

CARPATHIAN MINERALS IN THE EIGHTEENTH-CENTURY WOODWARDIAN COLLECTION AT CAMBRIDGE¹

MIKLÓS KÁZMÉR

The Woodwardian collection of the Sedgwick Museum, University of Cambridge is probably the oldest earth science collection preserved intact in the world. Among its c. 9,400 specimens (1,574 of which are foreign) it holds seventy-five specimens of minerals, fossils and other objects of curiosity derived from the Carpathians. Local collectors and travellers supplied John Woodward (1665–1728), the London physician and naturalist, with the specimens, which he carefully stored, registered in a catalogue and used as evidence in his natural history studies. Although scattered in origin, the Carpathian specimens possibly constitute the oldest surviving mineral collection of the region, originating in the mining districts of Lower Hungary (now Slovakia), in Transylvania (now Romania), and in Hungary proper. The collectors and the localities are identified here.

KNOWLEDGE in the earth sciences is recorded not only in print (books and maps) and in manuscripts (field notes, journals and letters), but more particularly in museum objects (mineralogical, palaeontological and geological specimens). While historians of geology – from Geikie to Oldroyd – have drawn extensively on the written and graphic sources, there are few, if any, comprehensive studies deriving information from specimens and collections.² Books and papers can be fairly accessible, map-reading requires more particular skills, but specimens are less easily interrogated. While all of us can enjoy their beauty, we rarely pose the question: what do they tell us about the knowledge and ideas of those who devoted their time, effort and money to collecting and preserving them?

In order to formulate an answer, we need some basic information: the identity of the specimens, the locality from which they derived, the name of the collector – all of which have been routinely recorded over the last two centuries, but rarely before. Given this knowledge, we can begin to ask why a certain specimen was collected, what was the scientific or circumstantial background to its acquisition, and what was the purpose of assembling the collection in which it was preserved?³

The aim of this paper is to call attention to a collection which contains treasures concerning the history of earth sciences of the Carpathians.⁴ The Woodwardian collection, dating from the early eighteenth century, is probably the oldest geological collection preserved largely intact in Europe.⁵ It is housed in the Sedgwick Museum in Cambridge and both its constituent specimens and their arrangement reflect the ideas of the collector, John Woodward (1665–1728), an eminent English physician and naturalist. His catalogue of the collection, his scheme of classification and his treatise on the origin of geological objects have all been printed.⁶

The collection holds seventy-five specimens from late-seventeenth- to early-eighteenth-century Hungary (now subdivided among Slovakia, Hungary and Romania).⁷

Torrens⁸ has emphasized the importance of Woodward's collection to the history of modern science – as the first truly scientific collection of geological objects, at least in Britain. He expressed concern about our lack of knowledge of Woodward's widespread circle of collectors and of localities. By identifying the collectors who dealt with material from the Carpathians, we aim to fill in part of this gap.

John Woodward (1665–1728)

John Woodward was the foremost British geologist of the period preceding Hutton, Smith and Lyell. He was born in Wirksworth, Derbyshire, on 1 May 1665. He studied medicine and natural sciences with Dr Peter Barwick, Physician in Ordinary to King Charles II. From 1692 until his death in 1728, he was professor of physick (i.e. medicine) at Gresham College, then the only university institution in London. In 1693 he was elected Fellow of the Royal Society.

Woodward's interest in geology was aroused by a botanical visit to the Cotswolds, studded with exposures of richly fossiliferous Jurassic rocks. Here he first became aware of the existence of fossil remains of marine organisms. The first fruit of his new interest was a book entitled *An Essay Toward a Natural History of the Earth* (1695), which has been reprinted several times and has been translated into Latin, French, Italian and German.⁹ It proposed that fossil remains were organic in origin, a view by no means universally accepted at that time, some still believing them to be sports of nature, formed within the rocks by some obscure process. At the same time, Woodward's theory claimed that the distribution of rocks and their fossil contents in successive beds or strata was a direct result of the universal deluge. This may seem of dubious merit today, but we ought to remember that diluvialists played a dominant role in persuading naturalists to accept the organic origin of fossils.¹⁰

In succeeding years, Woodward gathered together, at Gresham College, a very large collection of fossils, minerals and other curiosities, which he described carefully, noting information such as locality, mode of occurrence and the original collector's name. His passion as a collector¹¹ resulted in the appearance from his pen of two further books. The first, titled *Fossils of all Kinds Digested into a Method* (1728) is essentially a textbook of mineralogy, with a systematic classification of minerals based on his collection and an indication of methods to be used in identifying them. The other book, published posthumously in 1729, bears the title *An Attempt toward a Natural History of the Fossils of England*. The term 'fossil' here includes both minerals and remains of organisms. The book is an accurate catalogue of his collection, listing both English and foreign specimens.

Woodward's classification involved a breakdown into six classes, Earths, Stones, Salts, Bitumens, Minerals and Metals. Adopted by J. J. Scheuchzer,

it became a basic source of eighteenth-century mineral classification.¹²

For the safekeeping of his collection and in order to promote further studies in his fields of interest, he bequeathed his fortune to the University of Cambridge to establish a Woodwardian Chair of Geology. The Chair was the first in Britain – and possibly in the world – specializing in this branch of science. It still exists today, and one of the duties of the Woodwardian Professor is 'to shew the said Fossils gratis to all such curious and intelligent persons as shall desire a view of them for their Information and Instruction'.¹³

The collection

Woodward's collection – although rearranged – still exists today, preserved in its original walnut cabinets. Since only Woodward's specimens are stored in the cabinets, the collection is actually a fossil itself: it displays easily understandable information about the thinking of John Woodward himself.

