The name is the message: eagle-stones and materia medica in South America

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Abstract: This chapter presents one case history – the transfer of the name and virtues of 'eagle-stones' to Andean minerals and terebratulid brachiopods such as *Clarkeia antisiensis*. Eagle-stones, an ancient remedy of Asian origin, were used in early modern Europe to prevent abortion and as a charm to assist obstetric delivery. In the eighteenth century eagle-stones were the subject of what G. Baronti (*Tra bambini e acque sporche Immersioni nella collezione di amuleti di Giuseppe Bellucci*, Morlacchi, Perugia, 2008) calls the process of folklorization of European learned medicine, becoming a 'superstition' and a popular remedy of medical lore. Based on secondary bibliography and documents from the Archivo de Indias in Seville, the paper discusses the uses of eagle-stones in Spain and Spanish America in connection to the texts published, written or translated in the Iberian Peninsula (lapidaries, early modern medical books). The last section proposes clues to analyse the expansion of the trade in eagle-stones to Spanish America, to finally survey the references to 'eagle-stones' in Latin American popular medicine of the late nineteenth and early twentieth centuries. Eagle-stones are inscribed not only in the *longue-durée* but also in the intricate networks of commerce.

In 1999 Daniel W. Gade analysed the strong connection in Andean cultural history between the tapir and human epilepsy – a connection which, according to him, resulted from the crossroads of shamanic pre-Columbian practices, the meaning of tapirs in tropical South America and the transfer of Old World ancient pharmacopeia into the Andes. His essay showed how objects, words and animals from different traditions recombined, creating new objects and transferring ancient medical virtues to New World materials and animals. This situation, far from exceptional, characterized the hybridization process that accompanied the conquest of the Americas and which added not only a new chapter to the convoluted history of materia medica but also created new hybrid medical and symbolic objects.

As Gade (1999) indicates, sixteenth-century conquistadors were confronted with a new fauna, entirely different from that known in Europe. This sharp zoographic separation, however, did not prevent them from analogizing Old World and New World specimens. Neither did it prevent them from transferring to the New World's animals, minerals and plants, the names and properties from European materia medica which, as is well known, was a kind of ever changing annotated palimpsest, shaped by the translations, reception and transfer of Ancient, Jewish and Arabic sources (Schipperges 1955; Fresquet Febrer 1992; Fidora 2001). In this context, one can say that the fauna, flora and minerals from the Americas were thus incorporated into a globalized medical universe and into a novel ordering of knowledge which, as Daston & Park (1998), López Piñero (2000), López Piñero & Pardo Tomás (1994, 1996) and López Piñero & López Terrada (1997) underlined many years ago, was also being modified by the world of new data arriving from the other side of the Pillars of Hercules.

The present paper discusses one case history – the transfer of the name and properties of eagle-stones to Andean minerals and terebratulid brachiopods. Eagle-stones, an ancient remedy of Asian origins, were used in early modern Europe to prevent abortion and as a charm to help in child delivery. In the eighteenth century eagle-stones were the subject of what Baronti (2008) calls the process of folklorization of 'European' learned medicine, becoming a 'superstition' and a remedy of popular medicine and folklore. In the search for substitutes for the 'real' eagle-stones to supply the wider demand raised by this process, this paper discusses the uses of the eagle-stone in Spain and Spanish America. It summarizes from the literature some of the most important topics of the eagle-stone as an obstetric charm and it refers to writings and translations from the Iberian Peninsula (lapidaries and early modern medical books, in particular Andrés Laguna's (1636) translation of Dioscorides (1555)). Finally, the last section proposes clues that could help to explain the expansion of eagle-stones to Spanish America as a local mineral or fossil, presenting a first survey of the references to 'eagle-stones' in the Latin American popular medicine of the late nineteenth and early twentieth

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centuries. The Appendix includes the transcription of two manuscripts from the Archivo General de Indias (Seville) that show how, in the eighteenth century, local administrators were eager to insert Andean eagle-stones into the transatlantic commerce in medical remedies. Eagle-stones need to be studied not only in the *longue-durée* but also in relation to the intricate networks of commerce and the disciplines that today structure our current comprehension of human knowledge. Paraphrasing Nunemaker (1932, p. 559), the bibliography of these objects is scattered through different disciplines: art and archaeology, geology, mineralogy, medicine, alchemy and chemistry, astronomy and astrology, philology and literature. In that sense, this paper is a plea for further research into the global and transdisciplinary dimension of objects that, far from local traditions, may instead represent the living remains of a long history of exchanges, translations and transfers which de- and re-functionalized nature over the centuries and geographies.

Eagle-stones

Aetites or the eagle-stone has an enormous literature associated with it, especially in relation to the writings of Dioscorides and Pliny, in relation to Italian and northern European medicine in the early-modern period (Duffin 2013, p. 222). In his revision of the topic, Bromehead (1947, p. 16) recalls that this was the name given from the first century AD to 'any hollow stone containing loose matter, a smaller stone or sand, which rattles when shaken'. Whereas such objects – according to Bromehead (1947) – were of little interest to the modern geologist, who usually broke them open just to examine the interior for crystals or impressions of fossils, they were important for the archaeologist and folklorist by the fact that eagle-stones were mentioned in all important medical treatises and pharmacopoeia from the last two millennia, mainly in the field of obstetrics as a means of controlling events in childbirth (Drake 1940; Barb 1950; Forbes 1963, 1968).

Thus, in Dioscorides' *Materia Medica* it was said that, bound to the left arm, an eagle-stone helped against the slipperiness of the matrix and retained the child in the womb; the same being tied to the thigh facilitated childbirth. In the seventeenth century several monographs recorded the experiments and observations of the many cases in which eagle-stones were not powerful enough to produce what they were expected to produce (Bausch 1665; see also Barb 1950, note 4; and Duffin 2013, p. 222). However, as Barb (1950, note 5) remarked, despite the several refutations of their virtues, prescriptions containing eagle-stones continued to be administered. In Europe, the use of powdered eagle-stone in pills, ointments, liniments and plasters was still advised in the eighteenth century, being discarded from learned medical use only in the first half of the nineteenth century (Barb 1950, note 5, see Duffin 2013, p. 222). The discrediting of eagle-stones and other mineral remedies is thus connected with the conclusion that the chemical compounds found in them were not relevant for the purposes for which they were used, namely with the consolidation of modern chemistry (cf. Klein & Lefèvre 2007) and the definition of eagle-stones from a geological and chemical point of view. In this frame, eagle-stones became no more than chemically transformed 'siderite nodules or concretions deposited in lacustrine and paludal clay beds' (Duffin 2013, p. 222).

However, as recent research has shown with regard to other 'materials' (see, for instance, Pymm 2016, on 'Serpent Stones'), the name and virtues of eagle-stones expanded far beyond siderite nodules, the Old World and the time limits set by European historiography of both medicine and geology. As this paper shows, eagle-stones continue to be used in 'folk-medicine' in twentieth-century Latin America, where the properties of Old World eagle-stones were transferred to Andean rocks and fossils which do not match at all the standard definition of what eagle-stones 'are'. In this sense, this paper stands for a history of geological medicine that takes into account the nuanced itineraries of names, things and virtues in scenarios that include Spanish America, confronting the historian with a less categorical relationship between things and words.

