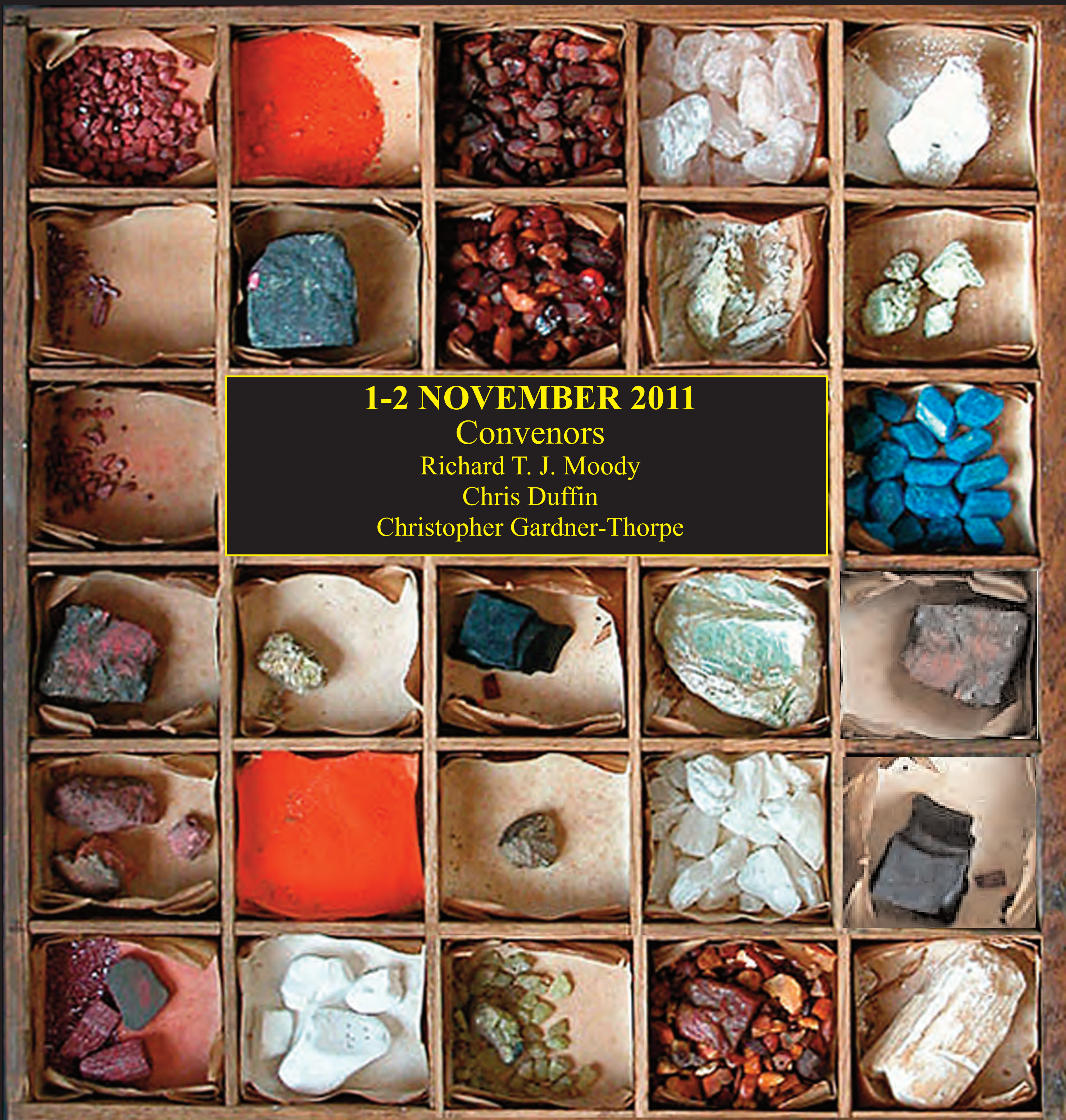
History
Of
Geology
Group

A HISTORY OF GEOLOGY AND MEDICINE



1-2 NOVEMBER 2011

Convenors

Richard T. J. Moody
Chris Duffin
Christopher Gardner-Thorpe

Geological Society, Burlington House, Piccadilly, London WIJ OBG

The History of Geology Group and the convenors of this meeting wish to thank the BG Group for the support given to this meeting and to future meetings on the history of geology

Caption for cover images

Front cover: Drawer from Vigani's Materia Medica cabinet, Long Room, Queen's College, Cambridge

Back cover: *Matthaeus Platearius* 1480-1500

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A HISTORY OF GEOLOGY AND MEDICINE

31 October-3 November 2011

Geological Society, Burlington House, Piccadilly, London, W1J OBG

ABSTRACTS BOOK

Compiled and Edited

by

Richard T. J. Moody

Chris Duffin

Christopher Gardner-Thorpe

Acknowledgements

The convenors wish to thank the British Gas Group, the History of Geology Group, The Geological Society and The Curry Fund of the Geologists' Association for their help with the funding, planning and organisation of this international conference on 'A History of Geology and Medicine'. Special thanks are due to the Geological Society for the use of the lecture theatre and Lower Library at Burlington House and to the Curry Fund for facilitating the printing of this book. Thanks also go to Beris Cox (HOGG) for the compilation of registrants and the management of incoming funds and to Louise Dyer (Geological Society) for her help with the essential resources that make life easier during the actual running of such a meeting. Finally thanks to Sarah Stafford (GA) and Linda Mcardell, Jean Parry and Dee Summers for advertising the meeting to members of the GA and OUGS.

As convenors we are also deeply indebted to the speakers/authors who have contributed so much to the publication of this book.

Introduction

CHRISTOPHER J. DUFFIN[1], RICHARD T. J. MOODY[2],
and
CHRISTOPHER GARDNER-THORPE[3]

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From the times of the earliest civilisations, two professional areas held the monopoly of formal education – the church and medicine. It was natural that, of these two disciplines, the latter should provide the birthplace for the bulk of enquiry into the natural sciences and geology in particular; many of the earliest descriptions of rocks, minerals and fossils can be attributed to physicians. Sumerian clay tablets, Egyptian medical papyri and Ayurvedic manuscripts all commended geological materials for the treatment of disease, examples of which would have been dispensed from one of the first pharmacies, which opened around 400 BC on the Arcadian Way in Ephesus. Apothecarial preparations containing essential geopharmaceutical ingredients have a rich and largely neglected history of use extending over some 4000 years. Similarly, the geological contributions of individual physicians to the development of the earth sciences have received only sparse attention. The aim of this conference is to provide an opportunity for international researchers from a range of disciplines, including geologists, medical professionals, historians and linguists, to explore for the first time the historical links between Geology and Medicine.

The papers and posters presented over the next two days are remarkable for their range, both temporally and in terms of their content. Two major themes emerge, however – the therapeutic use of geological materials and the contributions of individuals as they straddled the divide between medicine and geology.

In terms of lithotherapy, **Eladio Linan**, **Maria Linan** and **Joaquin Carrasco** reveal the hidden palaeontology of classical and mediaeval lapidaries, while **Dimitrios Koutroumpas** investigates the uses of geological materials by the great Galen of Pergamum (129-210 AD), physician to the gladiators. The uses of geological materials in the mediaeval Near East are considered by **Efraim Lev** (Egypt), **Joaquin Carrasco**, **Eladio Linan**, **Maria Linan** and **Christopher Duffin** (Arabic traditions). The history and uses of individual geological simples are traced by **Arthur MacGregor** (Terra sigillata), **Maria do Sameiro Barroso** (bezoar stones), **Nora Zergi** (haematite), **Renzo Console** (gold) and **Christopher Duffin** (fossil vertebrates). **Massimo Aliverti** considers geological materials in the context of European folk medicine, while the records of a patient vomiting forth stones and its effect on the 18th century Italian medical community is considered by **Alessandro Porro**, **Carlo Cristini**, **Bruno Falconi**, **Antonia Francesca Franchini** and **Lorenzo Lorusso**. Documentary and collection-based geological materia medica are elucidated by **Ian Rolfe** (Paper Museum of Cassiano del Pozza) and **Christopher Duffin** (18th century teaching cabinets).

The links between geology and public health are taken up by **Beverley Bergmann** (public health development), **Katriona Munte** (signs and signals) and **Aysegul Erdemir** (Turkish hot springs). Also, **John Pearn** and **Christopher Gardner-Thorpe** investigate the significance of the Sunday Stone.

The members of the early medical fraternity who contributed to the development of geology include Conrad Gessner (1516-1565) and Johannes Kentmann (1518-1574) by **Evelien Chayes**, Ole Worm (1588-1655) by **Ella Hoch**, Nicholas Steno (1638-1686) by **Jakob Bek-Thomsen**, Samuel Köleséri (1633-1732), John Woodward (1665-1728), and Johann Jacob Scheuchzer (1672-1733) by **M. Kázmér,** William Hunter (1718-1783) by **Jeff Liston**, John Wall (1708-1776), Edward Jenner (1749-1823) and Caleb Parry (1755-1822) by **Gillian Hull**. Victorian medics being considered at the conference include

John Jeremiah Bigsby (1792-1881) by **Leonard Wilson**, Ebenezer Emmons (1799-1863) by **Avi Ohry**, Paolo Gorini (1813-1881) by **Lorenzo Lorusso** (Chiari), **Bruno Falconi**, **Antonia Francesca Franchini** and **Alessandro Porro**, John Hulke (1830-1895) by **Simon Wills**, Conrad Clar (1844-1904) and Theodor Posewitz (1851-1917) by **Bernard Hubmann** and **Daniela Angetter**, Arthur Conan Doyle (1859-1930) by **Dave Martill** and **Tony Pointon**, as well as various physicians in The Heroic Age of Antarctic Exploration (1895-1922) by **H. Guly**. Sadly **Rais Akhtar** and **K S. Murty** were unable to travel to the UK but their original abstracts are include in this booklet.

The Geological community owes a debt to James Parkinson (1755-1824), who was a founding father of the Geological Society of London, in whose rooms these lectures are being held. His contributions are investigated by **Cherry Lewis** and **Christopher Gardner-Thorpe**.

Those of us who try to tease out details of the lives and work of these intellectual forerunners and polymaths who collectively contributed so much to the evolution of geology as a science begin to feel as if we know them personally. It is to this enormous list of medical men cum geologists that this meeting is fondly dedicated.

It is the hope of the organisers that this conference will provide a platform for the presentation of new research, a useful forum for identifying new questions worthy of future investigation, establishing new links within a scattered research community, as well as facilitating new friendships.

Pre-conference visit to

ROYAL COLLEGE OF SURGEONS

HUNTERIAN MUSEUM

31 OCTOBER 2011

ORGANISED BY

Professor Richard T. J. Moody

The Hunterian Museum at the Royal College of Surgeons

CHRISTOPHER J. DUFFIN

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The Hunter brothers, William (1718-1783) and John (1728-1793), were born into a family of ten children, several of whom died in childhood, and were raised at Long Calderwood Farm, now a museum in their honour, in what is now East Kilbride, Lanarkshire, Scotland.

William went on to study divinity at Glasgow University, matriculating in 1731, and then he went to study medicine at Edinburgh University. In 1741 he moved to London to train at St George's Hospital, specialising in obstetrics. He rose to become the leading obstetrician in the capital, being appointed Physician to Queen Charlotte (1764), FRS (1767) and Professor of Anatomy to the Royal Academy (1768). That same year he built the famous anatomy theatre and museum in Great Windmill Street, Soho, where the greatest surgeons and anatomists of the day came to train. Those flocking to his door included his brother John who until then had been working as a cabinet-maker in Scotland.

John assisted William with dissection and before long was in charge of his own series of dissection classes. Having found his forte, John went on to study medicine under William Cheselden (1688-1752) at Chelsea Hospital and Sir Percivall Pott (1714-1788) at St Bartholomew's Hospital. Following appointments at St George's Hospital as Assistant Surgeon (1756), and later as Surgeon (1768), and a spell serving as an Army Surgeon (where he made a name for himself treating gunshot wounds), John set up his own anatomy school and went into private practice in London. In 1771, he married Anne, sister of Sir Everard Home (1756-1832), who was later to describe the famous ichthyosaur discovered by Mary Anning (1799-1847) and her father from the Lower Lias (Early Jurassic) of Lyme Regis on the Dorset coast.

William, meanwhile, had cultivated a growing interest in the arts and was beginning to gather together a large collection of art work, antique coins, medals, shells, minerals, books and manuscripts. He made extensive purchases from the libraries and collections of private individuals and monastic houses, particularly in Paris, Vienna and Italy. He amassed a huge collection of anatomical preparations. After he died, eventually the collection passed to the University of Glasgow in 1807, forming the core of their Hunterian Museum and Art Gallery.

John emulated his brother William in his collecting activities as well as in his medical studies. By 1783 he had acquired a large house in Leicester Square, ideal to accommodate his growing number of specimens (supposedly around 14,000 preparations representing more than 500 species of plants and animals). In 1799 the Government purchased this huge collection of papers and specimens and presented it to the Company of Surgeons which became the Royal College of Surgeons where the collection forms the basis of the Hunterian Museum.

John Hunter's original collection was utilised by him as a teaching museum and included some significant contents, some of which has now been dispersed to other institutions. For example, Joseph Banks (1743-1820), the famous traveller and naturalist who later served as a long-term President of the Royal Society, at different times gave parts of his collection to Hunter. This included material collected during his 1768-1771 voyage to South America, Tahiti (to observe the Transit of Venus), New Zealand and Australia on HM Bark *Endeavour* when he served as naturalist on Captain James Cook's (1728-1799) first voyage of discovery.

In 1783 John acquired the skeleton of the Irish giant Charles Byrne (1761-1783), still prominently on display. Legend had it that Byrne's considerable height (over which there is some argument, but is generally agreed to have been at least 7 feet 7 inches or 2.31 metres) was due to the fact that he had been conceived on top of a haystack! Byrne left Drumallon in the remote reaches of County Tyrone and travelled to London to seek his fortune. Here, he was hailed as a remarkable curiosity and was overtaken by fame and wealth. He drank excessively, and having had his pocket picked of his life savings, tried to drown his sorrows in

The Royal College of Surgeons, Lincoln's Inn Fields, London: the interior of the Hunterian Museum. Coloured engraving (undated) by E. Radclyffe after T. H. Shepherd. Image courtesy of the Wellcome Trust.

alcohol, which led directly to his death. Apparently terrified at the prospect of the 'anatomists' dissecting his corpse, his deathbed request was to be born at sea. Contrary to his wishes, his corpse was purchased by Hunter, who bribed a member of the funeral party with £500. The coffin was supposedly filled with rocks at an overnight stop, and the body whisked away for dissection, preparation and scientific description. In similar vein, John Hunter is believed by some to have been somehow involved in a number of deaths. The question has been raised as to how his brother William was able to gain access to the corpses of so many pregnant women for his foundation study on the gravid uterus (published in 1774)!

The collections were supplemented after transfer to the Royal College of Surgeons in 1799. An extensive collection of skulls, jaws and teeth of humans and a range of other animals forms the historically important

Odontological Collection, for example, and there is a fine collection of historical surgical and dental instruments. Over 10,000 microscope slides collected or prepared in the 1840s and 1850s by John Thomas Quekett (1815-1861) belong to the Museum, as does a large and diverse collection of primate material collected and prepared by William Charles Osman-Hill (1901-1975).

There is one rather bizarre connection between the Hunterian Collection and the Oxford University Museum. William Buckland, first Professor of Geology at Oxford and later Dean of Westminster, died in an asylum in 1856. His son, Francis Trevelyan Buckland (1826-1880), studied surgery at St George's Hospital. His passion for surgery led him to order post-mortems on his own parents. The Hunterian Museum contains the occipital bone and five cervical vertebrae of William Buckland (RCSPCS/ 49a.5 – not on display). Frank later wrote '*[while] the brain itself was perfectly healthy…the base of the skull…together with the two upper vertebrae of the neck, were found to be in an advanced state of caries, or decay. The irritation, therefore, communicated by this diseased state…was quite sufficient cause to give rise to all symptoms; this irritation being considerably augmented by continuous and severe exercise of the brain in thought*'. Frank Buckland searched for and found John Hunter's coffin in the crypt of St Martin's in the Fields, Trafalgar Square, and arranged reburial in Westminster Abbey in 1859.

The first curator of the collections was cornishman William Clift (1775-1849). Clift was apprenticed to John Hunter through an introduction by a friend of Hunter's wife, and arrived in London on the date of both his and Hunter's birthday (14th February)! His drawing skills held Clift in good stead, and he was employed to care for the museum, attend Hunter's dissections, make notes, write letters and so on. After Hunter's death, the Royal College agreed to keep him on when they acquired the collections. It was to William Clift that Gideon Mantell (1790-1852) came seeking assistance and comparative material for his study of the reptile remains he had collected from the Early Cretaceous, later (1825) described as *Iguanodon*. Clift also contributed papers to the *Transactions of the Geological Society of London*.

Probably the most famous curator of the collections was Richard Owen (1804-1892), Clift's immediate successor and, eventually (in the face of many and sustained objections from his wife) son-in-law. Owen came to London from Lancaster following an apprenticeship to a local surgeon and apothecary, and medical studies at Edinburgh University. The eminent surgeon John Abernethy (1764-1831) encouraged Owen to accept the post of assistant to Clift at the Hunterian Musuem. Owen catalogued the collection, developing his skills as a comparative anatomist, and was appointed Hunterian Professor at the Royal College of Surgeons in 1836, eventually leaving in 1856 to take up the post of Superintendent of the Natural History Department of the British Museum. Owen's intimate knowledge of extant and fossil organisms and his access to the vast diversity of Hunter's collections allowed him to make significant contributions to geology. This included the definition of the Dinosauria in 1842, extensive descriptions and interpretations of labyrinthodont amphibians, Mesozoic mammals, mammal-like reptiles (therapsids), Mesozoic aquatic reptiles (plesiosaurs, ichthyosaurs and turtles), Darwin's Beagle collection of South American fossil mammals, the Moa, and *Archaeopteryx*. His zoological contributions were no less impressive, with memoirs on the Dodo, Kiwi, Takahe, Great Auk, Pearly Nautilus, brachiopods, *Limulus* and many others. Other achievements include supervising the removal of the natural history collections to a dedicated building, now The Natural History Museum in South Kensington, and advising the sculptor Benjamin Waterhouse Hawkins (1807-1894) in the preparation of life-size models of dinosaurs for The Great Exhibition of 1851 and then the Crystal Palace Gardens at Sydenham. He was never far from controversy, nursed a gigantic ego and was an accomplished political schemer. The science historian, Richard Freeman, once (1978) characterised him as '*the most distinguished vertebrate zoologist and palaeontologist ... but a most deceitful and odious man*'.

The Royal College of Surgeons was bombed during the night of 10th May, 1941, and much of the collection destroyed. With considerable foresight, the basements and sub-basements had been strengthened earlier, and the Hunterian and other historical parts of the collections placed there for safe storage. Fire damage meant the loss of some material, and parts of the collection were dispersed accompanying rebuilding of the College after the War. The new Hunterian Museum opened to the public in February 2005.

HISTORY OF GEOLOGY AND MEDICINE

1st – 2nd November 2011

CONFERENCE PROGRAMME

Day 1. Tuesday 1st November

8:30: Registration at the Geological Society, Burlington House, Piccadilly, London W1J 0BG

9:00: Welcome and Housekeeping: Professor R.T.J. Moody

Session 1: Eighteenth Century physician/geologists (Chairman : Richard .T.J. Moody)

9:10: Keynote Address: Christopher Gardner-Thorpe (Exeter, UK) and Cherry Lewis (Bristol,UK). James Parkinson (1755-1824).

9:50: Jeff Liston (Glasgow, UK): Mixing Gynaecology with Geology: The vertebrate fossil collections of William Hunter

10:20: Avi Ohry and Rachel Eljashev-Shimshon (Tel Aviv, Israel): Ebenezer Emmons (1799-1863): geologist, educator and physician

10:50: Coffee

Session 2: Early medicinal uses of inorganic material (Chairman: Chris Duffin)

11:10: Arthur MacGregor (Oxford, UK): Terra sigillata: a historical, geographical and typological review

11:40: Efraim Lev (Haifa, Israel): The practical medicinal use of inorganic substances in Medieval Mediterranean according to the Cairo Genizah

12:10: Joaquin Carrasco & M. Linan (Zaragoza and Leon, Spain): A comparative study of the stomatological stones cited in the Kitab al-tasrif (Albucasis, 1000 AD)

12:40: Nora Zergi (Budapest, Hungary): Haematite in ancient-medieval medical treatises

13:10 Lunch

13:10-13:15 HOGG AGM in lecture theatre

Session 3: Early Modern Physicians and Geology (Chairwoman: Cherry Lewis)

14:00: Jakob Bek-Thomsen (Aarhus, Denmark): From flesh to fossils: Nicolaus Steno and the anatomy of the Earth

14:30: Evelien Chayes (Nicosia, Cyprus): Conrad Gessner and Johannes Kentmann: two Early Modern physicians and their contribution to (Medical) Geology

15:00: Ella Hoch (Gram, Denmark): The realism of Ole Worm, portender of ‘that enlightened and barbaric realm, Europe’

15:30 Coffee

Session 4: Fossils, minerals and medicinal folklore (Chairman: W. D. Ian Rolfe

15:50: Eladio Linan (Zaragoza), M. Linan (Leon) and Joaquin Carrasco (Zaragoza, Spain): Cryptopalaeontology : The fossils contained in ancient lapidaries and their magico-medicinal use

16:20: Christopher Duffin (Sutton, UK): ‘The Gem Electuary’

16:50: Massimo Aliverti (Milan, Italy): Religiousness and magic in lithoiatric practices of European folk medicine

17:20: Alessandro Porro (Brescia), Carlo Cristini (Brescia), Bruno Falconi (Brescia), Antonia Francesca Franchini (Milan) & Lorenzo Lorusso (Chiari, Italy): Vomiting Stones: Mental illness and Forensic Medicine in 18th Century Italy

17:50: John Pearn (Brisbane) and Christopher Gardner-Thorpe (Exeter): The Sunday Stone

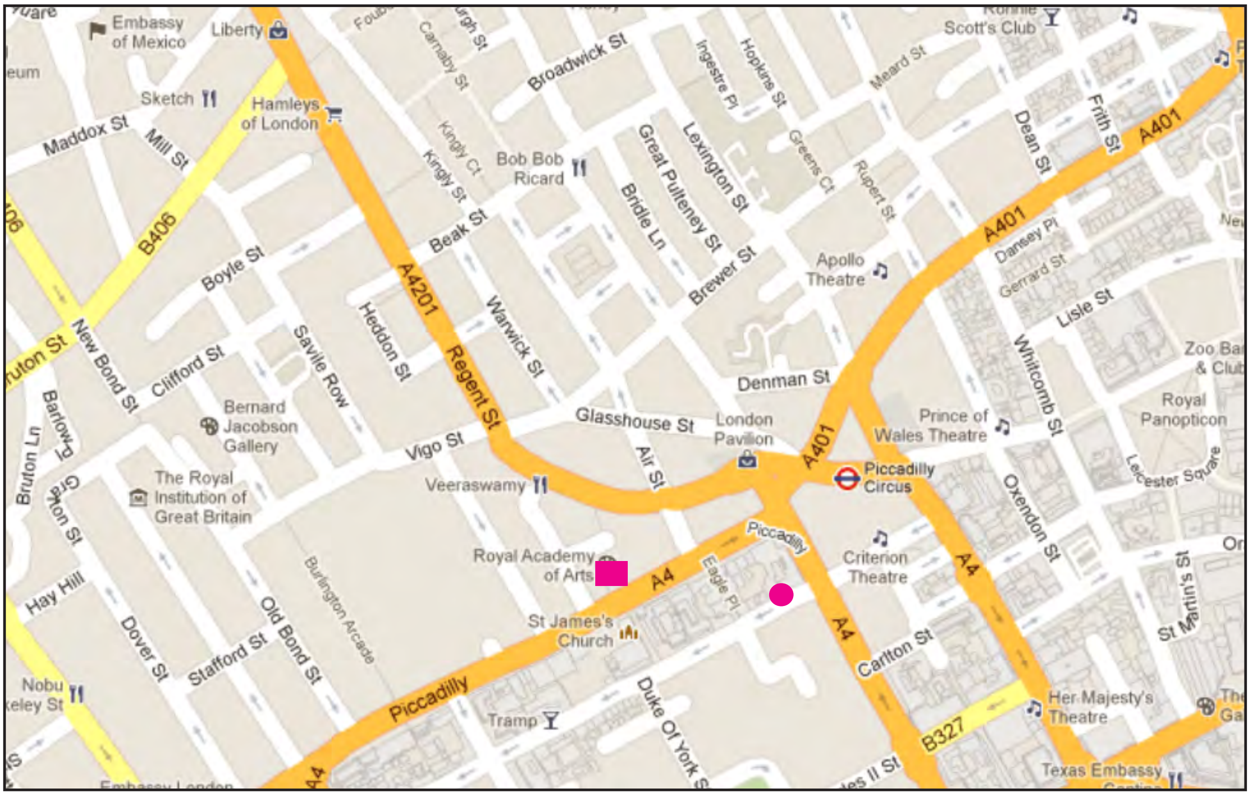
Close: 18:20

RECEPTION

18.30. Lower Library, Geological Society, Burlington House

CONFERENCE DINNER

19.45. Getti's Restaurant, 16/17 Jermyn Street, London, SW1Y 6LT



Day 2 Wednesday 2nd November

Session 5: Geology and public health (Chairman : Christopher Gardner-Thorpe)

9:00: Beverley Bergmann (Edinburgh, UK): The influence of geology in the development of public health.