While many local collectors and collections were mentioned in contemporary literature (e.g. the Imperial Collection in Vienna), the Carpathian material from these museums has mostly been lost, or, if preserved, merged with subsequent collections, so that extensive studies are needed to identify them. The unique value of the Woodwardian collection – although containing only a relatively small amount of specimens from the Carpathians (see Fig. 1) – is that it is readily available for study according to modern standards. The Woodwardian collection can be considered to be the oldest mineral collection from the Carpathian region.

While most of his material (four of the five cabinets) comes from Britain and was collected by Woodward himself, the foreign material is also impressive. It came from most countries in Europe, from North America and from Asia. It contains minerals in the modern sense, rocks, fossils and a very few artefacts (Neolithic axes and pieces of copper precipitated on iron). Many of the specimens lack the aesthetic character needed for a present-day museum exhibit, since the collection was amassed strictly for scientific purposes (unlike some of its contemporaries) and not as a curiosity chamber. The cabinets, with drawers concealed behind doors closed by intricate locks, suggest that the collection was by no means purely for entertainment, although we know that its founder showed it to many of his visitors.¹⁴

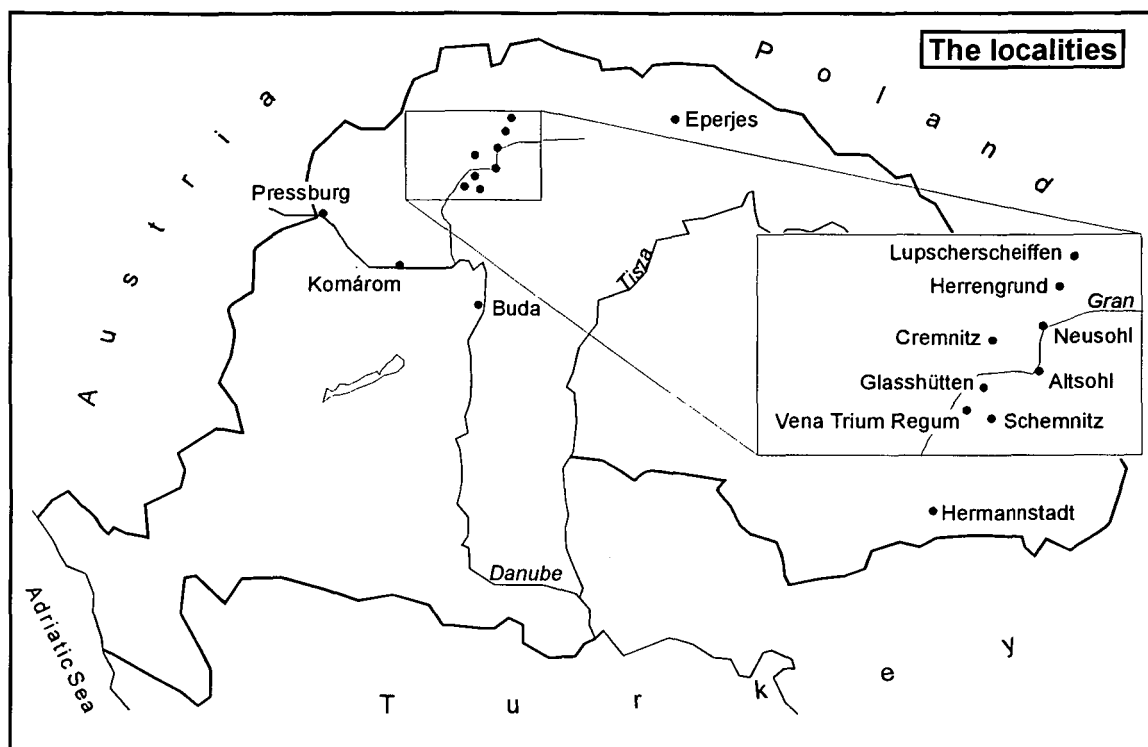


FIG. 1. Carpathian mineral localities represented in Woodward's collection. Hermannstadt is the city where Köleséri resided; the exact origin of his mineral specimens is unknown.

Woodward took great care to record exact localities and details of occurrence for his specimens, even distinguishing between those found *in situ* and those obviously transported.¹⁵ his care would do credit to the curator of a modern museum.¹⁶ Since he never left Britain, Woodward's foreign material came entirely from others, who collected it on their own account or at his specific request.

The catalogue records 7,364 entries for 9,377 specimens in the collection.¹⁷ Foreign specimens number 1,574. Altogether, seventy-five entries describe specimens from the Carpathians and from the Pannonian Basin (see Table 1).¹⁸ Twelve collectors – foreign travellers and residents in the region – are identified as sources of the Carpathian material.

The catalogue consists of twelve subsections,¹⁹ grouping 'native fossils' (i.e. rocks) and minerals, and 'extraneous fossils' (i.e. those deposited by the Deluge – the remnants of animals and plants). British and foreign fossils are listed in different subsections. As the first cataloguing was finished in the late 1710s, subsequent additions were grouped in additional

subsections; there are now twelve sections in total. Each subsection is subdivided according to Woodward's detailed classification system, with the classes named in Latin and English.