Piedras de águila and Piedras Buitreñas

Many authors have analysed the discussion of eagle-stones in Spanish literature and the Spanish medical world in the context of the Toledo School of translators, the medieval lapidary of Alfonso the Wise and the work by Isidore of Seville, in the fields of history of medicine and literature (Fidora 2001). In particular, much has been written about the concoctions and medical objects mentioned in literary texts from the late Middle Ages and the Spanish Golden Age, including the novels and works of Fernando de Rojas, Miguel de Cervantes, Alonso de Ercilla, Pero Mexía and Juan de Mena. It has been concluded that eagle-stones arrived in Spanish culture through differing mechanisms and paths.

Some accounts relate the reception of eagle-stones to the translation and transfer of *Materia Medica* compiled in Greek by Pedanio Dioscorides Anarzabeo early in the first century (Amasuno 1985, 1987, p. 82). Translated into Arabic during the ninth century, it was the source from which it passed to the Lapidary compiled in Spanish in the

thirteenth century following the orders of the King of Castile and León Alfonso X, also known as Alfonso the Wise or the Learned. The readers of this lapidary, which was attributed to the 'mysterious Abolays' (Nunemaker 1930; Darby 1936), were admonished to be versed in medicine, each stone being potent only in connection with certain signs of the zodiac and in the ascendency of certain stars and planets (Nunemaker 1932, pp. 557 and 559). Among others, it refers to the reproductive virtues of 'abietityz', namely 'buitreña' or the vulture-stone, a stone from XXVI grades of the Aries sign (Corrales 2014, p. 1207). Liñán & Liñán Aponte (2006, p. 154), based on the description given in the Alfonsine lapidary, suggested that this stone could coincide with fossil Echinoidea or with the fossil belemnites. However, later, by reference to Duffin (2012), they realized that 'the name and the description are also congruent to a stone described elsewhere as aetites – the eagle-stone – actually Pleistocene concretions' (Liñán *et al.* 2013, p. 55).

It must be remembered that in medieval Castile, the (black) vulture was both the most imposing bird and a species connected with fertility. As Biedermann (1992, p. 370) remarked, 'It was widely believed that vultures were hatched without fertilization by the male, whose role was assumed by the east wind'. If this bird could be impregnated by the wind, then Mary could conceive through the Holy Spirit; the vulture was therefore cited by the Church fathers as a natural prototype of the Virgin birth, a natural analogue of the Virgin Mary. The early Christian text *Physiologus* explained that, when the vulture was pregnant, she went to India to get the birthing stone, the size of a nut, which – like the eagle-stone – had another stone inside that made a sound like a bell when shaken. The vulture sat on this stone and gave birth painlessly (Biedermann 1992, pp. 370–371; see also Sigmund Freud's interpretation of Leonardo da Vinci's painting of St Anne, the Virgin and the Child, where Freud refers to the meaning of the vulture in Egypt and Renaissance culture; Schapiro 1956, pp. 148–149). The association between the vulture, the stone and fertility, however, became weaker and weaker, once the eagle assumed that role in the Spanish world (see Valdecebro 1728, p. 45; Cañizares-Esguerra 2002; Fig. 1).

It was Andrés Laguna's translations of Dioscorides' *Materia Medica* that would give eagle-stones their place in the early modern learned Spanish panoply of remedies. Laguna (1499–1559), physician to Pope Julio III and Kings Charles V and Phillip II, a specialist in the language and culture of ancient Greece, first published his annotated version of Dioscorides in Ambers in 1555 with such success that

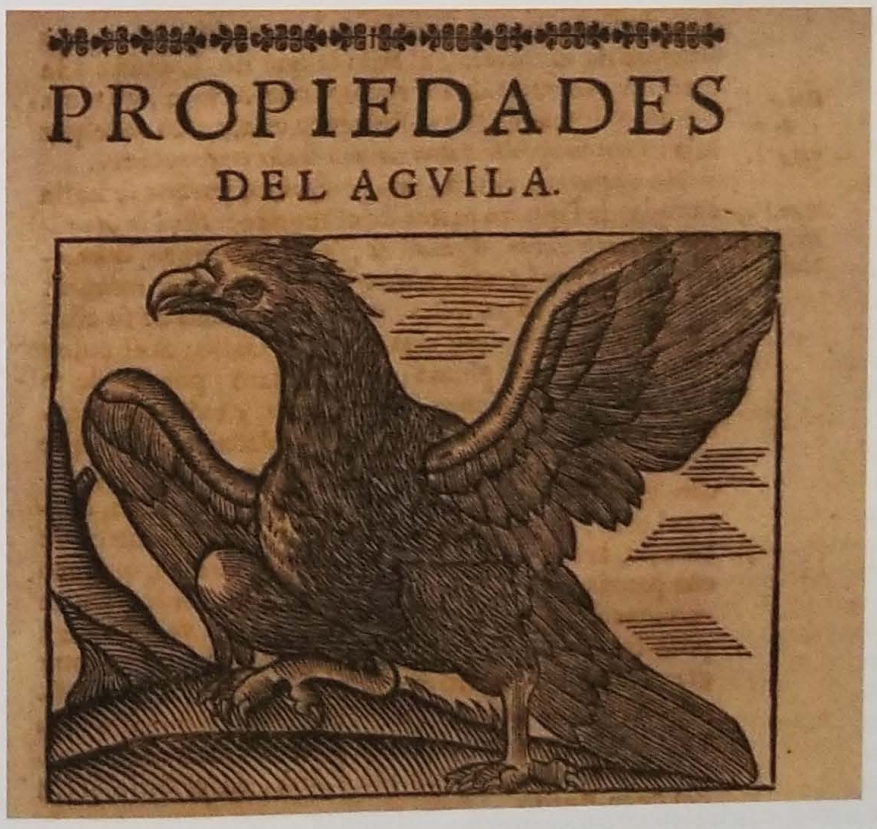

Fig. 1. Properties of the Eagle as described by Valdecebro (1728).

by the late eighteenth century it had reached its twentieth edition (Hernando Ortega 1960). Laguna had worked on his translation comparing all the Greek manuscripts and printed versions then existing in Italy. After comparing these versions, he translated what he considered to be the 'most accurate' into Spanish, adding his own notes and comments in the margins and listing the names of the simples mentioned by Dioscorides in most of the modern European languages. The search for Portuguese equivalences was undertaken with the advice of a Portuguese apothecary and physician (Hernando Ortega 1960). Laguna also provided depictions of European plants to illustrate the names he had translated; thus the translation was fixed not only by the name but also by an image, prepared in the workshop of physician Pietro Andrea Mattioli (1501–77), the celebrated translator of Dioscorides into Italian. Both, Laguna's and Mattioli's editions were the result of their philological study of ancient names and authorities as well as of the observation of local plants, fossils and animals (Hernando Ortega 1960). Thus Laguna remarked that the images that accompanied his work were faithfully copied from the manuscripts or taken from nature during his excursions in the countryside.

Laguna's notes on eagle-stones assembled the following topics, which, as mentioned, recombined different cultural traditions with actual observation of materials. Thus, Laguna devoted some paragraphs to the origin of the association between eagles, this peculiar stone and the properties attached to it, namely as a charm during pregnancy and child delivery, explaining where, when and how they had to be used. Laguna's notes devoted as well several lines to the description of the male and the female stones in terms of physical, observable characteristics (size, shape, colour, sound, compactness and internal composition), in order that they could be recognized by the practitioners of medicine. He underlined that both male and female stones had, however, the same virtues and acted in the very same way. Laguna's notes extended to explaining the reasons for binding the stone to the left side of the body (arm or leg), referring to the cold temperament of the left side of pregnant women and the role of the stone which, acting as a kind of magnet, had a counter-balancing power (see Appendix A, where these notes – written in Spanish prose from the sixteenth century – are transcribed).