9:30: Katriona Munthe (Rome, Italy): Signs and symbols: language and abstraction of the ideas that shaped the developing sciences.

10:00: Aysegul Demirhan Erdemir (Bursa, Turkey): Bursa in the history of Turkish hot spring and some samples (with the Ottoman Archive documents)

10:30: Coffee

Session 6: From Galen to Bigsby – Geological Contributions through two millennia (Chairman : Dave Martill)

10:50: Keynote Address: Leonard G. Wilson (Minnesota, USA): John Jeremiah Bigsby, M.D. (1792-1881): Geological Pioneer in Canada

11:20: Gillian Hull (Pitlochry, Scotland): Porcelain, Pox and Angina pectoris

11:50: M. Kazmer (Budapest, Hungary): Stones, fossils, and the medical profession – a collectors' network in Early Modern Europe in support of the Flood

12:20: Dimitrios Koutroumpas (Athens, Greece): The Pharmaceutical use of Earths, Rocks and Minerals by Galen of Pergamum

12:50 : Lunch

Session 7: 17th century studies (Chairman: Chris Duffin)

14:00: W. D. Ian Rolfe (Edinburgh, UK): Materia medica in the seventeenth century Paper Museum of Cassiano dal Pozzo

14:30: Maria do Sameiro Barroso (Lisbon, Portugal): Bezoar Stones, magic, science and art from the Late Middle Ages to the end of the 17th Century

15:00: Renzo Console (Woking, UK): Pharmaceutical use of gold in the 16th and 17th Centuries

15:30 Coffee

Session 8: 19th and 20th century physicians as geologists (Chairman : Dick Moody)

15:50: David M. Martill and Tony Pointon (Portsmouth, UK): Arthur Conan Doyle: physician, author and first true populariser of pterosaurs

16:10: Bernard Hubmann & Daniela Angetter (Graz, Austria): Conrad Clar (1844-1904) and Theodor Posewitz (1851-1917): lives between geology and medicine

16:40: H. R. Guly (Plymouth, UK): Medical geologists during the Heroic Age of Antarctic exploration

17:10: K.S.Murty (Nagpur, India): Medical professionals and their contribution to Indian Geology

17:40: Lorenzo Lorusso (Chiari), Bruno Falconi (Brescia), Antonia Francesca Franchini (Milan) & Alessandro Porro (Brescia, Italy): Geology, conservation and dissolution of corpses by Paolo Gorini (1813-1881)

CLOSE 18:10 : CLOSING REMARKS

Posters

Daniela Claudia Angetter, Bernhard Hubmann and Johannes Seidl. Physicians and their importance or the early history of Earth sciences in Austria

Christopher J. Duffin. Vertebrate Fossils as Drugs

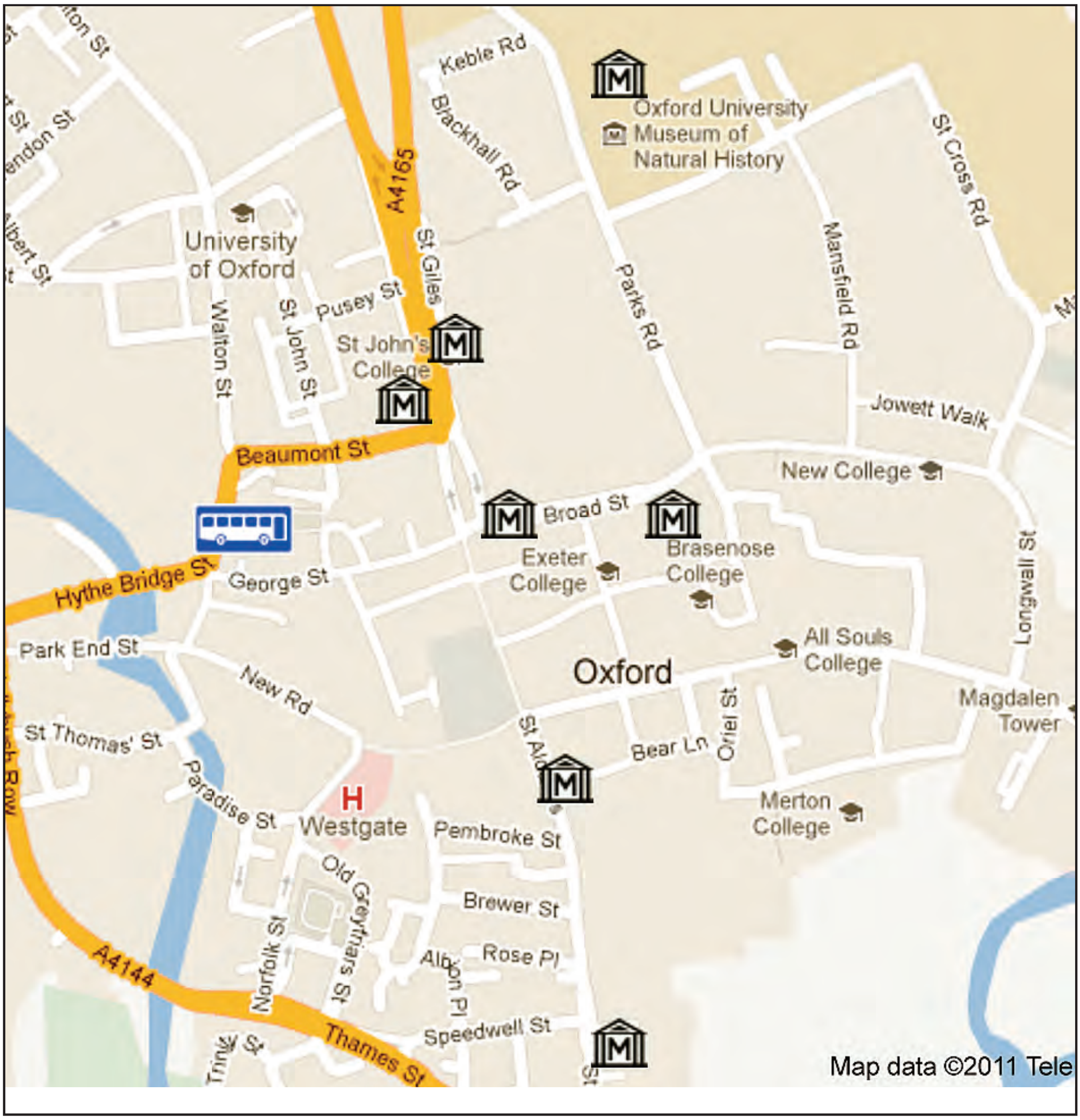
Christopher J. Duffin. Source materials for tracing the evolution of geological simples

Christopher J. Duffin. Some surviving early 18th century geological Materia Medica

Post-meeting excursion

THURSDAY 3RD NOVEMBER

Day visit to OXFORD including the University's Natural History, Pitt Rivers and Ashmolean museums.
Assemble in Oxford 10.30



James Parkinson (1755-1824), apothecary, surgeon and fossilist

CHERRY LEWIS[1] and CHRISTOPHER GARDNER THORPE[2]

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At the age of 16 years James Parkinson was apprenticed to his father in London to learn the art and mystery of being an apothecary. At the end of his six-year apprenticeship he spent six months as a dresser at the London Hospital and in 1784 he passed the oral exam at the Company of Surgeons that entitled him to practise as a surgeon. Shortly afterwards he attended a course of lectures given by the famous surgeon, John Hunter (1728-1793).

During the 1790s he became heavily involved in radical politics, joining several societies founded to campaign for the reform of Parliament. Under the pseudonym 'Old Hubert' Parkinson wrote many political pamphlets that ridiculed and harangued a corrupt and incompetent government for the soaring cost of food and high taxes incurred as a result of the war with France.

Parkinson also wrote many medical works aimed at the general public, helping them assess in times of sickness whether or not to call in the physician. With these same principles in mind of 'improving' the general public, he published his three-volume work on fossils that was entitled *Organic Remains of a Former World* . This masterpiece was to put palaeontology on the scientific map of Britain for the first time.

Having become interested in fossils as a young man, Parkinson tried to find publications in English that would help him understand their significance - but little was available. Assuming others must be having similar difficulties, he decided to write the definitive book himself and thus *Organic Remains* was aimed at a popular readership and written accordingly; nevertheless, the work reveals a man fully conversant with contemporary geological ideas being propounded on the Continent which were, in general, in advance of those in Britain.

The lily ecrinite from vol 2 (1808) of Parkinson's *Organic Remains of a Former World*.

In 1807 his expertise as the country's only 'fossilist' resulted in him becoming one of the founders of the Geological Society.

In 1817 he published the work for which chiefly he is remembered today. His Essay on the Shaking Palsy, now called Parkinson's Disease, has deservedly become a medical classic but it was for his work on natural history that the Royal College of Surgeons awarded him their first Gold Medal. Although his political radicalism barred him from becoming a Fellow of the Royal Society, his scientific achievements were greater than many others elected FRS.

In this paper, a neurologist experienced in Parkinson's disease and an historian of geology discuss how Parkinson's medical work influenced and interacted with his emerging understanding of fossils and natural history.

Mixing Gynaecology with Geology: The vertebrate fossil collections of William Hunter (1718-1783)

JEFF LISTON

Hunterian Museum, University of Glasgow, Scotland, UK: *j.liston@museum.gla.ac.uk*

Today William Hunter is remembered mainly for his pioneering work in obstetrics and for our understanding of the lymphatic system but his interests were wide-ranging, encompassing artworks (the first to collect Chardin), archaeological, numismatic and bibliographical items. As a key figure in the Enlightenment, he was one of the few in the mid-18th century to advocate the concept of extinction as recorded in the fossil record. Of some 400 fossil specimens, written records attest to the presence of at least 45 fossil vertebrates in his collection including fish from 'Monte' Bolca as well as specimens reflecting his comparative anatomical writings on the mastodon and 'Irish elk'. Some of the missing 45 specimens from Dr Hunter's original collection, recently unearthed during researches for the bicentenary (1807-2007) redisplay of the Hunterian Museum, will be presented.

Durant, G. P. D. & Rolfe, WDI. (1984): William Hunter (1718-1783) as Natural Historian: his 'geological' interests. *Earth Sciences History*, (**3**):9-24.

Hunter, W. (1768): Observations on the bones, commonly supposed to be elephants bones, which have been found near the River Ohio in America. *Philosophical Transactions of the Royal Philosophical Society of London*,1768: (**58**) 34-45.

Laskey, J. (1813): *A General Account of the Hunterian Museum, Glasgow*. Glasgow.

Rolfe, W. D. I. (1983). William Hunter (1718-83) on 'Irish Elk' & Stubb's Moose. *Archives of Natural History,* 11 (**2**): 263-290.

Mastodon cheek tooth from North America

Ebenezer Emmons, MD (1799-1863): man of nature: geologist, educator and physician

AVI OHRY and RACHEL ELJASHEV-SHIMSHON

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[2] *Ophthalmologist, Kupat Holim Clalit, Sharon District, Kfar Saba and Sackler Medical School lecturer/instructor Tel Aviv University, Israel*

"What's in a name?" William Shakespeare, playwright, Romeo and Juliet (II, ii, 1-2)

Ebenezer Emmons (1799-1863)

Upon the birth of Ebenezer Emmons, his parents, Ebenezer and Mary Mack-Emmons, both farmers, chose for him - as was the custom in those days, the same biblical name. Interestingly, with their choice of name for their son, Ebenezer, they had in essence forecasted their son's future occupation: for 'Ebenezer' is Hebrew for 'stone of help' ('helping stone').

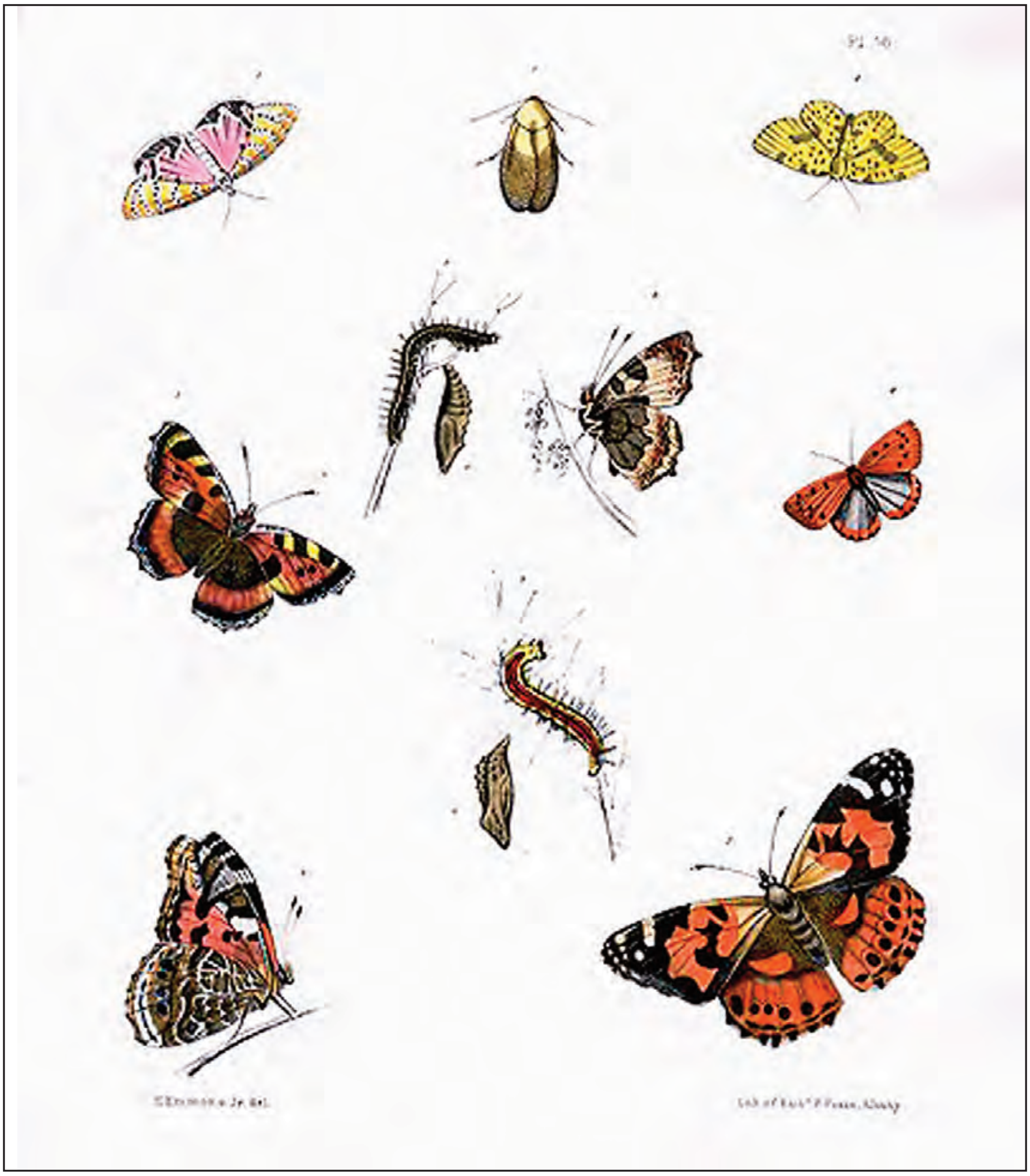
In the Bible, 'Ebenezer' is the name of the memorial stone set up by the prophet Samuel in order to commemorate God's Almighty assistance to the nation of Israel in their great battle against the Philistines (1 Samuel 7:7-12).

Early on, young Ebenezer showed an interest in the natural sciences. His room in Middlefield, Massachusetts was decorated with insects, bugs, butterflies and mineral specimens. He studied at Plainfield, Mass., at the school where the Reverend Moses Hallock taught.

Emmons, the poet/philosopher William Cullen-Bryant and Dr. Marcus Whitman, were all among the students who were deeply influenced by Reverend Hallock's teachings.

In 1814, Ebenezer moved his studies to Williams College in Williamstown, Mass., where he further studied natural sciences under the tutelage of Amos Eaton (1776-1842) and Chester Dewey (1784-1867) who both taught geology and chemistry there. After Emmons graduated in 1818 he went on to study medicine at the Berkshire Medical College. Dr. Emmons practised medicine in Chester, Massachusetts however, he ultimately returned to his first love: geology. From the years 1824-1826, Emmons had continued his studies in geology at the new Rensselaer Institute (Polytechnic) in Troy, New York where Eaton had become a senior professor. Dr. Emmons assisted Dewey in producing a geological map of Berkshire County, Mass. Emmons graduated from the Institute and published in 1826 'A Manual of Mineralogy and Geology' intended as a handbook for students.

In 1828, Dr. Emmons had moved to Williamstown where subsequently he was appointed lecturer in chemistry at Williams College. In 1833, he became a Professor of Natural History (Geology and Mineralogy) there as well. Afterwards, he was also appointed Professor of Obstetrics at Albany Medical College. In 1836, Dr. Emmons was appointed geologist-in-chief of the northern district of the Geological Survey of New York State. He was later appointed a custodian of the collection made by the survey; a position he held during the years 1842-48. In 1843, Dr. Emmons began an investigation of the agricultural resources of the state.



Hand coloured lithograph by Ebenezer Emmons from a Natural History of New York, Part V, Volume 5: *Agriculture*, portraying *Cynthia cardui* (pupa & caterpillar), *Vanessa urticae*? (pupa & caterpillar), *Chrysophanus phleas*, *Deiopeia bella* and ?*Blatta nivea*.

Terra sigillata: a historical, geographical and typological review

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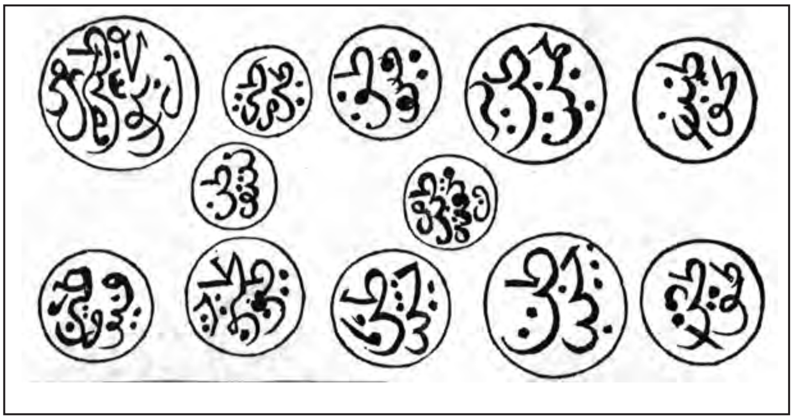
Since at least the Classical period, certain clays have been credited with extraordinary powers of healing and with the capacity to protect against the effects of poisons. Terra lemnia, from the island of Lemnos, was the most renowned of these, not least from its early endorsement by Dioscorides, Pliny and Galen, but several other Mediterranean sources also gained early recognition. Their reputation suffered something of an eclipse in the post-Roman era, until attention was once again drawn to them under the Ottoman empire, when their fame was spread throughout Europe.

Alternative sources for clays displaying similar medicinal or apotropaic qualites were sought in the central and northern European lands: Silesia came to be recognized as providing a creditable alternative to the Mediterranean sources, and as far north as England naturalists of the stamp of Robert Plot (1640-1696) sought further local clay beds of suitable composition. The healing powers of any such clays had to be demonstrated in practice, but their proof against poison was tested empirically in more direct fashion by administering poisons and clays in varying combinations to dogs. Modern research has since confirmed the efficacy of medicinal clays and has offered explanations for its action.

For our earliest knowledge of the introduction to pharmacy of these materials we are naturally obliged to the medical profession, but travellers, too, were drawn to the production sites and have left a number of first-hand accounts of them, while the founders of cabinets of natural and artificial curiosities in the sixteenth and seventeenth centuries found the prospect of including amongst their rarities examples of the productions of these various sites an irresistible attraction. Terra sigillata reached western Europe in two principal forms: as vessels made from these seemingly miraculous clays which were credited with the capacity of detecting or neutralizing poisons; and as troches of dried or baked clay stamped with an authenticating seal – the sigilla of their common name – which had the attraction to collectors that they could be formed into series in the cabinet in much the same way as the coinage with which many of them became obsessed. The illustrated catalogues and descriptive accounts of these early collections, notably from Italy, the German-speaking world and France, provide the basis of present-day knowledge of the iconography of the seals.



Turkish Seals for *Terra Sigillata* in use in Lemnos during the 16th Century.
From P. Belon 1555

The paper provides a brief review of the distribution of the clay sources and their respective fortunes. It also presents an iconographical guide by which the products of the respective production centres can be recognized.

The Practical Medicinal Use of Inorganic Substances in the Medieval Mediterranean according to the Cairo Genizah

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Inorganic materials have constituted part of the inventory of medicinal substances used in various cultures since ancient times. Such uses continue to the present day in ethnic folk medicine. The medicinal interaction between humans and inorganic substances has been an ongoing process in most societies all over the world. Minerals, metals, earths, organic minerals (e.g., asphalt) have played an important, though minor role in the curative practices of the inhabitants of five continents.

Research records and analyses of the practical medicinal uses of inorganic substances in medieval Egypt (as a reflection of the contemporary Eastern Mediterranean) are to be found in the Cairo Genizah. The Cairo Genizah is a room in the Ben Ezra synagogue of the Palestinian Jews of Fustat (old Cairo), in which various kinds of written materials were deposited and accumulated from the 9th to the 19th century.

Fragment from the Cairo Genizah

About 250,000 fragments were found in the Genizah and in Jewish cemeteries in Cairo and are scattered in libraries around the world. The biggest collection is at the Cambridge University Library (150,000 fragments) out of which about 1800 deal with medicine and pharmacology. The most important documents dealing with practical medicine are lists of materia medica and prescriptions. Twenty two inorganic substances were recorded as being held and sold for medicinal purposes by the Genizah people according to lists of materia medica and twenty seven substances were detected in prescriptions (altogether 32).

The substances are: Agate, Alum, Arsenic, Asphalt, Bezoar stone, Bitumen (Pix), Borax, Cadmium, Cinnabar, Clay (earth, bole), Copper, Cuprite, Gold, Gypsum, Haematite, Kohl [Antimony, Galena], Lapis lazuli, Lead, white (Ceruse), Litharge, Mercury, Minum, Mumie, Potash, Pyrite [Marcasite], Sal-ammoniac, Salt, Scoria, Silver, Sulphur, Vitriol [verdigris], Zinc. Ten more inorganic substances were identified in theoretical sources (books) in the Genizah but there is no record for their practical use by the contemporary physicians and pharmacists: Burnt copper, Crude oil (Kerosene), Crystal, Emerald, Hyacinth, Indian salt, Jews' stone, Lime, Lead peroxide, Pumice and Tartaric acid.

A comparative study of the stomatological stones cited in the Kitab al-tasrif (Albucasis, 1000 AD)

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The search for remedies to treat dental disease is as old as mankind, such is the importance of the stomatognathic system (mouth, jaws, teeth and related structures) in the evolution of man and society. The earliest records of such treatments date back to 3,000 BC according to an Egyptian hieroglyphic writing that shows Hessian-Re as head of dentists and doctors of the court. This paper will concentrate on the *Kitab al-Tasrif*, a medical treatise completed in 1000 AD by the famous Arabic physician, surgeon and pharmacologist, Abulcasis (Abu-l-Qasim al Zahrawi; 936-1013), from Cordoba (Andalusia, southern Spain). Chapter (Maqal) XXI of this thirty-chapter long, highly influential early pharmacological work, translated into Latin by Gerard of Cremona during the 12th century, is dedicated to mineral panaceas for oral and dental diseases.

The entries include alum, bitumen, cooked clay (phyllosilicates), arsenic, sulfur, Armenian Bole (red clay), borax, lime, verdigris (copper carbonate, copper chloride, and other copper salts), coral (calcite), lapis lazuli (lazurite), marcasite, marble, nacre, orpiment, salt (halite) and vitriol. The remedies detailed by Abulcasis are compared with those in Dioscorides' much earlier Materia Medica (1st century AD), the later Hortus Sanitatis (1496) by Johannes de Cuba, and recent pharmacopoeias. Successive authors have been influenced by their predecessors and so are their remedies.

By identifying which preparations have been retained, rejected or newly introduced it has been possible to trace and evaluate the evolutionary path of mineral-containing drugs and dental compounds, and to account for the survival of many of them in therapeutic compounds. Some of the old mineral remedies, even though they are effective, have a narrow therapeutic range and they are omitted from current pharmacology, but many of them are still useful. Thus, alum (hydrated potassium aluminium sulphate) is still often included in preparations for mouthwash and gargle, and is employed as a haemostatic and for the treatment of thrush. So is borax (sodium borate) which also has antiseptic properties and is a useful therapeutic for ulcers and throat infection. Arsenic is used for mouth chancre and as a caustic. Other salts, such as the calcium carbonate contained in marble, nacre or coral, are still used as antiseptics, tooth remineralisers and teeth whiteners.

Haematite in ancient-medieval medical treatises

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Haematite, or 'bloodstone' – from the Greek haima (blood) – was widely known and used as a healing mineral even in ancient times. It was mentioned in the earliest scientific treatise on stones written by Theophrastus in the 4th century BC and was present in every later materia medica – that is, medical collection – since minerals consistently formed part of a doctor's healing arsenal.

