OXFORD UNIVERSITY MUSEUM OF NATURAL HISTORY

Annual Review

2015-2016

Museum of
Natural
History

The Oxford University Museum of
Natural History Annual Review 2015–16
was edited from reports supplied by heads of
Collections, Sections and Research Units.

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Museum staff unless stated otherwise.

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Contents

Oxford University Museum of Natural History

1600s Tradescant Collection formed

1677 Ashmole cabinet arrives in Oxford

1860 Museum of Natural History opens

2016 Most-visited non-national UK science museum

Second most-visited University museum globally

7 million objects

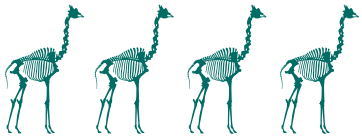
zoological type specimens 30,000

3,800 specimens loaned

500 active volunteers

£2.8 million operating budget

670,000 visitors a year



2,600 students visits

1.1 million web visits

317 events

125 for families

42 museum staff full time equivalent

www.oum.ox.ac.uk

Director's Introduction

The year started with a fair head of steam, thanks to our selection as a finalist in the Art Fund Prize for Museum of the Year earlier in 2015. This momentum continued into 2016 as we launched our first year-long themed programme of activity – Visions of Nature – and went on to pick up another clutch of awards.

Before that came the second exhibition in our Contemporary Science and Society series – Handwritten in Stone – which opened in October. This Heritage Lottery-funded exhibition, and its accompanying programme of events, celebrated the life and work of English geologist William Smith, creator of the first geological map of England and Wales two hundred years earlier. The show also inaugurated our new special exhibition gallery, on the upper east side of the Museum.

Handwritten in Stone marked the start of a busy period of exhibitions, with the Visions of Nature theme taking us in a more art-focused direction to experiment with drawing new audiences into the Museum. Bringing together a rich and varied programme of events, Visions of Nature combined two high-impact exhibitions, a year-long poetry residency for three poets and two smaller shows inspired by the natural environment.

The first major exhibition was artist Kurt Jackson's Bees (and the Odd Wasp) in my Bonnet, a multimedia body of work exploring the diversity of British bees and their ecological pressures. Complemented by material from the Museum's entomological collections – including a single-case display of all 270 British bee species – the exhibition successfully brought together art, science and an important contemporary environmental issue.

The second 'vision of nature' was a truly spectacular one. In Microsculpture, British photographer Levon Biss painstakingly imaged insects from the Collections to present them like never before in huge, beautifully-lit high-resolution prints. Exhibited in the main court, the largest of these images were three metres across. Sitting beside the specimens, often little more than three millimetres across themselves, the exhibition offered a dizzying transformation of scale.

Microsculpture drew new audiences to the Museum but was also enormously popular online, with an accompanying mini-documentary gaining viral popularity and scoring over eight million views.

Meanwhile, our three poets-in-residence – John Barnie, Steven Matthews and Kelley Swain – were busily immersing themselves in the Collections and architecture of the Museum, meeting with a wide range of staff to discuss ideas and ask questions. This culminated in the publication of a new anthology, *Guests of Time*, edited by John Holmes, Professor of Victorian Literature and Culture at the University of Birmingham. Featuring eight new pieces from each of the poets, presented alongside selected 19th-century poetry and new photography of the Museum, *Guests of Time* is a wonderful legacy of the artistic residency.

Another cause for celebration was the appointment of Adam Fisk as our workshop apprentice. Fresh from his GCSEs, Adam began his three-year programme in September, working alongside our facilities manager Peter Johnson. As well as helping to keep the building running smoothly, Adam also acts as an ambassador for the Oxford Apprenticeships scheme, visiting local schools to tell pupils about his experiences.

We not only gained an 'Adam', but also an 'Eve'. In January the Museum received a remarkable donation – the fossilised remains of a Jurassic plesiosaur found in a Cambridgeshire quarry in 2014. Nicknamed Eve by the palaeontologists who found it – the Oxford Clay Working Group – the story was picked up by the media and the moniker stuck. Eve is being scanned and studied and it is hoped that 'she' will ultimately go on display in the Museum court.

