equally valuable presents in Clusius's name, they would certainly send something. They are all delighted with exotic plants and diligently cultivated their gardens...<sup>32</sup> In his letter Camerarius enumerates six scholars (sometimes with their profession or the place of residence) who have been identified as follows:

- Kaspar Peucer („with whom I know you are acquainted”, sais Camerarius);
- Georg Aemilius (Oemler, 1517–1569) from Stollberg, a man of letters principally known for theological works (he, too, was disciple of Melanchton), also a botanist;
- Georg Fabricius (1516–1571), humanist and also a naturalist, rector of the school of Meissen;
- Christoph Leuschner (1521–1574), also from Meissen;<sup>33</sup>

<sup>28</sup>See principally [Wenning \(2015\)](#).

<sup>29</sup>Ludwig (I.) Camerarius is not to be confused with Joachim Jr.'s son, Ludwig (II.), who made career as a statesman and has ample secondary literature.

<sup>30</sup>During his journey home from Spain, Clusius met Ludwig Camerarius and Languet in Paris in May 1565 ([Hunger, 1927, 82](#)). One year later Camerarius still studied in Paris, thus he could be a good mediator between Clusius, who was based in the castle of Moerkerke at that time, and Camerarius's Saxonian acquaintances. In the July 8 letter Camerarius warmly remembers their encounter in Paris; from this beginning part of the letter it seems that Ludwig wrote first to Clusius, but Clusius had often greeted Ludwig in letters to common friends.

<sup>31</sup>The late medieval „Markgrafschaft Meissen” was the core area of the sixteenth-century Electorate of Saxony, with Dresden, Meissen, Chemnitz and other significant towns; the Latin name *Misnia* was still used in the sixteenth century for these central parts of Saxony.

<sup>32</sup>*Facta etiam in litteris tuis ad D. Languetum mentio est metallorum, quae in Germania effodiuntur, teque eorum cognoscendi studio maxime teneri animadverti. Si ego aliquid praestare possem tibi quae hac in re gratificari, facerem id non modo non [!] libenter, sed diligenter etiam. Sed parum video me posse praestare. Novi autem quosdam in Misnia qui sibi magnum nomen acquisiverunt illis scrutandis, quique etiam liberaliter cum amicis quae cognoverant communicant. Inter quos fere praecipui sunt (excepto D. Peucero, quem tibi notum esse scio) D. Georgius Aemilius Stolburgi vivens, ubi Chalcytis, Genera Vitrioli, Mysi item et Melant quam optime effoditur. Misena Georgius Fabricius et D. Christophorus Leichsnerus. Torgae D. Johannes Kentmannus et Joachimus Kreich pharmacopaeus. A quibus singulis si ἀτιδωρον offerrem, habere possem aliquid. Scio enim illos thesauros, ut ita dicam sibi comparasse ex rebus metallicis. Delectantur vero omnes cognitione plantarum exoticarum quam maxime, cumque magna diligentia et studio in hortis suis colunt; si igitur semina quaedam illis antea incognita habere possem, quae mitterem – praecipue vero Joachimo Kreich, qui hortum celebrem habet, quique id a me petiit –, mitterent scio quae vellem, vel potius quae tu velles. The letters of Ludwig Camerarius to Clusius between 1566 and 1571 were edited by [Istvánffy \(1900\)](#), but with some faults, so my transcriptions are based on the original mss. in Leiden.*

<sup>33</sup>Although Camerarius wrote *Christophorus Leichsnerus*, he must be identical with Christoph Leuschner, from whom a letter to Camerarius survived in the Trew collection of the Friedrich-Alexander-Universität, Erlangen-Nuremberg.



- Johannes Kentmann (1518–1574), city physician in Torgau, already mentioned as an author in Gessner’s *De omni rerum fossilium genere*;
- Joachim Kreich (d. 1575), apothecary in Torgau.

Camerarius provides this enumeration as consisting of scholars “who acquired treasures *ex rebus metallicis*”, but at the same time this is a good cross-section of that part of the Saxonian elite who were naturalists in whatever sense of the word. Several of them were friends of Agricola or Gessner, and / or were frequently mentioned in the works of these two leading naturalists.<sup>34</sup> They are known to modern scholarship to varying extents; and since they do not appear in further surviving letters – except for Kreich –, there is no need here to throw further light on them. What is important for us at this point is that a circle of naturalists existed in Saxony who seem to have exchanged minerals or at least information on minerals (as referred to in the letter itself<sup>35</sup>), and to this circle Clusius was about to connect via Camerarius.

This time it is certain that Clusius was the one who requested *metallica*, and that specifically from Germany or Saxony. He wrote to Languet (still in electoral service), and asked for (information about) minerals „extracted in Germany” – and by this he meant mainly metallic minerals, as will be seen. Again, we can only make inferences about Clusius’s side of the correspondence from references and notes in Camerarius’s letters. According to a letter written in July 1566, Johannes Kreich presented Camerarius earlier with “tiny nuggets of pure silver” which the latter sends now to Clusius “so that you would remember me”. Kreich will give more and larger pieces in exchange for seeds, so the matter is up to Clusius, whom Camerarius himself will also commend to the Torgau apothecary’s attention.<sup>36</sup> As could be expected, Clusius indeed sent seeds: Camerarius thanks him in his next letter for the *semina* sent to Kreich.<sup>37</sup> Our Low Countries naturalist had a good chance that Kreich gave something metallic in exchange: not only Camerarius seems to have recommended him, but Kreich was also closely related to Peucer.<sup>38</sup> In his reply to Camerarius, Clusius must have reinforced that such exchanges were to his liking, because Camerarius answered on December 20 that when he returns to Germany some half a year later, he “would not forget” Clusius, “especially [in connection] with those who I think can contribute something to that treasury of yours, if I may use this expression.”<sup>39</sup>

<sup>34</sup>Fabricius’s and Kentmann’s treatises on non-living naturalia have been included in Gessner’s edition *De omni rerum fossilium genere*. Fabricius was befriended with Agricola (see Hoover and Hoover, 1912, p. X.). Gessner described in an unpublished work of his Aemilius’s botanical gardens (see Holzberg, 1982, 120), and also praised Kreich’s garden (see Kusakawa, 2012, 147)

<sup>35</sup>...*quique etiam liberaliter cum amicis quae cognoverant communicant.*

<sup>36</sup>*Dedit mihi discendenti Joachimus Kreich Argenti puri massulas aliquot ut eius meminisssem, eas modo ad te, ut mei memor sis mitto, exigua sunt fateor, sed non ingrata tibi, ut spero. Promisit vero maiora et praestabit scio, si modo semina misero. Hic igitur tua opera opus erit. Ego proximis meis ad illum tui mentionem faciam interea et tuas fortassis accipiam.*

<sup>37</sup>Ludwig Camerarius to Clusius, Oct. 10, 1566: *Gratias autem tibi ago imprimis pro tuis ad me missis litteris, deinde etiam pro seminibus ad Joachimum Kraich mittendis, illa enim prima quaque occasione transmittam.*

<sup>38</sup>See Peucer’s letter to Joachim Camerarius Jr. dated Nov. 20, 1562; see also those of Nov. 4, 1560, and Dec. 31, 1562; all in the already mentioned Trew collection.

<sup>39</sup>Ludwig Camerarius to Clusius, Dec. 20, 1566: *Si in Germaniam rediero, quod vix ante mensem Maium, ut meas ego institui rationes, fiet, non ero immemor tui, praesertim apud illos, quos aliquid ad thesaurum illum tuum – liceat enim mihi ita loqui – conferre posse putabo.*





Camerarius's use of the word *thesaurus* is noteworthy here: in his letter of July 1566 he used it in a context referring the quantity and great value of the accumulated *metallica*.<sup>40</sup>

The importance of the matter to Clusius is made more probable by his notes on Camerarius's letters, according to which he replied within a few days both to the three above mentioned letters from 1566 and the next group of letters that survived (from between 1569 and 1571<sup>41</sup>). The Saxonian side, however, was not so eager to react. On August 1, 1569, Camerarius excuses himself for neglecting the correspondence with Clusius, one of the reasons being that he was not sent any minerals. He writes from Leipzig, "I would have gladly sent something special from the minerals extracted in our region, if I had received anything from my friends according to their promise."<sup>42</sup> Camerarius himself, at any rate, tried his best and sent what he could.<sup>43</sup> He enclosed with the same letter in 1569 a ring that he had recently received, "made of lead-coloured rough pure silver, with pure red silver in place of the gem". The ring was made from one nugget, without the help of fire.<sup>44</sup> Both the *argentum plumbei coloris* (probably today's argentite) and the *argentum rubrum* (see Fig. 1a–b; probably pyrargyrite, dark red silver, but can also be proustite, light red silver) are types of silver known in contemporary natural history; Agricola remarks in connection with a Saxonian finding place (Schneeberg) that *argentum rude rubrum* can serve as a beautiful transparent gem.<sup>45</sup> On January 22, 1570, Camerarius sent „a sort of limestone in the shape of peas”, that can be found in Karlsbad (Karlovy Vary), and some coins of “no value”.<sup>46</sup> Gessner also describes this limestone in his 1565 treatise, claiming that it is like “drops turned into pea-shaped stones”<sup>47</sup> (see Fig. 3b in the next section), and he, too, gives Karlsbad as the finding place (thus Camerarius may have gathered the piece of information from Gessner's work). Today we call this mineral dripstone.

Our sources regarding the contact which apparently continued throughout the 1570's between Clusius and Ludwig Camerarius are mostly references in the correspondence between

<sup>40</sup>*Scio enim illos thesauros, ut ita dicam sibi comparasse ex rebus metallicis.*

<sup>41</sup>Ludwig Camerarius to Clusius, Aug. 1, 1569; Jan. 22, 1570; Apr. 28, 1570 (all three from Leipzig); Jan. 1, 1571 (from Nuremberg).

<sup>42</sup>*Libenter ex metallis quae in vicinia nostra eruuntur ad te aliquid singulare misissem, si ab amicis, qui quidem id promiserant, accepissem aliquid.*

<sup>43</sup>Even if he could not send any *metallica*, he apologised for that; in all the four letters between 1569 and 1571 he expressed in some way that he kept the matter in mind. On Jan. 1, 1571, for instance, he put it this way: *Si in metallicis nostris fodinis aliquid est, quo tibi vel tuis amicis gratificari potero, audacter petito, si modo in nostra potestate est, auferes.*

<sup>44</sup>*Ne tamen nihil mitterem, volui hisce meis implicare anulum quem hisce diebus accepi ex argento puro rudi plumbei coloris, cui gemmae loco, argentum purum rubrum inclusum est. Est autem anulus hic ex massa integra, absque ignis adiumento ullo ita confectus.*

<sup>45</sup>Agricola (1558), 362; for more on various types of silver in general, see *ibid.*, 359ff.

<sup>46</sup>*Modo ad manus nihil erat, quam Calcis species forma pisorum, eruitur autem ad Thermas Carolinas in finibus Bohemiae. Addidi numismata quaedam nullius precii, nam aurea et alicuius aestimationis ad meas manus non perveniunt.* This latter remark and the ring sent with the previous letter imply that Clusius did not insist on minerals to be sent only in their natural form.

<sup>47</sup>Gessner (1565), *De rerum fossilium... genere*, 72v: ...*guttas, in lapideae formae veluti pisa conversas...*



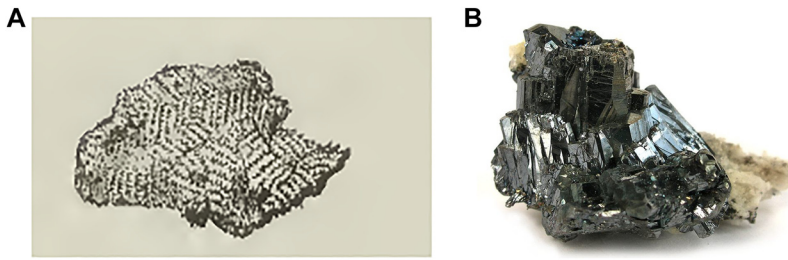


Fig. 1. a. “Argentum rude rubrum” in Aldrovandi (1648, 77). b. Pyrargyrite<sup>48</sup>

Clusius and Joachim Jr.<sup>49</sup> Altogether they seem to imply that botanical *naturalia* and books were dominant issues in the correspondence, but *metallica* also seem to have remained an important topic; all the more so since Ludwig moved to Annaberg.<sup>50</sup> On July 8, 1577, Clusius mentions to Joachim Jr. that Ludwig wrote to him about a mine recently opened up nearby, whence he sent to Clusius a “little present”.<sup>51</sup> Clusius felt obliged to return the kindness with a rare bulbous plant.<sup>52</sup> According to Ludwig’s letter of January 21, 1578 to Clusius (the only letter surviving from their direct correspondence in this period) the Annaberg naturalist sent a box<sup>53</sup> containing various minerals “extracted from our mountains”, principally fragments of metals – silver, copper, lead and tin – as examples of durable materials quite resistant to fire, but also two hardly identifiable specimens which Camerarius could only circumscribe.<sup>54</sup> The one is a fragment of stone that has a flowery scent and can be found dispersed in the nearby fields;<sup>55</sup> the other is a petrified liquid that merits the name ‘pseudo-diamond’ due to its outer appearance and hardness.<sup>56</sup> The whole passage has an aura of scientific interest: Camerarius seems to have

<sup>48</sup>Unless otherwise stated, the sources for the photos are the relevant English Wikipedia articles.