Entries are listed by Greek letters and Arabic numerals. Each entry includes a descriptive name of the specimen, often in Latin; the name of the collector and the locality where the specimen was found is given very precisely. There are remarks on the location, on the outward characteristics of the specimen and on its uses, and comparisons with similar specimens from other localities. Remarks of a certain Mr Weber, a native of Hungary, are added to the descriptions of several specimens.

The collectors

Most entries in Woodward's catalogue denote the person from whom he received the specimen. These are travellers, local collectors or collectors in other lands, who sent foreign material as donations or for exchange. For a few specimens it is possible to trace

Table 1. Geographical names used by Woodward and their equivalents in other languages used in the Carpathian region.⁴¹

Woodward's names	Name of what?	Country (today)	Latin	Slovakian	Hungarian	German	Romanian	Longitude and latitude
Altsol	town	Slovakia	Vetosolium	Zvolen	Zólyom	Altschl		19° 05' 48° 35'
Buda	town	Hungary	Buda	Budín	Buda	Ofen		19° 05' 47° 30'
Cibinium, <i>see</i> Hermanstad	town	Slovakia	Comaromium	Komárno	Komárom	Komorn		18° 10'
Comorrah	town	Slovakia	Cremnitzium	Kremnica	Körmöcbánya	Krennitz		47° 45' 18° 55'
Cremnitz	town	Slovakia	Danubius	Dunaj	Duna	Donau		40° 45'
Danube	river	?						
Duben	town	Slovakia	Eperthesinum	Prešov	Eperjes	Eperies, Preschau		21° 15' 49° 00'
Eperies	town	Slovakia						18° 55'
Glassiten	town	Slovakia		Skleno	Szklénó	Glashütte		48° 30'
Hermanstad	town	Romania	Cibinium		Nagyszeben	Hermannstadt	Sibiu	24° 10' 45° 45'
Hern-Grunt	mine	Slovakia	Vallis Dominorum	Spania Dolina	Úrvölgy	Herrengrund		19° 17' 48° 45'
Herngründt								
Hengrunt								
Hungaria	country		Hungaria	Uhorsko	Magyarország	Ungarn		
Isol, <i>see</i> Neusohl								
Leibschersuffen	mining settlement	Slovakia		Magurka (at Partizánska Lupča)		Lupscherseiffen		19° 26' 48° 56'
Neijsol = Isol	town	Slovakia	Neosolium	Banská Bystrica	Besztercebánya	Neusohl		19° 10' 48° 45'
Neosol								
Newsohl								
Newsol								
Palatinatus	region	Germany	Palatinatus		Pfalz, Palatinatus	Pfalz		17° 05' 48° 10'
Presburgh	town	Slovakia	Posonium	Bratislava	Pozsony	Pressburg		18° 55' 48° 30'
Schemnitz	town	Slovakia	Schemnicium	Banská Štiavnica	Selmecbánya	Schemnitz		18° 50' 48° 30'
Trium Regum	vein		Schemnitio					
vena Trium regum				žila Troch Kráľov	Háromkirályok-telér	Drei König Gang		
fodina Trium regum				(in Vyhne)	(Vihnyén)	(bei Wihne)		
sanctorum								

their progress from an original collector, through subsequent exchanges, to its final resting place in Woodward's collection.

Here a few brief notices are given on the collectors or senders identified; a more complete treatment of seventeenth-century mineral collecting and of the exchange of specimens in general and Woodward's connections in particular will be published elsewhere by the present author.

Page numbers refer to Woodward's catalogue (page numbering re-starts in the volume several times). The actual position of the specimens in the collection (e.g. E-4-15, where E is the cabinet of foreign specimens, 4 is the drawer number and 15 is the specimen's number within the drawer) is given at the end of each entry, copied by the author from manuscript catalogues in Cambridge.²⁰ Excerpts from relevant entries in Woodward's catalogue are given for each collector, detailing the nature of the item and its locality of origin. Woodward's original usage of italics and brackets is preserved.

Breynius

Woodward mentions him as *Dr Breynius*, in the 'An Addition to the Catalogue of the Foreign Native Fossils', p. 7.

Johann Philipp Breyn (1680 Danzig–1764 Danzig) was a well-known physician and naturalist in Danzig (now Gdansk, Poland), who had studied medicine in Leiden. Accounts of a voyage he undertook to Italy were published in the *Philosophical Transactions* of the Royal Society of London, of which he was a Fellow. Breyn published several works, mainly in botany, and also on fossils (*Dissertatio de polythalamis, nova testaceorum classe; adjicitur commentarius de Belemnitis Prussicis*, 1732).²¹ He sent Woodward two mineral specimens from Hungary:

θ.8. Asbestos, ex Hungaria. [p. 7, E-18–29]

ω.6. Charta, ex Asbesto Lapida Hungarico facta. [p. 21, E-16–43]

Brown

Woodward mentions him as *Dr Edward Brown*, *President of the College of Physicians* (Part II, p. 28).