Finally, a high point in the year emerged at the annual Museums + Heritage Awards for Excellence in May. Having entered our Dodo Roadshow campaign in the Project on a Limited Budget category we were pleasantly surprised to walk home with not only that award but also the end-of-ceremony top accolade – the Best of the Best award. The Museum of Natural History is rapidly gaining a reputation for being innovative, creative and dynamic, and it would be difficult to find a better way of describing the exceptionally gifted and creative staff who enable this.

Professor Paul Smith
Director

Highlights

Handwritten in Stone

Right: Detail from William Smith's 1815 geological map of England Wales

Below: Detail from Bees Bumbling Around on the Kitchen Table by Kurt Jackson

October saw the opening of an exhibition – Handwritten in Stone – celebrating the life and work of William Smith and the bicentenary of the publication of the first geological map of England and Wales.

Dubbed *The Map that Changed the World* in Simon Winchester's book of that title, the hand-coloured map revealed a three-dimensional arrangement of rock layers, or strata, along with a fourth dimension: time. This work earned Smith the title 'the father of English geology'.

The Museum holds the largest archive of Smith material globally since his nephew and apprentice, John Phillips, was the first Keeper of the Museum. Alongside the famous 1815 map were personal papers, drawings, publications, maps and geological sections, most of which were displayed for the first time. Fossil material from the collections appeared alongside these to illustrate Smith's realisation that particular combinations of fossils were unique to different rock formations and could therefore be used to date the individual stratigraphic units.

Handwritten in Stone, supported by the Heritage Lottery Fund, was the first show in the Museum's new special exhibition gallery on the upper east side of the building.

A programme of William Smith and geology-focused events ran during the exhibition, including a public talk by author Simon Winchester. A new exhibition also opened in Smith's birthplace of Churchill, north Oxfordshire, featuring copies of items from the collections.

Bees (and the Odd Wasp) in My Bonnet

In March, the Museum opened the temporary exhibition Bees (and the Odd Wasp) in My Bonnet in the upper east gallery. This contemporary science and art exhibition featured a new body of paintings, sculpture and drawings by contemporary artist Kurt Jackson that explored and celebrated the diversity and importance of bees and other pollinators. In collaboration with the Museum, the show presented Jackson's artworks alongside specimens from the Collections, including a display of all British bee species (270 in total), archival material and a large wasp nest. The latest scientific research into the hazards facing bees was presented alongside the artwork with information on how Museum visitors can help bees.

The exhibition, part of the Visions of Nature year at the Museum, buzzed with visitors, and a series of events accompanied the exhibition, including The Beekeeper's Year, Oxford Bee Fest, and a talk and tour by Kurt Jackson himself. The Museum's Presenting… case continued the theme and explored the huge variety of bees found around the world. The Museum has one of the most important bee collections in the world, containing specimens collected over 200 years ago and from many different countries. The star bee specimen, and one of the Museum's greatest treasures, was Wallace's Giant Bee (Megachile pluto), which was displayed for the first time in public.

Microsculpture

The special exhibition, Microsculpture: The Insect Portraits of Levon Biss, opened in May. The highly detailed photographic portraits of insects from the Museum's collections captured the interest of people worldwide, with visitors travelling from as far as the Middle East and Asia to view the spectacular images. The show was featured on the BBC's The One Show and in the national and international press.

The exhibition aimed to make it possible to look closely at insects from the UK and across the world, making almost invisible detail visible. Collections staff worked with Levon Biss to select the 23 specimens on show and to prepare them for their close-ups.

Each actual specimen ranged from 6 to 30 millimetres, but the ultra-high resolution images exhibited were a thousand times larger. To create the photographs, Levon used a microscope lens, making an individual portrait by stitching together around 8,000 photographs. A trailer video to preview the exhibition attracted 7 million views online, and has won a number of awards in its own right.

