

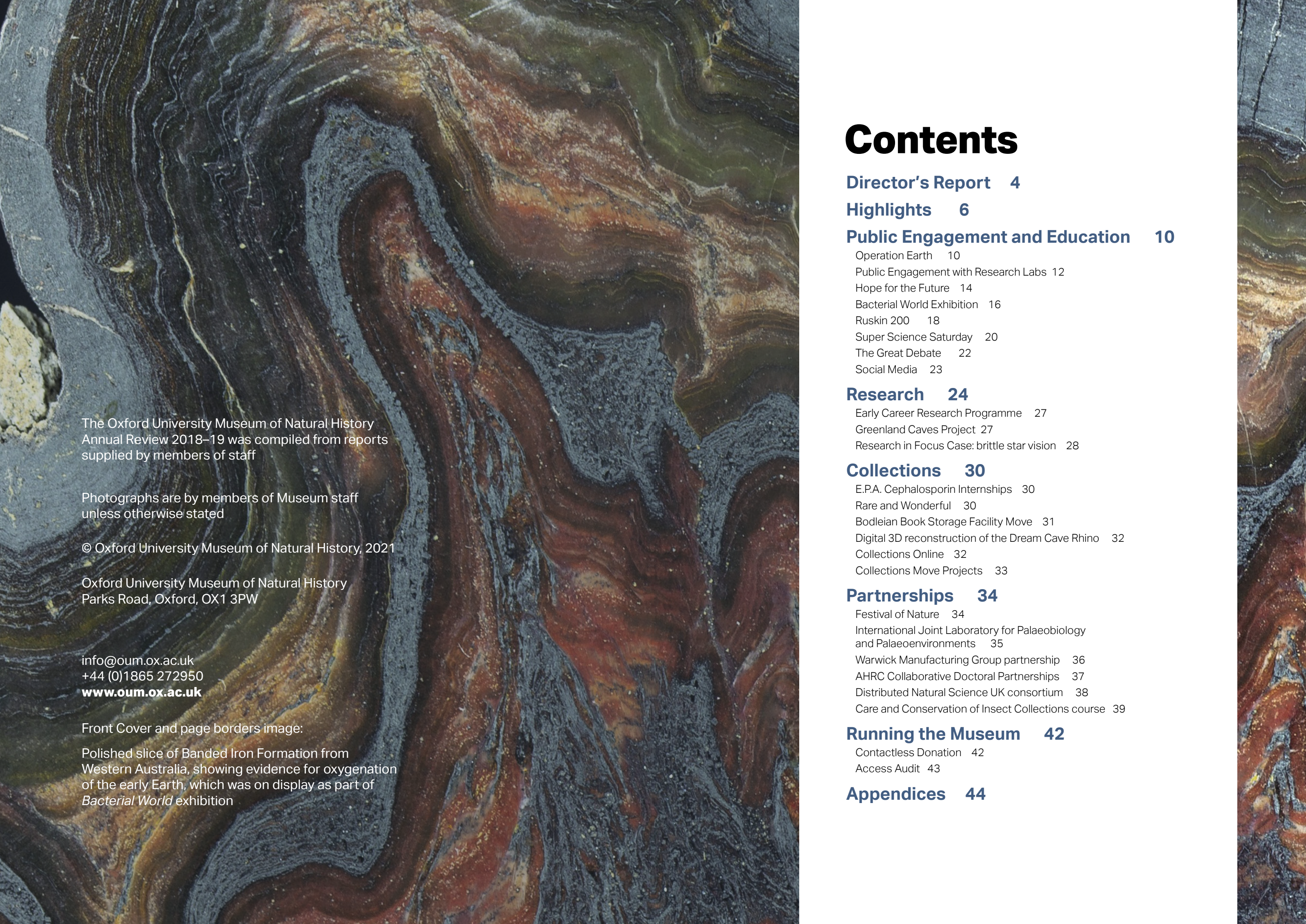
OXFORD UNIVERSITY MUSEUM OF NATURAL HISTORY

Annual Review

2018 – 2019



Museum of
Natural
History



The Oxford University Museum of Natural History
Annual Review 2018–19 was compiled from reports
supplied by members of staff

Photographs are by members of Museum staff
unless otherwise stated

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Front Cover and page borders image:

Polished slice of Banded Iron Formation from
Western Australia, showing evidence for oxygenation
of the early Earth, which was on display as part of
Bacterial World exhibition

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Director's Report

As the Museum of Natural History entered the new millennium, visitor numbers surpassed 200,000 for the first time in its history. Since then, those numbers have increased steadily, passing 400,000 in 2008 and 600,000 in 2014. Academic year 2018–19 was a further landmark with attendance of 801,521 over the 12 months. The level of activity in relation to the events programme has increased proportionately with visitor numbers and it was a busy year that saw the celebration of the 200th anniversary of John Ruskin's birth and his role in designing the Museum, and intensive work on the new displays of two of its larger specimens – the Yarnton and Peterborough plesiosaurs – amongst a wide range of other activity.

The year also saw by the far the most ambitious exhibition to date in the Contemporary Science & Society series, Bacterial World. One hundred and seventy-five thousand people (another record) came to see an interdisciplinary exploration of the natural history of bacteria, from the origin of life and how they have shaped the planet, to their role in ecosystems at all scales (including gut biomes) and how they interact individually. The exhibition also contained some ambitious digital interactives and crocheted Petri dishes commissioned from the textile artist Elin Thomas.

And what nobody could miss was the 28m sculpture of the bacterium *Escherichia coli* by Luke Jerram suspended from the glass roof of the north aisle. Ruskin and Acland conceived the Museum as sitting at the interface of art and science and the inclusion of work by Jerram and Thomas returned the Museum to that ethos in a contemporary sense. Ruskin may not have been so approving of the reworking of Madonna's 1984 hit – with permission – as Bacterial Girl (still available on YouTube).

2018–19 was an important year for collections too. A multi-year project to merge the Museum's many databases and migrate them to the new collections management system, Axiell EMu, culminated in the development and launch of Collections Online. This gives public access to almost 0.5 million records from across the Museum's collections and represents a major step forwards in opening access. And at the end of the academic year, we heard that the National Lottery Heritage Fund will support the HOPE for the Future project over the next three years to conserve and rehouse the 1.1 million specimens in the British insect collection, restore the Pre-Raphaelite decoration of the Westwood Room and turn it into publicly accessible space, and undertake an ambitious programme of outreach.



At a personal level, July 2019 was spent in the far north-eastern corner of Greenland, in Kronprins Christian Land, in an area that I spent much time making geological maps in the 1990s. The changes to the landscape that had occurred were stark. The area where base camp had been on the earlier expeditions had been removed by accelerated river erosion, and the weather was so warm at 80°N that we didn't get inside sleeping bags for the whole trip. Accelerated polar melting is just one aspect of global climate change, and the Museum will be returning to these themes with increased emphasis in coming months and years.

Professor Paul Smith
Director

Highlights

Bacterial World

Bacterial World, the latest in the Museum's Contemporary Science and Society exhibition, opened in October 2018, telling the hidden story of the smallest lifeforms and their influence on the past, present and future of our planet. In total, the exhibition received 174,804 visitors, the digital interactives were used 87,393 times, and the accompanying website received 37,000 views.



Bacterial World exhibition

Ruskin 200

Between February and May 2019, the Museum's Ruskin 200 programme used the bicentenary of John Ruskin's birth to focus on and explore visions of art and science at the Museum from 1860 to the present day. This interdisciplinary programme combined contemporary academic research on the history of science, museums and art with an inclusive series of practical drawing workshops focused on the Museum's architecture and the collections within.