Although grayish black in appearance with a metallic lustre, the streak and powder of haematite is reddish brown, and this may be the origin of its link with blood. This match seems to be obvious, since blood gains its colour from the iron-containing protein of erythrocytes – haemoglobin. Myth states that haematite is formed by consolidation of blood spilt on the ground, so according to folklore it was generally used as a healing agent in blood disorders, including those caused by injuries, menstrual bleeding and pregnancy. Haematite gems were mostly applied externally, enclosed in a ring, as a pendant on a lace, or even locally, bound to the injured part of the body. The intrinsic healing properties ascribed to the stone were often strengthened by carvings and incantations. Moreover, among extant specimens of haematite gems there are numerous examples that are broken or grated, providing evidence of processing for internal use. According to ancient medical texts one should drink the powder in wine or vinegar.

3rd century magical haematite gem
© The Trustees of the British Museum

Currently, there is a serious dispute amongst the medical community about effective iron replacement therapy, debating the absorbance of ferrous (Fe^{2+}) and ferric (Fe^{3+}) ions in the intestinal tract, as well as the affect of acidic milieu on that absorbance. The question arises: was it myth that inspired these medical indications, or was it that the people of antiquity, millenia ahead of their time, had empirical evidence for the therapeutic effects of haematite? This presentation will explore possible answers to these questions.

From flesh to fossils: Nicolaus Steno (1638-1686) and the anatomy of the Earth

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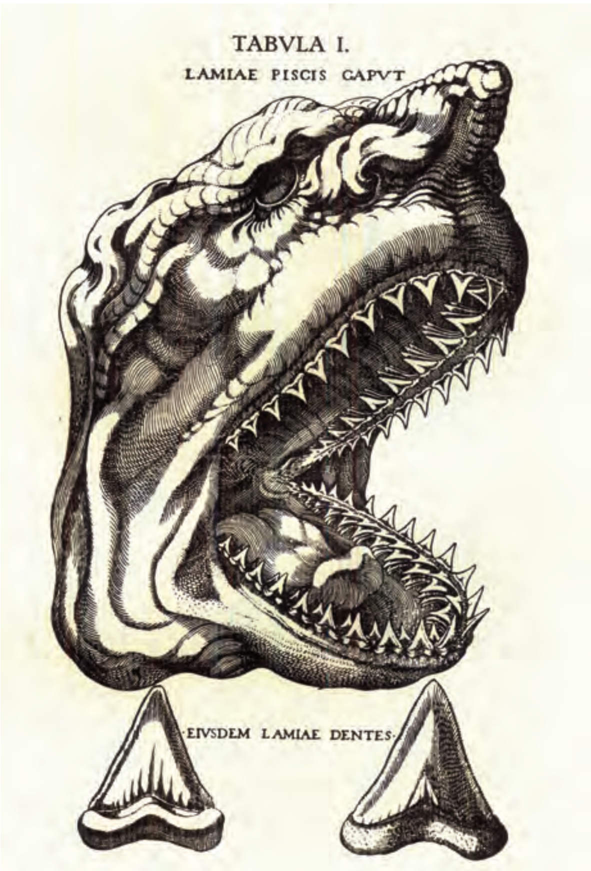
This paper explores the functions of natural philosophers at the court of the Medici through the case of the anatomist/geologist Nicolaus Steno. By tracing Steno's doings in the years he spent in the service of the Florentine Court, this paper pinpoints how the natural philosophies of anatomy and geology flowed freely between each other as a shared way of learning about and experiencing nature. From this perspective it becomes not so much a question of how medicine influenced geology, but how the methods and knowledge from a study of medicine were beneficial at the beginning of the study of geology.

Nicolaus Steno (1638-1686)

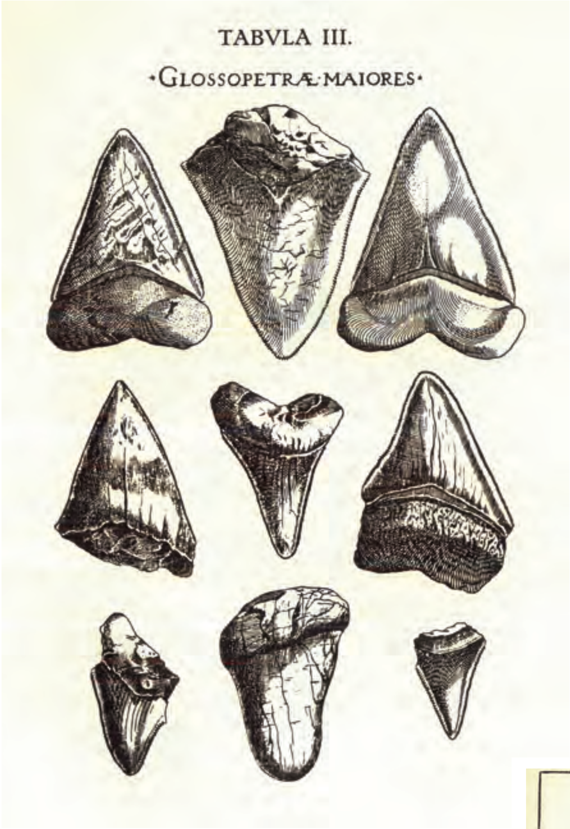
Within the history of geology Steno is known widely as one of the earliest natural philosophers who correctly described a theory of the Earth's formation. By some he is considered the 'father of geology' and his contributions to geology are seen by some as the equivalent of Charles Darwin's contributions to biology.

But while Steno's contributions to geology have received extensive attention, it has always been from the perspective of geology itself, excluding other and equally important aspects of his work. The division of professional disciplines we keep today was much more fluid in the early modern period. Geology and anatomy were not considered to be as far apart as they are today. Nature was the uncharted territory of all academic disciplines, making scholarly preferences only different methods of mapping.

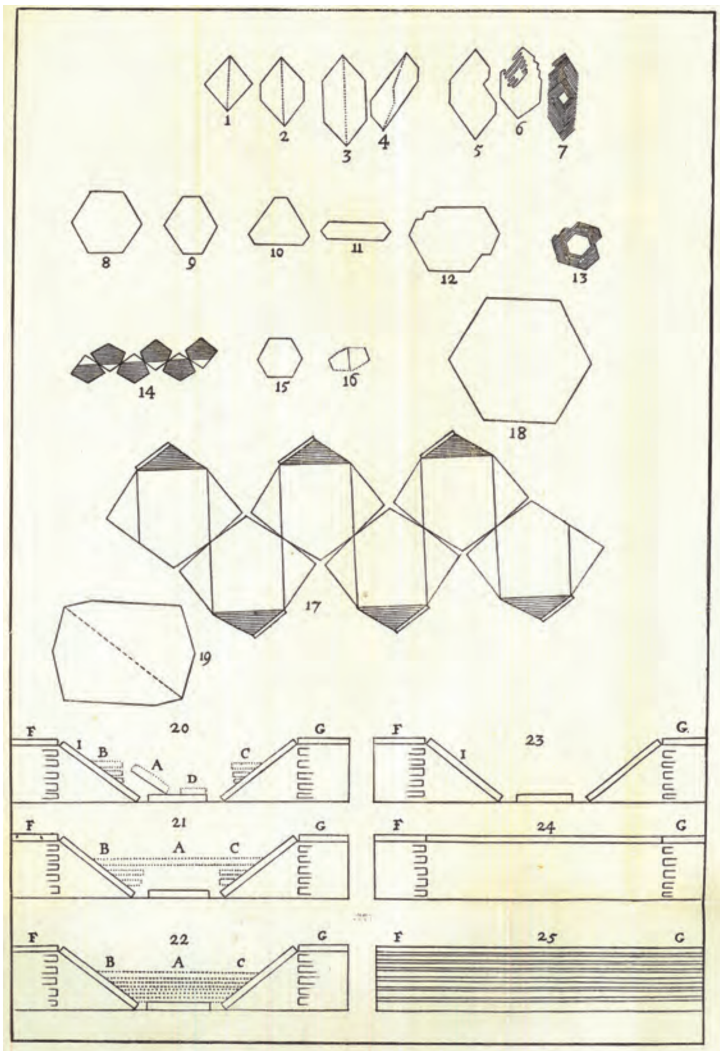


In this perspective Steno's functions at the court of the Medici makes good sense. A degree in medicine did not exclude him from studies in geology and this skill made him a valued client to the Medicis who already employed several physicians and anatomists at their court. The Medici family had a long tradition of keeping close company with and hiring artists, painters and natural philosophers. But what was the purpose and what advantages did these clients gain for themselves?

Steno arrived in Tuscany as a famous anatomist and reformer of Galenic medicine but quickly changed pace to follow questions of the physical formation of the earth. At the



same time he converted to Catholicism and eventually this led him away from his studies in natural philosophy, leaving his planned publication of a dissertation on geology behind. Steno spent only a few years as natural philosopher to the Medici Court before becoming Cosimo II's children's teacher of Christian Philosophy. In doing so, he followed his inner calling of devoting his life to the church much to the regret of several natural philosophers across Europe. However, Steno's religious questions were to him the obvious continuation in search of the questions that he had tried to answer through natural philosophy. To him, anatomy, geology and religion all revolved around the basic questions of what we are and how we can explain God's nature.



Steno
De Solido
Figurarum

Conrad Gesner (1516-1565) and Johannes Kentmann (1518-1574): Two Early Modern Physicians and their Contributions to (Medical) Geology

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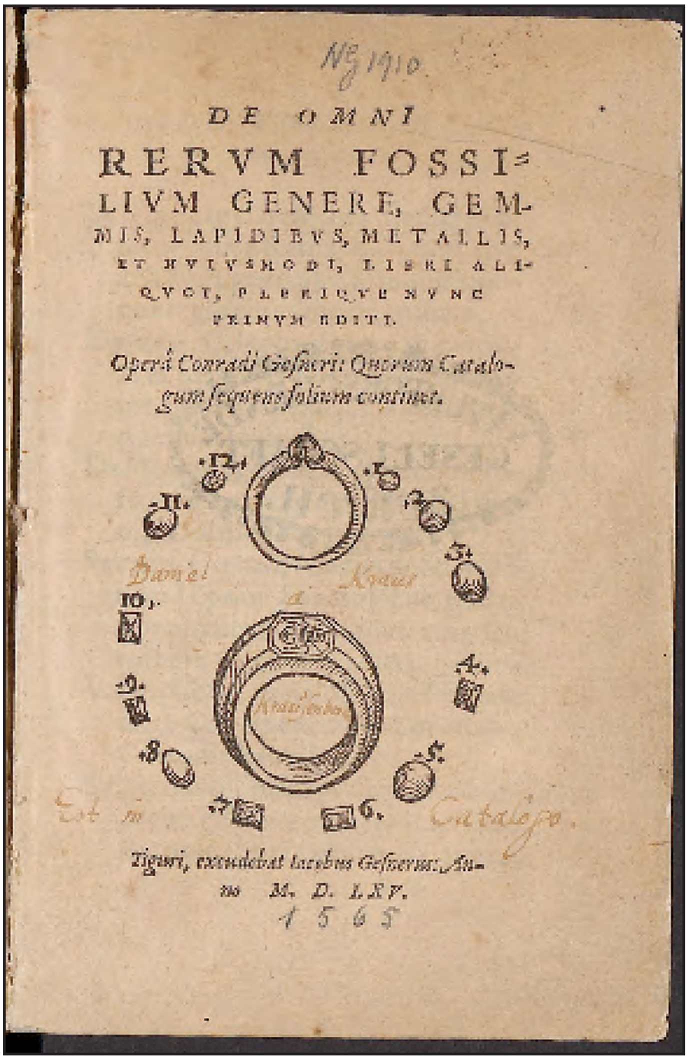
In 1565 the Swiss humanist and physician Conrad Gesner published a collection of treatises on stones, metals and fossils: *De omni rerum fossilium genere, gemmis, lapidibus, metallis* (Zurich: Iacobus Gesnerus, 1565). This constellation contained and juxtaposed empirical works and conclusions from direct observation – for example that on 'fossils' by the Dresden physician Johannes Kentmann and another on the same subject by Gesner – and more traditional, theological and neoplatonic compositions founded on the works of classical authors and on symbolic and moral conceptions of nature.

Kentmann and Gesner report their knowledge of stones found in human bodies and stones otherwise found in nature or given to them by colleagues; wood-engravings illustrate their work. Gesner in particular deploys, in addition to the experimental approach, an exposition of ongomastic analogisms as well as a symbolic approach.

These works are part of a scientific and encyclopaedic composition, the 1565 edition which, on careful analysis, reveals theological thought orientated around the principle of concentricity. This structural element is one of a set of fundamental theological commonplaces, for centuries associated with (mainly Christian) lapidaries – here chiefly represented by a Greek-Latin edition of fourth-century bishop Epiphanius' description of the stones on the high-priest Aaron's breastplate via its Biblical description. In Gesner's 1565 collection the concentricity principle is recognisable in both the scientific descriptions of stones, metals and other natural phenomena (by Gesner, Kentmann (1518-1574), Georg Fabricius (1516-1571), Severinus Goebelius (unknown) and in the (then controversial) astrological and neoplatonic work of François La Rue, De Gemmis.

At the same time, the *De omni rerum fossilium genere* unmistakably illustrates early modern developments within the study of nature, respecting particularly what would become the science of geology. Among questions these observations surely ignite is whether, how and to what degree this advancement was helped or retarded by then still pervasive systems of theology and philosophy. This question, already much-discussed in the history of science, is relevant to the study of precious stones described in this 1565 publication.



Cover of *De omni rerum fossilium genere, gemmis, lapidibus, metallis* (Zurich: Iacobus Gesnerus, 1565).

The realism of Ole Worm, portender of "that enlightened and barbaric realm, Europe" *

ELLA HOCH

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Main currents in Renaissance thought carried Europeans toward objective cognition and practical progress. Spiritual restraint gave way to curiosity and scrutiny of all things in man and nature. Sharp intellects were attracted to medical studies, experimental surgery and comparative anatomy, and the new printing techniques became applied for the promulgation of ideas.

Midwifery benefited from the growing insight into female anatomy and gynaecological peculiarities gained by learned dissectors of human cadavers. This is used as a dramatic theme in the depiction of a late 18th century encounter between European rationalism and Japanese tradition, noting traditionalists' recognition cum disgust of Western know-how, as quoted above. The Enlightenment issued from analysis of the tangible world, be it appalling or not. The physician Ole Worm (1588-1654) was a Danish pioneer in the deciphering of nature.

Lithograph of a middle-aged Ole Worm that figured on a 1988 commemorative Danish postage stamp

A Professor of Medicine at Copenhagen University, Worm created a cabinet of curiosities or a museum, that he used for teaching his students. The collection included, inter alia, fossils and other "stones", many acquired through colleagues abroad or travelling acquaintances with whom Worm corresponded. The exhibited skull of a male narwhal had been obtained through a Greenland-faring sea-captain for the purpose of demonstrating the true nature of the unicorn's horn as a cetacean tooth. Contemporary Dutch cartographers published the same interpretation accompanying a map of Iceland. It testified to the common intellectual urge of the time to combat Medieval ignorance and superstition through knowledge of facts.

Science in the Renaissance was truly international in Europe, and Latin was the academic lingua franca. With a basic education from Copenhagen Ole Worm studied in Basel from 1607 to 1608 (entering into a year long exchange of ideas and botanic specimens with Caspar Bauhin), focused on chemistry in Padua in 1609, was in Paris in 1610, Kassel in 1611, and London until 1613, before he began lecturing at Copenhagen University in 1614 and practising as a physician.

Worm helped to pave the scientific road for Steno (1638-1686). Niels Stensen (Nicolaus Stenonis, Steno) grew up in a goldsmith family a few streets away from Worm's Museum, and there are reasons to think that even if young Niels may not have been spoken to by old Worm, the boy saw his collection. As a highly receptive child he would have received lasting inspiration from the museum, which unfortunately was closed down shortly after Worm's death (the specimens being transferred to the King's Kunstkammer or Art Cabinet). Niels Stensen became inscribed at the Medicine Faculty of Copenhagen University in 1656.

Worm held erroneous interpretations of fossils. He maintained that tonguestones and toadstones grew from certain soils, and that toadstones had eye-cleansing power. Worm's letters constitute a rich source of information on his ideas, an analysis of which will be attempted using his preserved correspondence as a basis.

*David Mitchell, 2010: The Thousand Autumns of Jacob de Zoet. Sceptre, London.

Cryptopalaeontology: The fossils contained in ancient lapidaries and their magico-medicinal use

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Fossils were credited with magico-medicinal properties in lapidary books written from the second century BCE onwards. The analysis of historical references to fossils in these ancient literary, medical and magical texts has been named Cryptopalaeontology, a discipline which also includes discoveries of fossils at archaeological sites and the study of oral traditions.

Four apocryphal greek lapidaries (*Líthica Orphéôs*, *Orphéôs Líthica Kêrygmata*, S*ocrátous Dionísou perì líthôn* and *Damigeron-Evax* : 2nd century BCE), Pliny the Elder´s Historiae Naturae, Dioscorides´ De Materia Medica (1st century CE), Isidore of Seville´s *Etymologiarum* (7th century) and Alfonso X´s *Libro de las Piedras* (13th century) all contain frequent references to fossils. In this context, these works might be considered to be the oldest treatises on fossils ever written.

The lapidaries mention the following fossils : foraminiferans (Lentil stone); coelenterates (probably Yellow stone or *Crocallis*); trilobites (Scorpion stone or *Skorpíos*, *Scorpitis* and *Albarquid*; Ant stone or Myrmecitis; Beetle stone or *Cantharias*); crustaceans (Crab stone or *Carcinias*); crinoids (Man-hair stone or *Anthropochrinus*; Head stone or *Korsites* and *Corsoides*, and probably Cane stone or *Syringitis*); echinoids (Jews´ stone or *Iudaicus*, *Iudaikós* and *Iudiega*; Solvent stone or *Thecolithos* and probably Olive stone or *Euros* and *Piedra Marina*); bivalves (Oyster stone or *Ostrita*; Shell stone or *Ostrachitis*, *Ostrakitis*, *Ostrakita*, *Ostracite*; Bullock-heart stone or *Bucardia*; probably Heart stone or *Encardia* and *Enariste*, *Piedra Tarmicaz*; Bird-heart stone or *Yenetatiz*, and Ass stone or *Onocardia*); gastropods

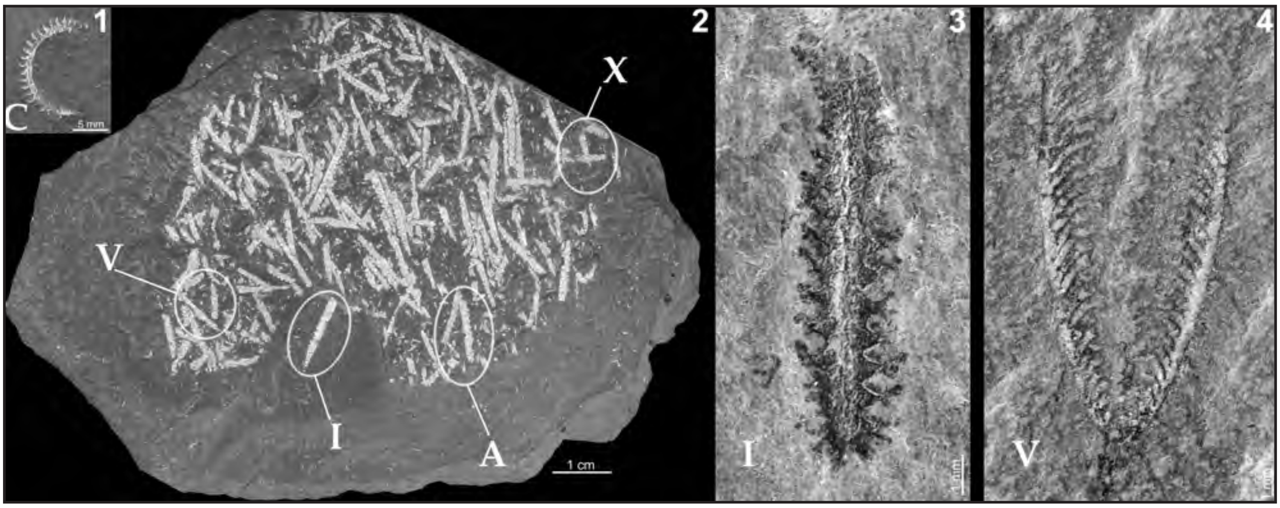

Figure:- The diverse morphology of graptolites interpreted as the "Roman Stone" in Alfonso X the Learned of Castille´s Libro de las Piedras (1276-1279). 1- *Spirograptus sp*., 2 - *Monograptus* assemblage, 3 - *Gymmnograptus* sp. and 4 - *Didymograptus* sp.

(*Caracole stone* or *Cochlides* and probably *Piedra Caracol de la Mar*); belemnites (Adad´s finger stone, Finger of Ida stone, *Iadeus dactylus* and probably Lynx stone or *lapis Lyncis* and *Lyngurium*, as well as *Abietityz* or *Accufaratiz Cabroci* and *Buitreña*); ammonites (Snake stone or *Ophites* and *Kartoiz*, Ammon's Horn or *Cornu Ammonis* and probably Crane stone or *Geranites*); brachiopods (Testes stone or *Enorchis* and probably Hermes-genitalia stone *Hermu aeodoeon* and Hand stone or *Chernitis*); graptolites (Roman stone or *Piedra Romana*), fishes (Shark's teeth or *Glossopetra*, Fish stone or *Scaritis* and *Triglitis*, and probably *Chelonia*); mammals (Tooth stones or *Nipparenne*, *Arabicus*, Deer-antler stone and Bone stone); and plants (*Samotracia* stone , Oak stone or *Dryitis* and probably *Mazuiquez* and *Maihutiz*). Chemical fossils include coal (Jet or *Gagates*, *Gagas*, *Gagatiz*, *Zequeth*); asphalt (*Asphalto*, *Pisasphalto*, *Catochitis*, Bitumen); bituminous clay (*Ampelitis gê* and *Pharmakitis*); and amber (*Myrrhitis*, *Narcissites*, *Élektron*, *Electrum*, *Chryselectus*, *Succinum*, *Lyncurium*, *Langurium*, *Thium*, *Sacrium*, and probably *Aromatitis*).

The talismanic use of most of these fossils against a wide range of diseases was based upon sympathetic magic. Only a few of them (e.g. *Lapis Gagates* and *Lapis Bitumen* [pitch]) survive in recent pharmacopoeia.

The Gem Electuary

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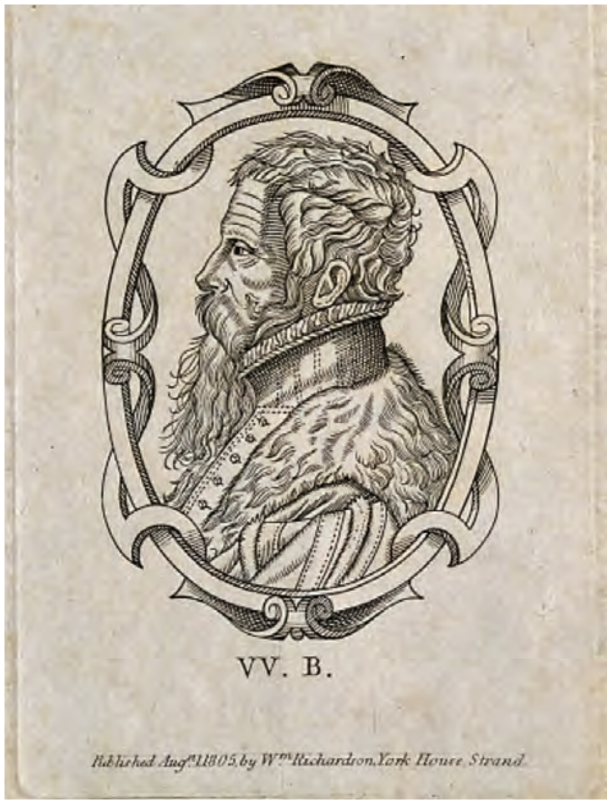
Precious and semi-precious stones have enjoyed a medicinal role since Theophrastus (3rd century BC) and Pliny the Elder (1st century AD). Often associated with herbal simples in the Greek and Roman medical traditions, the first extensive combined use of gemstones was in the Gem Electuary, a preparation which has a 750-year long history of application.

First introduced by Mesue the Younger (Pseudo-Mesue or John the Damascene; died 1015), the Gem Electuary was a paste of comminuted Sapphire, Jacinth (Zircon), Carnelian (red Chalcedony), Emerald, Garnet, Amber, Gold, Silver, White pearls, Red Coral, Ivory and a wide range of herbal ingredients, bound together with Musk and Honey. A popular mediaeval text, Mesue's Canones Universales was translated from Arabic into Latin, and first published in 1471. Reprinted several times during the 15th and 16th centuries, it has never been translated into English. The Electuary, quickly known in the West, was commended by Pope John XXI (Petrus Hispanus) in his (1272) *Thesaurus Pauperum*. Incorporated into many later pharmacopoeias, Mesue's original recipe was followed closely, especially with regard to the geological materials, although locally available herbs were commonly substituted for exotic botanical ingredients by the late 16th century.



Portrait of William Bullein, cousin of the ill-fated Ann Boleyn, whose recipe for the Gem Electuary appeared in his famous Bulwarke of defence (1562), written whilst he was in prison for debt. Image courtesy of the Wellcome Trust.

In powdered form, the Electuary was used as a 'species' or component of other mixtures from the 1520's onward. Pietro Mattioli (1501-1577) incorporated it into his "Great antidote against Poison and Pestilence", which contained about 150 ingredients. Similarly, Conrad Gessner (1516-1565) included it in his "Elixir, or compound water of Lyfe". Something of a cure-all, the electuary was used to strengthen the body when disease struck. In 1579, William Bullein used it "to cause mirth", treat heart problems, and act as both a rubefacient and perfume for his royal patients. The famous Elizabethan lifelong depressive, Robert Burton, praised its use in Melancholia. In addition, it was used alone or combined with other materials in the treatment of blood in the urine, breast and eye cancer, streptococcal infections (Erysipelas), fevers, tuberculosis (King's Evil), palsy, cramp, fainting, liver complaints, ulcers, plague, poisoning, madness, nightmare, sexually transmitted diseases, morning sickness and a range of gynaecological disorders including cervical and uterine gangrene (sphacelus). It was even incorporated into a suspicious alcoholic drink called "The Damnable Hum" in the 1650's.