Super Science Saturday

Over the past year the Museum has run two 'Super Science Saturday' events which focus on enabling researchers and science professionals to share their work with visitors to the Museum. These are a great way for families to discover all the fantastic research that goes on within the Museum and University departments.

On Saturday 28 November, the Museum held the first Super Science Saturday event: a mini science fair for all the family. The first event was Earth-themed, and featured stalls focused on geology, geography and the natural environment; diverse objects from fossils to earthworms were on display.

Super Science Saturday is an enhanced version of the regular Science Saturday events, where scientists from the University help visitors investigate natural history specimens and visitors have the chance to talk to University of Oxford scientists, meet people from wildlife organisations, and to handle specimens from the Museum's collections.

In June, the Museum received a Vice-Chancellor's Award for Public Engagement with Research for this family science fair. The Museum was selected as one of twelve winners from 84 entries; it won in the category of 'Building Capacity'. The awards recognise and reward those who undertake high quality public engagement with research.

Above: Microsculpture private view May 2016

Left: Family finding out more about how plastic pollution is affecting turtles at Super Science Saturday

Adam…

Meet Adam Fisk, the Museum's new apprentice who joined the team in 2015. Working alongside his supervisor Pete Johnson, he has already helped with a wide variety of tasks around the building, such as removing old display panels and fixing lights. In September he even helped rebuild and reinstate the *Edmontosaurus* cast on its return from the Cheltenham Science Festival.

Adam started at the Museum fresh from his GCSEs and is on a three-year apprenticeship run by Oxfordshire-based ACE Training. Adam also acts as an ambassador for Oxfordshire Apprenticeships, visiting local schools to tell students about how the apprenticeship system works and recommending that they consider taking this route into a profession, gaining work experience and qualifications on the way.

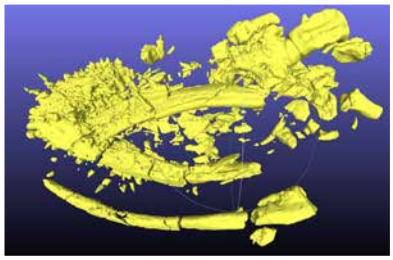
...and 'Eve'

Having lain in the Cambridgeshire earth for around 165 million years, the skeleton of a 5.5 metre plesiosaur was discovered in a quarry near Peterborough in 2014. The fossilised remains of the marine reptile were uncovered at a site owned by the manufacturer Forterra, who kindly donated the material to the Museum's collections.

The creature was first spotted by Oxford Clay Working Group member Carl Harrington who noticed a tiny fragment of bone sticking out of the clay. Over the course of four days, Carl and eight others dug up more than 600 pieces of fossilised bone. Carl then spent over 400 hours cleaning and repairing the specimen.

The plesiosaur's skull remains preserved inside a block of clay. Dr James Neenan, Museum Research Fellow, and Professor John Hutchinson, from the Royal Veterinary College, used a 3D X-ray CT scanner to reveal the location of the bones inside to help removal from the clay. Collections staff will begin the painstaking task of reconstructing the plesiosaur from the remains, which are a combination of individual separate bones and those still contained in clay nodules.

The plesiosaur will be used for research, education and display. Early indications suggest that it may be a species new to science.



Above: The Oxford Mail featured Adam in its article on apprenticeships in Oxfordshire

Right: The Peterborough plesiosaur laid out in the Museum lab and CT scan of skull

Public Engagement and Education

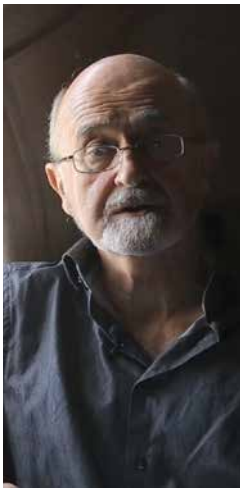
The Dodo Crew

In October, the Dodo Crew emerged from the Museum's first Youth Forum meeting. The Crew meets up once a month to have their say and create more opportunities for other young people to engage with the Museum. In addition, members have the chance to find out more about the Collections by going behind the scenes and holding a dialogue about the Museum and its activities.