<sup>49</sup>As mentioned above, a great number of letters from Clusius to Joachim Camerarius Jr. have survived; they have been edited by Hunger (1942). Ludwig („Ludovicus”) appears frequently in the letters.

<sup>50</sup>On the Annaberg mining region (which was already past its heyday by the 1570s) see e.g. Wagenbreth and Wächtler (1990), 236–257.

<sup>51</sup>*Nuper ad me scripsit Dominus Ludovicus frater, et ex fodinis nuper Annaebergae repertis munusculum misit: libenter illi etiam gratificarer...*

<sup>52</sup>Clusius to Joachim Jr., Sept. 17, 1577: *Volui (uti proxime ad te scripsi) bulbaceo munusculo fratrem tuum donare, ut aliqua ratione gratias agerem pro eleganti eius munere.*

<sup>53</sup>The box did arrive to Clusius, see his note on the letter: *Accepi Viennae 5 Februarii cum pyxide mineralium.*

<sup>54</sup>*At ut specimen quoddam rerum metallorum, quae in nostris montibus eruuntur, mittam, accipies cum hoc tabellario in scatula pauca quaedam; [1] Lapidis nempe frustum qui violas martias redolet, invenitur autem in copia ad octo hinc miliaria, utique an agris. [2] Argenti vero nativi, aeris item, plumbi et stanni frustula mitto, si forte antea metalla illa, quae statim...† sua [?] sunt, quibusque nihil vel paululum, si igne conflantur, decedit, non vidisti. [3] Fluores quoque et genus lapidis valde durum, qui fere propter splendorem et quod a natura miro artificio ita perpoliuntur, pseudo [emended by me from „speudo”] adamantini vocari possent. Vitrum enim ac si adamas esset scindunt. Haec mi Carole Doctissime ut grato animo accipere velis oro. Cupio enim magnopere tibi mea studia probare.*

<sup>55</sup>See [1] in the above note.

<sup>56</sup>See [3]; it may be the kind of *fluor* that Kentmann describes as *Candidi pellucidi, quadrangulo adamantini similes, & adhaerentes marmor metallico rubro* (Gessner, 1565, first treatise, 40v).



done more than simply collect or forward – he seems to have studied and even experimented with such *metallica*.

Looking at the kinds of minerals that we know to have been mentioned or sent by Camerarius to Clusius, one can see that metallic minerals dominate, which probably mirrors their greater availability in Saxony, or Clusius's greater interest in such minerals, or both. Already in his letter of July 8, 1566, Camerarius specified *Chalcytis*, *Genera Vitrioli*, *Mysi item et Melant* as minerals extracted near Stollberg. In modern terms these are various iron sulphates of different colours<sup>57</sup> which may be found in their natural state in stone-like form as metallic ores. Their mention by Camerarius may have been accidental, nevertheless "vitriols" or sulphates will continue to appear in later documents related to Clusius. Camerarius sent various kinds of silver, the most important resource of Saxony, at least three times (a tiny nugget in 1566, a ring in 1569 and a fragment of silver ore in 1578); furthermore he also sent other metallic fragments (at least in his 1578 letter), as well as coins.

In general, Clusius's relationship to Ludwig Camerarius – as appears especially from the 1578 letter – had much in common with his relationship to Achilles Cromer whose two letters from 1580 have already been discussed in Section 3. Beyond the usual aspects of humanist-naturalist correspondence – such as an exchange of botanical *naturalia*, information on friends, books, and so on –, a specific feature was the occasional sending of non-living *naturalia*, principally metallic minerals, from the central mining regions of Europe. The marked scientific interest for *metallica* on the part of Camerarius and Cromer is also a common characteristic.

From the 1580s and 1590s few sources seem to have survived that would allow us to draw conclusions about Clusius's attitude to minerals. The exchange of *naturalia* was not restricted to botanical specimens in this period; however, in such letters related to *metallica* that I could find it is not Clusius who requested or was presented with such objects, but others, and Clusius played a different role in these transactions. Let us now see an example from 1586, a case quite telling from the perspective of knowledge transfer and of the way in which the humanist-naturalist network functioned when it came to exchange of scarcely available *naturalia*. On February 20/28, 1568, Gian Vincenzo Pinelli asked Clusius's help in procuring specimens and information about various inorganic *naturalia*.<sup>58</sup> Pinelli (a key figure with regard to Clusius's Italian contacts, as seen before<sup>59</sup>) is known to have been a collector of non-living *naturalia*, among other things.<sup>60</sup> According to the letter, (1) he needed a fragment of basalt.<sup>61</sup> Agricola, who probably coined the term "basalt" itself,<sup>62</sup> had remarked in *De natura fossilium* that it can be found at Stolpen, not far from Dresden (the capital of Saxony), and that the bishop's castle

<sup>57</sup>Their exact meaning is not wholly clear to modern scholarship (see e.g. Hoover and Hoover, 1912, 574, note), but *chalcitis* seems to overlap with today's amaranite (a substance of a red to brownish colour), *mysi* with copiapite (yellowish), *melant* with melanterite (dark colours, e.g. dark grey). *Vitriol* could mean blue and green hydrous sulphates, but also sulphates in general. In Agricola the meaning of *chalcitis* is not copper or iron ore but *atramentum*, a kind of *Vitriol*: see Fraustadt and Prescher (1958), 321.

<sup>58</sup>Edited by Toni (1911), 70. Pinelli wrote the two parts of the letter on different days, viz. 20th and 28th February.

<sup>59</sup>See Part I, p. 73.

<sup>60</sup>See Raugei (2018), 55. As to this part of his collection there seems to be no scholarly literature. Non-living *naturalia* appear several times in his correspondence.

<sup>61</sup>...*un pezzetto del lapis Basaltes...*

<sup>62</sup>See Tietz and Büchner (2018), 295.



had been built on this kind of “marble”.<sup>63</sup> Drawing on Agricola and a letter by Kentmann, Gessner provided in his 1565 treatise a detailed description of basalt. He, too, pointed out its specific form (clearly visible in the illustration that he included, see Fig. 2) and its hardness (also due to metal ingredients).<sup>64</sup> In his 1586 letter, Pinelli explicitly refers to this passage in Gessner, mentioning even the page number, and the Saxonian finding place; he names a certain “Carlo Th.” who can help to procure it, and asks Clusius to mediate in the matter. (2) Pinelli also wanted to know where certain types of *Cadmia*<sup>65</sup> can be found in Germany. *Cadmia* was a general name for zinc compounds, and such items were found in nature as *cadmia fossilis* or *metallica*. However, Pinelli only needed *Cadmia fornacum*, *botrytis*, *placitis* or *ostracitis*, zinc

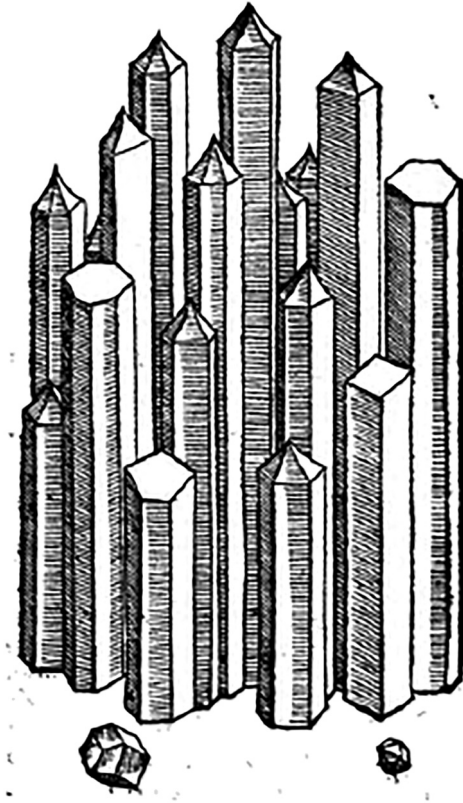


Fig. 2. Basalt in Gessner (1565, *De rerum...*, 21r)

<sup>63</sup> Agricola (1558), 306. Agricola classified it among „stones”, and within that, „marbles”; today it is classified as a volcanic rock.

<sup>64</sup> Gessner (1565), *De rerum fossilium... genere*, last treatise, 20r–24v.

<sup>65</sup> ...delle altre spetie della *Cadmia*, delle fornaci, dalla *Botryite* in fuori, cioè della *placite*, *ostracite*, etc.



oxides formed in furnaces. His source of information was certainly an Agricola passage where all these types of minerals are described.<sup>66</sup>

Clusius, still based in Vienna in 1586, received the letter on March 16, and wrote to at least two persons, Carolus Tettis (who is certainly the “Carlo Th.” mentioned by Pinelli) and Antonio Cappa.<sup>67</sup> We know this from a letter written to Clusius by Johannes Brambach from Dresden, dated August 31, in which Clusius referred to both men in his reply.<sup>68</sup> Brambach (1528–93) was brother-in-law to Johannes Kentmann and a physician to Elector Augustus, until the latter’s death (on February 11 of the same year). In the beginning of his letter, Brambach excuses himself saying that they cannot entirely fulfil Clusius’s request, because the furnaces had been moved away; nevertheless, “they” would try their best to meet expectations in the future. For the time being, Brambach sends (beyond valuable things sent by Antonio Cappa) *Calcritis* and *Mysi* from Goslar,<sup>69</sup> that had been sent to him by Andreas Baccharius, physician to Julius of Braunschweig<sup>70</sup> and his son. Added are beautiful fragments of marble, found and prepared by Giovanni Maria Nosseni (leading architect and sculptor at the court<sup>71</sup>). Furthermore, Brambach refers to works which can serve as sources of information about *Cadmia*: Gessner’s *De omni rerum fossilium genere*, Agricola’s works about the subterranean world and a summary about the kinds of *Cadmia* written by himself. Indeed, there is a one-page writing *De Cadmiae speciebus* attached to the letter, in Brambach’s hand. The other parts of the letter itself concern mainly botany; they expect various plants from Clusius. The latter’s note indicates that he received the letter in Vienna, on December 6, together with a box (containing the *naturalia*) and a letter by Cappa.<sup>72</sup>

To be sure, it was not only for geographical or practical reasons that Pinelli chose Clusius as mediator; he probably knew about the Vienna-based naturalist’s experience with *metallica* and/or his Saxonian relations. As we can see, Clusius’ request had indeed been heard. Several

<sup>66</sup>See Agricola (1558), 349.

<sup>67</sup>Both unidentified as yet.

<sup>68</sup>*Paulo serius, Nobilis et doctissime D. Clusi, ab amicis, Magnifico D. Carolo Tettis etc.[?] ac D. Anthonio Cappa, percepi, quae de Cadmiae speciebus, et de Marmore Basalte, ad eos perscripsisti, et expetivisti. Nam iam tum, officinae fusoriae aeris, quae vivente seniore Electore, piae memoriae, huc translatae erant, dirutae, et rursus in priorem locum translatae fuere, ubi nunc instaurantur. Ita ut hae exhalationes aut excrementa, iam hic aliis rudibus permista, illic, nondum officinis integre instauratis, commode et in copia haberi non possunt. Dedimus tamen operam, ut aliquid eorum effectus daremus: Quae hoc nostro tabellione accipies, et boni consules, dum reliquas, aut si quae alia vis, nacti fuerimus. Eae autem ex libello Gesneri De omni rerum fossilium genere aut ex ipsius Agricolae operibus de rebus subterraneis et metallicis, aut si compendiosius vis, ex inclusa scheda patebunt. D. Cappa, ut solet, inpigrum et strenuum, in gratificando amico se prestitit. Adiunxi his calcitris [!] et mysy Goslariensia, quae a conterraneo vestro, nec, ut puto, tibi ignoto, D. Doctore Andrea Bacchario, Dominis Julii ac filii Brunsvicensium Medico, accepi. Adiungetur his variae et forsitan inopinatae pulchritudinis marmorum frustula, quae in nostri Electoris ditone, ab Italo quodam Johanne Maria Nosseni inventa et effossa elaborantur ac perpoliuntur.*

<sup>69</sup>Famous mining town in the Principality of Braunschweig-Wolfenbüttel.