Edward Browne (1644, Norwich–1708, Northfleet, Kent) studied medicine in Oxford and London. He travelled extensively between 1668 and 1673 in Italy, France, Holland, Germany, Austria, Hungary and Turkey. It is by his descriptions of

these journeys that he is best known. Wherever he went he observed all objects natural or historical, as well as everything bearing on his profession. He published in 1673 a small volume titled *A brief Account of some Travels in Hungaria, Styria, Bulgaria, Thessaly, Austria, Servia, Carynthia, Carniola, and Friuli*. In 1667 he was elected FRS. He was president of the College of Physicians 1704–8.²² Woodward received ten specimens from Brown:

λ.3. An Incrustation, out of the Pipes that convey the Water into the Baths of Buda [p. 10, E-4–15]

λ.4. White Spar, from the Sweating-Bath at Glassiten in Hungary. [p. 10, E-4–16]

ν.17. The Stone on which the natural Vitriol shoots in the Mines of Schemnitz in Hungary. [p. 17, E-8–16]

ν.18. Native green Vitriol out of the Silver-Mine of Schemnitz in Hungary. [p. 17, E-8–17]

ξ.10. Arsenick . . . Hungary. [p. 21, missing specimen]

ρ.64. Silver ore out of the Silver-Mine of Schemnitz in Hungary. [p. 36, E-12–24]

ω.22. iron turn'd into Copper; from a Spring near the Copper-Mines of Hern-Grunt [p. 50, E-16–30]

μ.154. A small piece of Bone, having its Surface of a green Colour, and its interior Parts of a blue; Taken up near Hergrundt in Hungary [p. 28, E-27–63]

ι.1. Ludus Helmontij, with ferruginous septa. [p. 7, E-3–52]

π.3. Sand, so very fine . . . very dark grey Colour . . . there appearing [in] it numerous small Grains of Gold . . . This was found on the shores of the Danube, between Presburgh and Comorrah in Hungary. [p. 30, E-11–24]

Chishull

Woodward mentions him as *Mr Chishull* (Part I, p. 30).

Edmund Chishull (22 March 1671, Eyworth, Bedfordshire – 18 May 1733, Walthamstow, Essex) studied divinity at Oxford. He spent four years in Smyrna as chaplain of the Turkey Company. In 1702 he returned to England overland as a member of the household of the British ambassador to the Porte, Lord Paget. They travelled through Bulgaria, Transylvania, Hungary, Germany and Holland. His account, titled *Travels in Turkey and back to England* was published posthumously in 1747.²³ Woodward's collection contains three specimens from Chishull. He mentions in the travel account that he received mineral specimens from Samuel Köleséri (see below), supervisor of the mines in Transylvania. Possibly the

three specimens preserved in the Woodwardian collection derive from Köleséri's gift to Chishull:

π.8. Dust-Gold. From the River ———²⁴ in Hungary. [p. 30, E-11–29]

π. 9. Virgin-Gold, very fine, only wash'd. Out of the Vein of a Mine near *Hermanstad* [Cibinium], in Hungary. [p. 30, E-11–30]

π. 10. A grey Stone, part of the Side of a vein, with Spar adhering to it: as also Gold, yellow, and fine. From the same Vein. [p. 31, E-11–34]

du Mont

Woodward mentions him as *M. Oliv. du Mont* (Part 1, p. 17).

At the moment I am unable to identify him. He certainly travelled in Hungary and visited the Schemnitz mines. The Woodwardian collection contains seven of his specimens from Hungary:

v.14. *Vitriolum nativum album striatum, viridi leviter tinctum. Ex fodina Schemnitz.* [p. 17, missing specimen]

o.9. A Body compos'd chiefly of white Spar, but having some Cinnabar, and marcasite, along with it. Brought from Hungary [p. 20, E-9–9]

o.11. Rotgulden Ertz. Brought from Hungary [p. 20, E-9–11]

.+.o.9. *Pyrites Hungariae communis.* [p. 25, E-10–9]

σ.40. A Nodule of Lead from a Mine at ———²⁵ in Hungary. [p. 40, E-13–6]

*ω.23. Copper, very fine; and concreted in a very elegant and observable manner. 'Tis in form of the Letter B; and was form'd, in the manner recited in the precedent, upon putting a Piece of Iron of the very same Figure and Dimensions into a Vitriolick Spring in Hungary. [pp. 50–1, E-16–31]

*ω.25. A Piece of Copper in shape of a Piece of Iron, that was put into some Rivulet near *Herngrunt.* [p. 51, E-16–33]

Kisner

Woodward mentions him as 'Dr Kisner, à Leibscher-suffen' (Part 1, p. 28), and as 'Dr. Kisner, of Francfort' (Part II, p. 1).

Johann Georg Kisner (fl. 1720s). German physician and collector of general natural history in Frankfurt. He had a collection of 700 mineral specimens.²⁶ Woodward received from him four Hungarian specimens:

‡o.14. *Minera Antimonij Hungarica, stellaris, & pulchrè striata: cum fluore etiam striato.* Dr. *Kisner.* à Leibscher-suffen. [p. 28, E-10–67]

α.13. A piece of Wood dug up out of the Alum-Mines near *Duben* in Hungary. Sent by Dr. *Kisner*, of *Francfort.* [p. 1, E-18–35]

‡o.2. *Antimonium nativum griseum, cum Scintillis spississimis, Hungaricum.* From *Leibschersuffen.* Found in Veins among Copper and Iron-Ore, in the Day downwards, in great Quantity. [p. 27, E-10–55]

‡o.4. *Minera Antimonij, à Leibschersuffen in Hungaria.* [p. 27, E-10–57]

Köleséri

Woodward mentions him as *M. Sam. Robeseri* (*An Addition to the Catalogue of the Foreign Native Fossils*, p. 14). The name was misspelt by Woodward; the correct form is Sámuel Köleséri.