The supposed therapeutic effects of gemstones are based upon similia similibus curantur ("like cures like"), a basic tenet of the Doctrine of Signatures eventually subsumed into homeopathy. The red colour of Jacinth, Carnelian and Garnet indicated their use in strengthening the vascular system, for example. Gem Electuary applications included pastes (cataplasms) and ointments which were used topically, aromatic quilts, and also medicines to be taken inwardly in the form of lozenges, ‘morsels’, confections and conserves (sugary preparations), waters and marmalades. In spite of the fact that it was out of the price range of all but the rich, and that doubts were raised over the therapeutic efficacy of gemstones, the Gem Electuary was still being utilised in 1755, and was included in the 1716 edition of *Pharmacopoeia Londinensis*.

Religiousness and Magic in Lithoiatric Practices of European Folk Medicine

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Legends and myths play an important role in the history of numerous human cultures. Rocks and minerals are often interpreted as indicators of stability closely linked with primal forces, possessing inner powers.

European folk medicine includes the use of 'latteruole stones' (eg Chiastolite) to promote lactation, and 'pregnant stones' to encourage childbirth. Also well known are 'blood stones' used in bleeding, and 'nephritic stones' used in the healing of renal colic. 'Lightning stones' protect from adverse weather conditions and 'serpentine stones' protect against poisoning with 'eye stones' protecting against the evil-eye.

This presentation aims to highlight aspects of magic-religious lithoiatric cults in folk medicine still practised today, both in Italy and in other parts of Europe. Lithoiatric rituals can still be found in many places of worship where popular religion and traditional medicine join inextricably to offer devotees and the afflicted coveted relief from all kinds of psychological and physical discomfort.

This is exemplified annually near the village of Raiano in the Italian region of Abruzzo where the fifteenth century hermitage of San Venanzio is the focus for the anniversary of the local saint. A festival is currently held over a three day period but on the 18th of May the faithful follow an arduous ritual; entering the narrow gorges, climbing to the hermitage, prostrating themselves and then turning on the stone floor. They also rub their arms and shoulders against the wall, lean on a stone bench and pick up little stones with some sleeping in the church. This ritual is particularly lithoiatric helping to heal the pain of rheumatism, relieving abdominal pain, headaches and 'sore kidneys'.

Locally rocks and rock formations are regarded as sacred and treated with great reverence. Megalithic sites are often complex, their complexity evoking a fearful respect, recalling the indecipherable practices of ancient religions.

Vomiting Stones: Mental Illness and Forensic Medicine in 18th Century Italy

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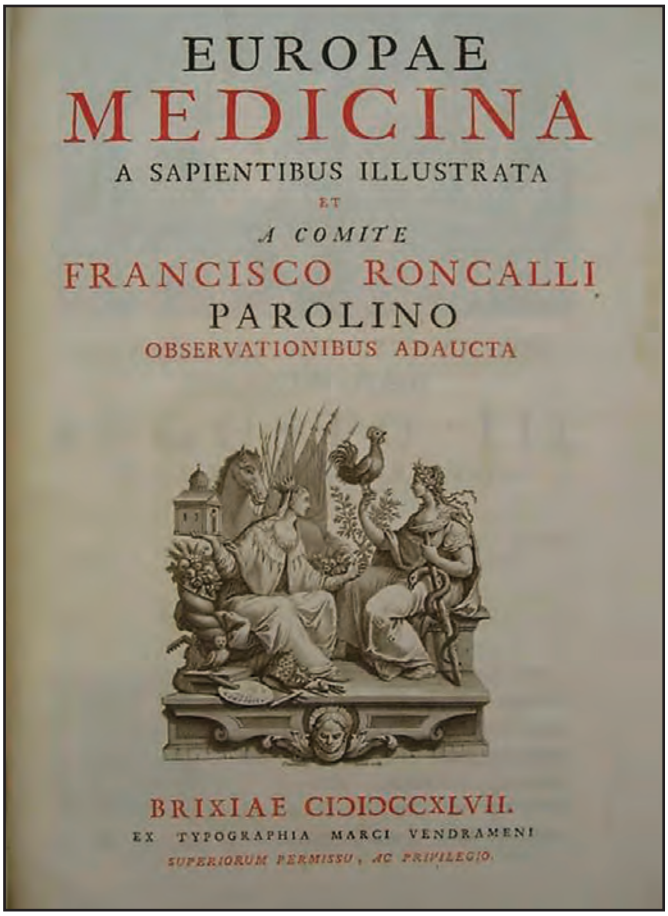
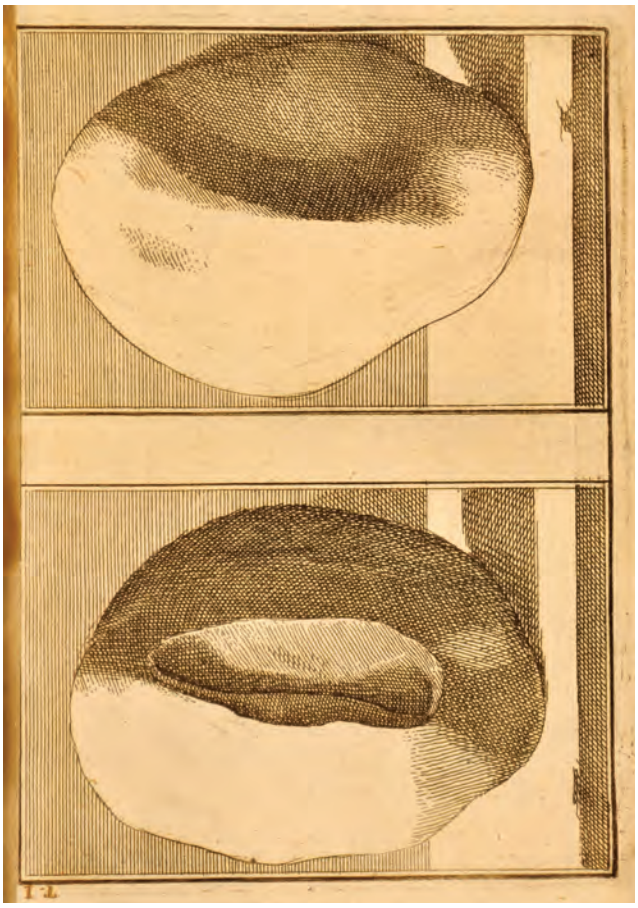
In 1746, the case of a virgin vomiting stones (as well as nails, glasses and other foreign bodies) was reported from Cremona (Lombardy, Italy). This phenomenon stirred much interest in the local Italian medical community.


EUROPAE
MEDICINA
A SAPIENTIBUS ILLUSTRATA
ET
A COMITE
FRANCISCO RONCALLI
PAROLINO
OBSERVATIONIBUS ADAUCTA
BRIXIAE CIƆIƆCCXLVII.
EX TYPOGRAPHIA MARCI VENDRAMENI
SUPERIORUM PERMISSU, AC PRIVILEGIO.

Above: Cover of *Europae medicina a sapientibus illustrata et a comite Francisco Roncalli Parolino observationibus adaucta* (1747).

Opposite: Virgin Vomiting Stone

The priest, confessor and exorcist of the young woman were all involved in this case. The Bishop of Cremona, Alessandro Maria Litta (1671-1754), deemed that a scientific-medical approach was necessary. Paolo Valcarenghi (died in 1780), one of the most famous of Cremona's physicians, was charged with this task. Valcarenghi was, for the times, a modern physician, having had a brilliant career at the University of Pavia as Professor of Rational Practical Medicine.



His analysis of the case was very interesting and cast doubt on every hypothesis of demonic possession.

Thanks to Valcarenghi's fame and the peculiar nature of the case, a great deal of interest was generated. Many physicians, both local and from the wider area of Northern Italy became actively involved in the discussion. The former group included Martino Ghisi (1715-1794), who was the first to describe diphtheria on a scientific basis. Others included Carlo Francesco Cogrossi (1682-1769; Professor of Practical Medicine at the University of Padua), who is noted for his parasitic theory of contagion, and Carlo Gandini (1705-1788), who introduced some typical traditional Chinese Medicine practices into Italian medicine, and compared the Chinese pulsology (sphygmology) with the Western pulsology. Francesco Roncalli Parolino (1692-1769) was a prominent participant: he recorded the case of the virgin of Cremona in his work entitled *Europae medicina a sapientibus illustrata et a comite Francisco Roncalli Parolino observationibus adaucta* (1747). This is a foundational work in the reconstruction of medical praxis in Europe and did not escape the attention of Albrecht von Haller (1708-1777).

In 1745, Roncalli Parolino published a *Dissertatio de ferris multisque acubus anatomica inspectione in cadavere repertis*; therefore he could intervene in debate with personal observation. There was nothing supernatural about the case, of course, as the co-operative evaluation by Valcarenghi and Roncalli Parolino fully established.

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Sunday Stone : Petrology and Pulmonary Disease

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The occupational hazards of miners include both acute trauma from rock falls and explosions and the long-term effects of progressive pulmonary disease. 'Black lung' diseases include coal miners' pneumoconiosis, silicosis, asbestosis, mesothelioma and radon-induced malignant lung disease - all potentially compounded by tuberculosis. Since the nineteenth century, the emergent discipline of preventive medicine has belatedly followed this threat to miners' life and health. In countries including the United States today, 1,500 former miners die annually from "black lung" diseases contracted during their working lifetimes. This worldwide issue has both historical and contemporary significance.

One of the most evocative of metaphors of the dust-laden atmosphere in which miners worked is Sunday Stone. Specimens of Sunday Stone are preserved in the Great North Museum, the "Hancock", managed by Tyne and Wear Archives and Museums, in Newcastle-Upon-Tyne. Sunday Stone is the name given to calcareous deposits which formed inside wooden pipes, square in section, carrying waste water from the collieries of Durham and Northumberland. Sunday Stone is composed of alternating light and dark bands corresponding to the day and night shifts worked in the coal mines with a broader light band corresponding to down-time on Sundays. Water seeping into the working mines became laden with coal dust and dissolved mineral salts. These precipitated in the pipes, which finally became blocked and were replaced. On Sundays, there was little disturbance of dust and, in the silent workings, a thick clean layer of white calcareous encrustation was laid down.

Water has long been a problem in coal mines. Thomas Savery's patent steam engine of 1698 "for raising water by the impellent force of steam" and Newcomen's engine (1712) were developed to pump water from mines. Mines had been ventilated from medieval times by furnaces kept burning at the base of vent shafts. Later, water trompes exploited the Bernoulli effect of falling water to entrain fresh air from the surface. Steam-powered wooden fans were introduced in the eighteenth century.

The morbidity and mortality of miners was one genesis of the discipline of industrial medicine. The Davy and Stephenson safety lamps, both invented in 1815, are symbols of advocacy for modem mining safety. The short-lived 1757 Act for the Relief of Coal-heavers working upon the river Thames (repealed in 1770) initiated the concept of insurance and compensation, but was not for the prevention of industrial disease.

Initial safety legislation for the prevention of acute trauma thus was aimed at maintaining uninterrupted production. In the United States, the first legislation in mining health and safety was introduced in Pennsylvania in 1870. The prevention of chronic miners' lung disease was not an issue for the efficiency of mining operations themselves. As both a preventative and an ethical theme, effective protection of miners' lungs did not develop until the second half of the twentieth century.

Sunday Stone is both a memorial and a metaphor of the challenge of preventive medicine in the mining industry. In Sunday Stone, encapsulated in these enduring mineral deposits, one sees in physical form the history of mining in its banded patterns; and in symbolic form the promotion of occupational health as the discipline is practised today.

Signs and symbols: language and abstraction of the ideas that shaped the developing sciences

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Signs and Symbols in geology and medicine have been used since the beginning; they have expressed that which the imagination was anticipating and later that which science was to prove. Symbols told the story and developed the process of human effort to dominate and decipher the environmental world. It was a cyphering and a defining as much as it was a language that veiled and hid the depths of the formulae that each graphical mark tried to contain.

These symbols are perfectly drawn and beautifully designed, ritual gestures that describe also the relationships that abide between the images, the ideas, the beliefs and the emotions of those who sought to know, to cure, to heal and above all simply to understand the Earth and its treasures.

As we approach and distinguish the semantic differences between the symbol and the sign we shall be aware of the very personal, in the sense of individual and variable meaning, of the integrity of the human mind, a synthesis both acquired and given, a significance that has been influenced by culture, by society, by the fruits of experience and by the anxieties of actuality. We may also find the unconscious instincts and spiritual longings that try to harmonise within every human being and within the individual.

Above all, the symbol can be distinguished from the sign. We consider the sign an arbitrary convention that leaves the object and the subject - the sign and its significance – unrelated and unknown to each other. On the other hand, we propose the symbol as a dynamic organising principle that brings homogeneity and allows resonance with the depths of our experience.

We delve into some of the symbols of the metals and the compounds that are spoken of in this conference and to reveal the richness and the contradictory problematics immersed in these apparently simple expressions - not only of the scientific mind which proceeds to reduce the multiple to the unitary - but to trace the explosiveness of the complexity and the multiplicity of symbolic thought before it reaches its essential and unifying nucleus.

The influence of Geology in the development of Public Health

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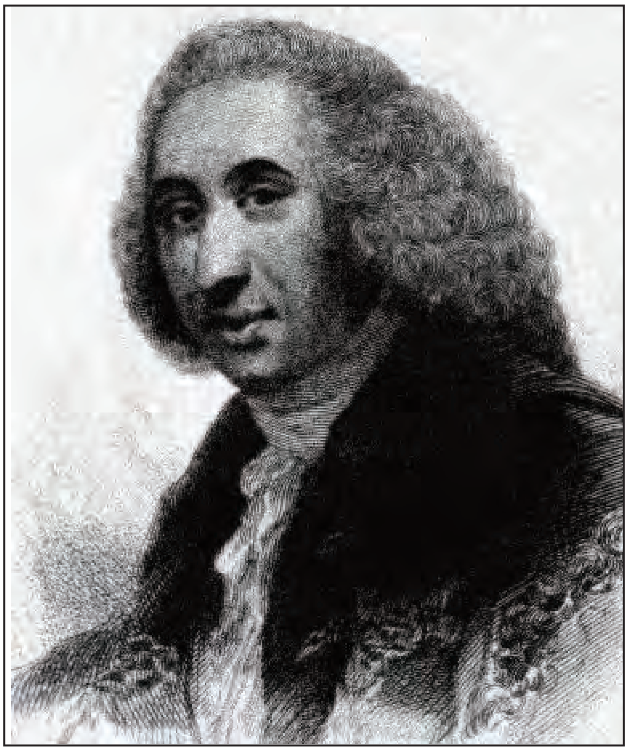
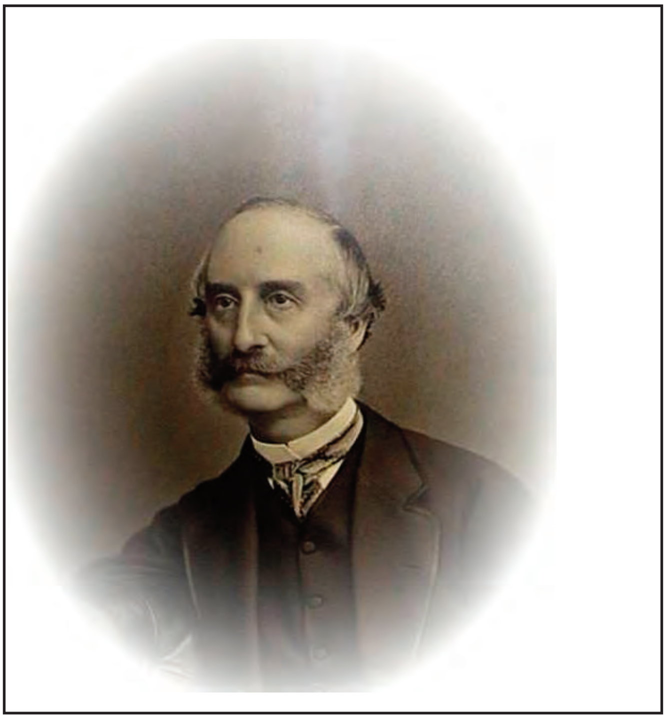


William Cullen (1710-1790)

Public health, the art and science of protecting the health of populations through community engagement, is generally considered to be a modern specialty originating in post-Industrial Revolution Britain, while environmental geochemistry is of even more recent origin. However, the roots of public health can be traced back to Classical times and the earliest writings on the subject show an understanding that geology could influence health. Over the centuries, the theory that many diseases were caused by miasma or contaminated air began to predominate whilst the focus on geology faded into obscurity. At the same time medical teaching began to concentrate more on diagnosis and treatment of the sick individual and less on preserving the health of populations. The concept of geology as a determinant of health began to re-emerge with the growth of scientific study that characterised the Enlightenment period of the 18th century, under the influence of eminent physician-chemists and mineralogists including William Cullen (1710-1790), Joseph Black (1728-1799) and Rev. John Walker (1731-1803).

Their main focus was on the therapeutic properties of minerals and spa waters rather than health protection but their teaching laid the foundations for the next generation of physicians who were faced with controlling the health threats brought about by a society undergoing rapid industrialisation and urbanisation in the early 19th century. Among the influential figures of this period was Edmund Alexander Parkes (1819-1876), the first Professor of Military Hygiene and author of a pioneering textbook of public health which was first published in 1864. In the book, which was aimed initially at a military readership but later became widely used in the civilian world, he discussed the geological influences on health in detail and reveals his depth of understanding of the topic, although some of his theories were later to prove erroneous.



Alexander Parkes (1819-1876)

At the same time as Parkes was demonstrating how geological factors could be harmful to health, others were taking the first steps in understanding the prevention of trace element deficiencies such as goitre. Over the next 100 years both public health and environmental geochemistry were to become established on a firm footing, although as separate disciplines. In recent years the focus in public health has shifted away from geology, apart from teaching about the hazards of radon, towards lifestyle choices as a determinant of health. Nonetheless public health and environmental geochemistry remain potentially powerful partners in the fight to protect health and there is much scope to enhance collaborative working. History holds important lessons for modern practice and it is essential that the legacy of the pioneers of both public health and geology is not forgotten.

Bursa in the history of Turkish hot springs

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Bursa is an old Turkish city acting as the centre of Bursa Province in the north west of the country. Famous for its many hot springs and baths, Bursa is matchless as a water city, with springs, fountains, pools or just the sounds of running water abounding. Hot Springs and Baths were particularly popular in an around Bursa during the 19th century. This paper will stress the importance and the historical development of the the Bursa Hot Springs, based upon Ottoman Archive documents. Furthermore, samples of these thermal waters will be distributed and their roles in traditional therapies explained.

The development of Turkish water architecture began with the Seljukians, a pre-Ottoman dynasty of the 11th to 13th centuries. The personal cleanliness required of followers of the Moslem religion was instrumental in the development of the baths. The evolution of the buildings associated with the baths was determined by the style of washing which grew up within this Islamic tradition. The Turks developed a characteristic inner architecture for the baths, based on an originally Roman plan but modified according to local social rules and customs.

Karamustafa Hotspring in Bursa in Turkey

Turkish Baths can be divided into three different types according to their functional target:

1. Social Baths (People Bath, Bazaar Bath)
2. Private Baths
3. Hot Springs.

Social Baths are buildings which provide the washing needs of every visitor.
Private Baths were personal baths which were used by state managers and the rich.

The Turkish Bath is referred to as 'Kaplıca' in Turkish. The Turkish traveller Evliya Chelebi (1611-1684) informs us that kaplıca is ‘Kermabe’ in the Persian language, ‘Kaynarca’ in Greek, ‘Ilıssi’ in the Tatar dialect and ‘Keremse’ in Mongolian

Social Baths and Hot Springs are social washing buildings constructed in the most used part of the city. The associated buildings were established either by the state or by gift from philanthropists.

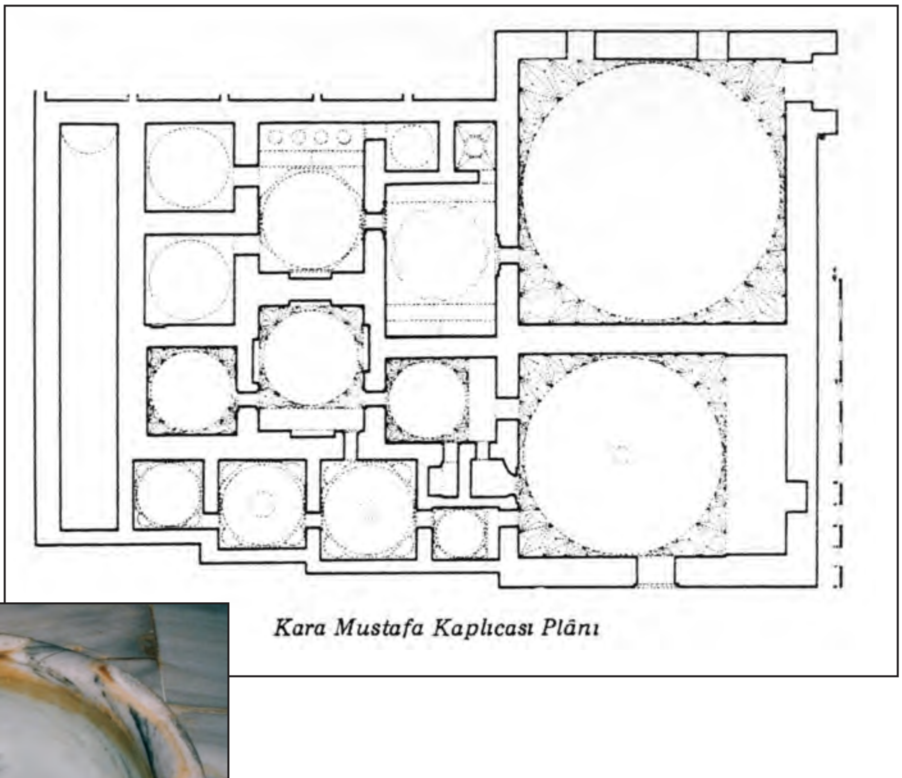
Social Baths are constructed of the following parts:

a) Apodyterium - Dressing Room (Soyunmalik in Turkish)
b) Tepidarium (Frigidarium) - Warm Room (Soğukluk in Turkish)
c) Caldarium - Hot Room (Sıcaklik in Turkish)

Examples of Bursa Hot Springs include Karamustafa Hot Spring, Kükürtlü Hot Spring, Oylat Hot Spring in İnegöl, and Kepekler Hot Spring in nearby Bandırma. Certain Ottoman documents give useful historical background about these thermal waters. For example, Karamustafa Thermal Water is used in rheumatism therapy because of its temperature and radioactivity. Radioactive waters have an analgesic effect due to the presence of radon. Calcium has a positive effect in the therapy of bones, joints and muscles. Bicarbonate also increases liver metabolism. Moreover, patients with gynaecological and urinary problems are recommended to drink Karamustafa water.

Two hot springs were present at Kepekler Farm in Bandırma near Bursa. According to a document dated 1894, the water contained potassium carbonate, sodium fluoride, aluminium, lithium, boric acid, etc. The associated mud was esteemed as therapeutic because of the presence of aluminium, magnesium, sodium, potassium, boric acid, etc.

Karamustafa Hot Spring Plan



Marble bowl at Karamustafa

John Jeremiah Bigsby, MD (1792–1881): Geological Pioneer in Canada

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In a mere decade from 1817 to 1827, Dr. John Bigsby studied the geology of a vast area of Canada extending from the lower St. Lawrence Valley to Lake of the Woods in the centre of the Continent. In some thirteen papers Bigsby described the geology of the St. Lawrence Valley and the shores and islands of the Great Lakes. From the terraces around the lakes, Bigsby recognized that their waters had stood formerly at much higher levels. From the limestone, sandstone and shale strata of their shores, he collected a wealth of fossils, many of unusual size. He described the mineralogy of the metamorphosed strata of the Canadian Shield, recognizing the igneous origin of the basalt precipices of the north shore of Lake Superior and of Montreal Island, although he did not venture to call them volcanic. Self taught as a geologist, Bigsby obtained from London a cabinet of labelled mineral specimens. The remarkable feature of Bigsby's decade in Canada is that he was an active Army medical officer who did his geological work alongside his medical duties. When on leave from the Army, he travelled to New York, New Haven, and at Philadelphia studied briefly with Dr. Gerard Troost (1776–1850), a highly skilled mineralogist, who helped him learn to identify minerals.

A native of Nottingham, Bigsby received his M.D. degree at the University of Edinburgh in 1814. After a period as a house physician at the Edinburgh Royal Infirmary, he joined the Army as an Assistant Surgeon and was sent for a time to the Cape of Good Hope. In 1817 Bigsby accompanied troops of the 37th Regiment to Canada, landing at Quebec on 6 July.

In 1819 when the International Boundary Commission, responsible for establishing the boundary between the United States and Canada, was at work at the western end of Lake Erie, the whole staff fell ill with malarial fevers. In September the British Agent on the Commission died of fever. These events led to the appointment in 1820 of Bigsby as Medical Officer and Assistant Secretary to the Commission. Bigsby accompanied the Commission during the summer of 1820 to provide medical care for its staff. In his leisure time he collected fossils on the islands off the north shore of Lake Huron, working in collaboration with Major Joseph Delafield (1790–1875), the American representative on the Commission. In 1823 Bigsby also travelled with David Thompson (1770–1857), astronomer on the Commission, to Lake of the Woods where he observed the great volcanic formations of the north shore of Lake Superior.