<sup>70</sup>Duke of Braunschweig -Lüneburg and ruling prince of Braunschweig -Wolfenbüttel (r. 1568–89).

<sup>71</sup>From 1575 Nosseni was one of the key figures of courtly culture in Dresden, as organiser, adviser, creator; working with gems was a specialty of his. See Delang (2007), 162.

<sup>72</sup>This letter, now lost, certainly provided information about the specimens sent by Cappa, referred to in Brambach’s letter.



intellectuals of the Saxonian court circles took efforts to send valuable information and specimens. We do not know how Clusius had formulated his mediatory requests in his letters, but Brambach replied in a most respectful way, and the minerals were addressed in part to Clusius himself. Earlier Saxonian connections and exchanges, as well as his growing fame as a botanist (from whom rare plants could be expected) must have played a role in this.

Objects requested from Clusius were not restricted to botanical *naturalia*: from his network, which grew quite extensive by the 1590s, several examples can be mentioned when he, Clusius, was asked for minerals. In 1591 Ulisse Aldrovandi<sup>73</sup> inquired via Johannes Bachofen-Echt whether Clusius had any previously unknown specimens either of living or of non-living *naturalia*.<sup>74</sup> In the same year, Jacques Garett Jr., a merchant apothecary who was Clusius's foremost informer about exotic *naturalia*,<sup>75</sup> asked in one of his letters sent from London whether his friend (then in Frankfurt-am-Main) could perhaps send certain minerals, as well as, perhaps, an instrument used for drilling holes into pearls.<sup>76</sup> Jacques Plateau,<sup>77</sup> who was another frequent correspondent of Clusius and owned a museum with a wide spectrum of *naturalia* and *artificialia*, broached mineral-related matters in at least four of his letters to Clusius in the 1590s. As he put it in April 1590, "I do not doubt that your cabinet contains various sorts of minerals, marine shells, drugs, exotic seeds and other rarities coming from the Indies and a number of other regions." He stated that he would be glad to receive something that happens to be in surplus, and promised similar rarities in return.<sup>78</sup> He repeated the request in two further letters,<sup>79</sup> all the more so since his correspondent seemed responsive: that same April of 1590 Clusius sent him pieces of "silver ore"<sup>80</sup> (which could have easily originated from Saxony, as seen above). Minerals also appeared among the things offered in return by Plateau;

<sup>73</sup>See Part I of this study, p. 73.

<sup>74</sup>Johannes Bachofen-Echt to Clusius, May 29, 1591: ...*similiterque si E[xcellentia] T[ua] novi quid habeat, cuius Bellonius et Gesnerus et alii scriptores non meminerint, vel si meminerint, quod ipse non habeat, tam in mineralibus quam animalibus et plantis, ut ipsi D[omino] Aldrovando communicetur.*

<sup>75</sup>On Jacques or James Garett Jr. (c. 1555–1610) and his family see Egmond (2010), esp. 175–181.

<sup>76</sup>Jacques Garett Jr. to Clusius, July 30, 1591: ...*je vous prie de me vouloir envoyer sil est possible par quelques libraires ung once ou deux de cinabrium mineralis et ung mortier d'acier pour estamper des perles et aulcunes mineraux et aultres pierreries...*

<sup>77</sup>Jacques Plateau (d. 1608) was a local dignitary and probably an apothecary merchant in Tournai; see Egmond (2010), 37–39, and Zanen (2011).

<sup>78</sup>Plateau to Clusius, Apr. 2, 1590: *De surplus ie ne doubtte nullement que v[ô]tre cabinet, nest furny de divers sortes de mineraux, concques marines drogues et semences estranges et autres rarites venant des Indes et de plusieurs autres endrois. Sy daventure aves quelque chose trop, et partisable, pour augmenter mon cabinet, ie me recomande me ferres tres grand plaisir que vouldroye recognoistre en tout ce quil me sera possible, au prochain voyage je vous feray une list de ce que iay, touchant les mineraux et autres rarites.*

<sup>79</sup>Sept. 3, 1590, and Sept. 2, 1591.

<sup>80</sup>Plateau to Clusius, Sept. 3, 1590: *Monsieur Clusius, i'ay receu v[ô]tre lettre dattee du 29 Avril du present an avec aucunes mines d'argent...*



in 1598 he even offered a detailed list of the contents of a package he had received from Christiaan Porret<sup>81</sup> – specifying a number of gems and crystals, strange stones and shells –, obviously because he thought Clusius was interested in them.<sup>82</sup>

The above examples reinforce that the contemporaries did not pigeonhole Clusius as a botanist, but regarded him rather as a humanist-naturalist with several concerns beyond botany; several men of letters looked on him as a scholar who was also interested in and/or possessed valuable non-living *naturalia*. Still, in the absence of relevant letters by Clusius himself, his attitude at least to minerals in the second half of his life remains a question. It is conspicuous that no case is known from this period with a definite request on the part of Clusius; instead, in the above examples we find him either in a mediatory role or as a potential “provider”. It is also telling that, as we saw in Section 2, Clusius rejected the offer made by the Leiden curators to lecture on non-living *naturalia*, although this may also have had other reasons than the lack of interest. However, before drawing general conclusions, we first need to discuss examples related to strange stones and special types of earth – this will be the subject of Sections 5 and 6.

Our overview of cases with minerals in Clusius’s correspondence overlapped with a partial overview of Clusius’s Saxonian relations. Several questions remain open, but some conclusions can already be drawn at this point. First, correspondents based in Saxony formed an important section of Clusius’s Europe-wide humanist-naturalist network. Beyond certain direct relations (Peucer, Languet, Ludwig Camerarius) he was also in some sort of contact with several members of the local elite (Jenitz, Kreich, Brambach, Cappa and so on). The circle of these men of letters overlapped with the Saxonian court, and Hubert Languet definitely played a key role in creating and maintaining Clusius’s Saxonian relations. Second, exchange of minerals formed an integral part of naturalists’ exchange with this region, in line with the local conditions; Saxony’s richness in such resources could even be a key factor in Clusius’s orientation towards this area in the 1560s. The pattern “minerals for botanical *naturalia*” seems to have been frequent in naturalist exchange with scholars based in Saxony.<sup>83</sup> Third, while minerals were valuable from several perspectives – economical, medicinal, scientific –, it is definitely the scientific/aesthetic aspects that seem to have been dominant in the above discussed exchanges, that is, the scholarly collector’s attitude.

<sup>81</sup>Porret (1554–1627) was also an apothecary-collector, living in Antwerp and then in Leiden, and friend to both Plateau and Clusius; see Egmond (2010), 162.

<sup>82</sup>Plateau to Clusius, Nov. 24, 1598: *...il y avoit aussi aucunes gommés avec aucunes pierres et mineraux, si comme Anime taramahara, Caranian, Lapiz Lasuli, Aetites, Amethystes, Osteolithos Christalli species, Umbilicus marinus sive faba marina, Solana, avec aucunes Coquilles marine si comme purpura, et autre asse communes.*

<sup>83</sup>Beyond the instances found in the Clusius correspondence seen above, examples can be taken from other correspondences as well, see e.g. Peucer’s letter to Joachim Camerarius Jr., Nov. 20, 1562 (Trew collection).



## 5. MESSENGERS FROM THE DISTANT PAST: FOSSILS AND OTHER STRANGE “STONES”

Stones or stony materials found in nature that have a peculiar form and resemble something familiar – a geometrical figure, artificial object, plant or animal – have always intrigued people, and received enhanced scholarly attention in the sixteenth century.<sup>84</sup> Such objects were already discussed to some extent in the first general overviews of *res metallica* or *fossilia* (in our terms, non-living *naturalia*), in Agricola’s and Entzelt’s<sup>85</sup> works, but it was Gessner’s 1565 edition *De omni rerum fossilium genere* in which they received considerable focus (mainly in Kentmann’s and Gessner’s treatises). Gessner’s classification of *fossilia* was based on outer appearance, and it was „stones”, *lapides* that showed the greatest variety in terms of shape, displaying curious similarities with living beings or geometrical figures; it is characteristic of the role of “stones” in Gessner’s work that Clusius too, referred to it as *libellus de lapidibus* in an already discussed letter from 1566.<sup>86</sup> The number of woodcut illustrations in the treatise were very helpful in attracting the attention of the public, and later publications about non-living *naturalia* – like Bauhin’s, Imperato’s or Aldrovandi’s<sup>87</sup> – contained even more illustrations on strange stones. Stones similar to (parts of) plants or animals were especially mysterious: are they a joke of nature, or were they really once living beings? In Section 3, in connection with Cromer’s experience about a fossil tree in the Zuckmantel mine, opposing sixteenth-century theories about the origin of what we today call fossils were already discussed: it was debated whether they were born by means of a certain *vis plastica* of nature or were living beings turned into stones through various processes. It was also mentioned that Agricola and Gessner do not seem to have taken a clear stance in such questions, although they seem to have been inclined to consider the specimens in question as ancient plants or animals somehow turned into stone. Agricola speaks about some findings of plants and animals petrified by the *succus lapidescens* (but also allows that certain things can be born inside the earth), and Gessner also sometimes uses the expression “turned into stone” (e.g. *conversa in lapidem*), without further explanation.<sup>88</sup>

Modern scholarship mostly focused on the above mentioned sixteenth-century review works on non-living *naturalia*, and actual discussions about and exchange of such *naturalia* between scholars received much less attention. These natural historical books include mentions of specific items sent by specific scholars – even passages from letters are sometimes quoted –, but extant correspondences (surviving mostly in manuscript) provide many more examples, at least in Clusius’s case. For a clearer picture of contemporary concerns about fossil specimens, related letters of the *respublica litteraria* have to be definitely included in the investigations. Was the share of curious „stones” significant in the exchange of *naturalia* in the Republic of Letters in general, and in Clusius’s correspondence in particular? What kind of strange stones did these

<sup>84</sup>On sixteenth- and early seventeenth-century European works about fossils in general, see e. g. Langer (1994); for the matter from a world-wide perspective, see McNamara (2020); from the perspective of nascent geology, see the relevant parts of Adams (1954) and Ellenberger (1996), already noted in Section 3.

<sup>85</sup>Entzelt (1551).

<sup>86</sup>See Part I, p. 69.

<sup>87</sup>Bauhin (1598), Liber IV; Imperato (1599); Aldrovandi (1648).

<sup>88</sup>See Leu (2016), 377.

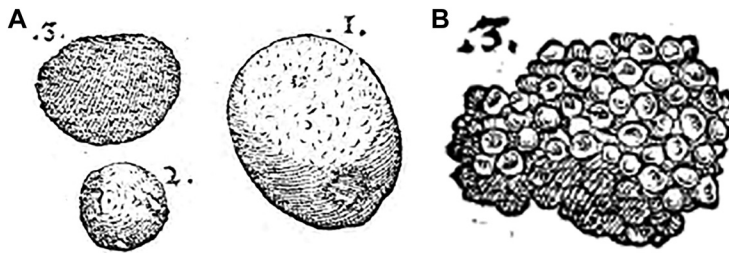




men send to each other? How were they called, classified and discussed? What do these cases tell us about the reception of the great natural historical works of the mid-sixteenth century?

Certain “stones” with a curious shape requested or received by Clusius have already been mentioned earlier in this study. In November 1566 he asked for *aetites*, eagle-stone, from Thomas Rehdiger, who was then in Valence (Fig. 3a shows the illustrations of *aetites* in Gessner’s *De rerum fossilium... genere*, the treatise that greatly inspired him).<sup>89</sup> In January 1570, he received a piece of limestone “in the shape of peas” from Ludwig Camerarius (Fig. 3b) – in fact, dripstone –,<sup>90</sup> and in 1600 he sent similar *piselli petrificati* (together with many other specimens) to Imperato and Pona, as will be seen later. Let it be mentioned here that Clusius wrote about bezoars, too, and received actual specimens. The bezoar “stone” is a borderline case from the perspective of the question we are investigating: on the one hand, certain kinds of it remind one of gemstones, on the other hand it originates in animal intestines, and this organic origin was already known in the sixteenth century. It was mostly valued for its medicinal properties (notably as an anti-poison), and seems to have appeared in sixteenth-century writings (theoretical works and correspondences) in a medical rather than a „wonders of nature” context. When Clusius translated the third part of Nicolaus Monardes’s work on the medicines of the New World, he added a one-page note (plus illustrations) to the Spanish physician’s general description of the bezoar about various specimens that he had seen, including three pieces that he himself had received from Francis Drake in 1581.<sup>91</sup>

Most interesting is Clusius’s case with what is known as “Saint Ladislaus’s coin” – a little round, stone-like *naturalium* that looked like a coin turned into stone, but was in fact neither coin nor stone. His already mentioned letter to Crato dated March 23, 1567, in which he expresses his ardour about *res metallica* growing day by day,<sup>92</sup> continues this way:



**Fig. 3.** a. *Aetites* in Gessner (1565, *De rerum...*, 10v). b. „*Pisolythum*” from Karlsbad, in Gessner (1565, *De rerum...*, 71v)

<sup>89</sup>See Part I, p. 69.