The different editions of Laguna's Dioscorides incorporated the experience and observations of their own time, such as the new edition by the Spanish physician Francisco Suárez de Rivera (*c.* 1680–1754), who in 1733 re-edited the *Materia Medica* by Dioscorides/Laguna and added his own observations. Rivera was already highly sceptical as to the virtues of the eagle-stone and stated that most were mere quackery (Suárez de Ribera 1733, p. 109). A similar view was held by his contemporaries, such as the Spanish naturalist and Franciscan missionary Joseph Torrubia (1698–1761) and the Portuguese physician Jacob de Castro Sarmento (1758, pp. 132–133), who described the specimens of eagle-stones kept at the Museum of the Royal Society in London and quoted Bausch to insist on the superstitious character of its supposed virtues and powers. Torrubia went as a missionary to the Philippine islands and travelled through various Asian countries, spending some time in Spanish America. He assembled a collection of rocks and minerals, which he classified and illustrated in his *Aparato para la historia natural española* (Gutiérrez-Marco *et al.* 1997; Sequeiros & Pelayo 2007). In his description of 'Piedras de Águila españolas', Torrubia included those collected in the mountains of Luzón (Philippines) by missionary Father Alexandro Cacho, hermit of the order of Saint Augustine, presented to him on his travel to these islands. Torrubia described them as small hollow spheres composed of several iron layers, with *callimus* (a loose pebble) in its interior. Torrubia collected eagle-stones also in the Iberian Peninsula, in particular in Sigüenza (Anchuela) and Guadalajara, where he found a mine with stones heavier than 10 kg (*c.* 1 arroba) and a *callimus* of 2 pounds. Called 'piedras huecas' (hollow stones) by the locals, they were used for the most pragmatic functions: the smaller as pellets for their shotguns, the bigger to keep water in, which acquired the same savour as if it were kept in Jalisco ceramic ('jarros de Guadalajara de Indias'), pottery highly reputed for its quality of decoration and manufacture. Torrubia celebrated that in Spain eagle-stones were not useful for the superstition, as happened in places such as Greece, where people attributed to them natural and preternatural virtues ('Hallanse muchísimas cabalmente esféricas, de las que usan los Paisanos en sus Escopetas, para toda caza. Gracias a Dios en España no sirven para las supersticiones, conque las usan en otras partes, en que les atribuyen no solo grandísimas virtudes naturales, sino preternaturales, especialmente los Griegos, que se valen de ellas, para descubrir ladrones'; Torrubia 1754, pp. 79–81 and 235, caption to fig. VIII; Fig. 2). Torrubia, for those wishing to know the supposed properties of eagle-stones, referenced Anselmus de Boodt's *Gemmarum et Lapidum Historia* (1609) and the work of Spanish Army Vicar Juan Bernardino Roxo (1728), who also acted as general administrator of the royal hospitals.

In fact, during the eighteenth century the virtues of the eagle-stone as an anti-abortive were still propagated in works such as the medical treatise published in Madrid by J.B. Roxo. Eagle-stones were also included in works devoted to the art of

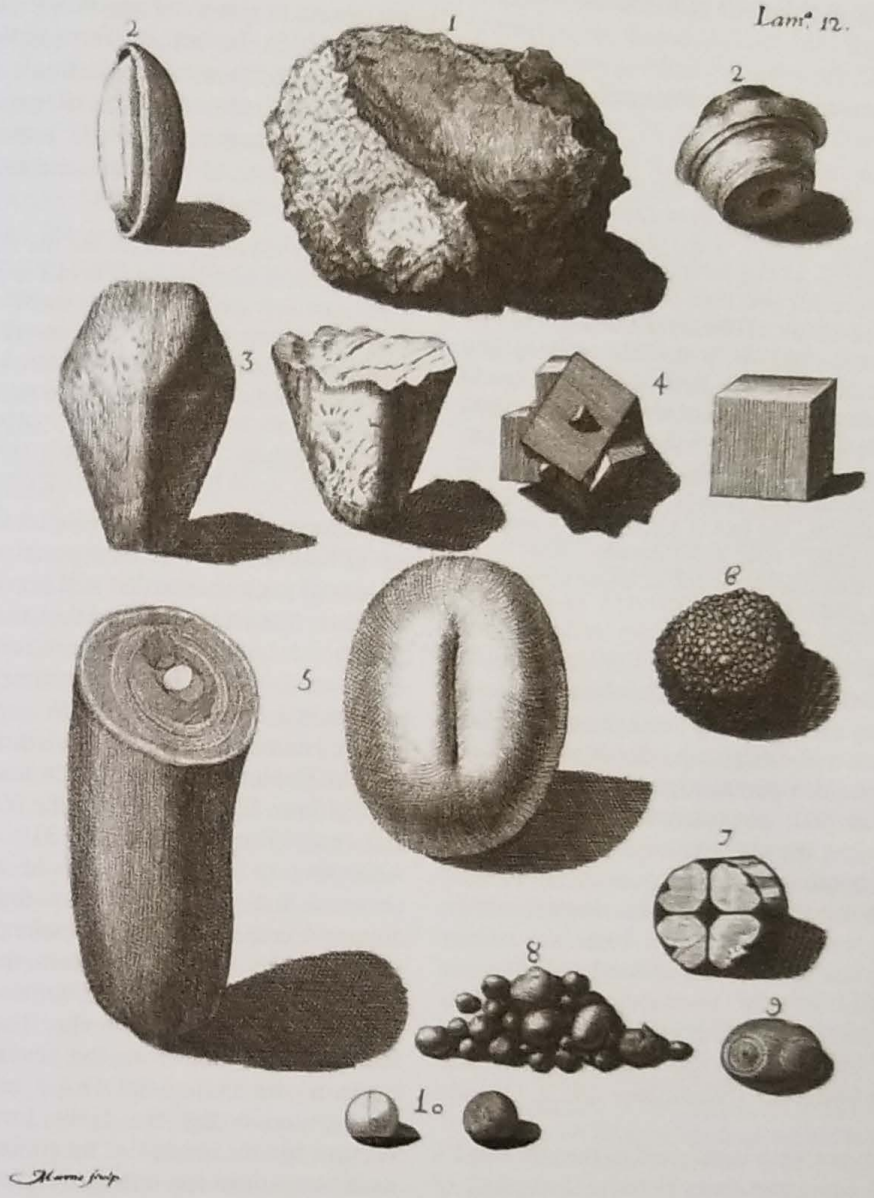

Fig. 2. Piedras de Águila as figured in Torrubia's *Aparato para la Historia Natural de España*.

amalgamating silver and gold by quicksilver, as *El arte de los metales*. This book was first published in Madrid in 1640 by Álvaro Alonso Barba (1569–1662), the secular Catholic priest and metallurgist, inventor of the pan amalgamation process and director of the mines at the villa of Potosi, the silver mining town from the Viceroyalty of Peru (current Bolivia), founded in 1545 and source of fabulous wealth. In his book on the mineral ores from South America, which was republished several times, Barba included a chapter on the 'faculties and virtues of mineral things' where he described the eagle-stone as an obstetric charm and a means to prevent miscarriage (Barba [1640] 1770, p. 66). Barba's work, based on Agricola's *De Re Metallica* (1556), was translated into English (1674), German (1676, 1726, 1739 and 1749), Italian (1675) and French (1733 and 1751) (Carracido 1911).