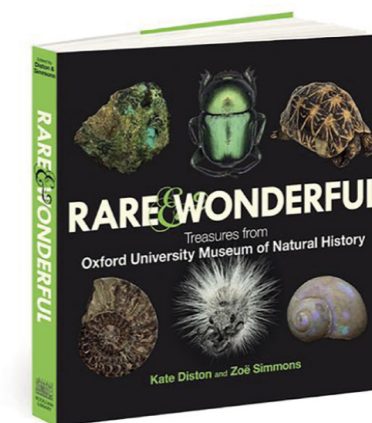
One-day exhibition, including John Ruskin's designs for the Museum's windows

International Joint Laboratory for Palaeobiology and Palaeoenvironments

The Museum of Natural History partnered with Yunnan University, China and several other institutions in the UK and Germany to form a major new joint venture, the International Joint Laboratory for Palaeobiology and Palaeoenvironments (JLPP). Representing the culmination of thirty years of scientific collaboration between the Museum and Yunnan, the aim of the partnership is to develop an international research platform on which the vast palaeontological resources of Yunnan Province can be integrated into the activities of the Museum of Natural History, enabling researchers to collaborate more efficiently and effectively on these materials, thereby promoting research on the evolution of the biosphere.

Rare and Wonderful: Treasures from the Oxford University Museum of Natural History

In October 2018, *Rare and Wonderful: Treasures from Oxford University Museum of Natural History* was published. Written by Kate Diston, Head of Print and Digital Collections and Zoë Simmons, Collections Manager (Diptera & Arachnida), this lavishly illustrated book features highlights from the collections ranging from the iconic Dodo and the giant tuna to crabs collected by Darwin during his voyage on the Beagle, David Livingstone's tsetse fly specimens and Mary Anning's ichthyosaur. Each item tells a unique story about natural history, about the history of science, about collecting, or about the Museum itself.



Rare and Wonderful: Treasures from Oxford University Museum of Natural History

Highlights

Distributed Natural Science UK consortium

In 2018/19, the Museum of Natural History took the lead in creating a new consortium of UK natural science museums. DiNaS UK brings together the collections of the devolved national museums, together with the larger university museums in this field and the civic museums with large natural science collections to provide a platform and voice for regional natural sciences collections that enables them to take part in discussions with a range of sector and government bodies.

Collections Online

Collections Online, an online portal to the Museum's collections, was developed, providing global access to 490,000 records from the Archive, Life and Earth collections. For the first time, all of the Museum's scientific and historical collections information was made discoverable in a single place and was fully integrated with the Museum's website. This cross-disciplinary resource can be used by people from sciences and humanities to answer their own research enquiries, or direct them to visiting or using the Museum's collections.

Out of the Deep

In September 2018, the Museum launched a brand new permanent display, featuring rare and remarkably complete skeletons of two plesiosaurs, marine reptiles which became extinct around 66 million years ago. Brought to life through digital animations, physical models and touchable elements, the Out of the Deep showcase was the largest single new permanent display to be added to the Museum in decades.



*Out of the Deep display in the main court
Plesiosaur digital animation below*





Public Engagement and Education

Operation Earth

The focus of the Museum's family programming in 2018 was Operation Earth: a national programme designed to engage, inspire and involve school-age children and their families with environmental science research. The project was funded by the Natural Environment Research Council (NERC) and led by the Association of Science and Discovery Centres (ASDC). The Museum was one of 10 partners involved in the project.

For the first time the Museum ran family science shows in the Lecture Theatre, featuring the character Earthy who was visiting the doctor for a check-up. Checking Earthy's land, air and oceans, the doctor and families in the audience discovered the issues affecting the earth and how these are happening, from plastic pollution and air pollution to loss of land and biodiversity. The show was designed to encourage audience members to consider how humans are impacting our planet with its finite resources. The show involved audience participation and short films featuring scientists explaining various aspects of environmental science. During the period 2018-19, the Museum ran 34 shows in total.

In addition to the show, the Museum's family event programme was themed around Operation Earth with activities featuring scientists in a Meet the Experts series, giving families an opportunity to find out more from an expert about a variety of environmental topics. The largest event was a family science fair, Super Science Saturday, where around 100 scientists showcased their environmental science research, attracting an audience of over 3,000 people looking at topics such as sustainable energy and meat consumption and production.

The Museum also took the Operation Earth activities out to two local shopping centres in order to reach audiences less likely to visit the Museum. Between February and October 2018, the project engaged with over 15,000 people.



Earthy meeting audiences at Westgate Shopping Centre



Pandora Dewan as Earthy



New Approaches

Developing Public Engagement with Research Projects (PER Lab)

The Museum began working with colleagues in the University's science divisions to develop and pilot new approaches to generating public engagement with research projects. The Public Engagement Lab (PER Lab) provides researchers and Museum and Library staff the opportunity to generate and develop innovative and high-quality public engagement with research (PER).

Across two phases, the project involved a structured process for researchers to access GLAM expertise, collections and venues, and for GLAM to work in partnership with researchers. Between November and December 2018, phase one saw researchers and GLAM staff taking part in three one-day sandpit workshops to collaboratively develop ideas. In 2019, during phase two, the proposals selected for funding received targeted support to further develop, deliver and evaluate their projects over the course of a year. The PER Lab project is funded by the Engineering and Physical Sciences Research Council (EPSRC).

Left - Pupils from William Fletcher Primary stand next to the new Yarnton pliosaur display for a photo shoot with the Oxford Mail

Good Vibrations

The project aim was to use the topic of 'bubbles in action' (how they can act as a model for cellular mechanics, and be used by biomedical engineering applications) to highlight how science can work beyond disciplinary boundaries, so people see science differently. The project created a pop-up experience in communities in Oxford, and targeted young people (10-13) and their families. A kit of 'do-at-home' experiments and investigations was given out, providing a way to connect with researchers, and participants visited the Museum to share what was learned and discovered.



Good Vibrations event



Out of the Deep object handling kit

Out of the Deep

In September 2018, the Museum launched a brand new permanent display, featuring rare and remarkably complete skeletons of two plesiosaurs, marine reptiles which became extinct around 66 million years ago. Brought to life through digital animations, physical models and touchable elements, the Out of the Deep showcase was the largest single new permanent display to be added to the Museum in decades.

On 24 September 2018, a group of year five pupils from William Fletcher Primary School in Yarnton, Oxfordshire, came to the Museum to celebrate the new display and take part in special activities about palaeontology. The short-necked plesiosaur on display was discovered in their village in 1994, so it had special significance to the children. They met the people who uncovered, excavated and researched the specimens.

The larger, long-necked plesiosaur was a very recent discovery, found in a quarry near Peterborough in 2014, by the Oxford Clay Working Group, who use considerable expertise to search for fossils in their spare time. This group were also invited to the Museum to see the display and the Museum continues to work closely with them.



HOPE for the Future

As part of the development phase of the National Lottery Heritage Fund supported HOPE for the Future Project, the Museum piloted school outreach focussed on schools with a high percentage of Pupil Premium students.

The project's two main aims with respect to young people facing disadvantage are:

To value connections between the historic Hope Collection of British insects and biodiversity in the natural living world.

To enthuse them about natural history, building their cultural and science capital.

Additionally, the project aims to support teachers in taking a creative approach to the science curriculum.

In the period 2018-19, the project engaged with over 500 primary and secondary age children through a variety of outreach models including one-day workshops leading to the British Science Association CREST Discovery Award, half-day workshops, summer holiday sessions working with a local charity, a week-long summer school based at the Museum, and an after-school club for Key Stage 3 students.

Both quantitative assessments and qualitative feedback received indicate that the project has been highly successful in building science capital by enthusing children, changing attitudes and educating them about the importance of insects to ecosystems, human

food supply, and in inspiring new technologies. Children have also gained a deeper understanding of the roles that museum collections and current field entomology play in conserving insect biodiversity. Several children involved in the project themselves made significant species finds. These specimens were added to the Museum collection and attributed to the children who collected them.

The approach to the science curriculum was also enhanced; teachers valued the experiences offered to pupils, access to resources and expertise, the opportunity to assess scientific working, and the variety of possible cross-curricular links. The Museum used the evidence gathered to design an enhanced outreach model that aims to further nurture young natural historians through a Young Entomologists Hub, online resources and teacher Continuing Professional Development.