<sup>90</sup>See Section 4 above.

<sup>91</sup>Clusius (1582), 43–45. He met with Francis Drake, pirate, traveller and “knight”, during his 1581 journey to England.

<sup>92</sup>See Part I, p. 70.



“I heard of a kind of little stones, plain and round as if made by a pair of compasses, found in the mountains that separate Pannonia and Dacia or Transylvania. Some of them have a gold-like colour, some of them silver, and they look as if letters of some unknown script were written on them. The story goes that once King Ladislaus chased the Tartars who were heavily laden with booty; his soldiers were lured by the treasures dispersed all through the way, and he was afraid that victory would slip out of his hand because of the soldiers’ avarice and idleness. He prayed to God to turn the coins and money left behind by the enemy into stones, and this way he restored speed to his deluded soldiers in pursuing the enemy.”<sup>93</sup>

This is not the only time Clusius summarises a Hungarian folk legend; he narrates this legend of Saint Ladislaus (László), king of Hungary (1077–95) in the *Nomenclator* of Hungarian plant names, too, together with other sagas.<sup>94</sup> Whatever Clusius believed about the legend itself, he seems to have suspected that those were extraordinary stones, perhaps of a metallic material (other “stones”, too – like hematite – turned out later to be metals). Clusius could not know what modern science does – that what the general folk called “Saint Ladislaus’s coin” had once been *living organisms*. These are in fact *nummulites*, fossils of a group of single-celled eukaryotes, huge when compared to other single-cell creatures, living a few thousand million years ago. That is why they are so flat and circular (see Fig. 4)<sup>95</sup> They had grown to the visible size of around 1–5 cm and are indeed of a grey, yellowish or brownish colour. In some rare instances spiral-like lines may also be faintly perceived on them, and this may have triggered beliefs about ancient coins or *characteribus incognitis*, to use Clusius’s words.



Fig. 4. “Saint Ladislaus’s coins” (Nummulites)

<sup>93</sup>Ed. Ram (1847), 56.

<sup>94</sup>At the entry “Gentiana... Zent Lazlo Kiraly fiue” in both editions of the work (Németújvár/Güssing edition: Clusius, 1583b; Antwerp edition at the end of Clusius, 1583a). In this *Nomenclator* the legend is told in more detail, but no reference can be found to stone-like material remnants of the events. The letter to Crato, not noted in Hungarian scholarship, demonstrates that Clusius was already familiar with the legend by 1567, before any travels to Hungary or East Central Europe.

<sup>95</sup>A biochemical analysis of “Saint Ladislaus’s coin” can be found in Nagy (2001).

Clusius repeated his request three weeks later,<sup>96</sup> after which point only Crato's answers survive concerning the matter, who informed his friend about the "lapilli" on May 29, July 12, August 31, September 24 and October 11.<sup>97</sup> At first Crato is sceptical about Clusius's request, he has "never seen" such coin-like stones and "always considered it a tale", nevertheless he offers to charge with the task one of his acquaintances, a physician residing in Vienna.<sup>98</sup> The next letter reveals this physician to have been Thomas Jordanus,<sup>99</sup> then lecturer at the university. Since he was originally from Kolozsvár (today Cluj-Napoca) and could provide the "little stones" within a short time, Crato had them at his disposal by July 12<sup>100</sup> (because of the legend, Clusius and his friends associated the "Saint Ladislaus's coin" with the mountains near Kolozsvár, although in fact they could and can be found in other parts of Europe, as well<sup>101</sup>). Later Crato was expecting further such stones and further information on them, although he was a little surprised at Clusius's curiosity, since the stones' "form shows satisfactorily" that they are simply born and grow underground<sup>102</sup> (a reference to nature's *vis plastica*). Clusius's enthusiasm and curiosity embracing the whole of nature was not *generally* shared by the contemporary literary republic, and this is clearly discernible from the contrast provided by Crato's letters. He declares to Clusius that he, on his part, does not have a "universal and infinite desire to learn", he is rather interested in practical, useful knowledge.<sup>103</sup> He does not want to burden his messengers, travelling on horse-back, with too many such stones.<sup>104</sup> By October, however, he seems to have picked up some of Clusius's enthusiasm: "my thoughts keep revolving around the little stones" – he expects to receive some and learn more about them.<sup>105</sup>

Clusius thus must have received at least one (fragment of a) "Saint Ladislaus's coin" by September 1567.<sup>106</sup> It is not known what he thought about it in the end, and no one in his circles was in the position to discover the truth regarding the object's origin. Clusius, who later found a lythoxilon (see below) and contributed to the beginnings of palaeontology, was in fact holding in

<sup>96</sup>Clusius to Crato, April 14, 1567; ed. Ram (1847), 57.

<sup>97</sup>The only edited letter among these is that of May 29: Freytag (1831), 88–90. From the references in Crato's letters, some of Clusius's other 1567 letters can be inferred, he wrote to Crato at least on July 1 and August 16.

<sup>98</sup>Freytag (1831), 89.

<sup>99</sup>The physician later became famous for his medical and other works, and made friends with Clusius.

<sup>100</sup>Letter of July 12: *Opera Thomae Iordani lapillos ex Hungaria nactus sum. Unum mitto quem aperire poteris. Plures dare iis qui per dispositos equos literas ferunt non debebam.*

<sup>101</sup>See also Crato to Clusius, Oct. 11, 1567: ...*Similes reperiri in Moravia audio, sed nondum vidi.*

<sup>102</sup>Letter of September 24: *De lapillis illis te laborare miror, cum forma satis ostendat, eos accretione gigni atque augeri.*

<sup>103</sup>Letter of August 31: *De lapillis interea aliquid cognovi a Transylvano, et spero me eos accepturum. Ego talium rerum, quarum usus in vita nullus est, parum sum studiosus, et universam atque infinitam cupiditatem cognoscendi illis libenti animo relinquo, qui spes longas inchoant. Vix ad necessaria mihi tempus concedi animadverto, licet eo parcissime utar...* Sept. 24: *Apud me admirationem nullam habent, cum nullum usum in vita habere possint.*

<sup>104</sup>Letter of July 12: *Unum mitto quem aperire poteris. Plures dare iis qui per dispositos equos literas ferunt non debebam.* September 24: *Veredarios his onerare nolui. Sed si ullam commodam mittendi occasionem nactus fuero, reliquos quos Vienna habeo, accipies.* With *unum mitto* he probably refers to a pack of "Saint Ladislaus's coins".

<sup>105</sup>Letter of October 11: *De lapillis non conquirit cogitatio mea: Itaque nuper admodum caepi aliquid extricare, speroque me ex Dacia accepturum.*

<sup>106</sup>The July 12 letter quoted above speaks about an actual attachment to the letter, which must have taken at least one month to arrive in Bruges.



his hand a once living eukaryote. What is sure is that he could not know the *real tale* behind it – which would have intrigued him even more than Saint Ladislaus’s tale – about life on Earth millions of years ago. In his time, assessments about the age of the Earth (the time after Creation) revolved around 5000 years.

In his later life, however, Clusius had several occasions to hold in his hand „stones” whose similarity to well-known plants or animals was clear, and which thus allowed him to muse on their possible origin as living beings. In the following we will review such cases – that is, fossils in the modern sense which he obtained or was informed about. As for plants, one case has already been discussed: in May 1580 Achilles Cromer reported about remnants of a tree enclosed in rocks, found in one of the Zuckmantel mines; and according his letter of July 1580, the miners saw several such ancient trees.<sup>107</sup> Cromer could only send information on the findings and discussions surrounding them, but no fragments of the trees themselves. However, Clusius did have pieces of fossilised wood, and he found at least one such piece himself. This is the piece of *Quercus cerris* that he found in Vashegy (Eisenberg) in Hungary. The finding is already known to scholarship, but Cromer’s letters allow us further to contextualise the episode.

From 1577 onwards, at the latest, Clusius often visited the Hungarian aristocrat Boldizsár Batthyány, a most inspiring patron and friend,<sup>108</sup> and made field trips using Batthyány’s castles as his base. In the hill of Vashegy (in German: Eisenberg), between Batthyány’s two most important castles at that time, Szalónak and Némétújvár (now Stadtschlaining and Güssing, both in Austria), he found fragments of a petrified “Lithoxylon” (a *Quercus cerris*) whose veins, rings and other features could still be seen. As Clusius relates in *Pannonian Flora*, “I not only observed” such fragments “that were dug out, and owned not only as presents from... Boldizsár Batthyány..., but I myself also collected such on the slope of... the hill of Eisenberg...”<sup>109</sup> Modern scholarship has already expressed its appreciation for Clusius’s skills in xylotomy and openness to palaeontology which helped, first, to recognise the object as a fossil plant, and second, to identify it as *Quercus cerris*.<sup>110</sup> The 1601 version of the text<sup>111</sup> provides the year of the finding, 1580 – but we are still left wondering as to the exact time of the year. Among the other passages of *Pannonian Flora* that refer to Batthyány estates and mention the year 1580, two passages also allow us to determine the month: Clusius collected „*Tribulus aquaticus minor*” that flowered in early June,<sup>112</sup> and „*Liliasphodelus luteus*” that flowered in late May, early June.<sup>113</sup> The other Batthyány-related *loci* of the botanical work also show that he was there mostly in the late spring or the summer of any particular year. After all, Clusius found the fossil wood most probably in May or June, and we also know that he received Cromer’s “first” letter

<sup>107</sup>See Part I, Section 3, p. 86–87.

<sup>108</sup>See Part I, p. 72.

<sup>109</sup>Clusius (1583a), 10: *Huius cerri... fragmenta... non modo eruta conspexi, et... Dominis Balthazaris de Batthyan... munere habui: sed ipse etiam legi in montis Eysenberg... acclivi...* At the end of the sentence Clusius specifies the place of the finding, which is probably identical with today’s Nagycsádhegy (Horváth, 1973, 592).

<sup>110</sup>Horváth (1973); Ubrizsy-Savoya (1977), 15.

<sup>111</sup>Clusius (1601), 20.

<sup>112</sup>Clusius (1583), 713.

<sup>113</sup>Clusius (1583), 143.



on May 23, in Vienna. It cannot be decided which was earlier, but we have evidence that Clusius had the two experiences during the same time of the year.

We saw from Cromer's letter of May 1580 that the two men seem to have had previous discussions about the origin of such underground findings. What Clusius's stance may have been about the Zuckmantel findings we do not know, and in *Pannonian flora*, too, he just describes the specimen he found (in line with the descriptive nature of the work). At any rate, he speaks about the tree as something that once lived but then turned into stone.<sup>114</sup> (The other aspect of origin, whether an underground specimen was born *in situ* or brought there by floods and so on, does not seem relevant here, since this was a surface finding.) After all, we can reinforce that Clusius had a conscious interest in what we today call palaeontology. In this respect the two cases fruitfully complete each other. The finding of the „Lithoxylon” was not an isolated, chance event: related issues had emerged in earlier scholarly conversions, and Cromer's reports gave further opportunities to think about questions of origin.

These concerns were not limited to ancient plants, but animal fossils came into the picture, too. Again, the scarcity of relevant surviving letters by Clusius himself does not allow us to learn his thoughts about “stones” with features of marine shells and other animals, but it cannot be accidental that several scholars sent him such specimens during his life, for instance, Giacomo Antonio Cortuso (1513–1603). Clusius corresponded with this eminent Italian scholar, who made long journeys in a number of countries and finally became the prefect of the Paduan botanical gardens,<sup>115</sup> from the 1560s up to at least the 1590s, exchanging mainly botanical *naturalia*. In response to a letter by Clusius sent via Thomas Rhediger on March 1, 1567,<sup>116</sup> some six months later Cortuso sent a box with “great<sup>117</sup> petrified animals” (among other things), “which can be found amid huge and very hard rocks in our higher mountains near Padua and Vicenza.”<sup>118</sup> What these animals were we learn, at least to some extent, from a later letter by Cortuso dated February 14, 1568: “If you like this sort of petrified shell and fish of which I sent a sample, just tell me to send more, as much as I can.”<sup>119</sup> So, these were remnants of little marine animals – just the kind of fossils whose mysterious presence in high mountains launched debates in the sixteenth century about their origin, with the *vis plastica* of nature and diluvial floods as the two most dominant theories.<sup>120</sup> Clusius received both letters in March 1568 (the letter with a box attached to it took much more time to arrive from Padua to Mechelen than a single letter), and replied to both within days;<sup>121</sup> – we can only wish we knew what. At any rate, Cortuso soon

<sup>114</sup>Clusius (1583), 10: ...*fragmenta in lapides commutata, ipsaque adeo matrice in nigrum silicem conversa...*

<sup>115</sup>Cortuso's career has been briefly summarised by Trevisan (1995).