Sámuel Köleséri (18 November 1663, Szendrő, Hungary—24 December 1732, Hermannstadt, Transylvania) studied theology, philosophy and medicine in Leiden and Franeker, Holland. He was chief physician of Transylvania and supervisor of the mines there. He published widely on philosophy, theology, medicine, history, law and philology. His treatise on the mines of Transylvania: *Auraria Romano-Dacica* (1717) is of lasting value. Köleséri assembled a library of 4,000 volumes in all his fields of interest.²⁷ He was elected the first Hungarian Fellow of the Royal Society in 1729. He corresponded with many persons of significance, including Sir Hans Sloane and Johann Jakob Scheuchzer.²⁸ Woodward received only two specimens directly from Köleséri, although the three Hungarian specimens given to him by Chishull and the three by Scheuchzer may have been the donations by Köleséri to those collectors.

o.12. Native Cinnabar. Hungary. *M. Sam. Robeseri.* [p. 14, E-9–24]

π.27. Native antimony, cover'd with a brownish Crust, after the manner of that of Cornwall. Mr. Sam. Robeseri. This is from Hungary. [p. 15, missing specimen]

Leopold

Woodward mentions him as *Dr Leopold* (Part 1, p. 20). 'Finding my collections not sufficiently stored with Swedish fossils, and that I had no satisfactory Account of the Mines there, of his own Accord, and at his own Expense he undertook a Journey

thither for my Satisfaction'.²⁹ Altogether he sent ninety-one mineral and fossil specimens to Woodward.³⁰ There is a brief notice regarding his work in Woodward (1728, p. 54) 'Leopold, De Itinere Suecico. 8vo. Lübeck.' The Woodwardian collection holds thirteen specimens from Hungary, donated by Dr Leopold:

o.6. *Anthrax, sive Vena Minnij Schemnicensis Hungarica, cum Fluore & Marcasitâ juncta*. [p. 20, E-9-6]

π.13. *Minera auri, cum admixta Particula Cinnaberis nativae. Ex fodinis Cremnizensibus, Hungaria*. [p. 31, E-11-34]

ρ.5. *Argentum nativum capillare Hungaricum. Schemnitz*. [p. 31, E-11-43]

ρ.6. *Argentum rude purpureum Hungariae. Schemnitz*. [p. 31, E-11-44]

ρ.21. *Minera Argenti ex fodinis Altsolensibus in Hungaria. Rotgulden-Ertz*. [p. 33, E-11-59]

ρ.34. *Argentum rude rubrum mixtum cum Marcasita, Schemnicense Hungaricum*. [p. 34, E-11-72]

ρ.35. *Minera Argenti purissima, ex fodinis Schemnicensibus in Hungaria*. [p. 34, E-11-73]

ρ.36. *Minera argenti ex Palatinatu superiori*. This pretty rich in Silver. There is also of this sort of Ore got at Schemnitz. [p. 34, E-11-74]

ρ.38. *Argentum rude nigrum Schemnicense Hungaricum*. [p. 34, E-11-76]

ρ.74. *Vena Argenti ex fodina Trium Regum sanctorum Schemnizensi, in Hungaria*. [p. 37, E-12-36]

ω.24. *Ferrum in cuprum mutatum in Fonte Neosolensi in Hungaria*. [p. 51, E-16-32]

ω.27. *Lamina ferrea in Cuprum transmutata. Spener Mus. p. 162. Ex Hungaria*. [p. 51, E-16-35]

ξ.7. *Vitriolum album nativum Schemnicense, Hungaricum*. [p. 13, E-8-28]

Linck

Woodward mentions him as *D. Linck* (Part II, p. 2).

Johann Heinrich Linck (17 December 1674, Leipzig–29 October 1736, Leipzig) studied pharmacy in Leipzig and Copenhagen. Following travels to Holland and England he returned to Leipzig, and opened an apothecary's shop. He became famous for his *Naturalienkabinet* and for his library in the sciences. The catalogue of his collections was published after his death as *Index musei Linckiani* (1783–1787) by his son of the same name. His major zoological work titled *De stellis marinis* (1733) was the authoritative treatise on starfish for more than a century. Linck was member of several academies.³¹ He dedicated his

book *Epistola de sceletto Crocodili in Lapide* (Lipsiae, 1718) to Woodward. The Woodwardian collection holds a single Hungarian specimen from Linck:

α.33. *Viride montanum Hungaricum, s. Crysocolla*. From Newsohl. in Hungary. D. Linck. It appears to me to be a preparation, and not in its native Condition. [p. 2, E-1-21]

Newton

Woodward mentions him as 'Sir Isaac Newton' (Part I, p. 20).

Isaac Newton (5 January 1643, Woolsthorpe–31 March 1727, Kensington) studied mathematics and physics in Cambridge and held the Chair of Mathematics there from 1669. He was Fellow of the Royal Society from 1672, and its president from 1703 until his death. He had already published his major works on gravity and optics when he was appointed supervisor of the Mint in London in 1695.³² He had an interest in minerals, mineral chemistry and alchemy. In 1669 he wrote to a friend planning a tour of Europe, asking if he would acquire for him specimens of antimony, copper, tin, iron, lead, mercury and zinc ores, and lapis lazuli, with their respective localities and names.³³ The Woodwardian collection holds a single Hungarian specimen donated by Newton:

ο.18. *Cinnabar. Out of a River in Hungary*. [p. 20, E-9-18]

Scheuchzer

Woodward mentions him as *Dr Scheuchzer* (Part I, p. 25).