Bacterial World Exhibition

19 October 2018 – 28 May 2019

Bacterial World, the latest in the Museum's Contemporary Science and Society exhibition, told the hidden story of the smallest lifeforms and their influence on the past, present and future of our planet. Combining Museum specimens, monumental art, and digital interactives, the exhibition revealed the crucial role bacteria have played from the formation of the very first life over three billion years ago to the present day.

Working with 37 researchers across multiple departments of the University and beyond, *Bacterial World* was generously supported by EPA Cephalosporin Fund and the Biotechnology and Biological Sciences Research Council (BBSRC). Displays featured items loaned from institutions including the Wellcome Collection, London, Yale Peabody Museum of Natural History, Connecticut, USA, Pitt Rivers Museum, and the Natural History Museum, London.

Visitors to the exhibition embarked upon a journey through dizzying scales, from the planet-wide creation of an oxygen atmosphere by cyanobacteria 2.5 billion years ago, to the microscopic world of bacterial colonies and cells themselves. Along the way, natural history specimens revealed the varied and surprising symbiotic relationships that many organisms, ourselves included, have with bacteria.

A 28-metre long inflatable *E. coli* sculpture five million times bigger than the real thing, created by renowned artist Luke Jerram, was loaned from the University of Sheffield.



E.coli 2015, Luke Jerram. Photo by Paul Smith

Two digital interactives were developed especially for the exhibition. Bacteria Explorer enabled users to travel from the everyday human scale down into the microscopic scale of the bacterium, where they discovered a surprising array of forms. And the Gut Wars game utilised real research simulations to highlight the different abilities and strategies bacteria use to battle and survive in the gut.

In total, the exhibition received 174,804 visitors, the digital interactives were used 87,393 times, and the accompanying website received 37,000 views.

Museum staff gained permission from Madonna and Sony to record Bacterial Girl, based on Madonna's 1980's hit, Material Girl. The video went viral: <https://www.youtube.com/watch?v=djtpRvjU5ws>

A key part of the Museum's contemporary science and society exhibition series is the extensive programming that accompanies exhibitions, with a wide range of events for different audiences. The programming involves creating opportunities for researchers to engage with audiences and significantly increases the number of researchers involved in the exhibitions.



Top and right - early career researchers taking part in public programming for Bacterial World

Above - view taken at the late night opening event, Uncultured

Events Included:

Uncultured: a late night opening with performances and workshops including printing, sewing, jazz and photography as well as the opportunity to investigate food produced with the aid of bacteria.

Stand Up for Bacteria: a comedy evening run in partnership with local group, the Philosopher Comedians.

Microbial Meeples: an evening of playing microbial themed board games under the dinosaurs, in partnership with local board games café, Thirsty Meeples.

Super Science Saturday: Microworld – a lively family science fair, attended by over 3,000 people with a microbial theme. Over 50 researchers were involved in developing and delivering hands-on investigative activities aimed at families.

Party in a Petri Dish: an alternative Christmas Party with a bacterial twist, incorporating carols, quizzes, talks, games and mince pies.



Ruskin 200

The Museum's Ruskin 200 programme built on the success of the 2016 Visions of Nature programme, using the bicentenary of John Ruskin's birth to focus on and explore visions of art and science at the Museum from 1860 to the present day.

This interdisciplinary programme combined contemporary academic research on the history of science, museums and art with an inclusive series of practical drawing workshops focused on the Museum's architecture and the collections within.

Over 100 people attended a specialist symposium at the Museum, *John Ruskin, Science and the Environment*, and a public lecture *Ruskin's Trees* on Friday 8 February 2019 - Ruskin's birthdate. On the same day, over 200 visitors viewed a temporary exhibit held in the Director's office at the Museum displaying Ruskin's own architectural sketches for the Museum's facade (on loan from the Ashmolean Museum) alongside archival items, in a room painted with expansive geologically-themed murals by one of Ruskin's protégés, Richard St John Tyrwhitt. The collective experience of viewing these items together resulted in new interpretations of Museum artworks, alongside lively discussions on Ruskin's legacy.

A Drawing Weekend on Saturday 9 and Sunday 10 February 2019 invited 6,090 visitors to pick up a pencil and join in with a variety of Ruskin-inspired drawing activities across the Museum. Colleagues worked with creative collaborators, Fusion Arts, to deliver over 24 hours of free, drop-in art tuition with six artists, all within the public spaces of the Museum. Over 200 visitors contributed to a large communal floor drawing of the Museum's facade whilst more than 120 people created still life compositions in watercolour inspired the Museum's carved capital designs. The weekend also launched a free Art Competition providing a platform for those over 16 years old to share their creative views of the Museum.



Visitor participating in the large communal floor artwork launching the Museum's Ruskin-inspired art competition

Throughout March 2019, free, drop-in Monday lunchtime art sessions were hosted by a resident artist from Fusion Arts, focusing observational drawing of the collections on display and architectural features. Attracting over 90 participants, feedback indicated that 75% felt inspired to look closer at collections on display and that 100% enjoyed the artist-led sessions. The Museum also hosted Fusion Arts' Young Person's Drawing Club on Thursday evenings where novel sessions were facilitated by Museum staff, including drawing through microscopes, and a 'life drawing' session with live insects.

The Ruskin programme continued over the summer with free drawing workshops, a Young Artist Art Competition for 5-15 year olds, and more events, all aimed at encouraging people to look closely at the Museum and better understand the relationship between art and natural history.

Free, drop-in, watercolour sessions took place on the Museum lawn in May 2019, inspired by John Ruskin's own designs for the Museum windows, with one co-run with an Illustration student on placement from Falmouth University.

The University's GLAM division funded four Student Stress-Soother workshops for Oxford University students, delivered by two artists outside of public hours in May 2019. The workshops encouraged students to unwind through close observation of Museum collections, making collages, and inviting new perspectives by drawing views looking up to the Museum's glass ceiling while reclined on floor cushions.

Further collaborative programming with the GLAM division included the delivery of six sessions with Crisis Oxford, developing Ruskin-inspired Museum tours.

In June 2019, two researchers from Birmingham University and a palaeontologist from the Natural History Museum in London, explored the relationship between Dinosaurs and Art in a special event held under the *T-Rex* and *Iguanodon* casts. Feedback received indicated 100% felt inspired to look further into the subject (85% strongly agreed) while 95% reported that the Museum is place where they can experience both contemporary scientific research and art.

The Museum's Ruskin Art Competition for 16+ year olds closed in May 2019 attracting a myriad of fantastic entries from local artists, students, and visitors from across the UK. Three, free Ready, Steady, Draw! workshops held on Saturdays throughout May 2019 launched the Museum's competition for younger artists, providing additional handling collections and free drawing materials for the public.

Finally, the Ruskin programme worked closely with the Arts and Humanities Research Council Collaborative Doctoral Partnerships students based at the Museum, supporting two temporary displays on their research; one on the relationship between art and science in natural history museums through looking at casts and models, and another developing an exhibit on Ruskin and Geology, to be displayed in September 2019.



Super Science Saturday: Fossil Frenzy

On 9 March 2019 the Museum ran one of its large-scale family science fairs, Super Science Saturday. The theme of the March event was fossils and proved very popular with over 3,600 attendees during the afternoon. With over 15 activity stands, the science fair aimed to share contemporary University research linked to the topic of fossils, with activities created by researchers from the department of Earth Sciences, as well as many of the Museum's in-house researchers, whom are mostly palaeontologists.

Children and their families could find out about prehistoric marine reptiles, dinosaurs, evolution, prehistoric plants, and habitats through fun games and interactive activities encouraging them to explore, question and investigate. All of these activities were led by 27 researchers who were currently working on fossil related topics. The largest proportion of attendees were families with primary school aged dinosaur enthusiasts (and in many case experts!) but participants also included teenagers and adults who had made special trips to Oxford to meet with researchers. The Public Engagement team supported the researchers in development of the activities to ensure that they were engaging and relevant for audiences.