As with *Materia Medica*, the treatises upon metals, mines and minerals brought together knowledge and expertise originating from different periods of history and different regions of the world. Barba's work clearly displays that knowledge circulated in both directions, and that medical knowledge not only was transmitted in hospitals and by medical practitioners but was also connected with the most important economic activity of the Spanish Indies: the art of silver and gold as known to miners and mining administrators.

Trade, letters and South American eagle-stones

In 1499 Converso Hidalgo Fernando de Rojas wrote:

> Believe me, sir, it is true as I tell you. Besides, out of charity forsooth, she relieved many orphans and many straggling wenches, which recommended themselves unto her. In another partition she had her knacks for to help those that were love-sick, and to make them to be beloved again and obtain their desires. And for this purpose she had the bones that are bred in a stag's heart, the tongue of a viper, the heads of quails, the brains of an ass, the cauls of young colts when they are new foaled the bearing cloth of a new-born babe, barbary beans, a sea-compass, a horn-fish, the halter of a man that hath been hanged, ivy-berries, the prickles of a hedge-hog, the foot of a badger, fern-seed, *the stone of an eagle's nest*, and a thousand other things (Parme on Celestina's charms, in Rojas 1631, p. 29, emphasis added).

La Celestina, a work published in 1499, marking for several authors the end of medieval literature and the beginning of the literary renaissance in Spain, refers to the arts of Celestina, dubbed 'vieja lapidaria', namely an 'old woman expert in stones' (Nunemaker 1932, p. 560). The celebrated passage quoted above describes the contents of a partition of the procuress's house and laboratory, showing to what extent eagle-stones were part of the Spanish medieval cultural world. Fernando de Rojas was neither the first nor the last to write of these objects since they, as part of the instruments and objects of magic, belonged to the elements that defined the powers of the magus and had been transferred to Spanish literature (Nunemaker 1932; Orlando 2006).

Eagle-stones were mentioned in Juan de Mena's (1411–56) *Laberinto de la Fortuna* (Labyrinth of Fortune, 1444) and Pedro Mexía's (1497–1551) *Silva de varia lección* (1540) or *A Miscellany of Several Lessons*, an early European best seller reprinted 17 times in the sixteenth century, translated into Italian (1542), French (1552) and English (1571). They also appeared in Miguel de Cervantes (Fatima in *El trato de Argel, c.* 1580) and in Alonso de Ercilla's (1533–94) epic poem *La Araucana* (1569–78) where these charms (tails of dragons and arachnids, the pregnant eagle's stones, mouths of hungry sharks) were transferred to a South American context, namely the military Spanish conquest of southern Chile and the charms in possession of Fitón, an Araucanian Shaman (Mejías-López 1992; Nicolopulos 1998).

So eagle-stones became part of a literary trope but also of a universe of women and men that trafficked and experimented with the virtues and powers of metals and natural objects. That reminds us of Giuseppe Faggin's remark that the witch belongs to the history of science (Faggin 1959; Russell 2001; Alberola 2010). In fact, far from fiction and as an incarnation of the witch, Celestina's manipulative skills and arts created spaces of experimentation, collection, propagation of new materials and refunctionalization of old substances. As Faggin (1959, p. 76) wrote

> In front of the indoctrinated and the wise, who derive theories and remedies from books and from eminent metaphysical speculations, the witch – and here one could add the quack and the traveller charlatan – represents the direct appeal to nature and to its secret: the therapeutic sacramental religion, which mediates the man with the divine power it contrasts with a material therapeutic, which is assumed to lead the order and normalcy in the human body by physical means.

Furthermore, Italian anthropologist Giancarlo Baronti (2008) stresses that these practices and the collections of eagle-stones that still survive confront us with their material nature and the concrete character of their use, not always visible in medical treatises.

Up until the seventeenth century most of the eagle-stones traded in Europe arrived or were believed to arrive from Arabia, Armenia, the Caucasus, the Euphrates, Persia, India and Africa. Most arrived from Egypt following the Venice–Alexandria route (Baronti 2008, pp. 316–317 and 325). According to Baronti, the trade in eagle-stones occurred through the routes of the pilgrims who crossed Europe either to Jerusalem and/or to the shrine of the Apostle St James the Great in the Cathedral of Santiago de Compostela in Galicia in northwestern Spain, on the Road to Santiago. He suggested that from the seventeenth century onwards the Franciscan Order traded in eagle-stones, connecting the Holy Land, Egypt and Europe by the trade in magic-religious objects used postpartum and during the pregnancy, including the so-called roses of Jericho (*Anastatica hierochuntica*) and the stone known as St Mary's milk (Gimma 1730, p. 93; Crowfoot & Baldensperger 1931; Lützenkirchen 1991). Eagle-stones were very expensive and inherited or loaned within the circles of women of rich noble families, including the Medici, the Grand Dukes of Tuscany (Baronti 2008, pp. 292–295). The stones were used during pregnancy and child delivery and, once used, were passed to other women in the family. It was also common for midwives to rent them to pregnant women until the baby was born. These scarce and expensive stones denoted a specific economic and social position.

Early in the eighteenth century, once discredited by physicians and their rich patrons, eagle-stones started being propagated among the common people in a process that Baronti (2008) described as folklorization, a trend that is associated with the use of

local (European) stones and the advertisement of their properties by means of cheap paper. The use of cheap local eagle-stones survived in Europe and the Americas to such an extent that late in the nineteenth century Emile Bertrand, the French mineralogist, received almost daily requests for eagle-stones from Paris and the provinces (Forbes 1963, p. 393, Witkowski 1887, p. 201). In this context, characterized by the popular propagation of the virtues of eagle-stones together with the propagation of the art of the metals in the Andes, one can understand the surveys and proposals from the late eighteenth century arriving in Madrid from South America in order to promote the local exploitation of these materials.

In May 1776 Joseph Gálvez y Gallardo, newly designated Secretary of State of the Universal Office of the Indies, had the *Royal Order notice for the remission of Natural History curiosities to the Royal Cabinet* (1776–77) printed and circulated. It followed other instructions, written in Aranjuez on 6 June 1752 and sent to the viceroys of Mexico, Lima and the Kingdom of New Granada, for the collection of all types of natural products and the building of a Royal Cabinet of Natural History of the Mines that were found in the domains of His Majesty in America. These instructions produced a flow of objects and reports from Spanish America to Spain, where they were evaluated and they created a way for some priests, military engineers, governors, mayors and viceroys in the overseas territories to take advantage of them so that, through a skeleton, mineral or plant, they could draw attention to the ordinary and extraordinary productions of their lands as well as to their own loyalty and devotion to the Crown (Grieco 2014). In the frame of the so-called Bourbon reforms, plants, antiquities and animals were mobilized to Madrid, combining the economic interests of the Crown with the creation of a public or semi-public space in Madrid, represented by the Royal Cabinet and Royal Pharmacy.

Thus, in 1787 Casimiro Gómez Ortega, 'the man who put into effect the plans of Spanish Kings Ferdinand VI (1746–59) and Charles III (1759–88) for a botanical garden of the highest rank' (Harvey 1974, p. 22), evaluated the content of a box that had arrived from the Viceroyalty of Peru and was destined for the Royal Pharmacy in Madrid. In fact, from the new established *Intendencia de Tarma* in central Peru, the local authorities had shipped several specimens of eagle-stones as a sample of the potential resources to be exploited in that territory. In the same file, kept in the Archives in Seville, is a note describing the virtues of eagle-stones according to the Prior of one the Hospitals of Brothers of St John of God (Appendices B and C). Casimiro Gómez replied, explaining that all the medical virtues attached to these geodes were just a superstition and that the box should instead be forwarded to the Royal Cabinet of Natural History that had been inaugurated in November 1776. The remittance of the Peruvian eagle-stones to the Royal Cabinet meant also that, for Casimiro Gómez, they were not useful at all and that in the late eighteenth century physicians and naturalists regarded them as a mere mineral and a curiosity.

