

Statement on the Value of Museums and Collections

The geological museums and collections of the UK are a great national asset and contribute to culture, research, science education and public engagement in a number of important ways:

- Collections form an intrinsic part of research carried out in the UK and internationally. They play a key role as a source of evidence in tackling major challenges such as climate change and exploring for natural resources.
- The UK is the site of many scientific breakthroughs in the history of geology. Collections tell an engaging story about the geological heritage of the UK.
- Museums and collections are crucial gateways to engaging students and the public in geology, Earth history and science.
- Local collections embody an important sense of place, different from centrally held collections, and tell a compelling story of local landscape and geology.

The UK is home to a wide-ranging and scientifically important set of geological collections. The diverse and unique nature of these collections contributes to scientific advancement and cultural understanding of our planet for researchers, students and the public. Specimens housed in collections around the UK include rocks and minerals, meteorites, casts, reconstructions and plant and animal fossils. Collections may also contain archival material such as photographs and historical documents. Together they represent an unparalleled scientific and cultural resource that attracts visitors from around the world.

Collections of the UK

Our remarkable geological collections are housed in natural history museums and other public institutions across the UK. They serve as national, regional and local centres for research, education and public engagement.

There is limited up-to-date data on the different types and distribution of collections. The Geological Curators Group, an affiliated group of the Geological Society of London, occasionally produces a 'State and Status review' of the UK's geological collections. When the most recent review was published in 2005, there were over 2000 museums and heritage sites in the UK, of which at least 258 contained geological collections. More recent informal surveys suggest the true number is probably higher. They are spread across all parts of the UK, and their geographical distribution broadly mirrors population concentration. Of the 258 collections surveyed, 74% displayed at least part of their geological collections to the public, while others allowed 'behind the scenes' access to members of the public.

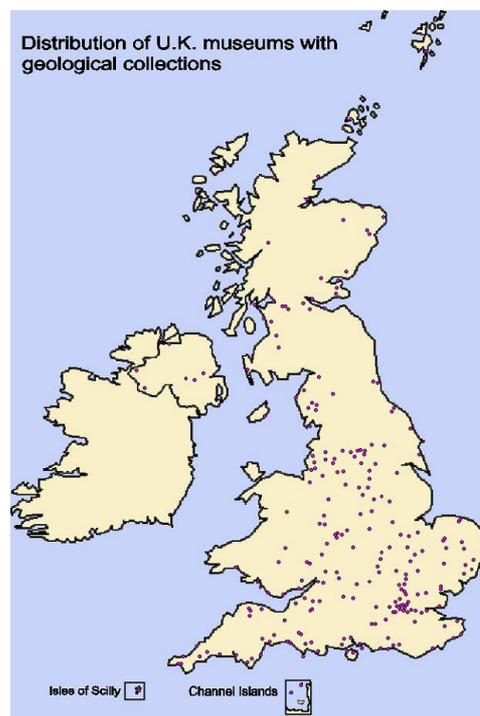


Figure 1 - Geographical distribution of geological collections. Fothergill, H. 2005. 'The state and status of geological collections in United Kingdom museums: 2001' *The Geological Curator* 8(3): 53–136.

Education

The curation and exhibition of natural science samples are invaluable to science education. Visiting collections and using associated teaching resources provide engaging and exciting ways to learn. Local and national museums are visited by children and students of all ages, and are also a considerable draw for many people visiting the UK. Public access to collections often provides the opportunity for hands-on interaction with some samples, helping to develop a more concrete understanding of the processes they represent. Geological collections can:

- Help people to better understand their local area through its geology.
- Provide students with practical insight into grand theoretical ideas such as climate change, plate tectonics, mountain building and sea-floor spreading.
- Enable an understanding of rare and remote rocks and rock forming processes through visiting collections of international samples.
- Illustrate the complexity of 'real world' features and processes which are often simplified when taught in the classroom.
- Create an appreciation of the flora and fauna of the planet, its evolution through geological time and humanity's place in the timescale of life.