<sup>116</sup>See Clusius to Th. Rhediger, ed. Ram (1847), 17. The letter to Cortuso has not survived.

<sup>117</sup>*Massimi* must stand here in the figurative sense, as „magnificent”.

<sup>118</sup>Cortuso to Clusius, Aug. 27, 1567: ... *nella scatola trovarite et massimi animali petrificati che si trovano nell'entro di grossissimi et durissimi sassi in questi nostri piu alti monti di Padovana et del Vicentino...* The passage was already noted by Egmond (2010), 81–82.

<sup>119</sup>Cortuso to Clusius, Feb. 14, 1568: *Si quella sorte di conchi et pesci petrificati ch'io vi mandai mostra vi piaciono, avisatemi che vi ne manderò quanto potrò...*

<sup>120</sup>See Part I, Section 3, p. 84.

<sup>121</sup>According to Clusius's notes, he received the letter of August 1567 on March 26 and replied on April 1; he got the February 1568 letter on March 9 and replied on March 10.



sent another box containing various items – he did not detail its contents in the brief accompanying letter which he apparently wrote in a hurry between two journeys.<sup>122</sup>

Did Cortuso send the fossils of his own accord, or did Clusius encourage him to send any strange “stones” in addition to botanical *naturalia*, perhaps in the letter of March 1567 sent via Rehdiger? It was just in this period that Clusius expressed his enthusiasm for “stones” in letters to Crato (November 1566, March 1567), and requested *aetites* from Rehdiger (November 1566) and Saint Ladislaus’s coins from Crato (March 1567). Furthermore, in a letter to Rehdiger we have not mentioned before, dated October 1, 1567, Clusius asks for such little stones (among other things) that display impressions of any (part of an) animal or the name of which comes from an animal, as in the case of *aetites*.<sup>123</sup> Rehdiger was already in Padua at this time and apparently met Cortuso whom Clusius greets in the letter in question. It seems that for some reason our Low Countries naturalist associated the Paduan or North Italian region with the possibility of acquiring animal-related stones; however, it was not Cortuso sending fossil shells and fish that gave Clusius the idea, since he did not receive these (or Cortuso’s accompanying letter) until 1568. After all, it is quite possible that it was Clusius who had broached the issue of animal-like stones to Cortuso in his letter of March 1567 (or before), and that Cortuso’s box was a reaction to such requests. It is remarkable that in his letter of October 1, 1567 to Rehdiger Clusius speaks of *impressions* of animals on stones and not about petrified animals, although, if anything, it was the latter type that appeared in mid-sixteenth-century review books on non-living *naturalia*.<sup>124</sup>

As in the case of minerals, Clusius not only received, but also sent or mediated stones of a curious shape. By 1600, much more information and many more images were at the disposal of naturalists about what we today call fossils, thanks principally to Ferrante Imperato’s and Johann Bauhin’s above-mentioned works; and parallelly, the circulation of such specimens in the *respublica litteraria* also increased significantly. This is well reflected by a series of exchanges of fossils (among other things) between Italian and Low Countries naturalists in 1600, where the main axis and the main source of information was the correspondence between Pinelli and Clusius. From a letter by Pinelli dated January 6, 1600 we learn that Imperato – the owner of one of the greatest collections of non-living *naturalia* – needed *Astroites* and turned to Pinelli (also Neapolitan by origin) who in turn asked Clusius, since he, that is Pinelli, had heard that this kind of stone could be easily procured from England.<sup>125</sup> Pinelli refers to Bauhin’s treatise *De lapidibus variis*, even mentioning the page number where the description and image of this *Astroites* can be found (see our Fig. 5a) – these small stones are shaped like five-pointed stars

<sup>122</sup>Cortuso to Clusius, July 24, 1568. In the two further letters (from 1569) that have survived from this period there is no reference to fossils.

<sup>123</sup>Ed. Ram (1847), 18: *Quae vero peto, aut semina sunt rariorum plantarum, aut bulbi, aut lapilli impressionem aliquam habentes, quales sunt, qui rem aliquam animale[m] representant, aut ab animalibus nomen sortiuntur ut aetites etc.*

<sup>124</sup>In the two standard mid-sixteenth-century overviews of the issue, Agricola’s *De natura fossilium* and Gessner’s 1565 edition, I have not found references to such impressions.

<sup>125</sup>Ed. Toni (1911), 139. Imperato was based in Naples, and Pinelli, a Paduan, was also Neapolitan by origin. It is also natural that Pinelli turned to Clusius, since the latter was Pinelli’s best Low Countries contact, who also had acquaintances based in England.



and fit together. The “Astroites” or “Asterias”, already described by Gessner who in turn refers to Pliny,<sup>126</sup> must in reality be a fossil part of an ancient marine animal called Crinoid (“sea lily”).<sup>127</sup> Its “stalk”, by which it was attached to the sea bottom, was made up of calcareous plates, and these star-shaped plates fell apart after its death, so the fossil parts can be found mostly distinctly but close to each other (see Fig. 5b).

Clusius answered to Pinelli in the positive in his letter of February 11;<sup>128</sup> Pinelli thanked him in his letter of March 16 for having “commissioned” the *Astroites* to be sent from England.<sup>129</sup> From Pinelli’s letter of May 4 it turns out that Bernardus Paludanus (from Enkhuizen) offered *Astroites*, together with two further presents, *lapis trochites* and *cornu Ammonis*.<sup>130</sup> “Trochites” is “wheel-like” stone, described for instance by Gessner,<sup>131</sup> while the “Horn of Ammon” is a “stone” known from antiquity but only identified in modern times. It is in fact the shell of an ammonite (*ammonites*), a type of cephalopod, similar to a snail’s house.<sup>132</sup> Gessner provides one schematic illustration of the “Horn of Ammon”,<sup>133</sup> while Bauhin shows a host of images about its various types (one can be seen as Fig. 6).<sup>134</sup> Imperato was very glad about the three “stones” and wanted to know where Paludanus had acquired them from; for Clusius he offered a copy of his *Dell’historia naturale* that had appeared in the previous year, and which focuses on

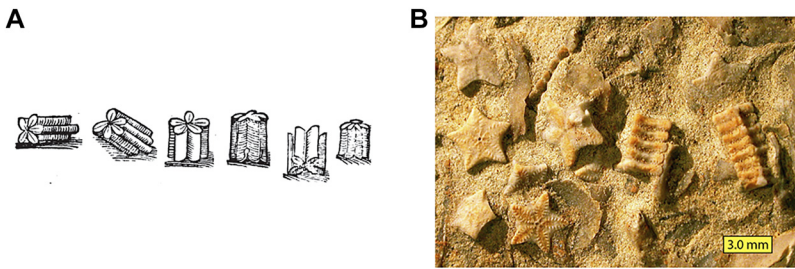


Fig. 5. a. “Astroites” in Bauhin (1598, Section *De lapidibus variis...*, 31). b. Fossil remnants of a crinoid

<sup>126</sup>Gessner (1565), *De rerum...*, 37r.

<sup>127</sup>Crinoids make up the class of *Crinoidea*.

<sup>128</sup>Again, for the dating of Clusius’s (lost) letters, see his notes on the correspondent’s (here Pinelli’s) letters.

<sup>129</sup>Ed. Toni (1911), 142–143.

<sup>130</sup>Ed. Toni (1911), 144. This is a reply to a letter written by Clusius on March 23. According to Hunger, Paludanus’s presents are also due to the partial selling of his collection: Hunger (1927), 254.

<sup>131</sup>Gessner (1565), *De rerum...*, 28v–29v.

<sup>132</sup>Cephalopods belong to the molluscan class *Cephalopoda*. An image of one genus of them is available at [https://en.wikipedia.org/wiki/Orthosphinctes#/media/File:Gasteropods\\_-\\_Ammonites\\_-\\_Orthosphinctes\\_sp.JPG](https://en.wikipedia.org/wiki/Orthosphinctes#/media/File:Gasteropods_-_Ammonites_-_Orthosphinctes_sp.JPG), as an example for a genus highly similar to Bauhin’s illustration.

<sup>133</sup>Gessner (1565), *De rerum fossilium...*, 159v. Kentmann also describes *ammonites* in this volume (e. g. 32v).

<sup>134</sup>Bauhin (1598), Section *De lapidibus variis...*, 15–23



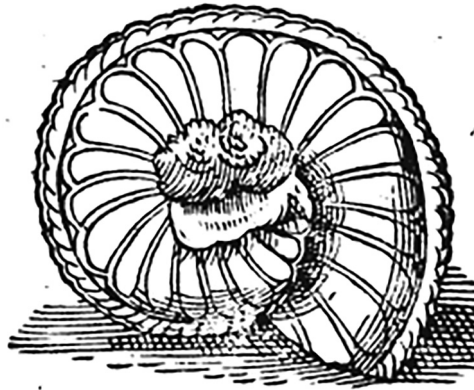


Fig. 6. An “Ammonites” in Bauhin (1598, Section *De lapidibus variis...*, 16)

non-living *naturalia*, complete with a host of illustrations.<sup>135</sup> (The book indeed arrived to Clusius later.<sup>136</sup>) All in all, we can witness here a fairly neat chain of exchanges involving four leading scholars of the period: we may trace the way in which three different fossils journeyed through the stations of Paludanus (Enkhuizen) – Clusius (Leiden) – Pinelli (Padua) – Imperato (Naples) in a relatively short time. We can also learn from the correspondence that it was once again natural historical works, most importantly Bauhin’s, that had apparently triggered the chain of transactions. In the case of *Astroites*, Bauhin’s work is explicitly referred to, and on the „Horn of Ammon” it is Bauhin again who provides the most abundant visual material. These stones are beautiful, but the scholars would have probably been even more intrigued if they had known their real origin: in at least two cases it could be established that these were remnants of marine animals, whose presence on land (even in mountains) puzzled contemporary naturalists.

Still in 1600, some further “stones” travelled from Clusius to Pinelli. Small pieces of “pea-like” stones, “*piselli pietrificati*”, probably from the same dripstone specimen that Clusius had received a generation earlier (see the beginning of this section), were sent not only to Pinelli, but several friends in Italy, certainly including Imperato and Giovanni Pona.<sup>137</sup> What is more, *Astroites* finally also arrived from *England*, thanks to Clusius’s previously mentioned mediation in his letter of February 11 (see above). According to intriguing letters between Clusius and Pinelli that cannot be analysed here for reasons of space, Mathias de l’Obel (Lobelius), Clusius’s friend and colleague, managed to acquire *Astroites* in London from the physician Thomas Doyle, who had collected them at Lassington near Gloucester. Clusius received them in early August

<sup>135</sup>Still the same letter of May 4 from Pinelli to Clusius.

<sup>136</sup>See Imperato to Clusius, June 28, 1600, ed. Toni (1911), 65–66.

<sup>137</sup>On June 21, 1600 (ed. Toni, 1911, 145) Pinelli acknowledged the receipt of four boxes, one of which included *alcuni Piselli pietrificati* meant for Imperato and Pona. Giovanni Pona (1565–1630) was a Veronese apothecary who also stood in correspondence with Clusius. In the edited inventory of his collection (Pona, 1601), Pona indeed had *Pisa lapidea Thermarum Carolinarum, Gesneri* (p. XXIV), and also *Astroitti syriaci genus quoddam, Paludani* (p. VI). (Both noted in Toni, 1911, 18–19).





and forwarded them, together with other items, on August 31; Pinelli received all of these despatches by October 24.<sup>138</sup>

The most specific description of fossils in Clusius's correspondence known so far occurs in a letter by Nicolas Fabri de Peiresc (1580–1637). This French nobleman was two generations younger than Clusius, but had similarly wide-ranging humanist–naturalist interests and a similar ambition to build a Europe-wide network.<sup>139</sup> His enthusiasm for nature and his natural historical skills are easy to recognise in his letter to Clusius dated Aix-en-Provence, February 15, 1605, which Hunger had already noted,<sup>140</sup> and which includes a description of a mushroom (*Clathrus Cacellatus Fr.*) that Florike Egmond and other modern scholars highlighted as an exemplary description from a scientific perspective.<sup>141</sup> Let us now turn to a previously undiscussed passage about fossils sent to Clusius: in the box that contained specific *naturalia* from the Marseilles region Peiresc included four kinds of fossil „stones” accompanied by a twelve-line description of the findings in the letter;<sup>142</sup> he also enumerated them (in a somewhat different order) in the inventory attached to the letter.