Johann Jakob Scheuchzer (2 August 1672, Zürich–23 June 1733, Zürich) studied science and medicine in Altdorf and Utrecht, and mathematics in Nuremberg. The fossil collection that he began assembling in 1690 soon became famous and brought him to the attention of the scholarly world. Upon returning to Zürich he became municipal physician, head of the Bibliothèque de Bourgeois, and director of the Museum of Natural History; in 1716 he became professor of mathematics. His son, Johann Gaspar, served for a time as an amanuensis to Woodward's rival, Sir Hans Sloane. Scheuchzer carried on correspondence with more than 700 European scholars. His published works include *Helvetiae stoicheiographia* (1716–1718), the first description of the natural history of the Alps; and *Herbarium diluvianum* (1709, 1723), which founded the science of palaeobotany. He was an admirer of Woodward, and translated his

An Essay Toward a Natural History of the Earth into Latin, to make it available to the learned world.³⁴ He donated 278 specimens to Woodward's collection.³⁵ Three of the Hungarian mineral specimens sent to Woodward may have been given to Scheuchzer by Köleséri. 'In your letter' wrote Woodward to Scheuchzer, 'you have given Names to each, but I wish you had rather mentioned the Place where each was found . . . For I do not so much please my self with Names and Words as with Things and the Uses of them'.³⁶

‡o.8. *Antimonium Hungaricum crystallizatum in Terra lutea*. [p. 27, E-10-61]

π.5. *Aurum purum Fossile ex Hungaria*. [p. 30, E-11-25]

ρ.54. *Argentum rude plumbej coloris*. Glass-Ertz Agricolae. Ex fodinis Hungariae. [p. 36, E-12-16]

Schönberg

Woodward mentions him as *Baron de Schonberg* (part 1, p. 5) or *M. de Schoenberg* (Part 1, p. 17), and identifies him too as 'Count de Schonberg, Lord Chamberlain to King Augustus, superintendent of the Mines in Saxony . . . [who] sent me samples of the Minerals and Ores there, with their proper names, and those by which they are known to the Miners . . .'.³⁷

Members of the Schönberg family were superintendants of the mines in Saxony between 1558 and 1761. The most famous of them was Abraham von Schönberg (1640–1711), superintendent from 1676. He was subject to Friedrich August I, known as the Strong, who was Elector of Saxony from 1694 and King of Poland as August III from 1697. For the better education of mining officials he published a book on all aspects of mining, from legal matters to the knowledge of ores and rocks.³⁸ Schönberg supplied 183 specimens of minerals to Woodward.³⁹

The Woodwardian collection holds six Hungarian specimens donated by Schönberg:

ζ.6. *Amianthus Hungaricus*. *Stein Flacks* [p. 5, E-5-31]

ο.4. *Vena Cinnabaris, cum fluore astro-rubente*. *Ex Hungaria*. [p. 20, E-9-1]

ο.5. *Cinnabaris Hungarica*. Zinnober-Ertz. [P. 20, E-9-5]

‡o.9. *Minera Antimonij Hungarica*. Spies-Glas; i.e. Spear-Glass, or Antimony. M. de Schonberg. (It is found in Quantity in the Gold-Mines of Cremnitz in Veins, 300 or 400 fathom deep. Mr. Weber.) [p. 27, E-10-62]

ρ.56. *Argentum rude ex Hungaria*, Glass-Ertz. [p. 36, E-12-18]

*ω.26. *Caementum*. N.B. *Caementum sua natura ferrum est, virtute vero Aquae vivae, quae prope Civitatum Eperies in Hungaria oritur, brevi temporis Spatio in Cuprum mutatur*. (The same is done in a Rill of greenish Vitriolick Water at Isol, five miles from Schemnitz. The Copper precipitates exactly in the very Form of the Piece of Iron, in 1, 2, 3, to 6 Months, according to the Thickness of the Iron. Mr. Weber.) [p. 51, E-16-34]

Weber

Woodward mentions him as 'Mr. Weber, who is a Native of Hungary, and has been long conversant in the Mines there, as likewise in those of Saxony' (Part 1, p. 3), or as 'Mr. Weber, who is an Hungarian and has been long conversant in the Mines of that Country, and of Saxony' (Part 1, p. 5).

So far I have been unable to identify Weber. It seems likely that he was a mining engineer or supervisor, holding posts both in Saxony and in Lower Hungary. Based on his opinion of a specimen from India, correcting the original determination of the sender, we are encouraged to think that he visited Woodward and gave expert opinion about his minerals. The Woodwardian collection holds two specimens donated by Weber. Many others were identified by him, often overruling the identifications of the original senders.

α.34. *Berg-Grün Germanis*, *Newsol* [p. 2, E-1-20]

δ.85. Another, dug up at the Depth of 50 fathom in an Iron-Mine, about 20 Miles from Newsohl, Hungary. [p. 10, E-22-24]

There are further twenty-one specimens from Hungary in the Woodwardian collection, for which the names of collectors or donors are unknown. A list of Carpathian specimens, with full citation, with Woodward's and Weber's remarks, and with a discussion of the author is published elsewhere.⁴⁰

Address for correspondence

Dr Miklós Kázmér, Department of Palaeontology, Eötvös University, H-1083 Budapest, Ludovika tér 2, Hungary. E-mail: kazmer@ludens.elte.hu

Acknowledgements

Dr David Norman, Director of the Sedgwick Museum, University of Cambridge, gave permission to study the Woodwardian collection. Mike Dorling and Rod Long, Keepers at the Sedgwick Museum, provided their enthusiastic help. The staff of the General Library and Earth Science Library of the Natural History Museum, London helped in many ways. Dr Gábor Papp (Budapest) identified some localities. Dr Peter Schmidt and Dr Klaus Thalheim (both

Dresden) assisted in identifying Schönberg. Mr Tomoo Oba, Mr Dewi Black and Dr Tamás Sütő are thanked for their hospitality during the author's successive stays in London. Dr Hugh Torrens (Keele) and Dr András Galács (Budapest) suggested alterations to the manuscript. Their help is gratefully acknowledged.