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The importance of local collections and regionality

Publicly accessible collections are well distributed across the nations of the UK. Smaller local collections are often best equipped to tell the story of an area's geology and landscapes through specimens and samples that may include outcrops and rock types unique to that area. Larger national institutions generally contain more nationally and internationally significant material which is less closely linked to its location. National and local collections therefore perform different and complementary functions in terms of public engagement and understanding.

Geoscience is distinctive in being characterised by a high degree of idiographic research (that is, research which is specific to a particular time or place – focusing on a geological region or site or a period in Earth history, for example). Samples from specific locations can be critical to the advancement of understanding and knowledge. At Kimmeridge Bay, for example, the Kimmeridge Clay source rock is a vital analogue of source rock systems in North Sea hydrocarbon fields. Local collections can contain material that is rare or unique and of great scientific importance. Local collections may therefore have national and international significance because they can hold samples of important local geology which may be relevant to research going on around the world.

Heritage

The physical landscape of the UK, and the geology that underpins it, is an important part of the UK's identity and national heritage. The UK is known internationally as being the birthplace of many important breakthroughs and fundamental concepts in geology, in part because of our wonderfully diverse geology. The UK is home to rocks that span the full extent of geological time resulting in a highly varied, historically complex suite of surface geology that has been discussed, debated and pored over for centuries. This geological heritage of rocks, minerals and fossil animals and plants illustrates the scientific legacy of leading British explorers and researchers. Eminent scientists such as James Hutton and William Smith built their seminal work on the geology of the UK and are responsible for some of the most important founding principles of our science. Museums and the collections that they house form an important part of the conservation and communication of the UK's geodiversity and geological heritage.

Kimmeridge Bay

Kimmeridge Bay is a Site of Special Scientific Interest lying within the Jurassic Coast World Heritage Site, and is part of the Dorset Area of Outstanding Natural Beauty. It is also a site of great geological importance, as shown by its inclusion as one of the Geological Society's 100 Great Geosites. It provides a fantastic educational function as an opportunity for both industry geologists and students to observe the world class Kimmeridge Clay source rock, which is a key analogue to aid understanding of source rock systems in North Sea hydrocarbon fields.



Figure 2 - Rocks at Kimmeridge Bay, a Site of Special Scientific Interest.

The full extent of the fossiliferous content of the formation is hard to determine on location, with only minor ammonites and thin-walled bivalves commonly observable. In fact, the Kimmeridge Clay is a crucial formation from a paleontological perspective as it contains a large range of fossils, including pleisiosaurs and ichthyosaurs that are remarkably well preserved and were hitherto unknown to science, and the fossil content is key to understanding the petroleum geology of the formation. The Steve Etches Kimmeridge Fossil Collection provides an opportunity to geologists who may only be visiting the area for a very short time to observe the full range of fossiliferous content that has been extracted from the formation over more than 30 years. In this time over 2000 Kimmeridgian specimens have been extracted, researched and catalogued. The collection is due to be displayed publicly in a purpose built museum in Kimmeridge and will thus remain a vital resource to any geologist visiting the bay. This collection is a prime example of the importance of local and regional collections in enriching the understanding of geologists in training and for engaging with the non-specialist public.

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Collections in the Landscape - Buxton Museum

At the heart of Buxton Museum's collection is the geology and archaeology of the Peak District. The Peak District is one of the most popular parts of the UK for visitors, with around 12 million visitors a year according to the Peak District National Park 'State of the Park' report.

Much of its draw is the outstanding landscapes and natural features which are a unique part of the UK's cultural and natural heritage. With funding from the Heritage Lottery Fund, it is the museum's ambition to become the destination of choice for people wanting to find out about the Peak District. To do this the museum is maximising the opportunity that digital access to its collections can provide. Guided tours of landscape sites



Figure 3 – Landscape around Buxton.

for use on mobile phones will provide access to the museum's collections for visitors enjoying the landscape. The museum's principal gallery will be developed, and items not exhibited before will be put on show, with additional material provided through digital interpretation and online access to the museum's collections. Through innovative approaches to engagement with collections, regional museums like Buxton Museum are enhancing public outreach and engagement with landscapes and local geology.