- The first item is “pieces of our stone *Astrites*”, which has branches similar to red corals, but it is grey, and dotted with small “stars”. They can be found near Le Castellet, where Peiresc saw a branch not unlike white coral. (See part [1] of the quotation in the footnote. The item is specified in the inventory as *Astrites, ejusque in formam plantae nascentis ramuli.*) This is not the *Astroites* or *Asterias* seen above – here the name indicates the small stellar figures on the coral-like object; however, corals with this name do not feature either in Gessner or in other standard works on natural history. Imperato does specify in his 1599 work a *corallo stellato* (with *corallo rosso, nero, bianco, articolato* as the other coral *species*<sup>143</sup>), but Peiresc does not seem to have been familiar with this, otherwise he would have referred to it (in the letter he only refers to red and white corals). Peiresc's *Astrites* must be identified with the fossil version of Imperato's *corallo stellato*, which in turn must be identified – based on Imperato's illustration (Fig. 7) – with today's *Alcyonidae* from the order of corals (*Alcyonacea*). As regards various species of *Alcyonidae*, the *corallo stellato* is quite similar for instance to “Dead man's

<sup>138</sup>See Clusius to Pinelli, August 18 and August 31, 1600: Milan, Bibliotheca Ambrosiana, S 107 sup. On October 24, Pinelli acknowledged that Clusius's letter of Aug. 31 had arrived, *insieme col rotoletto de ritratti et della pietra Astroite* (ed. Toni, 1911, 149).

<sup>139</sup>On Peiresc see Jaffé (1994) or Egmond (2010), 118–123.

<sup>140</sup>Hunger (1927), 278–279.

<sup>141</sup>See Egmond (2010), 120–121.

<sup>142</sup>On the second and third pages of the unedited letter: [1] *L'occasion de cette boitte m'a fait y adiouster oultre voz semences, quelques petites pieces de nostre pierre Astrites, qui se treuve dans terre en forme pareille à celle des rameaux de corail, vray est que les rameaux de corail sont rouges, là ou ceux cy sont de couleur grisastre et sont tous parsemés d'estoilles. On en treuve à deux lieues de Beaugentier, au terroir d'un petit villaige nommé Le Castellet, ou i'en ay veu un grand rameau tout entier qu'ï sembloit estre de corail blanc.* [2] *Et c'est aussi de là, que i'ay eu une espee de Conchites qui ressemble à la vraye concha striata,* [3] *et une aultre sorte de pierre qui est peult estre Trochites Io. Kentmanni et Gesneri, laquelle ressemble entierement à une sorte de coquille de celles qui s'attachent contre les rochers que les Marseillois apellent des Alapedes.* [Inserted on the margin:] *Et pour ce ie l'appellerois (s'il m'estoit loisible) Lepadites, plus tost que Trochites.* [4] *L'aultre espee de Conchites, ie l'ay recouuree d'Antibou, ou lon les treuve en couuant le roc et c'est peult estre Ctenites de Gesnerus. Si cecy vous est agreable, ie tascheray de vous mander quelqu'aultre curiosité.*

<sup>143</sup>See Imperato (1599), 713–724.





Fig. 7. *Corallo stellato* in Imperato (1599, 718)

fingers” (*Alcyonium acaule* or *Alcyonium palmatum*).<sup>144</sup> The “stars” are in fact traces of the small polyps that exhibit radial symmetry, and cover the skeleton of a living coral. It is the skeleton of certain corals that resemble bushes or branches, but corals are in fact animals – colonies of little polyps, and not plants.<sup>145</sup>

- Next come three specimens of petrified shells (*Conchitae genera tria* in the inventory). One of them is *Lepadites*, *Lepas Alapede concha univalvis* (the second item in the inventory passage; part [3] in the passage in the letter). According to Peiresc, it “may be the *Trochites* of Kentmann and Gessner”, but is totally similar to a limpet that attaches itself to rocks near

<sup>144</sup>See *Alcyonium acaule* in Marina (2006), 42.

<sup>145</sup>Corals had been known since antiquity mostly as plants (the red coral was particularly important as raw material for medicines or jewels); Gessner (1565, *De rerum...*, 131v, following Agricola) and Imperato (1599, 713), too, refer to it as basically a plant.



Marseilles, called “Alapede”, therefore he would rather call it *Lepadites* (*lepas* means limpet). Based on the wheel-like pattern suggested under the name *Trochites*, the adjective *univalvis* above, and the information that it looks like a shell that attaches itself to rocks, the specimen can be identified as a fossil of a common limpet (*Patella vulgata*, see Fig. 8), which can be found on the rocky shores of Western Europe.

- The *Conchites vera striata* (third item in the inventory passage, part [2] in the letter) indicated a fossil of a striped shell which according to Peiresc looked like a real *concha striata*; this type features in Kentmann and Gessner,<sup>146</sup> but is too general to identify with a specific species.
- Finally, the *Ctenites Gesneri, striatus* (fourth item in the inventory passage, part [4] in the letter) is again a striped shell that Peiresc acquired from the rocks of Antibes (also on the French Riviera) and “is perhaps the *Ctenites* of Gessner”. Both Gessner and Kentmann mention certain *Ctenites*, but their identity is again uncertain,<sup>147</sup> and Peiresc himself is not sure that his specimen is identical with that represented in Gessner (Fig. 9).

It is conspicuous how cautious Peiresc is in his description when it comes to forming any theory as to the origin of these strange stones that definitely resemble certain known marine species. He does not even commit to writing the idea that they appear to be “petrified” living beings, he always speaks about a “similarity” to them, although he is clearly impressed by the high grade of similarity. The other striking feature of Peiresc’s description is his adherence to Gessner. He intends by all means to fit his specimens into Gessner’s categories, even when this results in forced associations of which he himself is not sure (“may be the *Trochites* of Kentmann and Gessner”; “perhaps Gessner’s *Ctenites*”), while he could have found more types of corals in Imperato, and more types of shells in, say, Bauhin. This, at any rate, shows the great authority of the Swiss naturalist continuing Aeven after 1600.



**Fig. 8.** Common limpets ((*Patella vulgata*))

<sup>146</sup>Gessner (1565), *De rerum...*, 164r; and Gessner (1565), Kentmann’s treatise, 94v.

<sup>147</sup>Kentmann identifies two of his *Ctenites* with the so-called Jakobsmuschel (Kentmann’s treatise, 32v–33r), but this latter sort of shell is not similar to that illustrated by Gessner (*De rerum...*, 164v)





Fig. 9. A *Ctenites* in Gessner (1565, *De rerum...*, 164v)

The issue of strange stones or fossils appears several times in Clusius's correspondence: the above overview of examples stretched from the mid-1560s to the 1600s. As in the case of minerals, it was in his early period that he demonstrably looked for certain special "stones", while he seems to have played more passive roles in such issues in his later years. After all, he must have had several of such *naturalia* by the end of his life; he may have given away some, but such items as "Saint Ladislaus's coins", the fossil remnants of the oak that he himself found, or Pereisc's marine presents certainly formed part of the great number of "curiosities" indicated in the auction catalogue drawn up after Clusius's death.<sup>148</sup>

The above examples are also telling from a more general perspective: they present us with a cross-section of the exchange of strange stones and fossils that took place in the late sixteenth-century Republic of Letters (not only in Western but also in East Central Europe), and complete the image we have seen in the relevant review works of the period by Gessner, Bauhin or Imperato. In our sample letters, animal fossils came from small marine animals, while plants were represented by fossil trees: in the natural historical works, too, these are the most frequently mentioned types for animal or plant fossils. Furthermore, there were stones – mentioned both in letters and review works – whose strange shape was due to other reasons than having been once living beings; and there were fossils that did not look like fossils at all, and thus completely misled contemporary scholars. In certain cases, even the best naturalists of the time could not help putting objects in totally different categories than what they really are. The question seemed to be whether a coral is a plant or not – but it is in fact a colony of marine animals. Or, has the "Saint Ladislaus's coin" something metallic, or is it just a strange shaped stone? Neither of them, but a petrified eukaryote. Such cases may make one smile, but what really counts is the enthusiasm and activity of the scholars of Clusius's time, which accelerated scientific development and thus paved the way for exact identifications many generations later. Clusius himself took part in the birth of palaeontology: he acquired or circulated several fossils, and even found some himself.

<sup>148</sup>See Part I, Section 2, p. 78.



Due to the practical orientation of correspondence in Clusius's time, we rarely get to read explicit ideas or theories about the "stones" in the letters themselves – instead they tend to contain references to sending or receiving such objects, or short descriptions. We have an important exception – Cromer's report about the discussion between himself and the miners,<sup>149</sup> but here, too, the author refers to earlier discussions with Clusius for which we have no source. Still, the way the scholars speak about the objects (for instance, whether they refer to petrification or not) or the categories they use can be informative with respect to „palaeontological“ ideas of the time. The real significance of the passages quoted from these letters, however, lies in the fact that they provide living examples of how scholars used to search for, collect or forward such objects – in other words, how the subject matter of these review works about *lapides* was actually handled. We can see the *naturalia* not in a scientific but in a biographical or micro-historical context, and may come to understand, for instance, what kind of factors contributed to their increasing circulation; we get to appreciate how individual travels and adventures (like that of Cromer in the mine) and the increasingly dense network of the European *respublica litteraria* (with Clusius's network stretching from England to Silesia or Transylvania) were among the most important factors. We can see how the information contained in, say, Gessner's or Bauhin's work triggered real activity, and how, in turn, this activity resulted in more knowledge, more detailed and illustrated works on natural history. The fact that our last sample letters, those from the 1600s, report sending multiple objects, and testify to chains of exchanges with several stations, is in line with the spectacular development in the scholarship of "stones" from Agricola to Bauhin or Imperato (seen already in the sheer volume of descriptions and illustrations of fossils). Speaking about reception of the *lapides*-literature, Gessner's influence has to be underlined once again: several of our sample letters reinforced the influence of the 1565 edition of *De omni rerum fossilium genere*, particularly the last treatise, by Gessner himself.

## 6. SPECIAL TYPES OF EARTH

"Earths" was one of the general types of *fossilia* or *res metallica* in the classificatory system of most review works on non-living *naturalia*. Being less spectacular than minerals or fossils, perhaps we would not expect such materials to have been objects of investigation and exchange between scholars – but they were, as Clusius's correspondence shows. It was already shown that Achilles Cromer was intrigued by *solea*, a constituent of a geological layer in the Zuckmantel mine, a special earth which, according to him, "endeavoured upwards", and a sample of which he sent to Clusius.<sup>150</sup> This is an example of purely scientific interest on the part of these scholar(s). All of our other examples for the exchange of earths are to be discussed in the context of *terra sigillata*, medicinal earth or bole (*bolus* in Latin; in fact the term was used to refer to various types of clay). As will be seen from the next paragraph, *terra sigillata* was principally a medicine used mostly in the form of tablets and, strictly speaking, the exchange of medicines should not belong to the scope of this study. However, since medicinal earths also appeared in curiosity cabinets and collections of *naturalia*, and could also be objects of scientific

<sup>149</sup>See Part I, Section 3.

<sup>150</sup>See Part I, Section 3.



interest, relevant examples from the correspondence will be reviewed in this section, albeit in somewhat less detail than the previous sections.

*Terra sigillata* is a special type of clay used for medicinal purposes since antiquity: it was a famous antidote for poison, but its various types were also in demand as a remedy for plague, as an adstringent or absorbent.<sup>151</sup> Its most renowned variant was produced in Lemnos (*terra Lemnia*), but other Aegean localities (Chios, Samos and so on) also provided medicinal earth, as some regions more to the east (*terra Armenia* being the most important “oriental” type). It was mostly<sup>152</sup> cut into a round tablet form (*troche* or *pastille*), marked with a seal using a special device for authentication, and traded in this form, hence the name *terra sigillata*. After conquering the Aegean region, the Ottoman Empire monopolised the production of this clay. New, Turkish devices appeared on *terra Lemnia*, and it served, among other things, as a present of the sultan given to, notable individuals such as Western ambassadors. The situation in the East prompted the exploration of new finding places for medicinal earths, and in the second half of the sixteenth century new types of *terra sigillata* were discovered and produced at various localities in Europe. Two of these variants coming from East Central Europe occur in our sample letters: “Silesian earth” and “Tokaj earth”. Parallely with the growing popularity of medicinal earths in the period, scholars described more and more earth types in natural historical reviews or medical treatises. By this time, the names of certain types were transferred, based on the similarity of properties, to earths produced in other regions – for instance, “Armenian bole” as a general term could denote earths from various localities of Europe in the terminology of, say, Matthioli or Aldrovandi. Thus it was/is not always easy to establish the real place of origin behind the geographical name, not to mention counterfeited specimens whose circulation also grew in the period.<sup>153</sup> *Terrae sigillatae* also showed up in collections of *naturalia* like that of Matthioli, Aldrovandi or Imperato. In this case, the earths were clearly not collected for principally medical purposes – instead it brought great prestige to own a great variety of such troches, each type marked with its own device, similarly to the possession of numismatical collections.<sup>154</sup> Illustrations based on scholars’ collections in Early Modern works on natural history are our most important sources as to the physical appearance of these objects, since the material itself has not survived. Medicinal earth was also exchanged in crude form, but no illustration of such specimens seems to have survived.