A particular highlight of the event was a science musical entitled 'What Killed the Dinosaurs?', written and performed by two talented DPhil students from the University's Earth Sciences department. Attracting an audience of almost 200, the musical explored the scientific past and discoveries about how the dinosaurs died millions of years ago.



Above and left - visitors meeting the experts at a Super Science Saturday stall

The Great Debate

Should We Engineer Our Way Out of Climate Change?

Helping to fulfil a major strand of the Museum's strategic plan, 'To enable society to reflect and make decisions on issues relating to the natural world in an informed, evidence-led manner', the third annual Great Debate on climate engineering, a contemporary scientific topic with strong societal implications, took place on 19 June 2019. 110 visitors attended the 1 hour 30 minute-long debate to hear the panel of experts discuss their standpoints on how best to mitigate the current climate breakdown, ask questions, and give their own opinions both verbally and by using the online voting system, Mentimeter.

The panel was chaired by Professor Gideon Henderson FRS and consisted of Professor Friederike Otto, Director of the ECI, Professor Nick Eyre, Professor of Energy and Climate Policy at the Environmental Change Institute, Clare Shakya, Director of the International Institute for Environment and Development's Climate Change research group and Felix Heilmann, President of the Oxford Climate Society.

The debate was filmed and audio recorded enabling it to be featured on the Museum's website and disseminated to a wider audience.



Melting summer ice in Solitærbugt, North-East Greenland, 73°N
Photo by Paul Smith

Social Media

In 2019 the Museum launched a new Digital Communication Strategy which formalised digital content into distinct campaigns that would run for four months at a time. The three campaigning strands are:

Interesting uses of the Collections

It is important to give the public a picture of what happens in the collections departments and what use the specimens that are not on display are put to. This campaigning theme is designed to tell stories from behind the scenes and show how researchers are using the collections.

Staff stories

Our audiences are interested in working in museums. The Museum is also committed to increasing science capital in its audiences and breaking down barriers to learning, for example knowledge about scientific jobs and entry into them. This campaigning theme allows our audience to question museum staff and scientists directly.

Communicating the science of human impact on the environment

It is important as a natural history museum to communicate the fragility of the planet whilst inspiring wonder and affection in that world and a desire to protect it. The Museum is working with Masters students on Biodiversity, Conservation and Management courses to build their skills in digital engagement, and to share the science they are involved in.

In the first ten weeks following roll-out of the campaigns, the Museum's Facebook following increased by 12%, Instagram increased by 8% and Twitter by 4%. The average reach/impressions per week has also increased by 55% on Twitter, 49% on Facebook and 10% on Instagram.



One of the projects featured in stories about the use of collections including looking at bird specimens to measure pollution



Expedition to Kronprins Christian Land at 80°N, photo by Paul Smith

Research

Greenland Caves Project 2019

In summer 2019 Paul Smith, Director of the Museum of Natural History, participated in a research expedition to the far north-east corner of Greenland to collect palaeoclimate data that will help to inform our understanding of climate shifts in the high Arctic over the last two million years. The expedition to Kronprins Christian Land at 80°N involved nine scientists from the universities of Innsbruck, Oxford, Sheffield and Akron, supported by short take-off and landing (STOL) aircraft and a helicopter. The scientific team sampled cave sediments and speleothems in the area as well as collecting data from the glacial deposits and making geological maps of the area. Together these will help to constrain when these caves were formed and when they were eroded into by the glacial activity, thus helping to understand the past climates of the region at a time when the high Arctic climate is shifting at an unprecedented rate.

*Expedition to Kronprins Christian Land at 80°N
Photo by Paul Smith*

Museum of Natural History Early Career Researcher programme

The Museum is committed to assisting the creation of a diverse next-generation of scientists, and also to the support of collections-focussed research. As one strand of this activity, the Museum maintains a programme of collections-focussed early career research fellowships that were launched in 2013. The programme recruits highly talented early career researchers (ECRs), and then acts as an incubator to develop their research skills and portfolios prior to applying for permanent jobs in academia, museums and industry. The problems with the 'leaky pipeline' from school to degree to postgraduate research to independent early career research and then permanent posts are well-documented, and the programme targets the fall-out of talent that occurs at the transition from postgraduate research to independent postdoctoral research. The Museum aims to intervene in two ways at this important transition to support both diversity and collections-focused research.

Firstly, it offers internally funded independent research fellowships (three are currently funded in this way). Secondly, it works closely with the ECRs to develop high quality applications to external trusts and foundations such as the Leverhulme Trust and the Royal Commission for the Exhibition of 1851, with direct assistance from expert research managers and museum researchers in order to increase the application success rates. An additional three fellows are currently funded in this way. To date, the Museum has a 100% record with the ECRs moving into highly competitive permanent university posts, both in the UK and internationally.

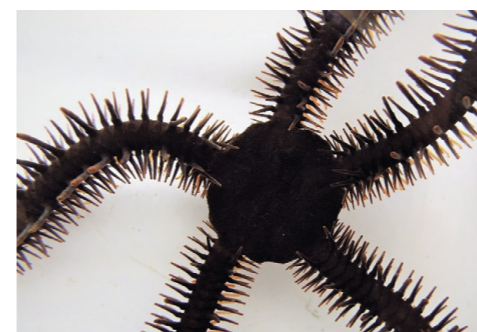
Research in Focus Case: brittle star vision

The first of two new Research in Focus cases covered work by Dr Lauren Sumner-Rooney, one of the Museum's research fellows whose work focuses on vision in invertebrates. The case highlights her recent work on a group of brittle stars (ophiuroids, relatives of starfish) and their potential ability to see without having eyes or a head.



Field work, Panama

As part of a long-term partnership with the Museum für Naturkunde, Berlin, and the Smithsonian Tropical Research Institute, Panama, Sumner-Rooney and colleagues have studied the behaviour, anatomy and genomes of two species that live in close quarters but respond differently to visual stimuli. Neither of these species have eyes; instead, the brittle stars use thousands of light-sensitive cells spread across the body. In one, these simply sense whether the surrounding are light or dark, but other species, which changes colour between night and day, seems to be able to detect areas of local contrast. In this species, the light-sensitive cells are surrounded by dark pigment granules during the day, which shield them from incoming light from most directions, meaning they only sample specific parts of the environment and can therefore be used to compare contrast or even reconstruct an image. At night, the pigment granules retract and visual ability disappears.



Brittle star *Ophiomastix wendtii*



Research in focus case

The case features specimens of the two focal species, *Ophiomastix wendtii* and *Ophiocomella pumila*, which were collected by Sumner-Rooney in Bocas del Toro, Panama, as well as a wrasse (potential predator) and two coral specimens. Additional images displayed close-ups of specimens, their natural reef habitat and a scene of this habitat transformed to the hypothesised parameters of the brittle star's vision.

Related publications

Sumner-Rooney L, Kirwan JD, Lowe E, Ullrich-Lüter EM. 2020. Extraocular vision in a brittle star is mediated by chromatophore movement in response to ambient light. *Current Biology*. 30:1-9

Sumner-Rooney L, Rahman IA, Sigwart JD, Ullrich-Lüter E. 2018. Whole body photoreceptor networks are independent of 'lenses' in brittle stars. *Proceedings of the Royal Society B*. 285:20172590

Collections

E.P.A. Cephalosporin Internships

The Museum hosted a bumper lot of eight Oxford University undergraduate summer internships funded by the E.P.A. Cephalosporin Fund. Projects from across the collections and Public Engagement team included collections management work on bird egg and Pleistocene fossil collections, cataloguing the Dale archive, researching historic fossil dealer and collector networks and working with exhibition, mentoring and family work in the Public Engagement team.

These internship posts created a buzz of activity behind, and in front of the scenes at the Museum and made significant progress into collection explorations, as well as training up a future generation of zoologists, palaeontologists, educators and museum professionals.