Public Outreach

Geological collections provide access to scientific and historical materials, samples and objects from all areas of the country. A very important element of the maintenance and display of geological collections is how they are utilised to improve public knowledge and understanding of geology. The role of geology in shaping the landscape and the many key societal needs it underpins (energy, geochemical buffering, use of underground space, etc) is often obscured by the fact that much of it is underground and therefore out of view. Geological collections and the innovative ways they are communicated present one of the best opportunities to engage the public with geology and its role in providing our resources and underpinning our understanding of the environment.

In addition to the traditional access route of visiting a museum and observing the collections first hand, advances in digital

collections, the advent of mass-participation citizen science and growing collaboration among leading institutions promises to revolutionise the use of these collections making them fully available to national and global scientific and public audiences for the first time.

Digital technologies provide the opportunity to produce high quality imaging, creating digital surrogates that can be distributed electronically. These digital technologies are complemented by the growth of citizen science, with broad public participation both in contributing new natural science information via dedicated apps on mobile devices and in online crowd-sourcing interpretation of the information on specimen labels. An example of how digital technologies can enhance the reach of collection can be seen in the Buxton Museum case study.

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Old collections provide new insights into the Stonehenge Bluestones

The recent use of historic collections held around the country to provide new insights into the provenance of the standing stones at Stonehenge is a great example of the long-term importance of well preserved collections. Researchers from Amgueddfa Cymru - National Museum Wales, Institute of Archaeology and Aberystwyth University have been re-examining the provenance of the Stonehenge bluestones using a variety of geochemical techniques that were not available when H. H. Thomas published his 1923 paper in the journal *Antiquity*. In that paper, Thomas concluded that the doleritic bluestones came from Carn Meini in the Mynydd Preseli area of North Pembrokeshire, whilst the rhyolitic component came from nearby Carn Alw and the 'calcareous ashes' from the northern flanks of Foel Drygarn.



Figure 4 - World Heritage Site Stonehenge.

However, new analytical results suggested otherwise and so it became essential to track down the original specimens and thin sections that Thomas used in his studies. One of the key rhyolitic thin sections was traced to the Natural History Museum. Other thin sections were found in the collections of the British Geological Survey in Keyworth. Thanks to the curators at those institutions allowing the researchers to borrow the thin sections they have been able to reassemble the set examined by Thomas and to compare again the bluestone samples with those from the Mynydd Preseli. This examination has challenged the original matchings by Thomas and in fact the petrography supports the evidence for alternative sources, still in the Mynydd Preseli area, suggested by the geochemical work. These new potential sources are currently under investigation by archaeologists from the Institute of Archaeology. These findings have been published in a series of papers in the *Journal of Archaeological Science*, and highlight the critical value of geological collections held by museums and other institutions around the UK. This case exemplifies the importance of long-term collections as a key part of cultural heritage. These archived materials remain of great importance to the UK's cultural history many decades after breakthrough research was first done, and support further groundbreaking research as new analytical techniques are developed.

Research

Geological collections are a significant part of the UK's research infrastructure and their use as a primary source of evidence has an important role in tackling many major scientific and socio-economic challenges. Geological samples can help to further explorative and fundamental science research, such as investigating planetary geology through analysis of astrogeological samples. They are also important in researching major challenges including environmental change; exploration of scarce mineral resources; advancing the understanding of the rocks and stratigraphy associated with oil and gas; and food security and sustainable agriculture. Access to these samples and the research and scientific breakthroughs they support engages the public with scientific advances and discoveries. These collections are also used extensively by the global scientific community.

The many museums and institutions with geological collections complement the extraordinary natural science collections held by the UK's great public museums, botanic gardens and universities. Together, they represent the most important and most extensive scientific infrastructure of its type in the world, providing a unique tool to understand the natural world and our place in it.

To find out more about the value and importance of museums and collections, visit the website of the Geological Curators Group (www.geocurator.org) whose purpose is to improve the state and status of geological collections and curation.