Among the several works on natural history and medicine that Clusius translated into Latin, two contained information about *terra sigillata*: *Antidotarium* (1561)<sup>155</sup> and, more importantly, Belon’s *Observationes*,<sup>156</sup> the original of which was one of the first reports in Western Europe about the production of *terra Lemnia*.<sup>157</sup> These are translated passages from the works of other scholars. What indicates that Clusius was truly involved with medicinal earths is the description

<sup>151</sup>An overview of *terra sigillata* in antiquity and the Early Modern age is provided by MacGregor (2013).

<sup>152</sup>Sometimes small vessels were also made of this substance, and they were said to affect their contents. If it had a tablet form, it had to be dissolved in liquid and ingested as such.

<sup>153</sup>See e.g. Camerarius (1583), 14r.

<sup>154</sup>MacGregor (2013), 116.

<sup>155</sup>Clusius (1561), 99v.

<sup>156</sup>Belon (1554), 23; Clusius (1589), 55.

<sup>157</sup>MacGregor (2013), 119.



of his collection in the 1609 auction catalogue, according to which he owned, among other things, *supellex... mineralium... complurium, terrarum sigillatarum, et permulta alia similis curiositatis*.<sup>158</sup> The fact that beyond sets of “minerals” and many “other similar curiosities”, *terrae sigillatae* is specified as a distinct category, suggests that there must have been several specimens or portions in evidence. These items were not necessarily the usual *troches*, with a “seal” on them: by the late sixteenth century *terra sigillata* had come to denote medicinal earth in general, in any form.<sup>159</sup> What kinds of *terrae sigillatae* did he exchange, and with whom? Was Clusius scientifically interested in this *naturalium*?

In the time when Clusius corresponded with Crato about the Saint Ladislaus’s coin, Crato also sent a certain *terra Caffensis*, on October 16, 1567.<sup>160</sup> This type of earth probably originated from Caffa (today Feodosia) in Crimea, which belonged at the time to the Ottoman empire.<sup>161</sup> We have Clusius’s response dated Bruges, November 25, according to which he received the earth wrapped in paper, “but almost reduced to powder” by foreign hands that had investigated it.<sup>162</sup> These words suggest that it may have been originally a *troche*. At any rate, Clusius was happy to receive the specimen and encouraged his friend to send similar items if he could, “since you would not believe how zealous [or “fond of”: *studiosus*] I have always been about all things exotic;<sup>163</sup> so it is little wonder that I eagerly look forward to receiving the little stones [the Saint Ladislaus’s coins] and the other things you promised.”

In early 1583, Joachim Camerarius Jr. published a book of treatises about the plague and its treatment, including a treatise he himself had authored about Armenian and Lemnian earths.<sup>164</sup> When in his letter of April 9 Clusius replied to Camerarius, thanking the latter for the copy sent to him, it was this treatise about medicinal earths that he specifically mentioned as one he had “read with pleasure”. But since Clusius was not persuaded that Camerarius’s knowledge regarding the Armenian bole was exhaustive, he sent to his Nuremberg friend various earth types: (1) a fragment of crude Armenian earth (*rudis fragmentum...*); (2) a kind of crude Lemnian earth; (3) two *troches* (*pastillos...*) of “more pure” Lemnian earth; (4) a further *troche* of fine (*lota*<sup>165</sup>) Lemnian earth; (5) and a crude fragment of an “oriental red bole”.<sup>166</sup> Enumerating these items, Clusius adds to each that he had received them from Ogier Ghiselin de Busbecq. Busbecq stayed in the Ottoman Empire (mostly as ambassador of the Habsburg emperor) from 1554 to 1562, and his role in mediating oriental cultural goods to the West is well

<sup>158</sup>See Part I, Section 2, p. 78.

<sup>159</sup>MacGregor (2013), 115.

<sup>160</sup>From Crato, Oct. 18, 1567: *Nudiustertius misi tibi terram Caffensem...*

<sup>161</sup>*Terra Caffensis* does not appear in the standard sixteenth-century descriptions of *terra sigillata*, but survived a letter has survived from one Manlius Constantinopolitanus (!) to Crato, in which the former provides some information about Armenian bole, Lemnian bole and *terra Caffensis* (Scholz, 1593, 370). Crato forwarded portions of medicinal earth arriving from the east several times, see Camerarius (1583), 16v.

<sup>162</sup>Ed. Ram (1847), 59.

<sup>163</sup>The adjective *peregrinus* usually refers to foreign countries, but this specific context connotes exoticism.

<sup>164</sup>Camerarius (1583), I3r-K2r: *De bolo Armenia et terra Lemnia observationes* (Already noted by Hunger, 1942, 127.).

<sup>165</sup>According to a common juxtaposition, the adjectives *rudis* or *crudus* referred to medicinal earth as found in nature, and *lotus* to its fine, purified form.

<sup>166</sup>Ed. Hunger (1942), 395–396.



known. Clusius, who followed Busbecq in the position of quasi botanist to the emperor, was on good terms with his compatriot. They corresponded and even met several times in Vienna, and it was probably on one or more of these occasions (between 1574 and 1582) that Busbecq presented his friend with the *terrae sigillatae*. Clusius notes that in order to acquire the crude Lemnian earth, Busbecq sent his physician, Willem Quackelbeen, to the island of Lemnos itself. This and the repeated mention of Busbecq, who was a trustworthy friend and famous man of letters, reinforced the authenticity of the material. The fact that Busbecq gave Clusius such earth is not surprising in itself: it was a usual present of the sultan to ambassadors,<sup>167</sup> and the Flemish man of letters forwarded specimens and/or information about them to several of his acquaintances.<sup>168</sup> More surprising is the variety of the specimens: Busbecq provided a kind of cross-section of the main types of *terra sigillata* produced in the Turkish Empire, including earths in their original, crude form. The scientific interests on part of both Camerarius and Clusius are clear.

By this time, Clusius certainly possessed medicinal earths from other, more western parts of Europe. According to Cromer's second letter of 1580 examined in Section 3, the Silesian physician saw in the Zuckmantel area "red earth that could have the effects of Armenian bole, which it seems to imitate. You will receive this partly in crude and partly in fine and prepared form."<sup>169</sup> It is highly interesting that Cromer not only alludes to finding a new type of medicinal earth perhaps as valuable as the Armenian type, but was also able to send a "fine and prepared" form of the substance, although this could hardly have been an official, stamped type of medicinal earth. The issue needs further research; here it suffices to say that various types of *terra Silesiaca* had been produced and traded by the 1580s, and Cromer was obviously keen on discovering such earth in the region of Neisse, his home town (south of Breslau). The first and foremost type of Silesian bole was discovered around 1550 in an abandoned goldmine near Schweidnitz (Świdnica), south of Striegau (Strzegom), by Johann Schulz (Montanus or Scultetus Trimontanus), a Paracelsian physician; due to its allegedly similar nature to gold, this *terra sigillata Strigoniensis* was also called *Axungia solis*, "sun grease". Soon, other production centres emerged, like Liegnitz, Jauer and Goldberg (similarly to the west of Breslau), each type having its own sealing device. *Terra Silesiaca* enjoyed great publicity – from 1583 onwards distinct treatises were written on it in several languages.<sup>170</sup> No wonder that by 1593 Cromer was again sending "Silesian earth" to Clusius (who was already in the Low Countries), this time *troches (rotulae)*, that is, official medicinal earth samples of any of the above mentioned types. Cromer believed them to make nice presents, tokens of his affection for his old friend.<sup>171</sup> Perhaps *terra sigillata* and its Silesian types formed part of their scholarly discussions referred to in the letters; at any rate, in both 1580 and 1593 Cromer was sure – certainly not without reason – that Clusius was interested in the new types of earth.

<sup>167</sup>MacGregor (2013), 118.

<sup>168</sup>For instance to Matthioli: see MacGregor (2013), 119.

<sup>169</sup>See [3a] of Letter 2 at the end of Part I.

<sup>170</sup>An overview of *terra Silesiaca* is provided by Dannenfeldt (1984); a shorter summary by MacGregor (2013), 123–127. Types originating from the Neisse region do not appear in either study.

<sup>171</sup>From Cromer, May 19, 1593: *Terrae Silesiacae rotulae aliquot ad te mitto, quam tibi non fore ingrati opinor. Utinam penes me essent alia, quibus tibi gratificari possem, profecto reipsa intelligeres, me tui esse studiosissimum.*





Our Low Countries naturalist received bole from Tokaj, too, a town that gave its name to the famous wine region Hegyalja in the north eastern part of the Kingdom of Hungary. *Terra Tokajensis* was again a type increasingly demanded in the period; there is no space here to present it according to its significance, but it appeared in more contemporary treatises than noted so far in scholarly literature.<sup>172</sup> This type of earth could be found principally in a mine of the Tokaji-hegy (Mount Tokaj) west of the town. Three brief references to this bole can be found in Clusius's correspondence with Claude Roussel, the Kassa-based captain general, then vice captain general of Upper Hungary<sup>173</sup> in the late 1580s,<sup>174</sup> whose person and relationship to Clusius is little known. In response to a letter by Clusius dated October 1, 1588 (by this time he had already arrived in Frankfurt from Vienna), Roussel assures the former on December 4 from Tokaj<sup>175</sup> that he would be able to procure *terre de Thochchay* when its season comes, and to send such via a certain "von Eck", who can be none other than Christoph Freiherr von Eck.<sup>176</sup> On February 24, 1589 he repeats this promise.<sup>177</sup> Finally, on May 8, 1589, he reports, "these days I have sent a little vessel (*un petit vasselle*) of our Tokaj earth" via von Eck.<sup>178</sup> If the material was in a vessel, it could not be troche(s). It is certain that Clusius had requested it and not just received it as a present: in his first letter Roussel had used the phrase "the Tokaj earth that you request (*demandez*)". Clusius did not necessarily have to read treatises to know of this Hungarian type of medicinal earth: it was used, for instance, against the plague in contemporary Vienna.<sup>179</sup>

So far we have too little information to establish whether Clusius (or an acquaintance for whom he mediated) actually needed the *terrae sigillatae* for medical purposes; at any rate, it was advantageous to have such drugs, if for no other reason than because the plague continued to flare up from time to time in the period in question.<sup>180</sup> What is certain from the above examples is that the boles (also) intrigued Clusius as a naturalist, similarly to minerals and fossils. This can be seen from the crude versions among the received specimens, the way he reacted to Joachim Camerarius Jr.'s treatise, or from the correspondents' allusions to how Clusius would value their gifts. By the 1590s Clusius must have owned a variety of *terrae sigillatae*; while large-scale collecting is not probable, he was certainly glad to have access to as many types (and forms) as possible.

<sup>172</sup>Viczián (2017) overviews the "Tokaj earth" mainly from a historical perspective, while Viczián and Németh (2021) from a geological-mineralogical perspective. Concerning its sixteenth-century printed sources, Viczián (2017) does not mention early reports about it, like Camerarius (1583), I6r, who drew on Jordanus (1576), 596. Jordanus refers to János Balsaráti Vitus, physician in Sárospatak; the work of Balsaráti to which Jordanus refers is most probably his lost *De remediis pestis prophylacticis* from 1564. Imperato (1599, 146–149) and Aldrovandi (1648, 271) also provide a description.

<sup>173</sup>The northeastern part of the Kingdom of Hungary, the centre of which was Kassa.

<sup>174</sup>He was captain general between Sept. and Oct. 1588, and vice captain general between March and April, and between Oct. and Nov. 1589. Pálffy (1997), 261.

<sup>175</sup>Ed. Istvánffi (1900), 279.

<sup>176</sup>See Christoph Freiherr von Eck to Clusius, Nov. 9, 1588, about the forwarding of Roussel's letters.