The Dodo Crew is made up of twelve 14- to 19-year-olds who are passionate about natural history. The aim of establishing the group is to ensure that the voice of young people is represented in the Museum, for example in the development of temporary exhibitions.

Poets in Residence

From January, the Museum played host to three poets in residence as part of the Visions of Nature year. The poets – John Barnie, Steven Matthews and Kelley Swain –worked alongside staff in the Collections and out in the Museum to gain inspiration for their writing. The year will end with a number of events and activities where the poets have the opportunity to present their work. The poets will also publish a special anthology of poetry for the Museum at the end of 2016.



Above:
The Dodo Crew with Museum staff

Left: Poets in residence: John Barnie, Stephen Matthews and Kelley Swain

Eat or be Eaten

Right: Excited children taking part in the Eat or be Eaten event

February half-term is the busiest week of the year, and February 2016 was the busiest in the history of the Museum with families flooding through the doors to experience the Museum's Eat or be Eaten activities. These focused on exploring animals' skills of attack and defence.

Over 1,600 children took part in the activities over three afternoons. They were able to use their craft skills to make wolverine and crocodile headdresses, as well as armour to dress the vulnerable bodies of armadillos and tortoises. Visitors were able to play a special game that allowed them to complete food chains before 'unlocking' the chance to touch real specimens. Additionally, a trail ran through both the Museum and the Pitt Rivers Museum, comparing human and non-human animal strategies for attack and defence.

Families could also join Museum staff in the lecture theatre for a fast-paced and fun family friendly talk about incredible animal armour and how this has inspired people around the world.

New Bees

Right: The new bees at work in the Museum observatory hive

May 2015 saw the arrival of over 2,000 new members of staff in the form of a new colony of bees for the Museum's observation hive. Sadly, the previous queen had not managed to survive through spring's extended damp spell of weather. However, this did provide an opportunity for staff to dismantle and give the beehive a deep clean to eliminate the risk of an infection or infestation. The new colony settled in well with the queen laying eggs only a couple of days after arrival. The hive made a second appearance in the upper east gallery as part of the Kurt Jackson exhibition via a live webcam link, and through the special Spotlight Specimens that took place as part of the engagement activities surrounding the bee exhibition.

Museum Roof

The mini exhibition Lives at the Top: Celebrating the Museum Roof opened in May. It allowed visitors to learn about the people behind the roof's creation, the secrets of its beautiful design, and to discover how it has been maintained for generations to come. The exhibition opened with the origins of the Museum building, the architectural competition won by Deane and Woodward, and stories about the craftsman and workers who made the roof a reality. The story continued with the 2013 roof renovation project and moved on to current museum concerns, including pests. There were six 'Curiosity Boxes' to explore, which used mirrors and magnifiers to invite visitors to look at the roof from different perspectives.

© Mike Peckett

Stone Age Primates

In June, a new temporary display Stone Age Primates – put together by Life Collections and Public Engagement staff with researchers from the Primate Archaeology Project at Oxford University – was unveiled as part of the human evolution displays. The exhibition showcased the research of the group, one of the first to identify non-human primate tools in the archaeological record. The display opened in time for a conference at the School of Archaeology on primate archaeology, and showed some of the archaeological tools collected as well as video footage of tool-use in macaques, capuchins and chimpanzees. All the objects were loaned to the Museum from the research group.