Materia medica from the late eighteenth century reflected those changes. The Spanish translation of Willian Cullen's *Materia Medica*, for instance, quoted the revision of French chemist Antoine François (1755–1809), Conde de Fourcroy, of the relationship in chemical terms between materia medica and natural history (Cullen 1792, p. XIV). In the new universe of chemistry and mineralogy, most of the fossils and minerals in use in European pharmacopoeia were rejected and eagle-stones transformed into a mere superstition, composed of the oxide of iron with small portions of silica and alum, a hollow geode of dull pale colour, composed of concentric layers of various magnitudes, of oval or polygonal form, and often polished (Hernández de Gregorio 1803).

On the other hand, eagle-stones had continued their lives as symbols, remedies, and/or charms in several regions of the Americas. As Cañizares-Esguerra (2002, pp. 312–313) put it in a paragraph that recollects the symbolic role of the vulture in Medieval Spain and Christian culture,

> In 1750, at the metropolitan cathedral, the Dominican friar Antonio Claudio de Villegas (b.1700), Professor of Theology and Censor for the Inquisition, concluded that the same glyph (the Nahua-Spanish glyph of the eagle with its wings spread devouring a serpent) was a prefiguration of the Church in New Spain. After quoting Pliny the Elder at length on eagles' habit of nesting on 'ethites' (eagle stones, common in lakes) and interpreting the appropriate prophecies and biblical passages, Villegas concluded that the Mexican Church was an eagle 'nesting' on the ancient pagan temples of stones. Just as Pliny had shown in his Natural History that ethites enhanced the reproductive power of eagles and gave solid foundation to their nest, Villegas argued the Mexican Church was fecund and anchored solidly in the midst of the lakes.

As this quotation implies, the lakes of Mexico yielded numerous 'eagle-stones', which, on the other hand, are mentioned in works on Peruvian minerals and folk medicine from Peru, Bolivia and the Argentine NW, with the same properties and virtues identified in ancient materia medica. While the virtues and uses remained almost the same, the objects in themselves varied, being in some cases an oxide geode, and in others a fossil invertebrate. Far from assuming that the name denoted everywhere the same kind of object, in some cases – especially when the citations of eagle-stones are

just textual or symbolic, as in the case quoted by Cañizares-Esguerra – it is very difficult to discern what was actually meant by 'eagle-stone'.

In the late eighteenth century, Spain continued to trade not only in 'piedras de águila' but also in all kinds of medical stones, as can be traced in the almanacs of commerce published in Madrid with the support of the Spanish Crown between 1795 and 1808 by Diego María Gallard, lawyer of the Royal Council (Fernández Pérez 1989). These almanacs included the lists of imports and exports, the taxes levied on them (*c.* 50% of their pages), and information on the marketplaces in the Peninsula and some cities from Spanish America. Sold in Madrid, Cádiz, Malaga, Seville, Valencia, Barcelona, Pamplona, Bilbao and some Spanish American cities, the almanacs were conceived as a tool to promote commerce in a context of political and commercial reform, representing a reliable source for economic history (Fernández Pérez 1989). Gallard, who compiled this information thanks to his extensive network of correspondents, listed – among many other goods – the national and foreign drugs traded in Spain, including medical stones and animal substances.

According to the almanacs and despite the abundance mentioned by Torrubia and the 'mine' detected in Peru, all eagle-stones passing through customs were 'foreign', namely not 'native' of 'these Kingdoms', i.e. Spain, Spanish America and Philippines. The term 'foreign' included Portugal and countries in friendship and alliance with Spain as well as the rest of the world. The almanacs, however, do not indicate where the stones came from. On the other hand, the almanac shows that, in contrast with the Asian bezoar stone, which was taxed at 22 *reales* 17 *maravedíes* per ounce, eagle-stones were assessed at just 10 *maravedíes* per pound (Fig. 3). Whereas this price indicates that eagle-stones were not very valuable, the sources clearly show that early in the nineteenth century there was an active commerce in medical things that had already been discarded from the universe of learned physicians and naturalists.

Further research into this trade could yield other published sources that could be mined to determine, for instance, the country of origin and the volume of the traded eagle-stones. Among others, *El correo mercantil de España y sus Indias* (also published by Gallard in Madrid, 1792–1808; Enciso Recio 1958) and the several Spanish American *Semanarios de comercio* (Commercial Weeklies) can enlighten us as to how these medical substances circulated in those years of political and cultural reform, just before South American independence and the outbreak of the Napoleonic wars.

Around 1810, a priest from Montevideo recorded that he had bought some drugs from the Native American – 'indios' in his words – in La Paz. Among them, he acquired certain 'pelagic shells' obtained in the surrounding regions that the Indians sold as eagle-stones. However, noted the Father, it was a species of terebratulid brachiopod, a kind that in those years was the subject of controversial classification (Lee & Brunton 1998; Lee

PIEDRA bezar occidental extrangera , cada onza. . 1.17
Idem dicha oriental que no llegue á media onza , pa-
ga á razon de cada onza. 22.17
Idem la misma , desde media onza arriba , c. onza.45
Piedra calamina extrangera ó calaminar , c. libra. .20
Piedra cananor ó nefrítica extrangera, cada libra. . 1. 6
Piedra de águila extrangera, cada libra. 10
Piedra de unicornio extrangera, cada libra. . . . 2.12
Piedra imán extrangera, cada libra. 16
Piedra infernal extrangera, cada onza. 6
Piedra judayca extrangera, cada onza. 3
Piedra lipis extrangera ó vitriolo de Chipre , c. lib. .20
Piedra pomex extrangera, cada libra. 8
Id. dicha para las fábricas de tornear, es libre (2).
Piedra sanguinaria extrangera, cada libra. 16

Fig. 3. Drugs (from *Almanak mercantil ó Guía de comerciantes para el año de 1808*, Madrid: Vega & Co., 1808, 77; also Juan García Barzanallán, *Arancel de Derechos que pagan los géneros, frutos y efectos extrangeros a su entrada en el Reyno*, Madrid, Francisco de la Parte, 1816). Note: a quintal equals *c.* 100 Castillian pounds (libras castellanas), *c.* 46 kg. The 'onza castellana' was *c.* 28 g. In pharmacy, the pharmaceutical pound equalled 12 medical onzas, *c.* 345 g. The 'piedra bezoar occidental' (Occidental bezoar stone) was obtained from South American animals (lamas, alpacas and vicuñas); the oriental type arrived from South and Central Asia. 'Ext.' means 'Foreign' – extranjero.

et al. 2001; Podgorny 2013). The Father went further in classifying the shells as a new genus named by him '*Guarcarite*', having one valve flat, the second, bigger and not perforated ('Yo compré a unos indios en La Paz entre varias drogas ciertas conchas pelágicas que se encuentran en aquellas inmediaciones: ellos me las vendieron por *piedras del águila*, y eran en realidad unas terebrátulas bien conservadas, y un nuevo género de esta familia que tiene una de sus valvas, es enteramente plana y la otra mayor no es perforada, a quien he puesto el nombre de *Guarcarite*'; in Larrañaga 1924, p. 22).