Notes and references

1. This paper is dedicated to the Hungarian Geological Society on the occasion of its 150th anniversary.
2. Two milestones in the historiography of geology are A. Geikie, *The Founders of Geology* (1897, reprinted New York, 1962), and the more recent comprehensive study of D. R. Oldroyd, *Thinking about the Earth. A history of ideas in geology* (London, 1996).
3. For a recent review of the subject, see P. Findlen, *Possessing Nature: Museums, collecting, and scientific culture in early modern Italy* (Berkeley, 1994).
4. The Carpathian Mountains, extending in a thousand-mile-long arc from the Alps as far as the Balkans, have been the site of large-scale mining activity for centuries. Mines belonging to the Hungarian kingdom were the largest suppliers of gold to the European market before Columbus, and a major supplier of copper thereafter.
5. The authoritative account of Woodward's collection is D. Price, 'John Woodward and a surviving British geological collection from the early eighteenth century', *Journal of the History of Collections* 1 (1989), pp. 79–95.
6. The synthesis volume, the essay on the origin of geological objects appeared first: J. Woodward, *An Essay Towards a Natural History of the Earth, and Terrestrial Bodies, Especially Minerals: As also of the Sea, Rivers, and Springs. With an Account of the Universal Deluge: And of the Effects that it had upon the Earth* (London, 1697), although based on his personal field experience and on the already large collection. It provides a theoretical background to his classification: J. Woodward, *Fossils of all Kinds, Digested into a Method, Suitable to their Mutual Relation and Affinity; with the names by which they were known* (London, 1728). His records on minerals and fossils, on which all of his conclusions have been founded, were published posthumously: J. Woodward, *An Attempt Towards a Natural History of the Fossils of England; in a catalogue of the English fossils in the collection of J. Woodward* (London, 1729). The best source for all his publications is V. A. Eyles, 'John Woodward, F.R.S., F.R.C.P., M.D., (1665–1728): a bio-bibliographical account of his life and work' *Journal of the Society for the Bibliography of Natural History* 5 (1971), pp. 399–427.
7. This is a surprisingly large number, considering the distance and the relative unavailability of the region to travellers during Woodward's time. While it may be considered as normal for collections in Vienna to have a large number of Carpathian mineral specimens, in London the unique scientific endeavour of Woodward was the major factor, which attracted gifts, donations and exchange specimens from remote parts of Europe.
8. H. Torrens, 'Early collecting in the field of geology', in O. Impey and A. MacGregor (eds.), *The Origins of Museums* (Oxford, 1985), pp. 204–13.
9. A detailed bibliography of all editions is in M. E. Jahn, 'A bibliographic history of John Woodward's *An essay towards a natural history of the earth*', *Journal of the Society for the Bibliography of Natural History* 6 (1972), pp. 181–213.
10. See V. A. Eyles, 'John Woodward, F.R.S. (1665–1728) physician and geologist' *Nature* 206 (29 May 1965), pp. 868–70; M. J. S. Rudwick, *The Meaning of Fossils. Episodes in the history of palaeontology*, 2nd edn. (Chicago, 1985), p. 85.
11. To assist his collectors, both in Britain and overseas, Woodward (anonymously) printed and circulated directions for them to ensure uniform recording of observations on localities and on specimens: *Brief Instructions for making Observations in All Parts of the World* (London, 1696). Reprinted with an introduction by V. A. Eyles, as *Sherborn Fund Facsimile* no. 4 (London, 1973).
12. See R. Porter, *The Making of Geology: Earth science in Britain 1660–1815* (Cambridge, 1977).
13. See Eyles, op. cit. (note 10); V. A. Eyles, 'Woodward, John', in C. C. Gillispie, (ed.), *Dictionary of Scientific Biography* 14 (New York, 1976), pp. 500–503; R. Porter, 'John Woodward: "A Droll sort of philosopher"', *Geological Magazine* 116 (1979), pp. 335–43.
14. See J. M. Levine, *Dr. Woodward's Shield: History, science, and satire in Augustan England*, 2nd edn. (Ithaca, 1991).
15. See Price, op. cit. (note 5).
16. F. J. North, 'From Giraldus Cambrensis to the geological map', *Transactions of the Cardiff Naturalists' Society* 64 (1931), p. 62.
17. See Price, op. cit. (note 5).
18. A full list of specimens derived from the Carpathians is provided with annotations in M. Kázmér and G. Papp, 'Minerals from the Carpathians in an eighteenth-century British collection', *Annales Historico-Naturales Musei Nationalis Hungarici* 90 (1998) (in press).
19. See Price, op. cit. (note 5), Appendix 1.
20. The late David Price, Keeper of the Woodwardian collection, compiled a catalogue of Woodward's specimens to show their arrangement in the cabinets and drawers. His card indexes of donors and localities make the collection easy to use. See also Price, op. cit. (note 5), pp. 92–3.
21. Michaud, *Biographie universelle ancienne et moderne*, 50 vols. (Paris, 1854–).
22. *Dictionary of National Biography* (Oxford, 1885–), sub nomine Browne, Edward.
23. See note 21.
24. The locality name is substituted by dashes both in Woodward's printed catalogue and in the original manuscript.
25. See note 24.
26. See W. W. Wilson, 'The history of mineral collecting 1530–1799' *Mineralogical Record* 25 (1994), pp. 1–243.
27. Although Köleséri's books were dispersed after his death, a full catalogue compiled by the magistrate has survived. The books have been identified by L. Bertók, 'Köleséri Sámuel könyvhagyatéka' [Library estate of Sámuel Köleséri], *Könyv és Könyvtár* 3 (1955), pp. 5–330, Debrecen.
28. There is no modern biography on Köleséri. A brief account is given in G. Csíky, 'Köleséri Sámuel' in F. Nagy (ed.), *Magyarok a természettudomány és a technika történetében. Életrajzi lexikon A-tól Z-ig*. [Hungarians in the History of Science and Technology. A Biographical