Egg collections re-curated by summer intern Julia Wilkinson

Rare and Wonderful: Treasures from the Oxford University Museum of Natural History

In October 2018, *Rare and Wonderful: Treasures from Oxford University Museum of Natural History* was published by Bodleian Publishing. Written by Kate Diston, Head of Print and Digital Collections and Zoë Simmons, Collections Manager (Diptera & Arachnida), this lavishly illustrated book features highlights from the collections ranging from the iconic Dodo (the only soft tissue specimen of the species in existence) and the giant tuna (brought back from Madeira on a perilous sea crossing in 1846) to crabs collected by Darwin during his voyage on the Beagle, David Livingstone's tsetse fly specimens and Mary Anning's ichthyosaur. Also featured are the first described dinosaur bones, found in a small Oxfordshire village, the Red Lady of Paviland (who was in fact a man who lived 29,000 years ago) and a meteorite from the planet Mars.

Each item tells a unique story about natural history, about the history of science, about collecting, or about the Museum itself. They give a unique insight into the extraordinary wealth of information and the fascinating tales that can be gleaned from these collections, both from the past and for the future. In April 2019, Kate and Zoë spoke about the publication at the Oxford Literary Festival and audiences were given the opportunity to view specimens from the Museum's collection. The book is available to purchase in the museum shop and online.

Bodleian Book Storage Facility move

From February to early May 2019, exactly 1,439 archive sized boxes of entomology pamphlets and reprints were moved from the Museum Library to the Bodleian Book Storage Facility in Swindon to create much needed space for Library material. All of the boxes were recorded, barcoded and the information entered into the Integrated Library System (OLIS), before being relocated to the Book Storage Facility by the Packaging & Delivery Service (PADS). All boxes are retrievable on request.



Bodleian book storage facility



Digital 3D reconstruction of the Dream Cave Rhino

In 2018, the Earth Collections team was contacted by the curator of the newly refurbished Wirksworth Heritage Centre in Derbyshire who was hoping to borrow a 43,000 year-old woolly rhinoceros skeleton which was discovered by lead miners working in Dream Cave in Wirksworth, Derbyshire, in 1822. The specimen was given to the Museum by landowner Philip Gell, and brought back to Oxford by William Buckland.

Unfortunately, the nearly-complete skeleton was far too big for the heritage centre's new display case, nevertheless, colleagues realised it would be possible to display the skeleton digitally, with just a smaller number of real bones on display. Ben Parker, an EPA Cephalosporin intern at the Museum, made a 3D surface scan of a 43,000 year-old woolly rhinoceros skeleton. Ben scanned 104 bones individually using an Artek Spider structured light scanner on loan from the Department of Earth Sciences, and used 3D software Blender to re-assemble the skeleton digitally. Several of the bones were also 3D printed for specimen handling to complement the exhibition.



Ben Parker digitally re-assembling the woolly rhino skeleton

Collections Online

Collections Online, an online portal to the Museum's collections, was developed, providing global access to 490,000 records from the Archive, Life and Earth collections. The project was made possible by the groundwork laid by the 2017/2018 project to move all the Museum's collections data and images into its collections management system, Axiell EMu. The technical system was designed in a way which allowed it to be implemented by the other Oxford University museums for their own Collections Online systems in the future.

For the first time, all of the Museum's scientific and historical collections information was made discoverable in a single place and was fully integrated with the Museum's website. This cross-disciplinary resource can be used by people from sciences and humanities to answer their own research enquiries, or direct them to visiting or using the Museum's collections.

The design and features included are based directly on the needs of users, supporting both specialist research and general enquiries. Key features include searching using keywords that include scientific terms, people's names and descriptive terms across all the Museum's collections, searching using the common names of animals, and fully browsable archival hierarchies. Collections information and images can be easily utilised through features including the availability of downloadable datasets, and the display of image rights and the associated conditions of use. Newly digitised or significant collections can also be highlighted on the Collections Online main page, to improve their discoverability.

Collections Move Projects

Collections staff oversaw two major move projects, in which nearly 250,000 specimens, weighing 30 tonnes, were relocated from poor quality offsite stores in Nuneham Courtenay Church and basement of the Radcliffe Science Library. The specimens were documented, packed and moved to alternative storage in readiness for a further move into two new University facilities: a Collections Teaching and Research Centre (CTRC) in central Oxford and an extension to the Bodleian Book Storage Facility (BSF) in Swindon.

Both projects finished on time and on budget, and demonstrated a strong focus on both economic sustainability and accessibility to users. Documentation procedures were designed to meet Spectrum standards for inventory, but also included significant data improvement in the areas most useful to researchers. All of this information will be available shortly on our new Collections Online site. The projects also included a collections review that resulted in more than 2,000 fossils being loaned to the University of Hull to enhance their teaching collections.

This strategic methodology helped to secure £68k from the Street Foundation and £3k from the Curry Fund to process and identify a large and scientifically important collection of Pleistocene fossils excavated from five sites across the Upper Thames Valley, which was acquired by the museum in 2018. The project has also fed into a successful bid for £3.8m of University capital funding to support the 42 individual collections moves that will be needed across its four museums in order to complete the move into the new facilities.



The BSF, Swindon

Partnerships

Festival of Nature

In June 2019, the Museum partnered with Berks, Bucks & Oxon Wildlife Trust to become the city focus for the county-wide Festival of Nature. Aimed at connecting visitors with their natural heritage, encouraging engagement with it and the inspiration that can be drawn from it, the Museum held various events aimed at a variety of audiences:

Children and Young People

Story Safari readings and workshops were held in the Story Museum's Pumpkin Tent on the lawn and illustration workshops run by author and illustrator Zuvell Zommer's were held in half term. Both workshops used material from collections as inspiration for the children's art.

Older children and adults

Three evening talks by award-winning author, Ben Goldfarb, Oxford University Zoologist author and advisor to BBC's Blue Planet series, Professor Alex Rogers, and broadcaster and author Lucy Cooke, attracting an audience of 543.

An adult evening event with local comedic group Jericho Comedy saw comedians deliver specially commissioned, research based jokes about the specimens on display to an audience of 300.

The Museum's entomological collection spaces and historic Westwood room were opened up to show the British Diptera collection during the Doing Up our Flies event. Celebrating the societal relevance of colleague's research and curation, around 200 people viewed specimens and talked to collections staff.

The Festival of Nature's main event was the pop up Wild Fair festival; a day of food, live music, story-telling and talks featuring stands with activities from over 20 local wildlife and conservation groups, as well as live animals including bats, crocodiles, wolves, skunks and birds of prey. This event attracted 4,491 visitors to the Museum.



Wildfair's pop-up scientists

International Joint Laboratory for Palaeobiology and Palaeoenvironments

The Museum of Natural History partnered with Yunnan University, China and several other institutions in the UK and Germany to form a major new joint venture, the International Joint Laboratory for Palaeobiology and Palaeoenvironments (JLPP). Funded by the Ministry for Education of China, it represents the culmination of thirty years of scientific collaboration between the Museum and Yunnan, including work that was instrumental in a successful bid to have the Chengjiang biota in Yunnan Province designated a UNESCO World Heritage Site in 2012. Other members of the partnership include the University of Leicester, the Natural History Museum, London, and the Bavarian State Collection of Zoology.

The aim of the partnership is to develop an international research platform on which the vast palaeontological resources of Yunnan Province can be integrated into the activities of the Museum of Natural History, enabling researchers to collaborate more efficiently and effectively on these materials, thereby promoting research on the evolution of the biosphere. This has been facilitated by reciprocal exchange visits between the UK and China.

In December 2018, four Museum researchers travelled to Kunming for the inaugural meeting of the JLPP. They discussed existing research and planned new projects with Professor Hou Xianguang, Director of the Yunnan Key Laboratory for Palaeobiology, and his colleagues.

This work is expected to yield multiple publications in top-ranked international scientific journals over the coming years, thus contributing to the Museum's planned submission to Research Excellence Framework (REF) exercise in 2020.

A significant outcome of this new partnership was the loan of 55 unique fossil specimens from Yunnan to Oxford, which formed the backbone of the First Animals exhibition, part of the Museum's Contemporary Science and Society series which aims to connect the Museum's diverse publics with current science research. Most of the material had never been outside of China before, and much of it has not previously been seen by the public. Newly created physical and digital content and related programming helped connect these iconic fossils that record the evolutionary origin of animals with diverse local, national and international audiences.