In 1827 Bigsby returned to England to take up medical practice at Newark-on-Trent. He moved to London in 1846 where he continued to publish papers and books, including in 1858 *Shoe and Canoe*, a personal memoir of his life in Canada, and in 1868 his *Thesaurus Siluricus*, a catalogue of Silurian fossils.

Porcelain, Pox and Angina pectoris

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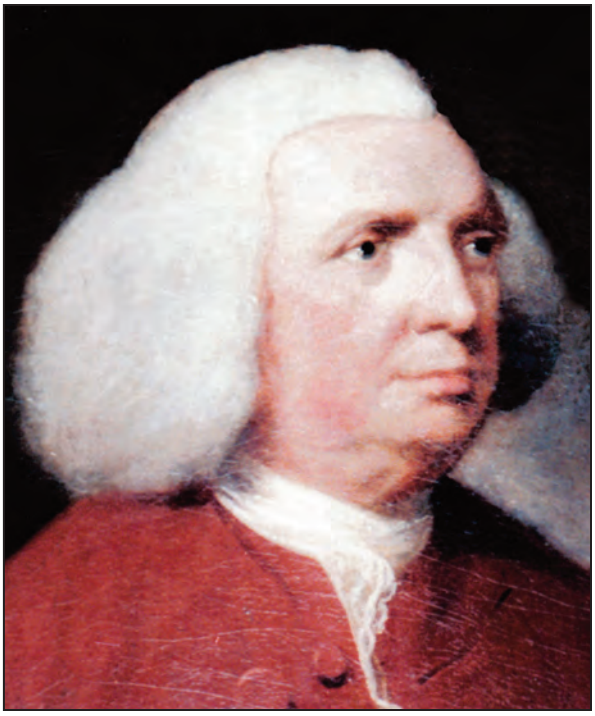
Three 18th century medical men, like many of their contemporaries, achieved renown for their medical skills and research abilities. They lived during an exciting period when man was questioning many traditional beliefs. Coeval scientific achievements increased their knowledge of the challenging natural world around them. Outside medicine, John Wall (1708-1776), Edward Jenner (1749-1823) and Caleb Parry (1755-1822) found time to pursue other interests: Wall studied Cornish china clay, Jenner and Parry shared an interest in fossils.



John Wall (1708-1776)

John Wall was a much respected physician in Worcester, working at the city's first Infirmary, one of the showpieces of the provinces. He established the successful spa of Malvern where the water was already known for its purity and healing properties, especially in the treatment of eye disease. In 1751, together with fourteen others, Wall founded the Worcester Porcelain Company which was soon producing work of the highest quality despite being based in a small provincial town. Wall had exhibited at the Royal Academy and took a constant interest, often visiting the factory to give artistic advice.

Edward Jenner grew up with a deep love of the Gloucestershire countryside. As a schoolboy he met Caleb Parry who became a lifelong friend. With his keen powers of observation, Jenner noted the cuckoo using another bird's nest while throwing the smaller bird's young to the ground. His resulting paper gained him Fellowship of the Royal Society. Jenner also researched the physiology of hibernation and bird migration. Jenner's life changed when he began inoculating cowpox to prevent smallpox. Adapting his lifestyle to that of a publicist for his life-saving procedure, which was soon known world-wide, cannot have been easy.

Edward Jenner (1749-1823)

Caleb Parry studied Medicine at Edinburgh, a prestigious school influenced by Scottish Enlightenment thinkers. As President of the Edinburgh Medical Society, he was known for his eloquence. He became a fashionable doctor in Bath and was admired for his dedication and integrity. With Edward Jenner, he spent many hours hunting for fossils in Gloucestershire and he published on the subject. He developed an interest in sheep and, with the support of George III and Sir Joseph

Caleb Parry (1755-1822)

Banks produced high quality merino wool. Parry suffered a major stroke but took pleasure in editing the journal written by his son, William Edward, an Arctic explorer.

All three men had distinguished medical careers. Sharing an interest in Angina pectoris, Wall may have observed the symptom before William Heberden (1710-1801) to whom he wrote in 1772. Jenner, former pupil of John Hunter at St. George's Hospital, concluded in 1776 that angina pectoris was due to coronary heart disease but suppressed the information so as not to alarm Hunter who was a sufferer. Caleb Parry, with his interest in research, was the first to establish a relationship between angina and coronary heart disease. As well as their medical achievements, these three men all found time to pursue other interests, including geology, which further enriched their lives.

Stones, fossils, and the medical profession – a collector's network in Early Modern Europe in support of the Flood

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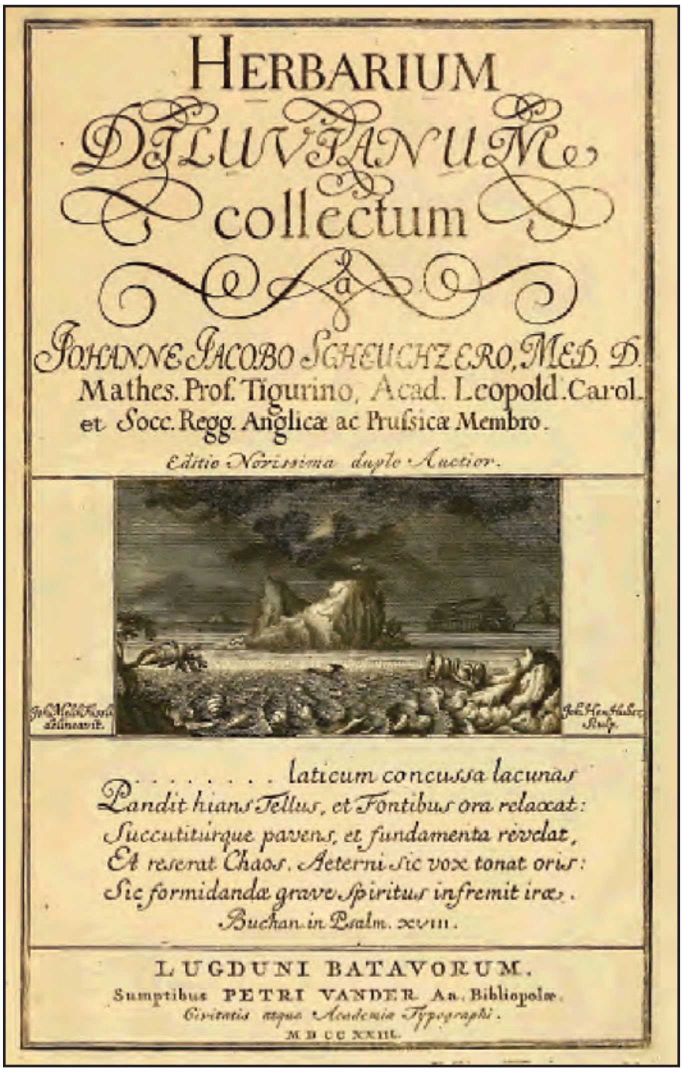
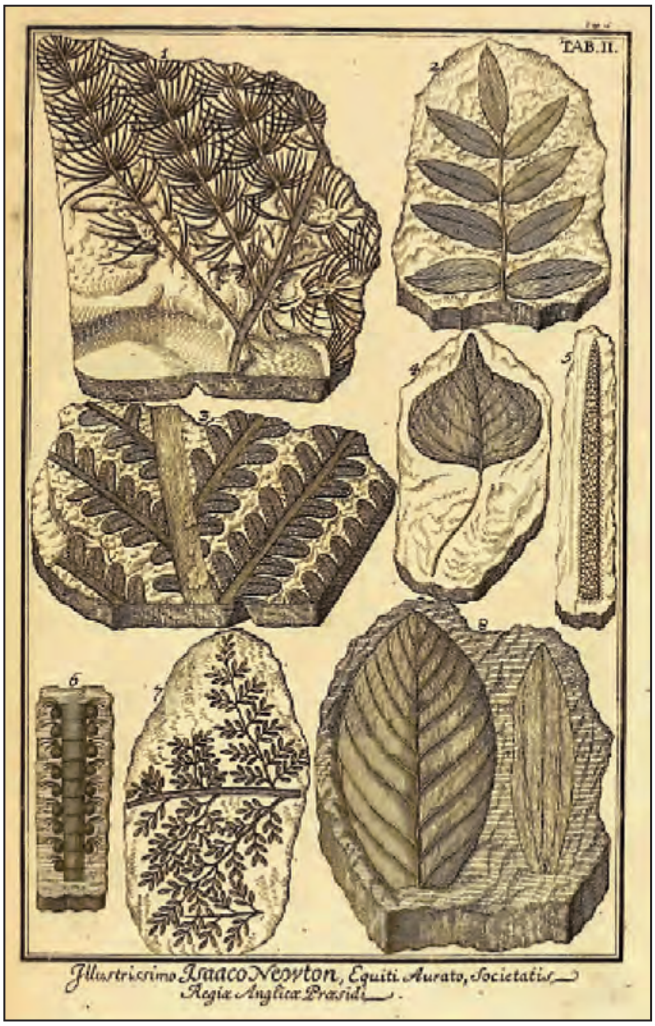
Fourteen copperplates in the first palaeobotany handbook, the *Herbarium Diluvianum* (1723) of the Swiss medical doctor Johann Jacob Scheuchzer, bear dedications to his most prestigious friends. They range from the Archbishop of Canterbury and Isaac Newton to learned men residing in the Low Countries, France, Germany, Switzerland, Italy, Hungary and Turkey. Five of the dedicatees and the author himself were extremely successful members of the medical profession. Their correspondence, published books, mineral and fossil specimens, and catalogues of their personal libraries and collections have been studied in order to map a network of scientific exchange in Early Modern Europe. Three medical doctors: the Englishman John Woodward (1665–1728) of London, the Swiss Johann Jacob Scheuchzer (1672 –1733) of Zürich and the Hungarian Samuel Köleséri of Transylvania shared interests in collecting and preserving minerals and fossils and in using them to support their scientific ideas. They regularly supplied each other with newly found specimens, communicating about their characters and origins. Each published monographic works in their respective fields of interest, using mineral and fossil specimens received from their partners in the scientists' network to provide substantial evidence for the Flood, a novel and progressive idea of the age.



Left: Scheuchzer, Johann Jakob (1723): *Herbarium diluvianum*. Title page. Scheuchzer (1672-1733), a successful physician in Zürich is considered the father of palaeobotany. The *Herbarium diluvianum* (1709, 1723) is the first really comprehensive and well illustrated treatise on fossil plants. The book remained the standard work in palaeobotany throughout the nineteenth century. As the title says, fossil plants are considered as remnants from the Flood, a progressive idea of the age, supporting a natural origin for fossils. A convincing depiction of the Flood and Noah's Ark in the background emphasizes the author's message.

Right: Scheucher, J.J. (1723): *Herbarium diluvianum*. Plate II of fourteen copperplates is dedicated to '*Illustrissimo ISAACO NEWTON, Equiti Aurato, Societatis Regiae Anglicae Praesidi*'. Left: Carboniferous/Permian fossils: *Asterophyllites*, *Callipteris*, *Calamostachys*, *Sphenopteris*, right: Tertiary leaves. Further plates are dedicated to contemporary scientists and sponsors of science, e.g. Thomas Tenyson (Archbishop of Canterbury), Hermann Boerhaave (medical doctor in Leiden), William Sherard ('*Botanicorum Princeps*', consul of Smyrna), and Sámuel Köleséri (Secretary of the Government of Transylvania), all of whom regularly supplied Scheuchzer and other dedicatees with minerals and fossils (Kázmér, 1998). These dedicated plates – among many other sources – help to map scientific networks in Early Modern Europe.



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The Pharmaceutical use of Earths, Rocks and Minerals by Galen of Pergamum (129 – c. 210 A.D.)

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Galen of Pergamum was the most influential doctor during the times of the Roman Empire. A prolific doctor, he contributed decisively to the development of pharmacology. His deep knowledge of drugs is found in the *Corpus Galenicum* and especially in the treatise *On Mixtures and Properties of Simple Drugs*, a whole book dedicated to inorganic and mineral substances, recorded according to their pharmacological properties. The treatise consisted of 11 books of which the ninth is dedicated exclusively to simple drugs that were known to use active ingredients from the earth and stones collected from several areas of the East Mediterranean. This is the only known work of its kind in ancient Greek literature.

The classification and description of these medicaments is divided in three parts: earths, stones and metals for pharmaceutical use. According to this sequence, Galen refers to the basic kinds of earths found in several parts of Greece, including Samian earth and the famous Lemnian earth. Next he records stones classified according to their colour and their ability to be ground and prepared as several types of clay with pharmaceutical properties. The book finishes by presenting the mineral medicaments, mineral substances used as drugs and named *metallika pharmaka*, including lead and copper.

Galen also discusses twentieth century AD ideas about the formation of rocks through the most popular theory, the theory of the four basic elements, established by the Presocratic philosopher Empedocles.

Pages from: *De simplicium medicamentorum temperamentis ac facultatibus*, manuscript in Greek, Byzantium, Tenth century, Illustrations added in Byzantine territory, fourteenth century Vat. gr. 284, fol. 232v -233r, Vatican, Bibliotheca Apostolica Vaticana.

Galen of Pergamum:
(Lithograph by Pierre Roche Vigneron. (Paris: Lith de Gregoire et Deneux, ca. 1865).

Materia medica in the seventeenth century Paper Museum of Cassiano dal Pozzo

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This Paper Museum comprises c.10,000 drawings and prints, most of which are in the Royal Collection at Windsor Castle. Among them is a volume of 56 colour drawings bearing an eighteenth century title: Fossils V. Of these, 25 are depictions of objects that can be considered both as materia medica and as 'geological' material, when viewed in their seventeenth century context. Many are listed in the official pharmacopoeia of Rome, the 1639 *Antidotario*. The original specimens for these illustrations were in the collections of members of the Academy of the Lynxes (Lincei) or collectors known to them. The academy, founded by Federico Cesi (1585-1630) in 1603, was a small but cosmopolitan and active confraternity, recognised as the earliest modern scientific society. Twelve of these drawings are reproduced here, nine of them for the first time, and references are given for previously published images; a single drawing may depict up to 25 specimens.

Unlike many other Paper Museum depictions, the do not drawings bear inscriptions to identify their subjects: reliance has therefore to be placed on visual identification of these images by many geologists, starting with C.E.N. Bromehead in 1947. Fortunately, there is evidence in the archives of Linceo Cassiano dal Pozzo (1588-1657) and others which confirms their interest both in Paracelsian chemistry and in materia medica. Cassiano owned copies of a fifteenth century manuscript by al-Suyuti listing four minerals with their therapeutic uses as well as a 1552 Aztec herbal manuscript that noted more than 30 minerals and their medicinal uses.

Caption for image on the right

Eagle-stone (concretion), 155 mm high, from Gargano, c.270 km east of Rome; mounted in gold to hang or stand at an expectant mother's bedside, to ease childbirth. Reproduced by permission of The Royal Collection © 2011 Her Majesty Queen Elizabeth II (RL 25480).

The Lincei's biggest project, however, that occupied them for almost 50 years, was the publication of a sixteenth century manuscript that became known as the *Mexican Treasury* (Hernandez 1651). Originally titled *De materia medica Novae Hispaniae*, Hernández's work in materia medica has been lauded as 'the most original ... in the entire Renaissance'. The last section of the Mexican Treasury comprises 26 'minerals suitable for medical use'. None is illustrated, but of those listed one can recognise obsidian, amber, bloodstone, jade and amethyst among material depicted in Fossils V.

Fossils V may have been a visual natural history encyclopaedia compiled by the Lincei for their own use. Drawings from it discussed here depict specimens of: earths, calculi and bezoars, toadstones, coral, calcifying alga, fungus stone, lodestone, eagle-stones, Bologna stone, amber, amulets, figured stones and gems. Some of these were acquired for the Lincei's own researches but, apart from nine drawings of 95 exotic seeds, fruit and plant products, it contains no great series to compare with the 196 drawings made for Cesi's field project on Acquaspartan Pliocene fossil wood, described by Scott and Freedberg (2000).

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Bezoar Stones, Magic, Science and Art from the Late Middle Ages to the end of the 17th Century

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Bezoars, chalky concretions produced by the second stomach of Asiatic ruminants, were introduced into the western medicine by Arabic doctors during the 12th century. They were used as antidotes against arsenic, the most commonly used poison in the European Courts. The use of bezoars was largely widespread during the 16th century, its price being ten times higher than its weight in gold.

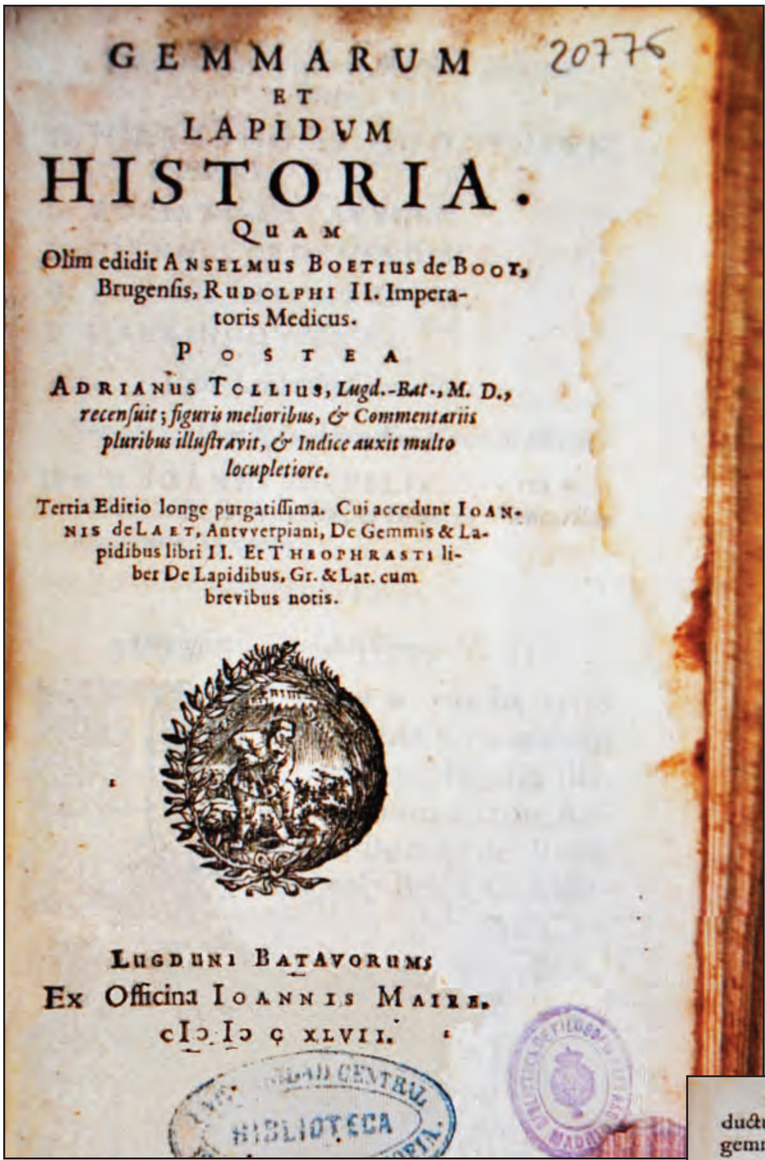
Because they were rare and expensive, many kings owned one or more specimens, and some specimens were worked as pieces of jewelry. Doctors of the 16th and 17th century have written, describing their properties and their use. By that time, the so called 'oriental bezoars' were also in use. These were mainly porcupine bezoars, brought from Asia. The Portuguese led this commerce, between the main centers, the cities of Lisbon and Amsterdam. Bezoars were also used as amulets and talismans to keep diseases away and they were also used as a panacea to prevent all kinds of evil and diseases, and to treat fevers and other serious disorders.

On Left: Bezoar goblet Jan Vermeyden (Brussels before 1559-1606 Prague) Prague c. 1600. This bezoar belonged to Rudolf II who in later life was afraid of beeing poisoned.

Kunshistorisches Museum, Vienna , Austria.

Bezoars were always difficult to obtain and therefore numerous dangerous counterfeits were produced, containing highly toxic substances like cinnabar, quicksilver and even antimony. Possibly for these reasons, their use declined at the end of the 17th century and from 1800 onwards, they were no longer used.

In strict mineralogical terms, bezoars are not actually stones. However, the Flemish mineralogist and physician, Anselm Boetius de Boot (1550-1632) included them in his work *Gemmarum* et *Lapidum Historia* (History of Gems and Stones, 1609) and their study is an important chapter in the history of toxicology.



GEMMARUM
ET
LAPIDUM
HISTORIA.
Quam
Olim edidit Anselmus Boetius de Boot, Brugenſis, Rudolphi II. Imperatoris Medicus.
Postea
Adrianus Tollius, *Lugd.-Bat.*, M. D., *recenſuit; figuris melioribus, & Commentariis pluribus illuſtravit, & Indice auxit multo locupletiore.*
Tertia Editio longe purgatiſſima. Cui accedunt Ioannis de Laet, Antverpiani, De Gemmis & Lapidibus libri II. Et Theophrasti liber De Lapidibus, Gr. & Lat. cum brevibus notis.

Lugduni Batavorum,
Ex Officina Ioannis Maire.
CIϽ IϽ C XLVII.

Frontispiece: *Gemmarum* et *Lapidum Historia* (History of Gems and Stones, 1609) by Anselmus Boetius de Boot.
(Sourced from Google Books)

Liber Secundus. 437
ductum eſſe videtur. a Plinius lib. 37. cap. 10. inter gemmas refert, ac ſequentia ſcribit.

Hammonis Cornu inter ſacratiſſimas Æthiopiæ gemmas aureo colore, arietini Cornu effigiem reddens. Promittitur prædivina ſomnia repræſentare. Solet ferreo armari hoc Cornu colore, qui aluminis ſucco accedente, in æreum, vel aureum facile mutatur; quemadmodum ferro ipſo facile contingit.

Ad Hoplitis ſpecies reduci poteſt, quia armatura conſtat. Interdum tamen armatura caret, ac cinerei eſt coloris, & nodoſus, quaſi iuncturis cohæreat. Germanice vocatur *ein Scherhorn*. Reperitur prope Hildeshemium, ac in aliis Germaniæ locis. Sæpe octo digitos latum eſt, ac aliquando pondere *Hoplites.* *Locus.*
Ee 3 tres

Right: Page 437 from *Gemmarum* et *Lapidum Historia* (History of Gems and Stones, 1609) Liber Secundus, by Anselmus Boetius de Boot. Illustrating fossils from the Creaceous of Southern England.

(Sourced from Google Books)

The Pharmaceutical Use of Gold in the 16th and 17th Centuries

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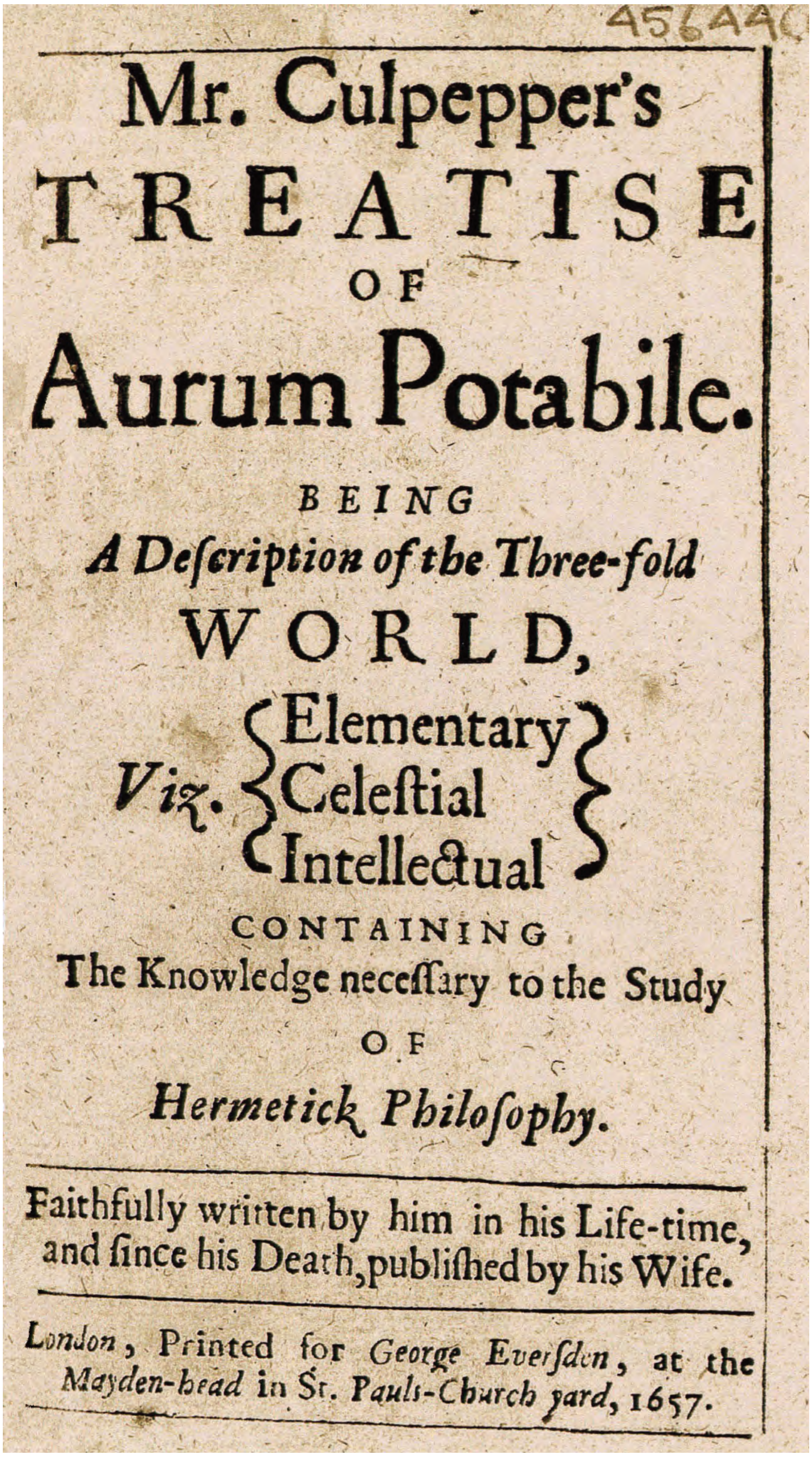
Gold, regarded for centuries as the most perfect and precious metal, was a natural starting point in the treatises of most early chemistry authors. For example, Christoph Glaser wrote this in his *Traité de la Chymie* (1663): 'We shall begin with gold, the most pure, fixed, compact and heavy of all metals, […] rightly called the King of metals. It has also been called Sun, for its relation to the Sun of the great world, which is what gives us light, and to the heart of man, called the Sun of the small world.'