No illustration was given but this observation clearly recorded that invertebrate fossils were sold by the native population as a medical drug under the name of 'eagle-stone'. Was this the result of transferring a name to an object that already possessed medical properties in the Andean world, where the missionary Catholic fathers collected natural history specimens, taught metallurgy and practised medicine? Further research is needed to answer this question. The sources remain elusive.

In Bolivia eagle-stones were called 'águila rumi' ('rumi' being the Quechua word for 'stone'; Oblitas Poblete 1971). On the other hand, the Italian naturalist Antonio Raimondi (1826–90) listed in his catalogue of Peruvian minerals for the 1878 World Exhibition in Paris a sample of 'limonita geódica' – hydrated iron peroxide [limonite] – collected in the province of Moyobamba, an important commercial centre in northern Peru during the colonial era, and known locally as 'oetita, eagle-stone or condor-rumi', Quechua for condor-stone (Raimondi 1878, p. 203). The Andean condor, a national symbol of many South American countries, plays an important role in the folklore of the Andean regions and, not surprisingly, replaced the eagle in the name of the stone. On the other hand, 'condor' was sometimes used to denote the vulture. Raimondi left no images of the minerals that he catalogued for Paris. However, other authors noted that up until the 1930s Andean eagle-stones – as well as bezoar and calamites – had been traded in Peru on the folk remedy stalls of Cuzco market (*hampi katu*) (Pardal 1937, p. 162).

Reports published by the French scientific mission to the Argentine Andes early in the twentieth century remarked that 'eagle-stones equalled to a kind of Silurian trilobites found in the desert of Atacama, where ground eagle-stones are taken as a remedy' (Boman 1908, p. 511). In this report, 'piedra águila' was one of the remedies possessed by Petrona Alejo, a female doctor (*médica*) living in the Altiplano of Jujuy (NW Argentina), remedies that she used in external and internal medicine to cure people who had lost their spirit. The report indicated that some of those remedies were sold in La Paz by the Callahuaya, the Bolivian travelling doctors and herbalists. Petrona's pharmacy included local compounds (such as the unguent *ampituna*) and others of

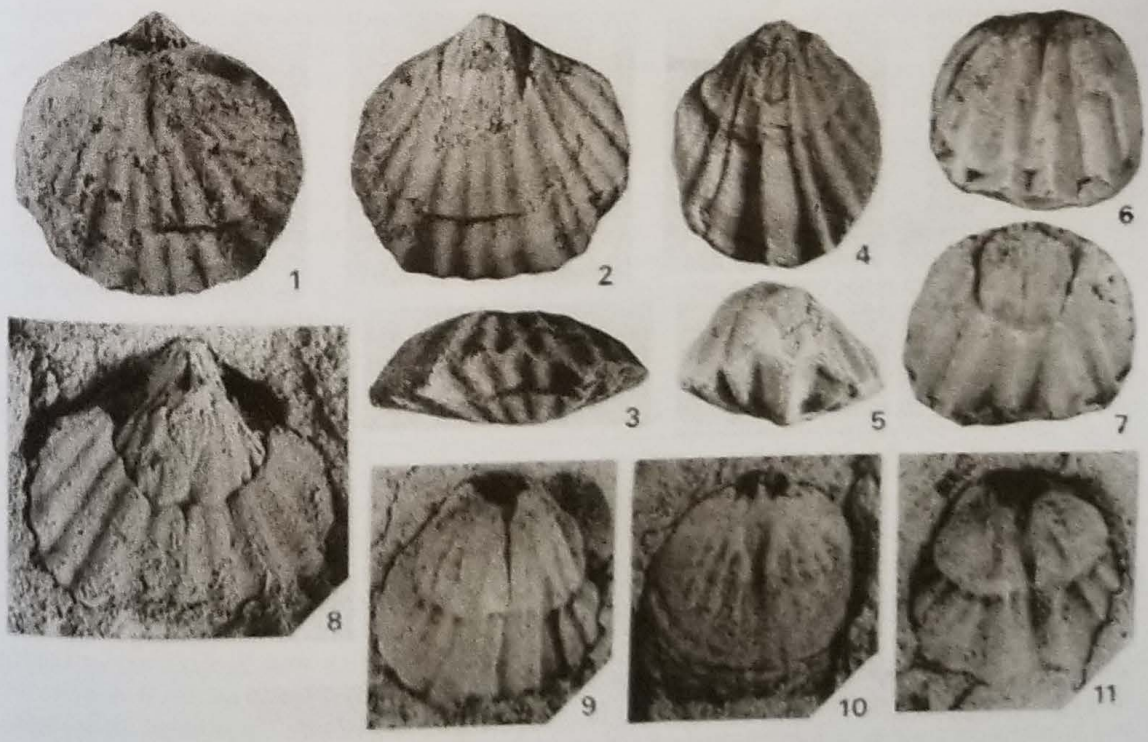

Fig. 4. *Clarkeia anteniensis* from Benedetto *et al.* (1996).