Duncan, Jack and Derek at the Cambrian-Precambrian boundary

Oxford University Museum of Natural History & Warwick Manufacturing Group partnership

The Museum developed a partnership with the Centre for Imaging, Metrology, and Additive Technology (CIMAT) at Warwick Manufacturing Group within the University of Warwick. The partnership examined a range of new visualisation technologies and their application to the heritage sector, including nanometre-scale X-ray CT scanning and high-resolution next-generation 3D printing, together with quantitative and qualitative approaches to product evaluation using the principles of User Centred Design (UCD).

One aspect of the partnership was a jointly supervised PhD studentship funded by EPSRC. The PhD student, Paul Wilson, examined the evaluation of touchable 3D-printed replicas in museums to ascertain user attitudes to authenticity, the understanding of objects and the presentation of replicas. Various technical approaches were used including content analysis, which converted a dense mass of qualitative data into manageable form (Wilson et al. 2017, Curator: the Museum Journal; <https://doi.org/10.1111/cura.12244>), together with semantic differentials, exploratory factor analysis and other statistical approaches (Wilson et al. 2018a, Journal of Cultural Heritage; <https://doi.org/10.1016/j.culher.2018.02.002>).

These studies provided robust evidence that visitors dominantly prefer prints that best represent the original specimen, with other factors such as the robustness of a 3D printed replica and its quality also being important. Also examined was the impact on learning experiences, an aspect then further developed to better understand the needs and preference of blind and partially-sighted visitors.

In parallel, the research also used a novel combination of CT scanning and geochemical analysis to unravel the conservation history of heritage objects – specifically the lower jaw of the theropod dinosaur *Megalosaurus bucklandii*, the first scientifically described dinosaur specimen (Wilson et al. 2018b, Heritage Science; <https://doi.org/10.1186/s40494-018-0223-0>). This revealed previously unknown phases of plaster repair with different chemical compositions, and a smaller amount of repair than previous estimated, something important for future interventions. This combined technique has the capacity to evaluate other problematic museum objects for conservation.

Megalosaurus jaw



Arts and Humanities Research Council Collaborative Doctoral Partnerships (AHRC CDP)

From 2016 to 2019, the Oxford University museums were awarded one of twelve CDP awards in the UK for PhD studentships to work on collaborative arts and humanities across the collections. Three studentships per year are awarded, with Oxford managing the programme but the studentships registered at an external university with joint supervision arrangements.

For the Museum, these studentships have offered a valuable opportunity to explore the arts/science interface in line with its 2017–2022 strategic plan:

Helen Goulston (University of Birmingham) commenced her CDP PhD in 2017, investigating the interior decorative scheme of the Museum, including the portrait sculpture, decorative stonework and ironwork, murals and bespoke furnishings.

Susan Newell (University of Leeds) commenced her CDP PhD in October 2018, examining the use of museum collections in the development of geology as a professional discipline, using the archives and the historical teaching collections used to teach geology in the nineteenth century.

Elaine Charwat (UCL, also 2018) is researching the way in which natural sciences models and casts are carriers and catalysts of knowledge by examining the array of materials, skills and technologies utilised, and the complex interaction of these facets with collecting, display, manufacture, design and science communication.

Mountains in Miniature John Ruskin and Geology

In 2019 we are celebrating the 200th anniversary of the birth of art critic, cultural commentator, teacher and painter John Ruskin (1819–1900). This display reveals a lesser-known side to Ruskin's activities: his love of minerals.

Ruskin collected minerals from the time he was a boy, and some of his specimens, bearing his own numbers and hand-written labels, are in this Museum's collections.

He had important connections with Oxford, studying here himself from 1837 to 1842. He provided drawings of botanical details that were used in some of the stone carvings in the new University Museum, as this building was originally known. In 1869, he also became the University's Slade Professor of Fine Art.

Ruskin was passionate about mountains, travelling to Europe and visiting the Alps on many occasions. He saw every stone as 'a mountain in miniature', and recommended that art students study mineral specimens to train the eye and appreciate the beauty and variety of nature.



John Ruskin
John Everett Millais, oil on canvas
1853-54

This portrait shows Ruskin standing by a mountain stream at Glenfinlas in the Trossachs in Scotland.

John Ruskin as a student at Oxford
In 1837 Ruskin enrolled as a student at Christchurch College where William Buckland was Dean. Although Ruskin studied classical literature, he signed up to attend Buckland's optional lecture courses, and his signature can be seen at the top of the student list in the register, indicating his keenness. Ruskin's artistic talent was soon recognised by Buckland who asked him to draw illustrations of important geological landscapes for use in his lectures.

Ruskin also became good friends with Buckland's wife, Mary, with whom he shared his love of minerals. Like Ruskin, Mary had started collecting when she was very young, long before her marriage to Buckland. Part of her extensive collection was presented to the University Museum of Natural History in 1877.

Museum display 'Mountains in Miniature: John Ruskin and Geology' by CDP PhD researcher Susan Newell

Distributed Natural Science UK consortium

In 2018/19, the Museum of Natural History took the lead, along with National Museums Scotland and National Museum Wales, in creating a new consortium of UK natural science museums. The Distributed Natural Science UK consortium (DiNaS UK) brings together the collections of the devolved national museums (NMS, NMW, National Museums Northern Ireland) together with the larger university museums in this field (Cambridge, Glasgow, Manchester, Oxford) and the civic museums with large natural science collections (Bristol, National Museums Liverpool). The aim of DiNaS UK is to provide a platform and voice for regional natural sciences collections that enables them to take part in discussions with a range of sector and government bodies including, for example, those relating to the UK Research and Innovation (UKRI) roadmap for research infrastructure. The consortium will expand over time to provide a voice and representation for other smaller university and civic museums. DiNaS will also work closely with national institutions such as the Natural History Museum, London, Royal Botanic Gardens Kew and Royal Botanic Gardens Edinburgh.

A major priority for DiNaS UK is collections digitisation to enable global access to the collections of its partners, and the new consortium will enable regional museums to have a direct interface with major European digitisation initiatives such as the Consortium of European Taxonomic Facilities (CETAF) and the Distributed System of Scientific Collections (DiSSCo), together with a range of associated funding initiatives.

Care and Conservation of Insect Collections Course

Run in conjunction with NatSCA, this one-day intensive course set sector-standard practice for entomological collections. Attended by delegates from across the UK and Europe the course covered everything you need to know about looking after entomology collections, from modern collections management techniques and to practical remedial conservation skills. Held on 22 March 2019, the day included a number of talks from all of the entomology staff at the Museum and an innovative practical session of conservation techniques to end. The aims of the course were to give participants practical, usable advice that could be implemented quickly, cost-effectively and with confidence so as to ensure the longevity of entomological materials in museums during a time of substantial sector change.





Running the Museum

Contactless Donation

The Museum's contactless donations pilot ran from 25 March 2019 to December 2019 working with the supplier Good with Devices (GWD). The pilot was enabled by the University's Digital Strategy fund. The aim of the pilot was to understand the implications and potential benefits for contactless donations across all the GLAM institutions. Coin donations boxes have been a part of the fabric of GLAM institutions for a long time but this project aimed to find out if digital technology could enable new giving experiences and generate additional methods of support.

The contactless kiosk was positioned at the Museum entrance and featured a site-specific branded plinth. The standard donation amount was limited to £5 and it was decided not to provide an option for Gift Aid for the initial trial. The first four months of the pilot generated £4,085 in additional donations and initial feedback on improved location and speed of processing was fed into the permanent implementation of the facility.

The popularity of contactless payments continues to grow each year. In 2018 debit cards were the most frequently used payment method and contactless payments rose to 7.4 billion, a 31% increase on the previous year. Furthermore, more than two thirds of UK adults now use contactless payments, suggesting that contactless donating is definitely a payment method that GLAM should be offering to their visitors in order to encourage donations from as wide an audience as possible.