Believing in the great healing virtues of such a perfect substance, gold-based medicines were especially recommended against diseases of the brain and heart, poisonings, fevers and the plague. This paper focuses on an extensive survey of medical literature, nearly all in Latin, printed between 1471 and 1698. Early printed versions of authors of the late Middle Ages include brief mention of the virtues of gold by the Arab physician Avicenna (980-1037) in his *Canon*, and formulae for treating a weak heart by Pope Juan XXI (1220-1277). Classical authors (Dioscorides, Celsus, Galen) however (with the exception of Pliny) failed to mention gold-based medicines.

Two main, very different medicines containing gold gained popularity. *Aurum Potabile* (drinkable gold), very simple to prepare, was pure gold reduced to impalpable powder for inclusion in drinks. *Aurea Alexandrina*, named after the late 13th century physician Nicolaus Myrepsus Alexandrinus and included in his *Medicamentorum Opus*, was very complex with gold being just one of its many ingredients. The same formula is also in an *Antidotarium Nicolai* by Nicolaus Salernitanus who is (confusingly) supposed to have lived in the early 12th century.

Nicholas Culpeper's specific *Treatise of Aurum Potabile* (1656) included many philosophical considerations but, curiously, furnished no explanation of how this medicine was prepared. Three popular formularies by Italian authors were published for the first time between 1491 and 1496 including: *Lumen Apothecariorum* by Quirico degli Augusti, *Luminare Maius* by Manlio del Bosco and *Thesaurus Aromatariorum* by Paolo Suardo. These books present formulae for *Aurea Alexandrina*, Mesue's *Electuarium de Gemmis*, Avicenna's *Confectio de Hyacintho* and Pietro d'Abano's *Laetificans*, all containing gold leaves.

Nicholas Culpepper (1616 – 1654)
Courtesy of the Wellcome Library, London


Mr. Culpepper's
TREATISE
OF
Aurum Potabile.
BEING
A Deſcription of the Three-fold
WORLD,
Viz. Elementary, Celeſtial, Intellectual
CONTAINING
The Knowledge neceſſary to the Study
OF
Hermetick Philoſophy.

Faithfully written by him in his Life-time, and ſince his Death, publiſhed by his Wife.

London, Printed for *George Everſden*, at the *Mayden-head* in St. *Pauls-Church yard*, 1657.

Illustration of the title page of Nicholas Culpepper's work *Arum Portabile* printed in London in 1657.

Courtesy of the Wellcome Library, London

Some pharmaceutical authors explained how gold was obtained in Europe. Pietro Andrea Mattioli (1501-1578) wrote that vein gold was found in German, Hungarian and Transylvanian quarries and alluvial gold in the sand of river banks in many parts of the world. Nicolas Lémery (1645-15715) added that the largest quantity was carried by Spanish galleons from Peru to Cadiz.

While most authors were enthusiastic about the medicinal virtues attributed to gold, some expressed doubts. For example, Lémery omitted auriferous medicines from his *Pharmacopée Universelle* (1697) and wrote in his Traité *Universel des Drogues Simples* (1698): 'Although there is no real drinkable gold in the world, and it is unsure what effect it would produce if someone found it, this name of drinkable gold impresses many people, and allows the charlatans to deceive with impunity'.

Arthur Conan Doyle: physician, author and first true populariser of pterosaurs

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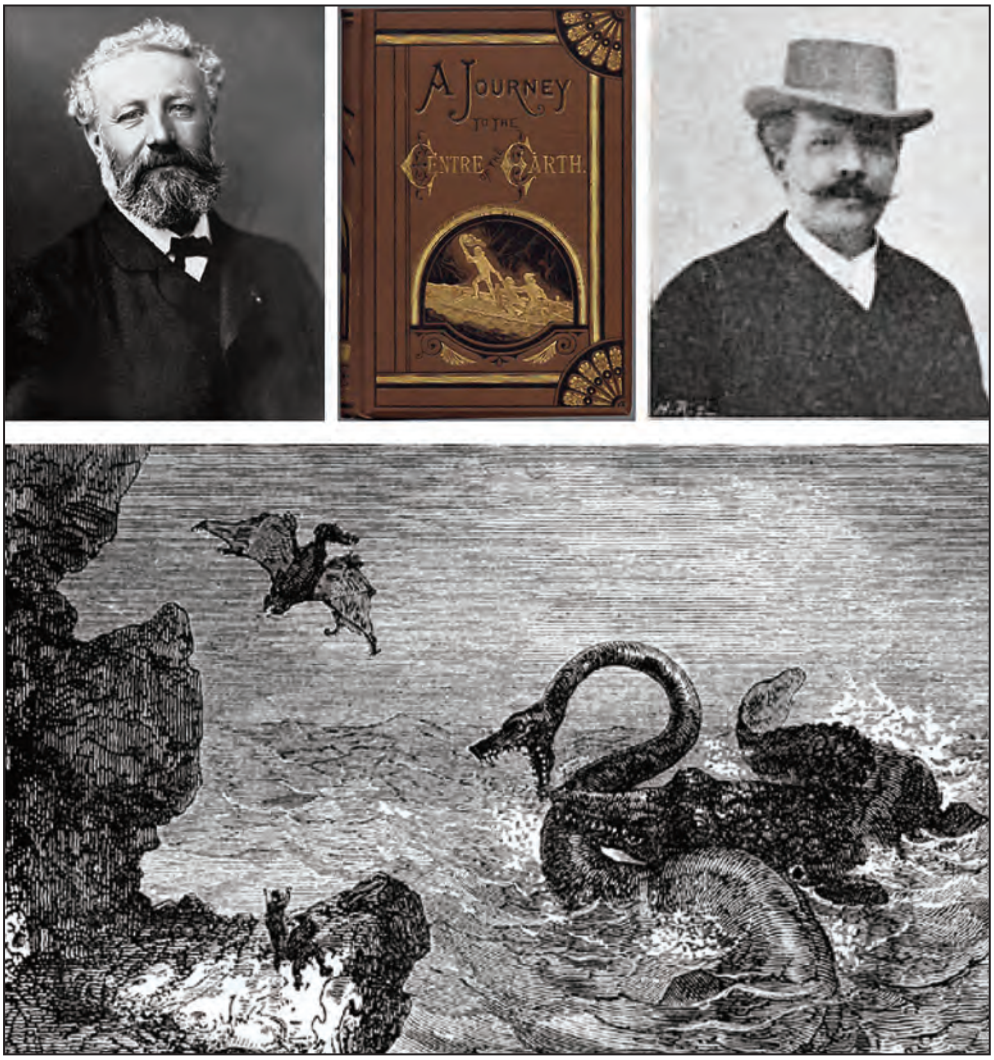
Much has been written of the life and works of Arthur Conan Doyle, one of the most celebrated of English authors, and of his passion for things prehistoric. His 1912 epic *The Lost World* became an instant hit, with the story being told first as a series in *Strand Magazine* and then as an adventure novel. Film (silent and sound), radio and television adaptations followed, and numerous stories by other authors paid homage to *The Lost World*. Conan Doyle was not the first to popularise prehistoric reptiles, as many factual books that included dinosaurs and other prehistoric beasts had been published in both France and England during the mid to late 19th century for an enthusiastic reading public had been published in



Above: Top left - Jules Verne, often consider to be the 'inventor' of the sci-fi adventure genre, as author of *Voyage au centre de la Terre* (1864) he was the first person to include pterosaurs in popular fiction. Centre – copy of a later edition of '*Voyage*'. Right - artist Edouard Riou who included two pterosaurs in his illustrations of Verne's '*Voyage*'. Bottom, a scene from '*Voyage*' in which a gigantic pterosaur overflies a battle between *Ichthyosaurus* and *Plesiosaurus*.

in both Fance and England during the mid to late 19th century. Among the best known of these are works by Louis Figuier (*La terre avant le deluge*) and Henry Neville Hutchinson (*Extinct monsters*). Indeed, it is French novelist and inventor of the Sci-fi Genre, Jules Verne (1828-1905) who is usually credited with being the first to truly popularise prehistoric reptiles in his 1864 science fiction novel *Voyage au centre de la Terre*, in which ichthyosaurs and plesiosaurs (among others) are discovered alive and well by adventurers exploring deep in the Earth's interior.

Above: Top left – Sir Arthur Conan Doyle, physician, author and populariser of all things prehistoric, especially pterosaurs. Bottom left - 1 Bush Villas, Elm Grove, Southsea, from where Conan Doyle built up a medical practice and began his writing career. Top right - a scene from *The Lost World* where a captured pterosaur escapes from the Queen's Hall of the Zoological Institution by artist Joseph Clement Coll.Bottom right - the same scene as perceived by artist Harry Rountree.

Interestingly, both Verne's and Doyle's works are supposedly inspired by Charles Lyell's *Geological Evidences of the Antiquity of Man* of 1863.

At the time of writing of *The Lost World*, pterosaurs had been known for well over one hundred years, having first been described in 1784 by Cosimo Alessandro Collini, a secretary of Voltaire, and recognised as both reptilian and volant first by Hermann but usually credited to Baron von Cuvier in 1801 (Cuvier was also the person to apply the name *Ptero – dactyle*, (wing finger) to the group).

In Louis Figuier's *A Journey*, pterosaurs play only a minor rôle in the story, although they do appear as bit players in the vignette of the novel's title page thanks to artist Édouard Riou - and again when a lone but gigantic specimen adds ornament to the skies above a titanic battle between *Ichthyosaurus* and *Plesiosaurus* in a dramatic scene worthy of Dante. By contrast, in Doyle's *The Lost World* pterosaurs are major players in the story line although they are only depicted in one of the illustrations in the first edition. However, later editions see many more pterosaurs illustrated.

Here we examine the prominence of pterosaurs in *The Lost World* and argue that Conan Doyle is responsible for the popularising of these iconic prehistoric reptiles.

Conrad Clar (1844-1904) and Theodor Posewitz (1851-1917): lives between geology and medicine

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Conrad Clemens Clar, born on 22 February 1844 in Vienna, studied chemistry and geology in Dresden and Leipzig. In 1864 he was awarded a PhD in Leipzig. He continued to study medicine in Graz where he was awarded an MD on the 13th December1869. During years of study in Graz he mingled with Carl Ferdinand Peters (1825-1881) who lectured there on mineralogy and geology for medical students. In 1870 when Clar studied balneology at Graz University and started reading there during the winter months. Starting in 1888 Clar was active at the University of Vienna. Up to his death in 1904 he also was Bath Physician in Gleichenberg (Southern Styria) where he established the first two pneumatic chambers. During the winter semesters Clar read balneology and climate therapy (at the Viennese University) and during the summer months he was active at the convalescent home in Gleichenberg. On 13 January 1904 Conrad Clar died in Vienna after a short illness.

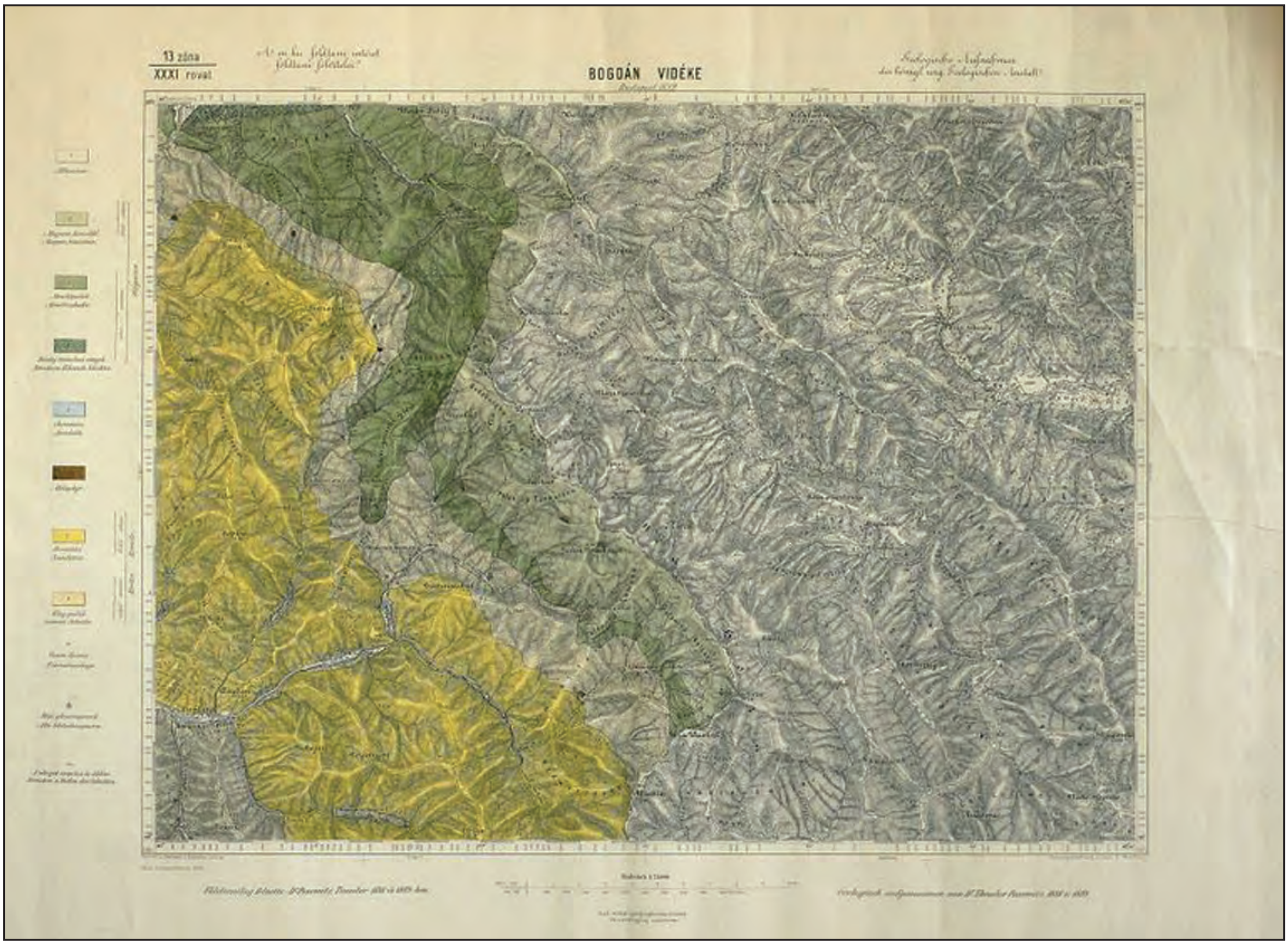
Conrad Clar (1844-1904)

Clar's importance concerns his activities as a balneologist, in particular at the convalescent home in Bad Gleichenberg in Styria. In addition, he developed a very good reputation on the island of Losinj because, 120 years ago, he noted the great value of the area as a climatic spa which raised Losinj's standing as a health-resort before the First World War. Among Clar's geological studies his works on the Graz Palaeozoic are of particular importance.

Theodor Posewitz (1851-1917)

Another medical doctor who completed a geological education is Theodor Posewitz. Born on 2 December 1851 in Zipser Neudorf (Spišská Nová Ves) in today's Slovakia, he studied medicine at the University of Budapest and graduated in 1874 as an MD. Then he went to Freiberg (Saxony) to register at the Mining Academy where he finished his studies in 1877. In 1879 he went as a military surgeon to the Dutch East Indies where he spent his free time exploring the region. In 1887 Posewitz was Assistant Geologist at the Hungarian Geological Institute in Budapest and in 1908 he became the principal geologist there. He dealt with petroleum and asphalt deposits in Hungary and created several geological maps of the Carpathian Mountains. In 1900 he published the first description of the Liptovské Tatry. On 12 June 1917 he died in Budapest.

During his employment in the DE Indian Army in the years 1879-84 Posewitz spent almost three years in South East Borneo, staying a while in the swamp region near Bandjermasin and for several months in the dry plain near Barabei. During his stay in Borneo Posewitz undertook outstanding geological studies which are still of value. In his publications of the late 1880s he provided detailed knowledge on the location of diamonds and in-depth descriptions of the mines and mineral resources that attracted common interest during his time.



Geologische Karte, Kgr. Ungarn, Blatt Bogdán-Vidéke, 1892

Medical geologists during the Heroic Age of Antarctic exploration

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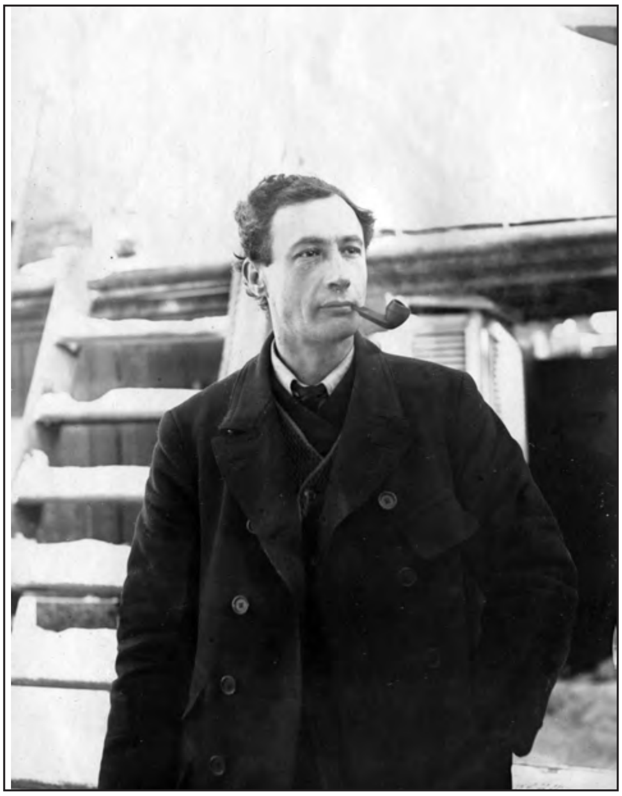
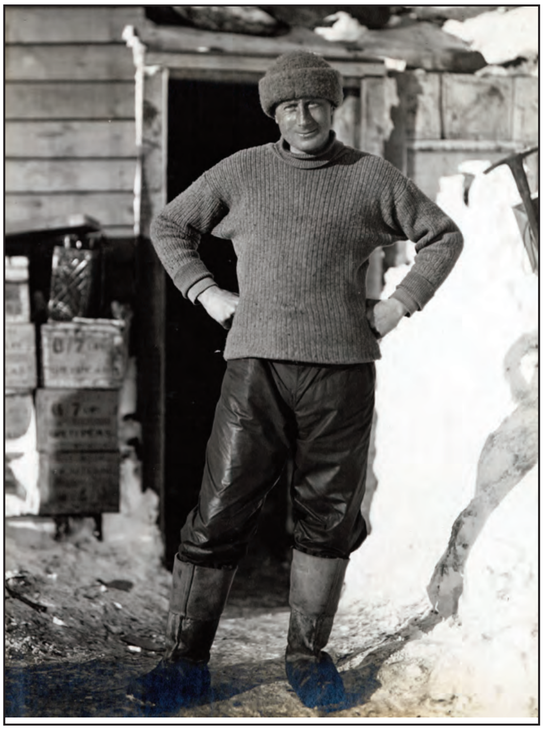
At the start of the Heroic Age of Antarctic Exploration (1895-1922), the Antarctic was virtually unknown but during this period there were at least eighteen expeditions to the Antarctic and geology was one of the main sciences of interest. All the scientific expeditions took a geologist and most expeditions took at least one doctor and, since medical work was expected to be light, the doctors were expected to have additional responsibilities. Two of the doctors on British expeditions were amateur geologists and the geologist on the two French expeditions obtained doctorates in both geology and medicine for his work relating to the first expedition.



Dr Reginald Koettlitz

Dr Reginald Koettlitz was a general practitioner who went on the Jackson-Harmsworth expedition to Franz-Josef Land (1894-7) as a geologist and it has been said that the geological work was among the most important scientific work of the expedition. He did further geological work in Somaliland and Abyssinia in 1898. He volunteered for Scott's Discovery expedition to the Antarctic (1901-4) and wanted to study geology there but, despite excellent references relating to his geology, he was appointed as botanist (though he did do a little geology).

The Scottish expedition (1902-4) advertised for a bacteriologist but Dr John Harvey Pirie had a degree in natural sciences in addition to his medical qualifications and had worked with the geological specimens from the Challenger expedition (1872-6). He was appointed as both geologist and bacteriologist to the expedition and reported on the geology of the Falklands and the South Orkneys.

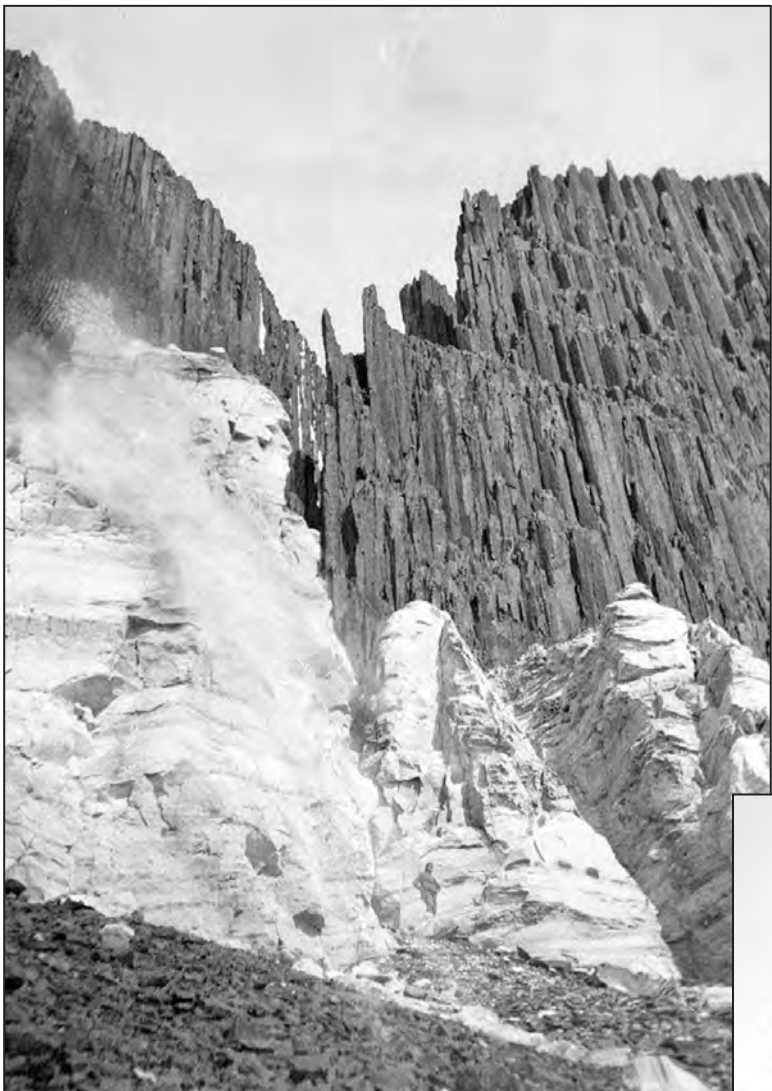


Dr Edward Wilson

Dr Jean-Baptiste Charcot, son of the famous neurologist Jean-Martin Charcot, led two French expeditions – the Français (1903-5) and the Pourquoi Pas? (1908-10) expeditions to the Antarctic and on both, the geologist and glaciologist was Ernest Gourdon who obtained a doctorate in science for his geological work on the first expedition. There is very little information available about him but in 1913 he obtained a doctorate in medicine for a study on the medical aspects of the Français expedition.