- Lexicon from A to Z.] (Budapest, 1992), pp. 290–1. Köleséri's correspondence with Sloane is discussed and the Latin letters are published in Gy. Gömöri, 'Köleséri Sámuel levelei Sir Hans Sloane-hoz' [Letters of Sámuel Köleséri to Sir Hans Sloane], *Magyar Könyvszemle* 105 (1989), pp. 283–7. Scheuchzer dedicated his *Herbarium diluvianum* to his fellow naturalists, among others to Newton and Woodward; Köleséri was also one of those honoured (see M. Kázmér, 'Une dédicace à Sámuel Köleséri dans le livre du médecin suisse J. J. Scheuchzer', *Magyar Könyvszemle* 113 (1997), pp. 318–20. For other letters of Köleséri see Zs. Jakó, *Köleséri Sámuel tudományos és irodalmi levelezése* [Scientific and literary correspondence of Sámuel Köleséri], (Szeged, in press).
29. See Woodward, [*Fossils of all Kinds*] op. cit. (note 6) pp. 54–5.
 30. See Price, op. cit. (note 5).
 31. *Allgemeine Deutsche Biographie* (Leipzig, 1875–1912).
 32. See in I. B. Cohen, 'Newton, Isaac', in C. C. Gillispie, *Dictionary of Scientific Biography*, 10th edn. (New York, 1964), pp. 42–101.
 33. See Wilson, op. cit. (note 26).
 34. A readily available, brief biography is in P. E. Pilet, 'Scheuchzer, Johann Jakob', in C. C. Gillispie (ed.), *Dictionary of Scientific Biography*, 12th edn. (New York, 1975) p. 159. A full account is given in H. Fischer, 'Johann Jakob Scheuchzer, Naturforscher und Arzt', *Neujahrsblatt der Naturforschenden Gesellschaft in Zürich* 175 (1973), pp. 1–168. Details of his translation of Woodward's work are to be found in Eyles, op. cit. (note 6) and in Jahn, op. cit. (note 9).
 35. See Price, op. cit. (note 5).
 36. See Woodward, op. cit. [*An Attempt*] (note 6), p. 47.
 37. See Woodward, op. cit. [*Fossils*] (note 6), p. 54.
 38. See W. Fischer, '400 Jahre Sächsisches Oberbergamt Freiberg (1542–1942). Die Bedeutung dieser Dienststelle für die Entwicklung der Geologie und Lagerstättenkunde', *Zeitschrift der Deutschen Geologischen Gesellschaft* 95 (1943), pp. 143–83. A. Schönberg's book is titled *Ausführliche Berg-Information, zur dienlichen Nachricht vor Alle, Die Bey dem Berg- und Schmelzwesen zu Schaffen* (1693).
 39. See Price, op. cit. (note 5).
 40. Kázmér and Papp, op. cit. (note 18). The identity of ancient settlement names in eighteenth-century Hungary is best given in J. Lipszky, *Repertorium locorum obsectorumque in XII. tabulis Mappae regnorum Hungariae, Slavoniae, Croatiae, et Confiniorum Militarum Magni item Principatus Transylvaniae occurrentium*, 2 vols. (Budae, 1808). For each town or village, names are given in one or more versions of Latin, German, Hungarian, Slavonian, Romanian, Croatian or Illyrian. Although a little late for Woodwardian times, the book of M. Majtán, *Názvy obcí na Slovensku za ostatných dvesto rokov* [Place names in Slovakia in the last 200 years], (Bratislava, 1972) lists all versions of place names in unparalleled detail for present-day Slovakia, i.e. for all the northern mining regions of eighteenth-century Hungary. A recent handbook, listing all settlements and many mountains, rivers, etc. for historical Hungary in several languages is L. Kiss, *Földrajzi nevek etimológiai szótára* [Etymological Dictionary of Geographical Names] 4th edn., 2 vols. (Budapest, 1988). Present-day and historical mineral localities in Slovakia are listed in M. Koděra (ed.), *Topografická mineralógia Slovenska*, 3 vols. (Bratislava, 1986–1990). Geographical coordinates are after A. Rónai and G. Teleki (eds.), *A Duna-völgy. Magyarázó a Magyar Földrajzi Intézet Rt. kiadásában megjelent "A Duna-völgy és környéke" című 1:1,000,000 léptékű térképhez* [The Danube Valley. Explanations to the 1:1,000,000 scale map 'The Danube Valley and Environs', published by the Hungarian Geographical Institute, Co.] (Budapest, 1948). An excellent recent handbook of Carpathian mineral localities in a historical context is G. Papp, 'A Kárpát-övezetben felfedezett ásványok történeti adattára' [Historical Lexicon of Minerals First Described from the Carpathian Region], *Általános Földtani Szemle* (in press).