Access Audit

An access audit was requested by the Museum, a requirement of the Arts Council England Museum Accreditation. The audit was undertaken by Ben Smith, Accessibility Advisor for University Estates Services. The Museum's public areas were the main focus of the audit, completed in June 2019, although staff and back of house areas were briefly visited.

The audit took into account the balance of adjustments recommended against the Grade 1 listed status of the building. From the audit, a priority of adjustments were graded and the recommendation and actions fed into an access plan which formed part of the accreditation submission in July 2019. The audit continues to prove an extremely useful document in the planning of new facilities and development of future funding proposals.

Guidance was taken from existing documentation containing examples of good practice, to make facilities more accessible to disabled people, these were used as criteria for assessment and the basis for recommendations, these included:

Exhibitions for All

https://www.rnib.org.uk/sites/default/files/EXhibitions_for_all_NMScotland.pdf

The Building Regulations 2010. Access to and use of buildings. Approved Document M

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/441786/BR_PDF_AD_M2_2015.pdf

The Building Regulations 2010. Protection from falling, collision and impact. Approved Document K

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/443181/BR_PDF_AD_K_2013.pdf

British Standards 8300-2:2018. Design of an accessible and inclusive built environment. Buildings. Codes of Practice

<https://shop.bsigroup.com/ProductDetail?pid=00000000030335835>

The Sign Design Guide

<https://www.signdesignsociety.co.uk/book/the-sign-design-guide/>

Building for Equality: Disability and the Built Environment

<https://publications.parliament.uk/pa/cm201617/cmselect/cmwomeq/631/631.pdf>

Appendices

Appendix 1 Visitors of the Oxford University Museum of Natural History 31 July 2019

Carole Souter CBE (Chair)
The Vice-Chancellor: Professor Louise Richardson
The Pro-Vice-Chancellor (Gardens, Libraries and Museums): Professor Anne Trefethen
Assessor: Professor William Whyte
Professor Christopher Ballentine
Professor Tim Coulson
Professor Philip England FRS
Professor Dame Jane Francis
Professor Sir Charles Godfray CBE, FRS
Professor Alex Halliday FRS
Professor Peter Holland FRS
Professor Alice Roberts
Dr Emily Scott-Dearing
Professor Ben Sheldon
Dr Laura Van Broekhoven
Professor Paul Smith (Secretary to the Board)

Appendix 2 People

Staff of the Museum 2018-19

Director Professor Paul Smith
Deputy Director Janet Stott
Administration Manager Emma Thomas

Life Collections

Head of Life Collections Darren Mann
Conservator Jacqueline Chapman-Gray
Collections Managers Mark Carnall,
Dr James Hogan, Zoë Simmons,
Amoret Spooner, Eileen Westwig
Image Technician Katherine Child

Earth Collections

Head of Earth Collections Eliza Howlett
Collections Managers Hilary Ketchum,
Robert Knight
Earth Sciences Conservator Juliet Hay
Project Officer Neil Owen

Research

Head of Research Professor Paul Smith
Deputy Head of Research Dr Imran Rahman
Senior Researcher Dr Sammy De Grave
Museum Research Fellows
Dr Jack Matthews,
Dr Ricardo Pérez-de la Fuente,
Dr Lauren Sumner-Rooney
Leverhulme Research Fellows
Dr Duncan Murdock, Dr James Neenan
Research Assistant Dr Carolyn Lewis
AHRC CDP Researchers Elaine Charwat,
Helen Goulston, Susan Newell

Archives and Library

Senior Archives and Library Assistant
Danielle Czerkaszyn
Digital Collections Manager
Dr Sarah Joomun
Documentation Officer Sophie Misson
Museum Archivist Emily Chen

Public Engagement

Head of Public Engagement Janet Stott
Head of Education & Learning Sarah Lloyd
Digital Engagement Officer Scott Billings
Digital Content & Analysis Manager
Georgina Brooke
Education Officer Chris Jarvis
Families Officer Carly Smith-Huggins
Education Assistant Jenny Hulmes
Exhibitions Manager Rachel Parle
Exhibitions Officers Katherine Clough,
Ellie Grillo, Dr Kelly Richards, Vanessa Moore

Operations

Head of Operations Wendy Shepherd
Events Manager Laura Ashby
Deputy Events Manager Megan MacLean
Accounts Anne Atkinson, Melanie Adams
Cleaning Technician Gary Coates
Front of House Manager Clare Denton
Deputy Front of House Manager
Michelle Alcock
Visitor Services Assistants Gemma Allerton,
Carlos Fernandez Gonzalez, Evie Granat,
Jane Griffin, William Hunter, Louis Lofthouse,
Safron Marriott, Navigator Ndhlovu,
Robert Parker
Building Manager Peter Johnson
Museum Maintenance Technician Adam Fisk
Retail Manager Fitri Puspitasari
Shop Assistants Corinna Crowther, Chantelle
Dollimore, Thomas Edgeworth, Susan Everiss,
Georgina Hardy, Clement Lofthouse,
Hannah Stott, Mia Thompson

Gardens, Libraries & Museums shared services

Divisional Secretary/Chief Operating Officer
for GLAM Kevin Rodd

Head of GLAM Programmes
and Partnerships Lucy Shaw

Head of Volunteers and Community
Engagement Service Joy Todd
Community Outreach Officers Nicola Bird,
Susan Griffiths, Beth McDougall
Volunteer Engagement Officer Dr Caroline
Moreau, Hayleigh Jutson
Arts Co-ordinator Miranda Millward

Research and Impact Manager
Dr Harriet Warburton
Support Officer Emma Webster

Gardens, Libraries & Museums shared services cont.

Head of Comms and Marketing
Susanna Wintersgill

Head of Assessment and Evaluation
Roza Hussain
Data Analyst Ramesh Narayan
Evaluation Officer Rob Coates

Digital Strategy Programme Manager
Nick Perry
Digital Engagement Lead Jenny Townshend

Head of IT (Museums & Gardens) Haas Ezzet
Commercial Systems Manager
Helen Mouldon
IT Officer Anjanesh Babu, Amanda Clark,
Alex Duta, Carl Parker, Daniel Pull,
Spiro Vranjes

Environmental Archaeology Unit

Director Professor Mark Robinson

Honorary Associates

Mr John Cooter
Mr Guillaume de Rougemont
Professor John Holmes
Dr John W. Ismay
Dr Jeyaraney A. Kathirithamby
Dr Tom S. Kemp
Professor W. Jim Kennedy
Dr George C. McGavin
Malgosia Nowak-Kemp
Mr Roy Overall
Sarah Phibbs
Dr Adrian C. Pont
Mr H. Philip Powell
Monica Price
Professor Derek Siveter
Sally-Ann Spence
John Tennent
Mr Chris A. O'Toole
Dr Dave Waters

Appendices

Appendix 3 Finance

Grants Awarded & Donations Received

The Museum is extremely grateful to the many individual donors, foundations and trusts who have generously contributed to its work in 2018/19.

£250,000
FCC Communities Foundation Ltd,
Main Court redisplay

£34,786
FCC Communities Foundation Ltd,
Out of the Deep

£1,000
John D. Kesby

£761,030
National Lottery Heritage Fund,
HOPE for the Future

£59,244
Negaunee Foundation

£15,000
Rothschild Foundation,
HOPE for the Future

£3,000
Dr Mortimer and Theresa Sackler
Foundation

£10,000
Street Foundation,
African Moths

Research Grants

Eight successful grant applications

£7,488
John Fell Fund
Evolution and development of a highly
variable visual system in spiders

£16,000
BBSRC (Biotechnology and Biological
Sciences Research Council),
Bacterial World

£14,000
Diamond Light Source,
Shining Diamond light on three-dimensionally
preserved fossil deuterostomes from a key
period in Earth's history

£7,433
John Fell Fund,
Uncovering the emergence of animals
through macroevolutionary analysis of a
555-million-year-old fossil

£105,796
John Fell Fund,
Wytham Genome Project

£50,000
Paul Scherrer Institute,
Growth, form and function in the skeletons
of the first biomineralizing vertebrates

£50,000
Paul Scherrer Institute,
Alternative ways of seeing: extreme visual
specialisations and their optical basis

£2,500
Varley-Gradwell Travelling Fellowship in
Insect Ecology,
Potential hidden effects of light pollution on
the migration of a major crop pest

Appendix 4 New Acquisitions 2018–19

Earth Collections

A total of 14 accession lots comprising around 20,500 specimens were received by donation or exchange.