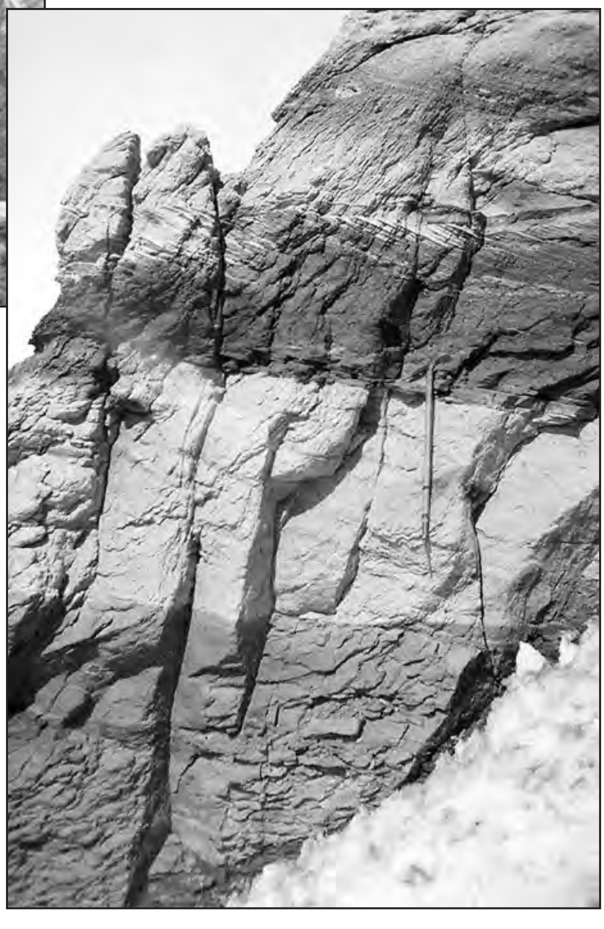
All the scientists were expected to have a general interest in all aspects of Antarctic science in addition to their own specialty and Dr Edward Wilson (who was a zoologist and artist on both Scott's expeditions) had great knowledge of geology, discussing this regularly with the geologists and making important discoveries himself, including a fossil that demonstrated the link between Antarctica, South America, India and Australia.

The name of Dr Whetter (on the Australian expedition) is remembered because he was one of the three-man sledging party that found the first meteorite in the Antarctic.



Below:
Sedimentary series at Horn Bluff
Antartica

Above:
The organ pipes at Horn Bluff, Antartica



John Whitaker Hulke, Surgeon and Palaeontologist

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John Whitaker Hulke (1830–1895) was a Victorian polymath and one of the early pioneers of vertebrate palaeontology whose work in this area is now somewhat forgotten. During his career, Hulke's interests and activities ranged from ophthalmology and surgery through to vertebrate palaeontology, botany, linguistics and Shakespearian literature. At various times he was President of the Geological Society, President of the Royal College of Surgeons, President of the Clinical Society and President of the Pathological Society. He was also a Fellow of the Royal Society, member of council of the Zoological Society of London and Consulting Surgeon at Moorfields Eye Hospital, London.

Hulke's medical career began with his entry into King's medical department in 1849. His training coincided with the outbreak of the Crimean War in 1853 and in 1855 Hulke volunteered for service as a surgeon. He became the Assistant Surgeon to the British Civil Hospital in Smyrna and was attached to the General Hospital before the conclusion of the war. He returned to England in 1857 where he became a medical tutor at King's College Hospital, following his election as a Fellow of the Royal College of Surgeons. In the same year he was appointed as assistant surgeon to the Royal London Ophthalmic Hospital, Moorfields where he was eventually to become a consulting surgeon. He was also associated with the Middlesex Hospital in London, becoming assistant surgeon in 1862, surgeon in 1870 and senior surgeon from 1879 to the time of his death in 1895.

Hulke had a long association with the Royal College of Surgeons after his election to a fellowship in 1857. This began with his appointment to the Board of Examiners in 1880. He rose through the ranks of the Royal College becoming Vice-President in 1888 and again in 1891 and finally President in 1893. He also served as chairman of the joint committee appointed to run the Royal College's medical laboratories on the Embankment in London.

Hulke was also associated with three other learned London medical societies, the Pathological Society, the Ophthalmological Society and the Clinical Society, of which he was an original member. Again he achieved high rank, becoming President of the Pathological Society in 1883 and President of the Clinical Society in 1893. It is worth noting that twice in his career Hulke was president of two scientific societies simultaneously. In 1883 he was president of both the Pathological Society and the Geological Society, and in 1893 of the Clinical Society and the Royal College of Surgeons.

During his palaeontological career he authored more than 50 papers of which 28 were devoted to dinosaurs. The sauropod Ornithopsis hulkei was named in his honour by his friend Harry Govier Seeley (1839-1909) in 1870. Hulke described and named a number of dinosaurs including *Eucamerotus*, *Cumnoria* (= *Iguanodon*) *prestwichii* and *Lexovisaurus* (= *Omosaurus*) *durobrivensis*, amongst others. Hulke attempted the first complete skeletal reconstruction of the small ornithopod dinosaur *Hypsilophodon foxii*, which was acknowledged by O. C. Marsh (1831-1899) to be of great value in assisting his later work. Hulke is also credited with the first detailed description of *Polacanthus foxii*, which had previously been named, but not described, by Richard Owen after its discoverer (the Reverend William Fox, 1813-1881).

Geology, Consevation and Dissolution of Corpses by Paolo Gorini (1813-1881)

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Paolo Gorini, mathematician, is considered one of the fathers of experimental geology and his work contributed to the evolution of medicine. In 1844 he began to study food conservation and worked out a method for conserving corpses and anatomical specimens, approved by Medical School of Pavia. His studies concern the field of mineralisation. At that time several researchers experimented to conserve corpses scientifically, among whom were Jean Nicolas Gannal (1791-1852), Girolamo Segato (1792-1836), Ludovico Brunetti (1813-1899) and Efisio Marini (1835-1900).

Later, Gorini studied mountain formation and suggested experiments and demonstrations to produce volcanoesartificially . In 1851, his first published work concerned the origin of mountains and related experimental geology. Gorini's theory was based on the observation of liquid solidification. He tried to apply it to vegetables and animals, including man. In 1871 his second work was published concerning the origin of volcanoes. Gorini reconfirmed his theories and the importance of experimental geology. His studies were fundamental to realise the early methods of corpse cremation in order to solve the problem of hygiene in cities and cemeteries.

During his experiments reproducing volcanoes, he observed the immediate dissolution of the bodies of insects that came into contact with the melted matter and so Gorini thought to apply this process on a large scale. Nevertheless, technical difficulties included the provision of proper containers, and the preparation and use of great quantities of fusion matter prevented him from applying his method and so Gorini conceived and constructed a model of a simple and rational crematorium, the Crematoio Lodigiano (Lodi Crematorium), so called after the city of Lodi, in Lombardy (Italy), where Gorini lived and devoted himself to his experimental studies. Gorini supervised the construction of the first crematorium in Woking, in the United Kingdom, tested in 1879 but commissioned only in 1885 when it cremated Jeanette C Pickersgill. Gorini cremated the corpses of Giuseppe Mazzini (1805-1872) and of the Italian writer Giuseppe Rovani (1818-1874).

Gorini's theories were not scientifically confirmed, but his attempt to understand the Universe and the origin of life and evolution by means of a sole law is very interesting.

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ABSTRACTS SUBMITTED BY AUTHORS WHO WERE UNABLE TO ATTEND MEETING

Soils and Cancer in Kerala, India : Historical Perspective and Current Scenario

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Voisin's work on Soil,Grass and Cancer (1959), Armstrong's on the relationship between soil elements and disease in Iceland (1971) and Howe's study on stomach cancer and lead in Wales (1971) have been pioneering efforts in identifying the association between geology and cancer incidence.

The present study was conducted on the spatial distribution of cancer in Kerala, particularly in the southern region also known as Malabar. The cancer intensity was high in respect of colon leukaemia, stomach and larynx. However, the rate of incidence of thyroid cancer is the highest in this region in comparison with the metropolitan region of Mumbai (formerly Bombay) and Delhi.

J.C. Paymaster who published his paper in 1964 on cancer distribution in India, noticed the occurrence of thyroid cancer in Kerala without explaining the reasons for its occurrence.

In the context of history, I.M.Orr published his paper in 1933 in which he investigated the incidence of mouth cancer on the western coastal areas of Kerala. Orr asserted that the diet of the Travancore people is perhaps, of all human diets, the one in which vitamin elements are most poorly represented. The diet consisted entirely of rice and tapioca (cassava) and was deficient in protein and vitamins. The present research finding reveals that tapioca contains limarin cynogenic glucoside which, when acted upon by the enzyme limarinase contained in the plant, forms cyanide, which in humans is predominantly converted into thiocyanate, a known goitrogenic agent.

Based on trace element analysis and recent data obtained on thyroid cancer, this study reveals that the cultivation of tapioca on soils rich in radioactive elements, and its consumption, results in much higher incidence of thyroid cancer in Kerala compared to other regions in the country.

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Medical Professionals and their contribution to Indian Geology

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The classical literature of India reveals that her ancient seers and savants had a grasp of the science of Geology. The Vedas, the Upanishads and subsequent literature mention many minerals and their extraction and purification. They were studied with a view to their use in the preparation of Ayurvedic medicines.

Susruta regarded the following as earth substances: gold, the five lohas (silver, copper, lead, iron and tin), their rust, arsenic, orpiment, various earths and salts, sand and precious stones. He, as an Ayurvedic physician, also described the preparation of metallic salts and mild, caustic alkalies. Charaka., Susruta and Umasvati also dealt with the classification of animals.

In the modern era, a few individuals stand out prominently who, though physicians by profession, contributed immensely to the study of the geology of India. Dr Henry Westly Voysey, affectionately known as the Father of Indian geology, stood tallest among them. He was surgeon to the then Trigonometrical Survey, under the Superintendence of Lieutenant Colonel Lambton. During the short period of five years he made a pioneering contribution to the understanding of the Geology of India. He contributed seven papers to the Journal of the Asiatic Society between 1824 and 1844, all posthumous because he died of fever on 19 April 1824 while on his way from Nagpur to Calcutta.

His notable contributions included the tracing of the Gondwana sandstone from the Pranhita Valley into the Ellore country; the description of of garnet mines in the neighbourhood of Garibpet and the association of kyanite with garnets and the occurrence of clay slate between Palauncha and Baiaram.He also gave a description of two springs near Bhadrachalam and Dummaudem and the diamond workings near Sambalpur. He also made a prophetic observation about Isostasy that led to Pratt’s hypothesis.

Other physicians who contributed to the understanding of Indian geology include Dr Henry J Carter, Assistant Surgeon (Bombay, 1857), Dr Buchanan (1807) and Dr Fleming who were the many Army men who contributed to the understanding of the Geology of India, these physicians stand out luminously.

POSTERS

Physicians and their importance for the early history of Earth sciences in Austria

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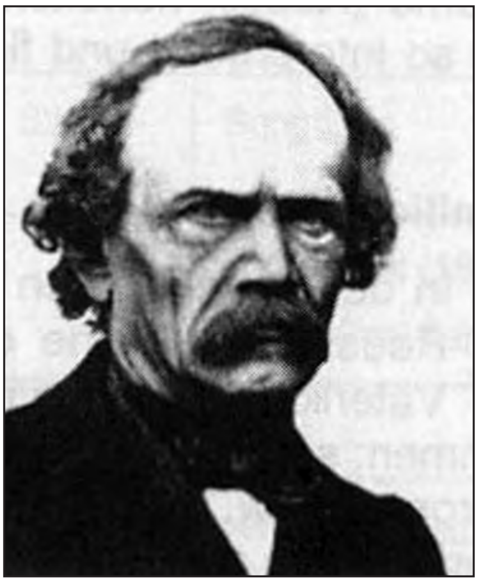
The propaedeutic character of academic studies at the philosophical faculties of the Habsburg Monarchy during the 'Vormärz'-period ('pre-March era', i.e. the period known as the Age of Metternich, which was a period of Austrian police state and vast censorship) prevented research-oriented scientific training at the universities. It was the Minister of Education, Leo Thun-Hohenstein, who initiated comprehensive educational reform in 1849.

The improvements to the system of higher education, modelled on that of the Humboldt-University (Berlin) established in 1810, transformed the old Austrian philosophical faculties into genuine research faculties, thus facilitating scientific studies on a more progressive level.

Before to this fundamental reform, natural scientific subjects were offered only at the medical faculty at which empirical scientific subjects, e.g. chemistry and natural history, were taught. Very prominent pioneers in Austrian geology therefore earned a medical degree before they changed to geology, a science they had to acquire themselves auto-didactically.

Among these 'pioneers' August Emanuel Reuss (1811-1873), full Professor of Mineralogy at the Universities of Prague and Vienna, son of the famous Bohemian balneologist, Franz Ambros Reuss (1761-1830), and Carl Ferdinand Peters (1825-1881), the first Professor of Mineralogy and Geology at Graz University may be mentioned. A full generation before Reuss jr. and Peters, Ami Boué (1794-1881), the descendent of a rich Hamburg Huguenot family was active in Austria. After finishing his medical studies at the renowned Edinburgh University in 1817, Boué's interests shifted increasingly towards geology.



Left: August Emanuel Reuss (1761-1830). (Image sourced from Archives of the Geological Survey)

Right: Carl Ferdinand Peters (1825-1881) (Image sourced from the Archives of the University of Austria)

Attracted by variegated research possibilities provided by the Habsburg Monarchy, B*OUÉ* moved together with his Viennese wife Eleonore from Paris to Vienna. During the years 1836 to 1838 BOUÉ searched the Balkan Peninsula and, as a result of his scientific work, Boué's magnum opus in four volumes, *La Turquie d'Europe*, was published in 1840. Ami Boué, whose complete work also contains very important geological mapping results, represented an enormously important link between the early Austrian and Western European geological communities. Furthermore, he was an important person in the scientific network; he was not only one of the co-founders of the Société géologique de France (1830) but also an early member of the Geological Society of London and mediated numerous contacts between Austrian and German-speaking Earth-scientists.

Other representatives, who demonstrated a close connection between medicine and geology in their scientific careers included: Franz Unger (1800-1870), Joseph Matthias Anker (1772-1843), Constantin EttingShausen (1826-1897), Karl Eduard Hammerschmidt (Abdullah Bey) (1801-1874), Rudolf kner (1810-1869), Adolph Pichler (1819-1900) and Michael Stotter (1813-1848).

Left: Ami Boué
(1794-1881)
(Image sourced from Archives of the Geological Survey)

Right: Franz Unger
(1800-1870)
(Image sourced from the Archives of the University of Austria)

Some surviving early 18th century geological Materia Medica

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The late 17th and early 18th centuries represent an interesting time in the evolution of the Pharmacopoeia. The authority of Aristotle, Galen and Dioscorides, via mediaeval and renaissance authors, was gradually yielding to a more empirical approach. While printed works give a window into the prescribing practices of the times, surviving contemporary medical cabinets with their drugs and simples are noteworthy.

Irish born Hans Sloane (1660-1753) studied Chemistry and Physic at the Apothecaries' Hall and then Medicine in France. As personal physician to the 2nd Duke of Albemarle in Jamaica he indulged a passion for collecting, returning to England in 1689. Practising in Bloomsbury, he treated royalty and was created a baronet in 1716. At his death, Sloane's collection formed the nucleus of the British Museum. Four drawers from Sloane's pharmaceutical cabinet found their way into the collections, where, until the 1930s, they were largely ignored.

John Francis Vigani (circa 1650-1713) arrived in England from Verona early in 1682. Giving private lessons in chemistry at Cambridge, he was characterised by one of his students as 'a very learned Chemist and a great traveller but a drunken fellow'. Vigani was elected to the first Chair of Chemistry in 1702, teaching at Cambridge until 1708. Rather more interested in the techniques of production than in theory, his work was technically competent but somewhat pedestrian. He used a Materia Medica cabinet, made to order for £10, to support his teaching. Currently held in the Long Room at Queen's College, the cabinet and its' contents are intact.

Right: Vigani's Materia Medica Cabinet, Queen's College Cambridge.

John Addenbrooke (1680-1719) entered St Catharine's College as a pensioner (paying for his own tuition) in 1697. Gaining his M.D. in 1710, he left Cambridge for London, but retired through ill health, dying at age 39. His will provided for a voluntary general hospital which was completed 47 years after his death. Addenbrooke lectured on Materia Medica at Catharine Hall from 1705 and presented the collection used to illustrate his lectures to the College Library before his death.

The Londoner, William Heberden (1710-1801), went up to St John's College, Cambridge at age 14, eventually moving to London in 1748. The first to describe Angina Pectoris, he also completed original work on Chicken Pox, successfully distinguishing it from smallpox and, considered the founder of Rheumatology, is immortalised in the eponymous Heberden's nodes. Heberden lectured on the Materia Medica from 1740 to 1748, illustrating his talks with specimens from his personal cabinet which, on leaving, he donated to St John's.

Above: Drawer F, containing minerals, fossils and otoliths from Vigani's Materia Medica cabinet.

The above collections contain a wealth of contemporary geological simples, whose application was often determined by *similia similibus curantur*. *Balanocidaris* spines (*Lapis judaicus*) were employed in the treatment of urinary disorders, particularly kidney and bladder stones. Belemnites were ground and used in wound treatment. In Scotland, water in which belemnites had been steeped supposedly cured horses of parasitic botfly. Haematite was used to treat burns, bilious disorders, bleeding, and was an ingredient in eye lotions. Garnets were used with various gemstones in tonics to strengthen the heart against poisons and the plague. Salt of Amber was esteemed highly for treating convulsions, headache and gynaecological conditions. The limonitic Aetites ('Eagle Stone') was tied about the waist to prevent miscarriage and to the thigh to ease birth, in addition to preventing the epilepsy. Nicholas Monardes commended binding Lapis nephriticus to the arm to ease the passing of renal calculi and in the treatment of blood disorders and liver complaints.

Source materials for tracing the evolution of geological simples

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Geopharmaceuticals have a long and stable literary pedigree but only a few studies have been dedicated to their historical uses. Egyptian, Chinese, Aztec and Tibetan cultures all incorporated geological materials into their pharmacopoeias, as did the traditional Ayurvedic medicine of the Indian subcontinent. In the European, Islamic and other near-eastern traditions, elucidation of the complex threads of the evolution of geopharmacology involves the consultation of a wide range of literature.

Classical Sources: Pliny's Historia Naturalis (around 77 AD) was one of the first printed books (1469), and translated into English in 1601. Pliny compiled an eclectic mix of anecdote and folklore, including many medical observations, describing many geological items in the last of his 37 volumes. The medical writings of Galen (129-199 AD) contain numerous examples of the use of geological materials but Pedanius Dioscorides (circa 40-90 AD) De Materia Medica contains the greatest amount of information on geological simples and was the precursor of subsequent pharmacopoeias.

Mediaeval Sources: Leechbooks, mostly from the 9th century, mention the medicinal use of jet and Swallow stones or Chelidonius. Hildegard von Bingen (1098-1179) Abbess of Rupertsberg Monastery referred to numerous geological simples in her *Physica*. Relevant Mediaeval 'encyclopaedias' include Vincent de Beauvais' (circa 1240) *Speculum Naturale* ('Mirror of Nature'), Bartholomaeus Anglicus' (fl. 1220-1240) *De Proprietatibus Rerum* and Albertus Magnus' (circa 1206-1280) *De Mineralibus*.

Bestiaries: These beautiful manuscripts present animals in terms of Christian allegories. Records of fabulous stones include *Lyncurius* (amber), voided by the Lynx and used to treat urinary problems.

Lapidaries: Marbode of Rennes (circa 1035-1123), Canon of Angers wrote a popular verse lapidary, *Liber de Lapidibus*, translated into numerous languages by the late 14th century and first printed in 1511. Numerous others, largely derivative, are preserved as Anglo-Norman and Old English manuscripts. Prose lapidaries arranged the stones alphabetically, giving brief descriptions of their appearance and medicinal or amuletic applications. Castilian King Alfonso X 'The Wise' (1221-1284) directed the production of a lapidary discussing medicinal stones in an astrological context.

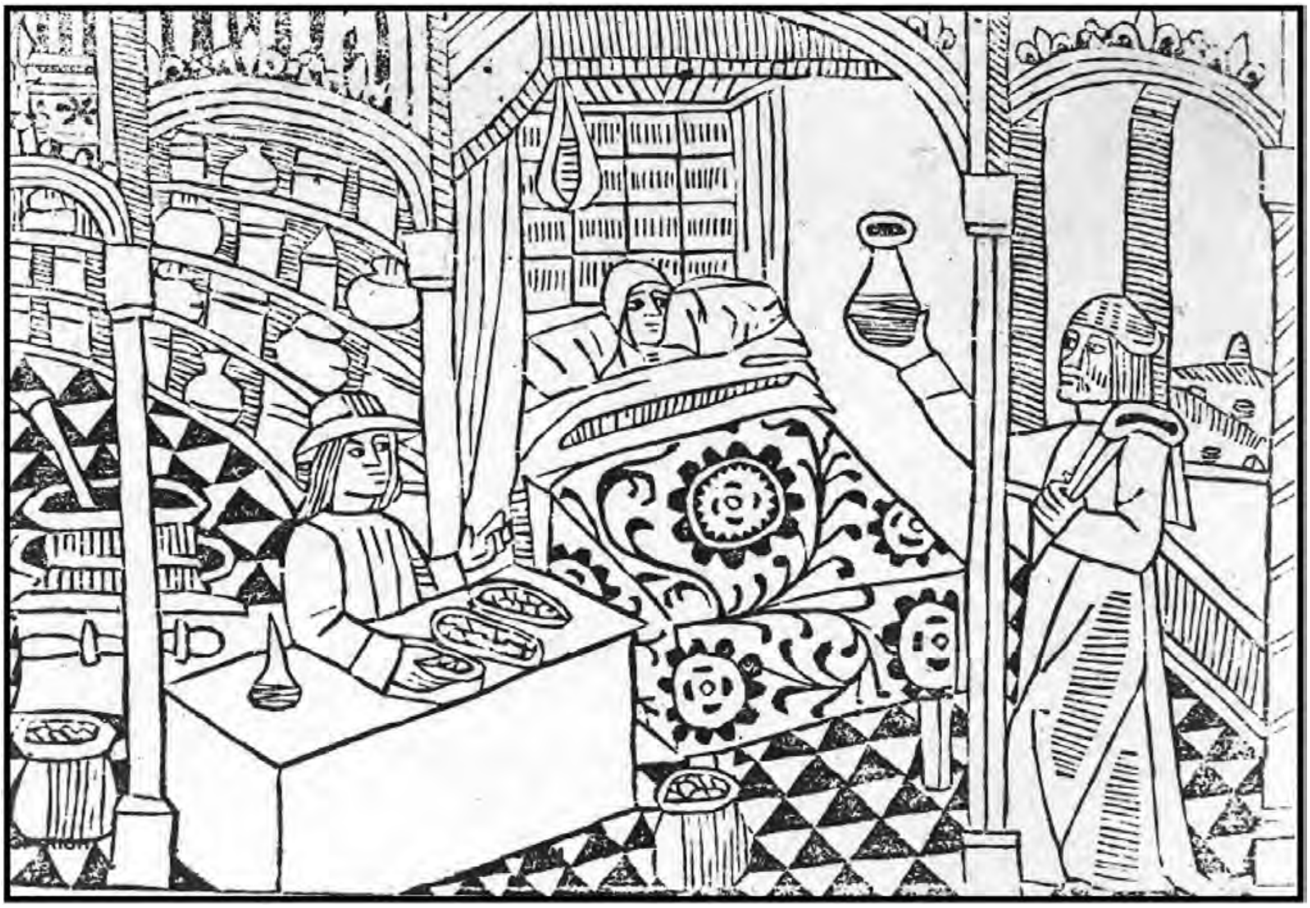
Near Eastern Sources: Avicenna's (ca. 980-1037) seminal *Canon of Medicine*, contains several citations of medicinal uses of minerals and fossils. The Jewish theologian, Moses Maimonides (1135-1204) fled Spain to Egypt where he wrote extensively. These authors refer to fossil echinoid spines in the treatment of urinary and intestinal problems, and the formation of a plaster (mixed with crocodile fat, herbal ingredients and the dung of pigeons, ducks and goats) which was applied to open wounds.

Incunabula: The most useful of these works printed before 1500 is the *Ortus Sanitatis* which contains a long section, *De Lapidibus* ('On Stones'), recording brief entries of a wide range of geological materials, and illustrated with some delightful woodcuts.

Early Scientific treatises: Conrad Gessner's (1516-1565) seminal work, *De Rerum Fossilium*, Lapidum et Gemmarum presented an illustrated systematic classification of geological materials. Anselm Boetius de Boodt's (1604) *Gemmarum et Lapidum Historia* described around 600 minerals, making passing comments on their folklore and medicinal uses.

Curiosity Cabinet Catalogues: Useful information is present in *Museum Wormianum* by Ole Worm (1655). Michel Mercati (1541-1593), Superintendent of the Vatican botanical garden, produced *Metallotheca Vaticana* (1717), while Michael Bernhard Valentini (1657-1729) published *Museum Museorum*. Ulisse Aldrovandi (1522-1605) of the botanical garden in Bologna described many geological specimens in his *Musaeum Metallicum* (1648). The *Rariora Naturae* (1737) illustrates the collection of J.C. Kundmann.

Medical works: Pierre Pomet's (1694) *Histoire Générale des Drogues* gives details of the medicinal uses of numerous gems, also referred to by Moyse Charas (1619-1698) in his *Pharmacopée Royale Galénique et Chymique* (1676 - the first European medical book to be translated into Chinese!). English herbalist and apothecary, Nicholas Culpeper (1616-1654) published a rich store of geopharmaceutical applications; his *School of Physick* (1659), for example, commends treating renal stones by using teeth of *Lepidotes* spp.



Above: An Apothecary's shop, with a bedridden patient having his urine examined by a doctor. Bartholomaeus Anglicus (1494) : *De Proprietatibus Rerum*. Image courtesy of the Wellcome Trust.