<sup>177</sup>Ed. Istvánffi (1900), 280.

<sup>178</sup>Ibid., 281.

<sup>179</sup>Camerarius (1583), I6r.

<sup>180</sup>For instance, the plague threatened Clusius in 1561 in Paris, or in 1577 in Vienna.



## 7. CONCLUSIONS

The above investigations (Parts I and II) were intended to contribute to our knowledge regarding, on the one hand, Clusius and his network, and on the other, various – mostly practical – aspects of contemporary natural science. To begin with Clusius himself, it is now certain that non-living *naturalia* formed an integral part of his world all through his life, and in at least one period – in the early phase of his active scholarly career – he was demonstrably enthusiastic about them. Let us remember how he yearned for *aetites*, Saint Ladislaus’s coin or *res metallica* in general in 1566–67, or how Cromer spoke to him, sending a great variety of underground *naturalia* and referring to earlier discussions. For the later years it is difficult to establish his attitude (due, among other things, to the lack of surviving letters on Clusius’s part of the relevant strands of correspondence); at any rate, the number of specimens he received in his old age was not diminished compared to the 1560s–70s – sometimes he himself would send something, at others he would mediate between other members of the Republic of Letters. His enthusiasm, however, must have diminished at least to some extent. We have found almost no certain reference to *direct* request of such *naturalia* from this later period, even in his correspondence with some key collectors such as Aldrovandi; on occasion he would even give away some specimens he had received before (“pisolithum” and a piece of silver ore); and eventually he refrained from lecturing on *res metallica* in Leiden, although this may have had reasons other than lack of interest. Still, it can be no accident that whenever his correspondents broached the issue of a certain non-living *naturalium*, they would as a rule, take it for granted that Clusius was interested in matters of the kind. The bare fact that even after a partial review of his surviving correspondence more than 50 letters have been found with such *naturalia* among the topics (plus a few passages in his printed works<sup>181</sup>) speaks for itself.

These results reinforce what is already known but still not emphasised enough in scholarship: botany was only one of Clusius’s fields of concern, and he was open to all miracles of nature. While in our terms Clusius was principally a botanist, his contemporaries seem to have regarded him rather as a naturalist or man of letters whose main field was botany, but who had several other skills and interests. Non-living *naturalia* were one of these, and this also means that he was more closely connected to the world of „museums” or “Wunderkammer” than has been believed previously. To be sure, to speak about Clusius as “naturalist” is also a crude oversimplification, given his many typical humanist concerns (epigraphy, editing the works of other humanist authors and so on), which are again relatively neglected in scholarship.

The Middle Ages was mostly interested in the medical uses of what we call non-living *naturalia* – let us consider for instance the *lapidaria* –, and in the sixteenth century they were still presented in a medical framework in university curricula (similarly to plants), at least on the institutional level. A number of the specimens appearing in Clusius’s correspondence had widely known healing properties (“virtues”), or were raw materials for drugs; he himself was a trained physician. All the more conspicuous is the fact that no reference is made to the medical use of the despatch in any of our examples, not even in the case of *terrae sigillatae*. It cannot be ruled out that specimens that were considered to have (direct or indirect) healing properties were

<sup>181</sup>Not counting his translations.



indeed required and used for such purposes in Clusius's circles, but, in the letters at least, they do not appear in their medical, but in their "scientific" context (in the sixteenth-century sense) as "wonders of nature", as objects of investigation and as collectibles. The examples from the correspondence illustrate clearly the paradigm shift that took place in the course of the sixteenth century and that led to the birth of mineralogy, geology and so on, as distinct sciences. At the same time, we are still at the beginning of specialisation in the period in question, and it is precisely this fresh look at objects as wonders of nature, their unstable classification and their curiosity for the observer that add a special charm to this period of Renaissance scholarship. All in all, the frequency of such objects and the way they were spoken about in Clusius's circles are in line with what modern literature revealed about the new attitude to nature and the significance of museum type collections in the sixteenth century.

Naturally, Clusius focused on plants, seeds and gardens, and did not build an extensive, representative natural historical collection à la Imperato or Paludanus. Still, similarly to many other members of the late sixteenth and early seventeenth-century Republic of Letters, in the end he did have a considerable collection, with several non-botanical categories of objects that appeared in the exemplary museums of Italy or the Low Countries (minerals, *terrae sigillatae*, coins and so on) and with several items within each category. This can be seen clearly both from the passage of the auction catalogue we analysed, and from the sample letters. Variety is a characteristic trait of collections, and indeed, based on the letter examples there must have been various specimens within each groups of non-living *naturalia* in Clusius's collection: metallic ores, crystals, non-metallic minerals like vitriol; fossilised marine animals, fossilised tree fragments and various other curious "stones" (not necessarily fossils), as well as both Oriental and western types of medicinal earths, in both crude and prepared forms.

Clusius's network extended to almost all parts of Christian Europe; therefore, beyond the interests of Clusius himself the sample letters seem to provide a good cross-section of the exchange of non-living *naturalia* that existed in late sixteenth-century Europe in general. The scientific significance of descriptions or objects exchanged in the framework of humanist-naturalist correspondence has only been pointed out in the last decades of modern scholarship,<sup>182</sup> and even today, the exchange of *res metallica* or *fossilia* seems to have been little investigated. The exchange of minerals and fossils, at least, must have been more frequent in the correspondence of the period than has been revealed so far, otherwise the great collections and great natural historical review books (with illustrations) could not have been born. Our sample letters reflect clearly the general principles of humanist-naturalist correspondence and exchange, most importantly that the exchange was not based on the rules of commerce but on the humanist notion of friendship, *amicitia*. True members of the *respublica litteraria* respected and trusted each other, they sent presents, did favours and were confident that in the long run they would benefit from favours; their *amicitia* and *liberalitas* did not allow the involvement of money. As we saw from Clusius's correspondence, these frameworks could even allow the sending of valuable metallic minerals, fragments of gold or silver for instance.

<sup>182</sup>See primarily Van Miert (2013). In this otherwise excellent edited volume, which covers a great variety of contemporary sciences, non-living *naturalia* or underground objects are not represented.



Scientific literature flourished in the second half of the sixteenth century: an increasing number of works reviewing *res metallica* or *fossilia* were written, as well as distinct treatises on “metals”, “stones” or “sealed earths”. Information about all of these found in *letters* neatly complete the picture about the development of science as seen from the theoretical treatises. Practical issues were dominant in the correspondence of the period, and the interesting theoretical debates – for instance about the origin of what we today call fossils – are seldom present in the letters. However, the passages from the letters can vividly attest to their authors’ interest in non-living *naturalia*: these are real-life, real-time examples of how the contemporaries looked at the specimens, how they felt about them and what they did with them. Sometimes scientific literature and life events, such as the personal experience described in the letters may be linked directly: we saw how disputes about the origin of metals or fossils influenced Cromer in his choice of where he went and what he sent, or how Clusius reacted to the copy of Joachim Camerarius’s book sent to him by sending in return a variety of medicinal earths. In general, letters can reveal a great deal about the reception of works on natural history in the Republic of Letters: our examples included several references to Agricola, Gessner or Bauhin (sometimes even the page numbers in the books). With respect to “stones”, the most frequently mentioned reference work in Clusius’s circles seems to have been Gessner’s 1565 edition *De omni rerum fossilium... genere*.

It is worth looking at the spatial distribution of the places of origin of the specimens mentioned in the sample letters and of the places where they were sent from: the relevant map (Fig. 10) indicate only instances where we may be sure that the transaction was successfully concluded. In the case of minerals, these localities are concentrated in Saxony, and to a lesser extent in Southern Silesia (due to Cromer’s adventures). As we have already discussed, Saxony became the centre of *Montanwissenschaften*, thanks principally to Agricola, and the richness of the region in such resources must have been one of the reasons why Clusius turned to men of letters in this country and extended his network in this direction. In the case of strange stones and earths, too, Central Europe, particularly East Central Europe, features heavily. Unsurprisingly, the objects mostly originate from the mountains (the places of origin are at various distances from the places of sending), more precisely from mines (like Annaberg, Zuckmantel or, probably, Tokaj) or from the surface (like the fragment of fossilised tree from Vas-hegy). Although the spatial distribution illustrated by the map is not fully representative, since it is based on a partial overview of a huge correspondence, still, it underlines the significance of Saxony and East Central Europe in Clusius scholarship – regions which have been relatively neglected compared to Western and Southern Europe. Saxony and Silesia seem to be almost white spots in the literature on Clusius, but in the case of many other countries, too, only a small part of his network has been examined. The above investigations have thrown some light on several little known relationships that Clusius held with significant men of letters of his age, particularly in Central Europe (like Achilles Cromer or Ludwig Camerarius). However, all of these correspondences were only explored from the perspective of non-living *naturalia*; a more general investigation of these sections of Clusius’s world will hopefully be accomplished by future scholarship. In general, the great number and broad spatial distribution of the exchanges referred to in the sample letters we examined reinforce that Clusius was one of the key figures of the Republic of letters of the period, and also played a vital role as mediator between the western, the central and the eastern parts of Europe.



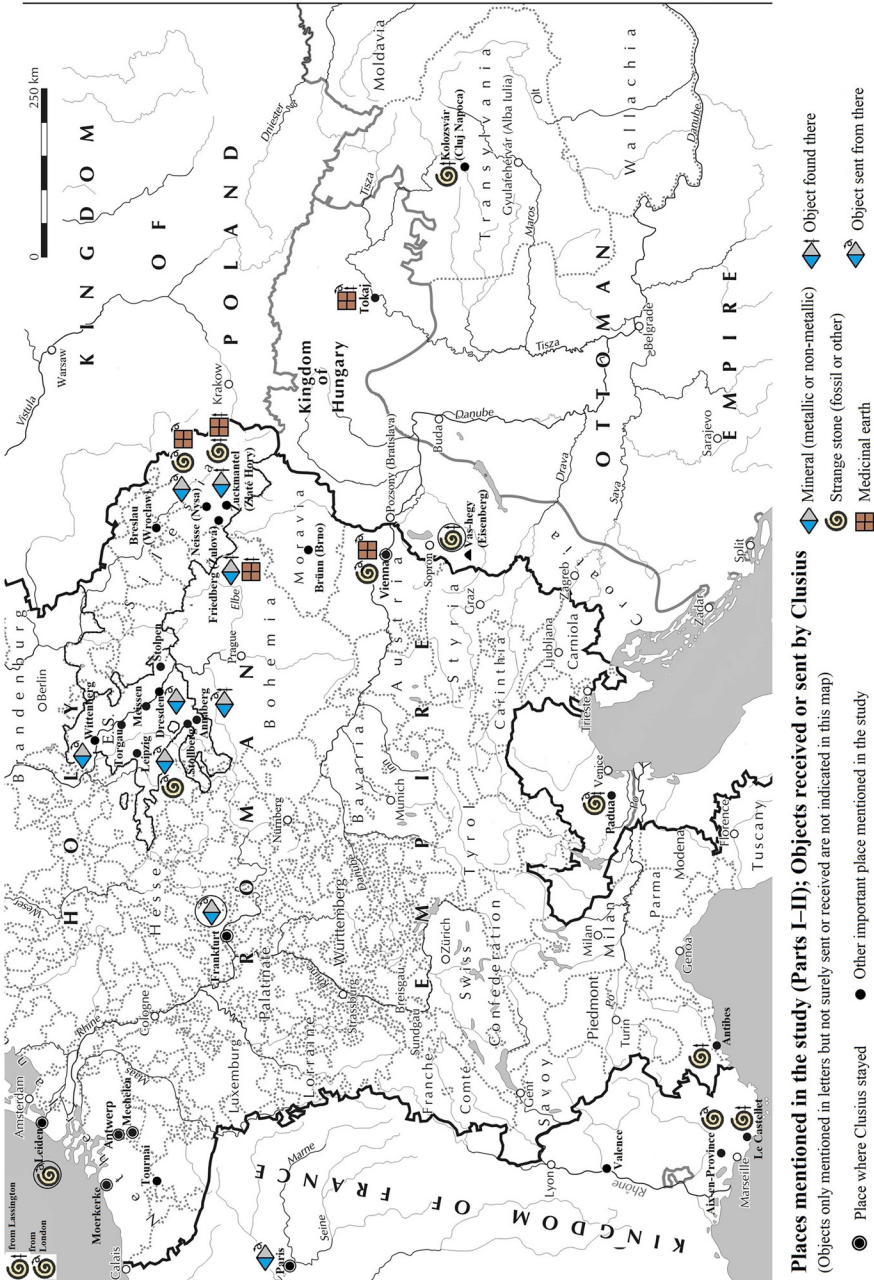


Fig. 10.



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