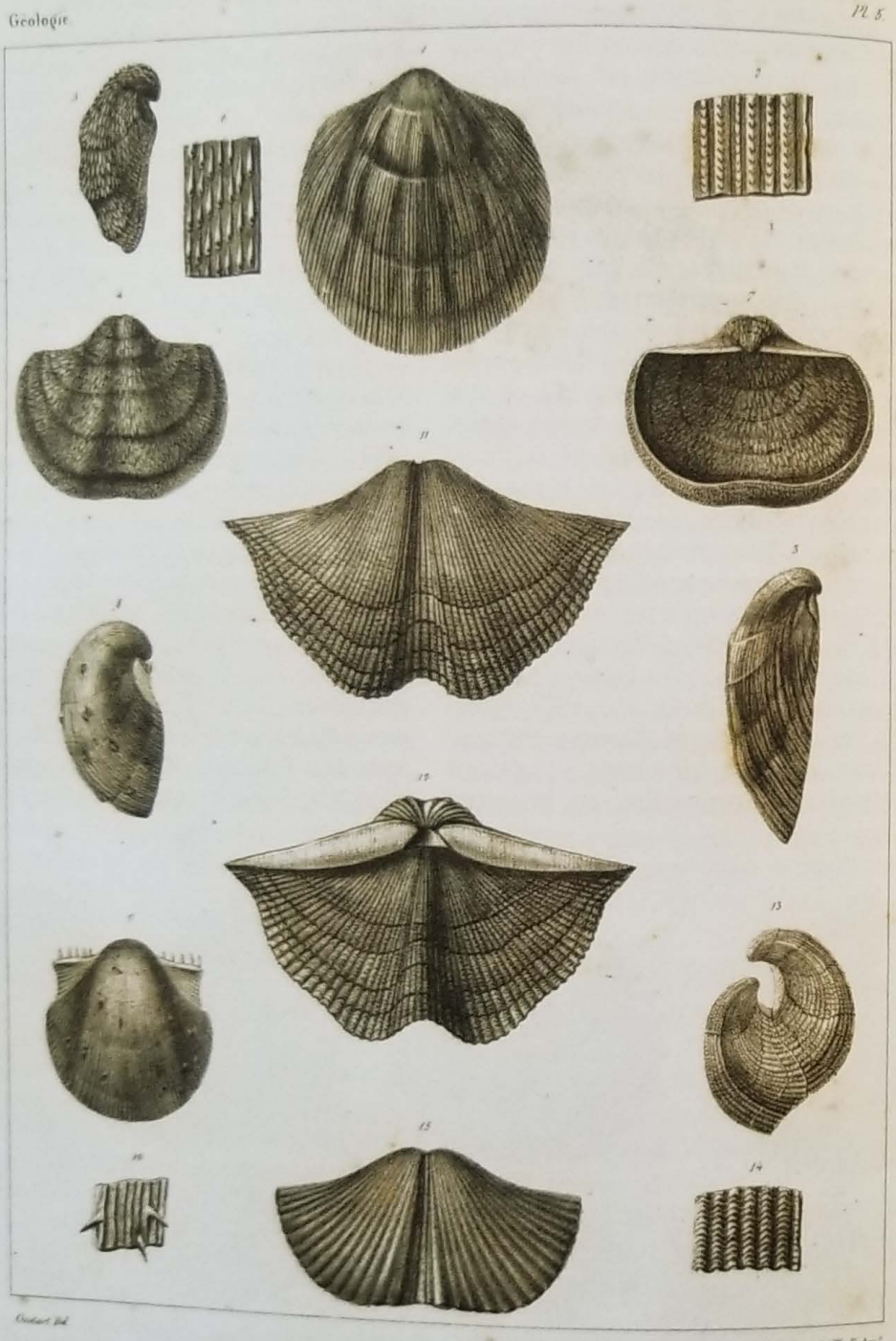

Fig. 5. Invertebrate fossils from the Transition Formation in Bolivia (d'Orbigny 1842), 11–14: *Spirifer condor*.

European origin (the herb *Melissa officinalis*) or known by European names, such as the eagle- and thunder-stones which were transferred to local substances, in this case to a trilobite (Boman 1908, pp. 510–511). No image of the medical remedies was given in the French report, making it impossible to determine the exact appearance of the Argentine eagle-stone. However, it is a very interesting record of the remedies used by a medical practitioner from the Argentine Altiplano and it may be that other unexplored ethnographic sources can be mined to discover similar cases.

Seventy years later Palma (1978) refers to the use of 'piedra de águila' in the NW Argentine provinces, in this case as the name given to fossil marine Brachiopoda. According to Palma, *Clarkeia antisiensis* was used against the so-called *susto* illness, one of the most common pathologies in the region, a severe depression caused by a fright, characterized as the loss of the soul or of the main spirit which a human possesses. 'Piedras de águila' were also used as a poison antidote and for curing heart problems.

Clarkeia antisiensis was first described by French palaeontologist Alcide d'Orbigny in 1847 as belonging to the genus *Terebratula* (a member of the Brachiopods, where d'Orbigny also placed the genus *Spirifer*). In Argentina the genus is found in the Sierras Subandinas (Subandean Ranges) from the provinces of Salta and Jujuy (Lipeón Formation, Upper Silurian, Llandovery/Aeronian, Ludlovian or Pridoli, which consists mainly of shales interbedded with fine micaceous sandstones) and in the Precordillera (Los Espejos Formation, Wenlock?, early Lochkovian, which crops out in the Central Precordillera and is composed of marine siliciclastic strata, primarily green sandstones and green siltstones; brachiopods, trilobites, graptolites, tentaculites, crinoids, eurypterids, nautiloids, gastropods, acritarchs, conodonts are common; Fig. 4; Benedetto *et al.* 1996).

In Bolivia the marine brachiopods *Spirifer condor* and *boliviensis* (d'Orbigny 1842) were called eagle-stones and used – as eagle-stones were in the Old World – fastened to the arm of a pregnant woman to prevent abortion (Condarco Morales 1978). D'Orbigny (1842, p. 47) collected the type specimen of *S. condor* at Yarbichambi, North of La Paz, in the Bolivian plateau at about 4000 m above sea-level. The dimensions of their valves were about 1.7 × 1.6 cm and 0.8 × 1.4 cm. D'Orbigny gave the adjective *condor* to the species following the local use of the inhabitants, who referred to the analogy between the form of this rather rare shell and the silhouette of a flying condor. Today called *Gypospirifer* (alternative to *Neospirifer condor*), this brachiopod is from the Permian of Bolivia. Each of the existing 44 collections (including 19 from Bolivia and 8 from Peru) includes a single occurrence (Fig. 5).

For reasons currently unknown, La Paz, in Bolivia, appears as a centre of dispersion of eagle-stones in its form of fossil shells. Whether this was a result of the combination of the pharmacy of missionaries and clerics (such as Barba and/or Roxo), the reception of Laguna's translations of Dioscorides, and the local meaning attributed to these fossils, is a question that has to be explored by further research.

Conclusions

Gade placed the problem of analogies in the realm of the emergence of universal associations that, to be appreciated, 'require empathetic engagement into the thinking process of the prescientific, non-Western mind and a willingness to project the edge of knowability' (Gade 2003, p. 207). The present essay assumes not only that this line of research is worthy of further attention but also that the transfer of names and the creation of analogies happened in multiple directions, involved regions far beyond Spanish America and the Iberian Peninsula, connected with the traffic in minerals and medicinal goods and the transfer of expertise from one field to another. Was this transfer of names and virtues the result of the combination of pre-Columbian medical systems with ancient materia medica? If this is the case, South American eagle-stones could represent a wonderful story of survival of the use of a medical charm in the *longue-durée* and in the most distant geographies.

Several scenarios should be taken into account to understand the global uses and transfer of materials: the interactions between trade, book printing, translations and the propagation of products and knowledge, the missionary networks, pharmacies and culture, and the action of travelling or sedentary medical practitioners and midwives. Thus, eagle-stones appeared as a remedy from the therapeutics on both sides of the Atlantic, mentioned in the natural histories, books of remedies and charitable handbooks that proliferated in the Old World and European settlements. Moreover, they can be the material testimony of the reconciliation in the sixteenth and seventeenth centuries of the tensions between classical, medieval Christian, rabbinic, Native Spanish America scholarship and the natural world reaching the Old World in the wake of new geographical discoveries.

The fact that the properties of Old World eagle-stones were transferred to Andean rocks and fossils which do not match at all the standard definition of what eagle-stones are is at least intriguing. Most probably they previously had meanings/properties

that were replaced/recombined by new ones following contact with European cultures. To solve these questions, one answer could come from future joint work on a scale that embraces localities far beyond the Spanish American geographies. Whether it was due to the post-Columbian circulation of recipe books and drugs in both directions, or a kind of structural relation of nature/culture that crossed and connected different peoples and cultures can be archaeologically tested. Medicinal use of stones is, however, not easy to detect archaeologically and, as Russell (2012) remarks for animals, there have been few attempts to do so. However, eagle-stones not only occur in existing museums or in the inventories of lost collections; stones used as remedies can be found in the archaeological record from current or past archaeological excavations. In that sense, this long story of eagle-stones can be read as a mere plea for combining ethnographic, archeological, and historic research to disclose the long history of South American popular medicine.