Vertebrate Fossils as Drugs

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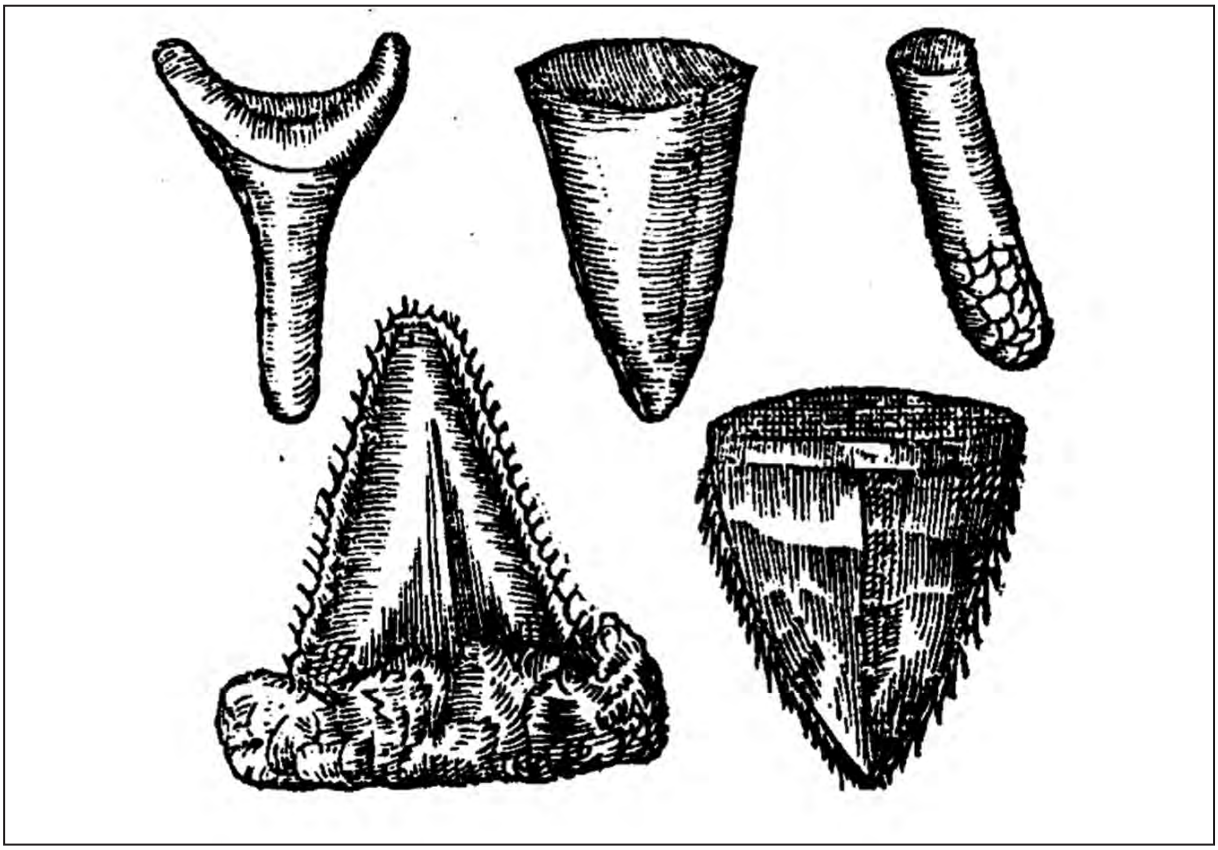
Glossopetrae or ‘Tonguestones’ are the teeth of fossil lamniform sharks and the ubiquitous Oligocene to Pleistocene giant, *Carcharocles megalodon*, in particular. The bifid root resembles the forked tongue of a snake. Glossopetrae were believed to be powerful antivenins, with the ability to detect poisons. Teeth mounted in Natternzungenbaum were popular with mediaeval nobility, supposedly ‘sweated’ near poison, or changed colour when dipped into poisoned wine. Malta supplied the apothecaries of Europe with specimens. As amulets, they supposedly protected against snake bite, assisted and hastened delivery

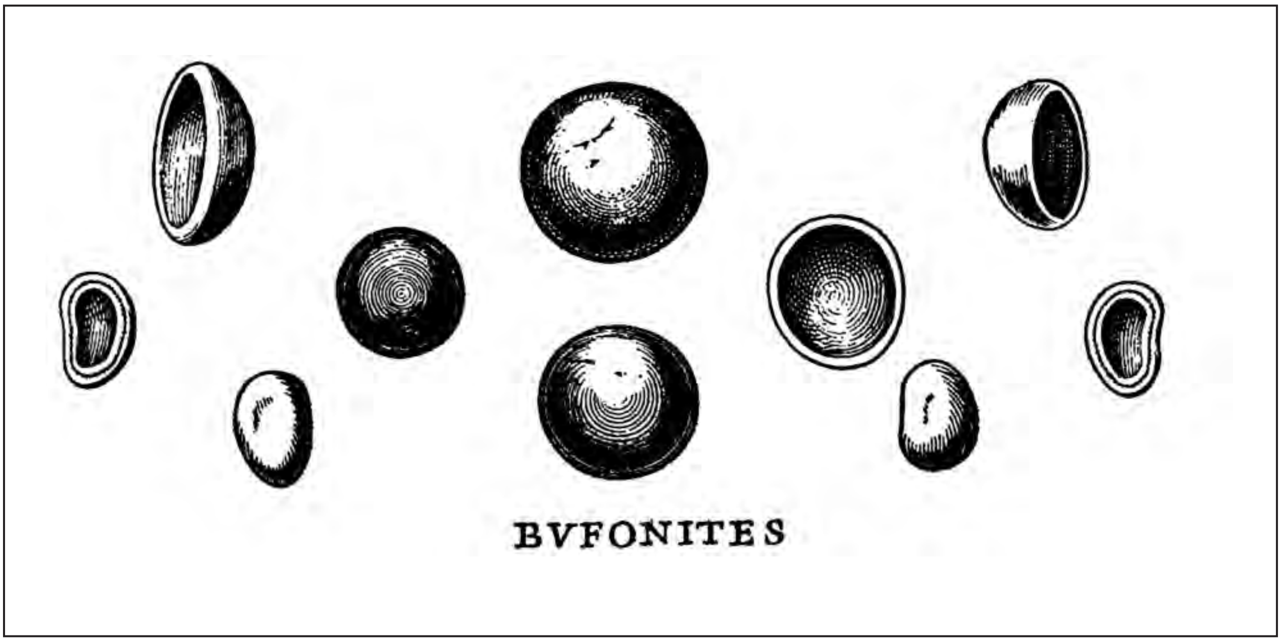


Above: *Glossopetrae from Museum Wormianum* (1655)

during birth, eased cramp and protected against diseases caused by witchcraft. De Laet (1581-1649), was sent some glossopetrae with the comment that they would cure anyone suffering from soreness of the mouth. Spring water glossopetrae had been dipped in was gargled several times. Other oral problems treated by shark’s tooth amulets included toothache and the avoidance of seizures during teething in children.

Bufonites (‘Toadstones’) are durophagous teeth from pycnodont and semionotiform fishes, particularly Lepidotus. The stone was supposedly obtained from the heads of an ancient toads; placing them on a red cloth caused them to vomit the stone.

De Boodt (1609) tested this by watching the creature on the cloth all night long. No stone was ejected! Albertus Magnus (c. 1276) indicates that “if swallowed this is said to cleanse the bowels of filth and excrements”. The swallowing of a 1cm or so wide fossil fish tooth is no mean feat, but the advantage was that it could be retrieved and used again and again. The Toadstone was credited as effective against the bites of serpents and “creeping worms”, spiders, wasps and rats, but also eliminated internal poisons due to humoral imbalance. It dispelled the poisons associated with malignant tumours, biliousness, erisipelas, apostems (deep abscesses), bubonic plague, carbuncles, sores, malaria, fevers, labour pains, fits, scrofula, bowel problems, diarrhoea, bladder stones and epilepsy, as well as being able to protect from witchcraft against cattle, children and pregnant mothers.



Above: Toadstones from Mercati (1719) Metallotheca.

At least some unicorn horns were mammoth tusks (Unicornum fossilis). The ‘horn’ was powdered and, taken in a drink, used to prevent and treat poisoning, as well as convulsions, epilepsy, bites from mad dogs, plague, measles, and smallpox. It was also supposed to be an antifebrile, sudorific (sweat promoter), cardiac and cephalic agent (strengthening heart and conteracting disorders of the head)

The dragon is an important Chinese cultural icon. China also has a rich fossil record which has yielded much fossil mammal and probably also dinosaur material which is still sold today in apothecary’s shops as dragon’s bones and teeth (Long gu and Long chi respectively). The material may be either untreated (sheng) or calcined (duan), and quality is assessed on the basis of colour and degree of variegation. Numerous fossil mammals have been associated with this industry, including Stegodon, Hipparion, and a range of gazelle, deer and extinct rhinoceros.

One of the earliest accounts of the use of dragon bone is by Shen Nong (The Divine Farmer). The Ben Cao Jing (Materia Medica Classic) was originally written in the 3rd century BC, but a full compilation of the scattered fragments was not begun until the Song Dynasty (960-1280 AD). The record runs as follows:

Dragon bone is sweet and balanced. It mainly treats heart and abdominal demonic influx, spiritual miasma, and old ghosts; it also treats cough and counterflow of qi, diarrhoea and dysentery with pus and blood, vaginal discharge, hardness and binding in the abdomen, and fright epilepsy in children. Dragon teeth mainly treat epilepsy, madness, manic running about, binding qi below the heart, inability to catch one's breath, and various kinds of spasms. It kills spiritual disrupters. Protracted taking may make the body light, enable one to communicate with the spirit light, and lengthen one's life span. It is produced in mountains and valleys.

Post Conference Tour

The History of Science in Oxford Museums

3 November 2011

Chris Duffin and Richard Moody

History of Science in Oxford Museums

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There is evidence of teaching taking place at Oxford University since the 11th century. With such a long and auspicious pedigree it comes as no surprise that some intellectual giants should be numbered amongst the scientists living, working and teaching at the University down through the centuries. Conference participants will have the opportunity to visit four Oxford museums of relevance to the History of Science as part of a post-symposium excursion.

Museum of the History of Science

Location : Broad Street, Oxford OX1 3AZ

The origins of this museum lie with Elias Ashmole (1617-1692). Born at Lichfield in Staffordshire, and following his attendance at Lichfield Grammar school and his service as a chorister at the Cathedral, Ashmole travelled to London and qualified as a solicitor. His first wife, Eleanor died during pregnancy in 1641, the 3rd year of their marriage. After a further 3 years spent in retirement, Ashmole, a royalist, served as an ordnance officer in Oxford for the forces of King Charles I. Here, he lodged at Brasneose College, studying mathematics and physics in his spare time. This led to an abiding interest in astronomy, astrology and magic. He began collecting manuscripts and artefacts assiduously. A second marriage, in 1649, added further estates to his increasing wealth and allowed him to expand his interests to embrace alchemy, archaeology and botany. Ashmole met the traveller and botanist, John Tradescant the Younger, around 1650. Tradescant had made, together with his father, a vast collection of curiosities which included large numbers of exotic plants and minerals as well as ethnographic artefacts. This, the earliest major Cabinet of Curiosities in England, was housed in Tradescant's quarters (called The Ark) at Lambeth in South London. Ashmole helped to catalogue the collection, and financed the final publication of *Musaeum Tradescantianum* in 1656. Ashmole went on to publish extensively on alchemy, Roman coins, archaeology and in several other disciplines. He was rewarded with a variety of offices on the Restoration of Charles II in 1660, and became a founder member of the Royal Society in 1661. John Tradescant legally deeded his collection to Ashmole in 1659. It should have passed to Ashmole directly on his death in 1662, but Tradescant's wife contested the deed claiming that her husband was drunk at the time of signing! Ashmole vigorously fought for the collection and was successful in his ownership bid.

In 1669, Ashmole received a Doctorate in Medicine form the University of Oxford, and in 1677 gifted his own and Tradescant's collections to the University on condition that they would be displayed to the public in suitably provided accommodation. The Old Ashmolean Musuem building, which now houses the Museum of the History of Science, was completed in 1689. Ashmole made good his offer of providing his and Tradescant's collections for display, but the bulk of his own collection was unfortunately destroyed by a fire in The Middle Temple in 1679. The transportation of the remainder of the two collections from London to Oxford required 12 wagons. On his death, the remainder of his collection was bequeathed to the University, including a vast and important manuscript collection which now resides in the Bodleian Library.

The building was used to house important historical documents and scientific apparatus, as well as acting as teaching rooms, with a chemical laboratory and dissecting rooms, right up to 1924. Then, the gift of the collection of Lewis Evans (1853-1930) allowed the Museum to be transformed into a Museum of the History of Science. The first curator was Robert T. Gunther (1869-1940), who published a 14

Above: Window dedicated to Elias Ashmole, Museum of the History of Science.

volume series entitled *Early Science in Oxford*, which catalogued letters, collections and lives of such luminaries as Edward Lhwyd, Robert Hooke and Robert Plot.

Items to look out for during the visit include the oil painting of Robert Plot (1640-1696), chemist, geologist and first curator of the Ashmolean Museum, which is housed in the Reception area.

The Basement houses a cabinet of pharmaceutical jars originally used to store preparations such as Mesue's (11th century recipe) *Electuarium Diacordium*, Rodomel (juice of roses mixed with honey), *Papaveris* (probably lachrymal papaveris – "poppy tears" - dried latex from the opium poppy, *Papaver somniferum*) and Lumbricor (dried and powdered earthworm, used as an anodyne, diuretic and diaphoretic (sweat inducer), as an anticonvulsive in epilepsy, as well as to treat arthritis). Equipment belonging to Charles Dodgson (1832-1898 – who wrote under the pseudonym, Lewis Carroll), as well as that used to produce penicillin, is also on display here. An exhibition on eccentrics includes some interesting material pertaining to William Buckland, especially the ammonite seal used to seal his correspondence.

On the first floor, look out for stunning displays of astrolabes, mathematical instrucments, microscopes, sundials, surveying 'instruments' and numerous other measuring devices. The small exhibit containing specimens from the original *Museum Ashmoleanum* includes several specimens from the Tradescants, plus a Jurassic echinoid named in honour of the first curator – *Clypeus ploti*.

Pitt Rivers Museum

Location : Parks Road, Oxford, OX1 3PW
entrance through the rear of the Oxford University Museum.

General Pitt Rivers, baptised Augustus Henry Lane Fox, had a moderately distinguished military career, seeing active service in the Battle of Alma (1854) at the opening of the Crimean War, but was invalided out due to persistent illness. He went on to test new rifles for service in the army, a topic on which he became the authority. Inspired by Charles Darwin's *Origin of Species*, he formulated his own theory of the 'Evolution of Culture', supported by a vast collection of ethnographic specimens, later, by means of a donation in 1884, forming the core of the Pitt Rivers Museum collections at the University of Oxford.

This interest in the study of mankind and its material culture lead naturally to a fascination with antiquities, and soon saw him actively excavating archaeological sites. As his experience in this field grew, the General began to apply military principles, approaching his sites systematically, both in terms of the process of excavation and the detailed recording of finds. Logical, thorough, painstaking and with a good eye for detail, his techniques ushered in a new era of archaeological excavation.

On the death of Horace Pitt, 6th Baron Rivers, in 1880, Augustus Henry Lane Fox inherited the country estate of his second cousin, an annual income of just less than £20,000, and took on his surname. Cranborne Chase, a Chalk plateau straddling the Dorset, Hampshire and Wiltshire borders, on which part of Pitt Rivers' new estate, Rushmore House, was located, was something of a happy hunting ground for archaeologists. The General excavated Neolithic, Bronze Age and Roman sites on the Chase with ever-exacting standards, and in doing so, laid the foundations for the modern discipline of archaeology.

The Pitt Rivers Collection originally consisted of some 20,000 items, now considerably expanded by later additions. The displays are packed together and contain many objects which are cramped together in glass display cases which are arranged thematically.

Of particular interest to conference delegates might be Case c61A which contains numerous geological items used in a talismanic or amuletic capacity. The Cretaceous echinoid *Echinocorys scutatus*, for example, was referred to variously as lucky stones, Fairies' heads or Fairies' Loaves – placing a specimen on the window sill ensured that the household would never want for bread. Jurassic belemnites were scraped to provide a powder which was then drunk in a draught of milk, wine or other such vehicle as a treatment for ' eruptive diseases of the mouth'. Cut and polished fossil scleractinian corals were worn in silver mounts in Italy as *Pietre Stregonie* – Witch Stones – ensuring protection against witchcraft. Small clusters of pyrite crystals were believed to be thunderbolts, and to protect the bearer from lightning during thunderstorms. Echoing the more typically European beliefs surrounding the Aetites or Eagle Stone, witch doctors in British Guiana employed 'Ma-sikhi-sikhi' (siderite nodules with rattle stones inside) for protection during pregnancy and inducing successful childbirth. A toadstone amulet from Devon is actually a Jurassic fish tooth belonging to *Lepidotes*. Toadstones were used extensively as antivenins and in the treatment of a wide range of diseases.

Oxford University Museum

Location : Parks Road, Oxford, OX1 3PW

The Oxford University Museum was built in 1860 in order to bring together the somewhat disparate natural science collections of the University. Construction took place between 1855 and 1860 under the watchful eye of Sir Henry Acland, Regius Professor of Medicine. Various University departments moved to the building to carry out their teaching under one roof, but have subsequently expanded and moved to larger premises. The famous confrontation between Thomas Henry Huxley and Bishop Samuel Wilberforce over evolution took place here during the British Association for the Advancement of Science meeting in the summer of 1860.

The core of the collections is formed by the natural history specimens belonging to the old Ashmolean Museum collections, largely made by the father and son team of John Tradescant the elder (c. 1570-1638) and younger (1608-1662). A small display of specimens from the *Musaeum Tradescantiarum* can be sent to the left of the doorway. Added to this are the entomological collections made by William Burchell (1781- 1863), who spent years travelling and exploring in Africa and Brazil, amassing a huge natural history collection. Following his suicide, the plants in his collections made their way to Kew, whilst the insects went to Oxford.

William Buckland (1784-1856) studied at Westminster School and then Corpus Christi College Oxford, graduating in Classics and Theology in 1804. He was appointed Reader in Mineralogy (1813) and then

Above: Oxford University Museum.

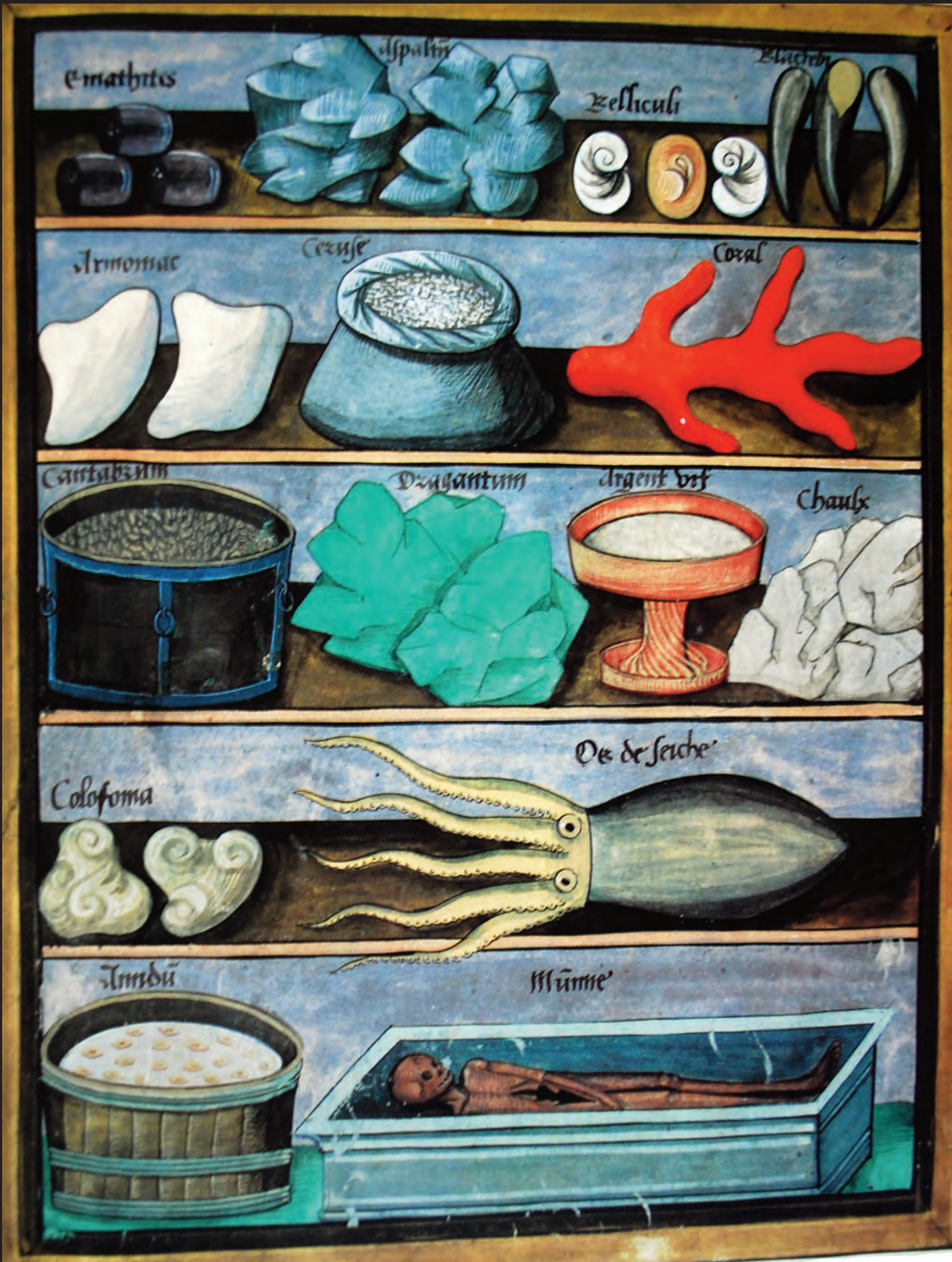
Reader in Geology (1818), quickly establishing himself as a popular lecturer, avid collector and innovative researcher. The Museum contains numerous displays which testify to Buckland's contribution to the early development of Geology. His study of Pleistocene cave deposits from Kirkdale in Yorkshire led him to the conclusion that the cavern preserved the remains of a Hyaena den, rather than an accumulation of bones washed in by the waters of the Biblical Flood. He identified the white phosphatic balls lying amongst the bone scatter on the cave floor as Hyaena faecal pellets. This avenue of research expanded, leading to the identification of coprolites from a range of geological formations. He filled the intestines of extant skates and rays with hydraulic Roman Cement in order to test the hypothesis that coprolites with a spiral form could have been produced by sharks; one of his original set of filled intestines, plus the coprolites he was modelling, is on display. He was instrumental in identifying the footprints of *Chirotherium* from the Triassic of Scotland and Cheshire, supposing them to have been made by a reptile akin to a tortoise – having replicated the structures by forcing several of his pets to walk across a slab of specially designed pastry on the kitchen table. He gave the first scientific description of a dinosaur; the jaw of *Megalosaurus bucklandi* from the local Stonesfield Slate is on display. A follower of Louis Agassiz (1807-1873), he was also instrumental in helping the Ice Age theory to become accepted in Britain. In 1823 Buckland also discovered a skeleton of what is now known to be an Upper Palaeolithic male at Goat's Hole Cave in the Gower Peninsula. Buckland believed the skeleton to belong to a Roman female, but subsequent work has shown the skeleton to be the oldest known ceremonial burial in the world. The skeleton, still on display in the Museum, was referred to as the Red Lady of Paviland on account of the red ochre with which the bones have been stained. A renowned eccentric, Buckland kept a menagerie of pets at various times, including a bear that was allowed to roam the nearby village of Islip where Buckland's Rectory as Canon of Christ Church was located. Buckland went on to be appointed Dean of Westminster in 1845, but later died in a mental asylum in Clapham, possibly following a fall from a coach.

Other items to look out for in the Oxford University Museum include the statues of great scientists which are displayed around the ground floor of the central court, the columns of different British building stones, originally chosen by John Phillips (1800-1874 – nephew of William Smith) and which support the arches in the cloistered arcades on both the ground floor and the first floor of the display area. The most complete remains of a single Dodo are preserved in the museum, and a display is also dedicated to a regular Victorian visitor to the collections - Charles Dodgson (1832-1898), better known by his pen-name, Lewis Carroll. This famous author of *Alice's Adventures in Wonderland* (1865) was actually a talented mathematician who held a lectureship at Christ's College. The central court also contains some impressive mounted dinosaur skeletons (casts of *Iguanodon*, *Tyrannosaurus, Edmontosaurus* and *Struthiomimus*).

Ashmolean Museum

Location : Beaumont Street, Oxford OX1 2PH

The Ashmolean Museum is dedicated to Art and Archaeology, and combines the University Art collections, originally based in the Bodleian Library, with parts of the Elias Ashmole collection, including material originally belonging to the Tradescants. The present building was opened in 1845 to house the many later additions to the collections made through the centuries since the 1600's. The current collections are very wide ranging and include drawings by Michelangelo, Raphael and Leonardo da Vinci, watercolours and paintings by Turner, and paintings by John Constable, Claude Lorraine and Pablo Picasso. Some unusual objects in the collections include the death mask of Oliver Cromwell, the lantern carried by Guy Fawkes during the Gunpowder Plot of 1605, and the Messiah Stradivarius violin. Archaeological highlights include the Alfred Jewel (late 9th century Anglo-Saxon jewel), the Abingdon Sword (late 9th or early 10th century late Anglo-Saxon iron sword and hilt), the jewels of the Thame Hoard (including a toadstone ring), and the Minoan collection of Arthur Evans.



Matthaeus Platearius, 1480-1500