Notable accessions donated during the year included:

Middle Jurassic invertebrates from the Cotswolds (c. 800 specimens, from Aaron Hunter)

Fossil invertebrates and vertebrates from the UK, Continental Europe, the United States and Canada (c. 11,800 specimens, from Adrian Brokenshire)

Cast of a fossil protocetid skull (1 specimen, from University of Michigan)

Pleistocene fossils from the Upper Thames Valley (c. 6,750 specimens, from Katharine Scott)

Toarcian ammonites from Somerset and Dorset, and Callovian ammonites from the Cotswold Water Park, Wiltshire/Gloucestershire (468 specimens, from John Huxtable)

Life Collections

A total of nine accession lots comprising 7,247 specimens were received by donation to the collection.

Archive and Library Collections

54 journals were subscribed to and a further nine were donated, containing 208 parts and comprising 1.3 linear metres. 34 monographs were purchased and additional uncatalogued material was also added to the collection.

Notable accessions and donations during the year included a collection of books from Honorary Associate Dr Adrian Pont (46 books on Diptera).

No items were donated to the archive collection.

Appendix 5 Loans 2018–19

Earth Collections

A total of 14 loans of 175 specimens were provided, of which 10 were to the UK, one to the Republic of Ireland, one to France, one to Canada and one to Australia.

Life Collections

A total of 75 loans of 3,012 specimens were provided, of which 48 were to the UK, 10 to the EU and 17 to the rest of the world.

Archive and Library Collections

There were no external loans in 2018-19.

Appendix 6 Enquiries 2018–19

Earth Collections

Staff dealt with 702 enquiries.

Life Collections

Staff dealt with 849 enquiries requiring an estimated 476 hours of staff time.

Archive and Library Collections

Staff dealt with 187 enquiries requiring an estimated 120 hours of staff time.

Appendix 7 Official Visitors 2018–19

Earth Collections

There were 120 collections visits, of which 95 were from the UK, 12 were from other EU countries and 13 were from other countries.

Life Collections

There were 451 visitors in total, of which 273 visits were from UK residents, 34 from other EU residents and 19 from residents of other countries.

Archive and Library Collections

There were 99 visitors in total. The majority of visitors were from the UK but visitors also came from America, Australia, Canada and Poland.

Appendices

Appendix 8 Publications by Museum staff 1 January to 31 December 2018

Members of OUMNH staff indicated in **bold**; OUMNH Honorary Associates indicated in **bold italics**. In addition to these publications, 59 journal articles, one book and two monographs were published on the collections by external researchers.

Albino, A. M., Rothschild, B., Carrillo-Briceño, J. D. & Neenan, J. M. 2018. Spondyloarthropathy in vertebrae of the aquatic Cretaceous snake *Lunaophis aquaticus*, and its first recognition in modern snakes. *The Science of Nature*, **105**, 51. DOI: 10.1007/s00114-018-1576-7, 5 pp.

Ambrose, T. K., Wallis, D., Hansen, L. N., **Waters, D. J.** & Searle, M. P. 2018. Controls on the rheological properties of peridotite at a palaeosubduction interface: A transect across the base of the Oman–UAE ophiolite. *Earth and Planetary Science Letters*, **491**, 193–206. DOI: 10.1016/j.epsl.2018.03.027.

Anderson, A., Clark, G., Haberle, S., Higham, T., **Nowak-Kemp, M.**, Prendergast, A., Radimilahy, C., Rakotozafy, L. M., Ramilisonina, Schwenninger, J.-L., Virah-Sawmy, M. & Camens, A. 2018. New evidence of megafaunal bone damage indicates late colonization of Madagascar. *PLoS one*, **13**, e0204368. DOI: 10.1371/journal.pone.0204368, 14 pp.

Ashelby, C. W., **De Grave, S.** & Van Xuan, N. 2018. A new species of *Palaemon* from Can Gio District, Vietnam, previously confused with *Palaemon sewelli* (Kemp, 1925). *Crustacean Research*, **47**, 17–27. DOI: 10.18353/crustacea.47.0_17.

Ashelby, C. W., Lin, W.-C., **De Grave, S.** & Chan, T.-Y. 2018. Notes on the shrimp genus *Palaemon* Weber, 1795 (Crustacea, Decapoda, Palaemonidae) and related genera from Taiwan. *Zootaxa*, **4446**, 575–595. DOI: 10.11646/zootaxa.4446.4.10.

Bee, L., **Howlett, E. A.** & Wright, I. 2018. The physical environment of Shotover Hill. In Wright, I. & Wright, J. (eds). *Shotover: the life of an Oxfordshire hill*. Pisces Publications, 260 pp. ISBN: 9781874357872.

Burca, G., Nagella, S., Clark, T., Tasev, D., **Rahman, I. A.**, Garwood, R. J., Spencer, A. R. T., Turner, M. J. & Kelleher, J. F. 2018. Exploring the potential of neutron imaging for life sciences on IMAT. *Journal of Microscopy*, **272**, 242–247. DOI: 10.1111/jmi.12761.

Cong, P.-Y., Harvey, T. H. P., Williams, M., **Siveter, Derek J.**, Siveter, David J., Gabbott, S. E., Li, Y.-J., Wei, F., Hou, X.-G. 2018. Naked cancelloriids from the lower Cambrian of China show evidence for sponge-type growth. *Proceedings of the Royal Society of London B*, **285**, 20180296. DOI: 10.1098/rspb.2018.0296, 7 pp.

Couri, M. S. & **Pont, A. C.** 2018. The male terminalia of some African species of *Helina* Robineau-Desvoidy, 1830 (Diptera, Muscidae). *Zootaxa*, **4399**, 233–247. DOI: 10.11646/zootaxa.4399.2.7.

Davies, K. E., **De Grave, S.**, Delmer, C. & Wills, M. A. 2018. Freshwater transitions and symbioses shaped the evolution and extant diversity of caridean shrimps. *Communications Biology*, **1**, 16. DOI: 10.1038/s42003-018-0018-6, 7 pp.

De Grave, S. & Anker, A. 2018. A new, distinctly coloured species of *Lysmata* Risso, 1816 (Malacostraca: Decapoda: Lysmatidae) from the south-central Atlantic. *Zootaxa*, **4429**, 390–400. DOI: 10.11646/zootaxa.4429.2.13.

De Grave, S., Arjun C. P. & Raghavan, R. 2018. The discovery of Euryrhynchidae (Crustacea: Decapoda) in India, with the description of a new genus and species. *Zootaxa*, **4462**, 367–378. DOI: 10.11646/zootaxa.4462.3.4.

de Rougemont, G. 2018. A new species and a new record of *Siagonium* Kirby & Spence from China (Staphylinidae, Piestinae). *Entomologist's Monthly Magazine*, **154**, 145–147. DOI: 10.31184/M00138908.1542.3912.

de Rougemont, G. 2018. Four new beetles from Borneo (Staphylinidae, Paederinae). *Entomologist's Monthly Magazine*, **154**, 16–20. DOI: 10.31184/M00138908.1541.3878.

de Rougemont, G. 2018. New generic combinations for *tutus* Rougemont and *brunneus* Rougemont (Staphylinidae). *Entomologist's Monthly Magazine*, **154**, 148. DOI: 10.31184/M00138908.1542.3936.

de Rougemont, G. 2018. New Oriental *Oedichirus* (Staphylinidae, Paederinae, Pinophilini). *Linzer biologische Beiträge*, **50/1**, 461–536.

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Appendices

Appendix 8 Publications cont.

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