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Appendix A

Aetos en griego quiere decir águila, de do vino a llamarle Aetites esta piedra, porque ordinariamente tiene dos de ellas, conviene a saber, macho y hembra, en sus nidos las águilas sin las cuales no les es posible parir, y a causa de las cuales ponen dos huevos tan solamente. El macho es menor que la hembra, tamaño como una agalla, y de color algún tanto rojo: dentro del cual se siente otra piedra durísima. La hembra tiene figura oval, y es como blanquecina, o por mejor decir cenicienta, la cual se desmenuza muy fácilmente, y lo que contiene dentro de si, es como barro, o arena. La una y la otra posee admirable virtud de provocar y tener el parto, pero para semejantes efectos, conviene sean hurtadas del propio nido del águila, pues estas son las más escogidas. Podríamos alguno pedir la causa, porque respeto no haya ordenado Dioscórides que para retener la criatura en el vientre, atemos la piedra Aetite al brazo izquierdo de la preñada, y para facilitar el parto al muslo, no habiendo mayor razón de atarla mas al un lado que al otro, pues la madre de la mujer es redonda y exquisitamente está colocada en medio, entre la vejiga y el intestino recto. A la cual pregunta no impertinente, responderemos, que las partes izquierdas del cuerpo humano, son sin comparación muy más flacas que las derechas, como se ve claramente por los pies y las manos. Lo cual también acontece en la madre, cuya parte siniestra es más fría y más flaca que la derecha, y así en ella comúnmente se conciben las hembras. De suerte, que para retener, y expeler la criatura es menester a las veces que le ayudemos. Ayudaremosla, pues, a retener, aplicando dicha piedra, no al brazo derecho, pues le es contrario, sino al izquierdo, que con ella tiene mas coligancia, asi como a expeler el parto, aplicándola al muslo siniestro, por la parte de dentro, pero conviene tener advertencia, que luego en acabando de salir la criatura del vientre, se quite la dicha piedra, porque si se dejase allí un mínimo espacio de tiempo precipitaría la madre. En suma, la piedra del Águila naturalmente atrae las partes y la madre hacia si, ni mas ni menos, que la piedra Imán al acero. (Dioscorides (translated by Laguna) 1555, p. 564)

Appendix B: Virtues and properties of eagle-stones according to the Prior of the Convent of St John of God

Esta piedra se llama del águila porque la lleva en su nido para que defienda a sus polluelos de los animales ponzoñosos.

Otros la llaman Piedra Doble, porque se siente sonar dentro otra piedra pequeña o bien polvos que son de diferentes colores.

Cualquiera que traiga esa piedra consigo se preserva de toda infección y causa otros muchos efectos de sanidad y particularmente se hace arrojar el veneno, tomando sus polvos en caldo.

A las mujeres que están de parto recio, admirablemente ayuda atando la Piedra a un muslo aziadentro y para las demás funciones que siguen, tomando los polvos de la piedra pequeña, logrará la Parida salir con felicidad.

Tomada esta piedra en vino, quita las tercianas, bebiéndose el vino antes que entre el frío.

Es muy saludable para las mujeres obstruidas, trayendo la Piedra otra piedra al cuello.

Alivia el dolor de hígado o estómago aplicándola a la parte dolorida, tomando los polvos de adentro, en caldo o vino.

También es bueno para el dolor de cabeza, mal de piedra y orina, tomando sus polvos en caldo o vino, y finalmente, vale para serenar la cabeza y la vista cuando insulta algún vaguido, tomando sus polvos en caldo o vino.

Otras muchas virtudes tiene esta piedra según afirma el Prior del Convento de San Juan de Dios

[This stone is called eagle-stone because the eagle takes it to her nest to protect her hatchlings from poisonous animals.

Others call it double stone because it has inside a smaller stone or powders of several colours.

Whoever wears this stone is protected against all kinds of infections. It has effects on other health problems; taken in a soup, it eliminates poison. Bound to the inner part of the thigh, it helps women in hard deliveries, by drinking the powder of the smaller stone, birth will be given with happiness. With wine, it helps again tertian fever: it has to be drunk before the cold arrives. Wore at the neck, it is very healthy for obstructed women. Applied to the affected parts, powdered and drunk with wine or soup, it relieves liver and stomach pain, headache, and kidney stones. It also soothes the sight and the head and has many other virtues.]

(Folio 217. Virtudes y propiedades de la Piedra del Águila, Archivo de Indias, Seville, Spain.)

Appendix C: Report to Antonio Valdés from Casimiro Gómez Ortega on the eagle-stones sent from Tarma, in Peru (1787)

Las piedras nombradas del Águila que ha remitido al Rey el Intendente de Tarma en el Perú con los polvos que contienen dentro de sus cavidades son unos fósiles muy conocidos en Europa con el propio nombre de Piedras del Águila y por los Naturalistas con el de Aetites que en Griego equivale a lo mismo. Se les atribuye vulgarmente igual virtud que en América, de contener los flujos inmoderados de sangre y abortos y aún la que parece contraria a estos efectos, esto es la de facilitar el parto: esta vana opinión que tuvo origen en tiempos menos ilustrados sin más fundamento que el del color de la Piedra semejante en algunas al de la sangre y en la estructura mecánica de ella que consiste en un núcleo rodeado de multiplicadas incrustaciones que la han ido formado, no ha correspondido a las diligentes observaciones y exactas experiencias que se han hecho posteriormente y la han reducido por consentimiento general de todos los inteligentes a la clase de una Mina pobre de yerro que no merece beneficiarse ni posee más virtud que la astringente común a todas las Minas del mismo Metal. Por contener esta Piedra aquel núcleo que a veces suena al agitarla, los nombraron algunos autores Piedra preñada, y sin más razón la empezaron a usar para remedio de las mujeres embarazadas, ya aplicándola a los extremos inferiores para promover el parto, y ya a los superiores para contener las evacuaciones. Ningún profesor juicioso de nuestro siglos se ha dejado arrastrar de estos raciocinios desmentidos por la experiencia ni de otras credulidades aún más ridículas y supersticiones: pero los curiosos que las leen en los Escritores anteriores o en los Diccionarios, no es de extrañar que inflamados de zelo procuren recomendarlas superándolas al examen y decisión del Ministerio. Que en qto. en obedecimiento de la orden de V.E. del 13 del corriente debo informarle devolviéndole el Caxon que aprobándolo V.E. podrá destinarse al Gabinete de Historia Natural para que pueda resolverse como siempre lo más adecuado. Dios guarde la importante vida de V.E. muchos años que le deseo y he menester, Madrid Diciembre 14 de 1787, B.L.M. de N. E.

[The so-called eagle-stones dispatched to the King by the Intendente of Tarma in Peru together with the powders they contain in their interior are fossils that are very well known in Europe as 'Piedras del Águila', called by the naturalists as Aetites, the Greek name for that stone. The vulgar opinion propagated in Europe – as well as in the Americas – claims that they have the property to restrain bleeding and abortion as well as its contrary: to promote delivery. This pointless opinion, originated in less enlightened times, had no other basis than the colour of the stone, sometimes similar to the colour of blood, and its mechanical structure, namely, a nucleus covered my multiple layers of concretions resulting from the process that had shaped the stone. It is contradicted by several diligent observations and precise experiments. The intelligent person now knows that this stone has the properties of a poor ore of iron, which not only is not worthy of enrichment but also has the same mere astringent virtues of the other mines of this metal.

Because this stone contains the above-mentioned nucleus, which when shaken sometimes rattles, it was called pregnant stone, and for this reason was used as remedy for pregnant women, either bound to the arm to restrain evacuations or tied to the leg to facilitate childbirth. No sensible professor from our century has accepted to be trapped by this, or even more ridiculous reasoning and superstitions contradicted by experience, however it is not surprising that the curious person, who reads ancient authorities and dictionaries, wants – full of zeal and enthusiasm – to try to promote their virtues, in spite of the examinations and the recommendation of the Ministry. Having said this, I send back to you the box with eagle-stones that was sent to me for its examination, with the further suggestion that it be forwarded to the Natural History Royal Cabinet, where another decision on its destiny can be made.]

(Indiferente General, 1550 Remisión de la piedra del Águila por el intendente de Tarma, folio 733, Indias Hazienda y Guerra., 22 December 1787, Archivo de Indias, Seville, Spain.)

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