Above: Detail from the Museum's roof by Mike Peckett

Left: One of the Stone Age primates exhibition cases

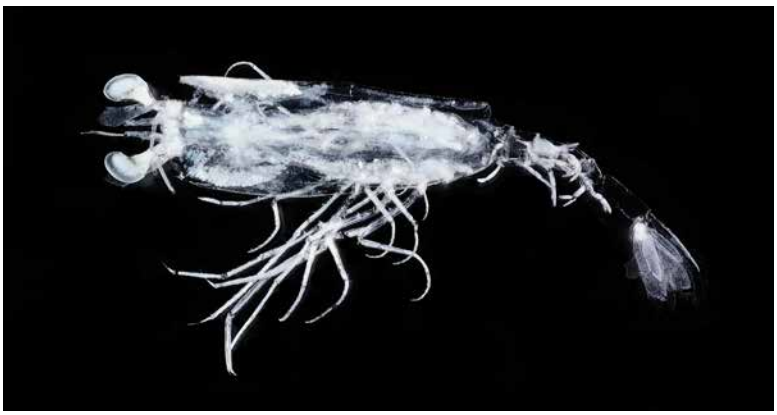
Ugly Bug Ball

It is not often that music and dancing takes place in the Museum, so it was a treat to host the Ugly Bug Ball during summer half-term. Families boogied along to creepy-crawly themed music wearing bug headdresses and masquerade masks, made with the help of volunteers. During the Ball, dance teacher Monica Aspell ran a fantastic insect-inspired dance workshop where children adopted the movements of a predatory praying mantis and a sparring stag beetle. Families also enjoyed a performance by the Oxford Lindy Hoppers who, in the guise of grasshoppers, jumped and jived to the sound of swing music. No Ugly Bug Ball would be complete without the presence of real bugs, so the entomology team ran insect handling with families. 483 families took part in the Ball over the two days.

Right:
Dancing at the
Ugly Bug Ball

Research

Out of Order



© T.-Y. Chan

The Museum's Head of Research, Sammy De Grave, was the lead author of a paper published in *Scientific Reports* in December. In this paper, he and his co-authors proposed the removal of an entire order of crustaceans.

There are around 70,000 known crustacean species grouped into approximately 50 different orders. One of these orders, Amphionidacea, was the subject of the paper. The order was created in 1973 for just one species, an open-sea creature called *Amphionides reynaudii*. Relatively few specimens of *Amphionides* have been collected and only three adult males and no intact adult females have ever been found.

In 2011, José Landeira, a biologist on Gran Canaria, collected six specimens. As usual, they were extensively damaged, but a specialist genetic lab at National Taiwan Ocean University was able to extract some small fragments of DNA. Building on earlier work by an American group, these sequences were analysed by Dr De Grave's team and the results showed that *Amphionides* is not a separate order, but a shrimp.

Many questions remain unanswered. *Amphionides* larvae have been recorded across all oceans from the tropics to subtropics, but few known shrimp species have such a wide distribution as adults. Although the genetic analysis reveals a strong affinity to a single family of shrimp (Pandalidae), it remains unclear which genus or even species it is.

Herefordshire Silurian

Research continues into the Silurian Herefordshire Lagerstätte, a deposit of exceptionally preserved marine invertebrate fossils. The latest discovery is a new arthropod, less than one centimetre long, that carried its young in capsules tethered to the parent's body like tiny kites. Named after *The Kite Runner* (the 2003 novel by Khaled Hosseini), *Aquilonifer spinosus* lived on the sea floor 430 million years ago.

The fossil was preserved with ten tiny juveniles, at different stages of development, attached to the larger adult by long threads. Evidence of parental care is rarely found in fossils; however, some modern arthropods use tethering strategies to protect their young from predators. Although there is no exact modern analogue, the brooding strategy apparently employed by *Aquilonifer spinosus* may be part of a range of complex brooding behaviours that developed in early arthropods.

The researchers were able to describe *Aquilonifer spinosus* in such detail thanks to its reconstruction as a 'virtual fossil' – a 3D digital model generated from a stack of digital images produced by serially grinding the original specimen.

These findings were reported in a paper published online in April in the journal *Proceedings of the National Academy of Sciences* (PNAS) by scientists from Oxford, Yale and Leicester Universities and Imperial College, London. Derek Siveter and David Legg of the Museum were co-authors of the paper, with Carolyn Lewis providing technical assistance. The Yale Peabody Museum of Natural History, the Natural Environment Research Council, the John Fell Oxford University Press Fund and the Leverhulme Trust supported the research.

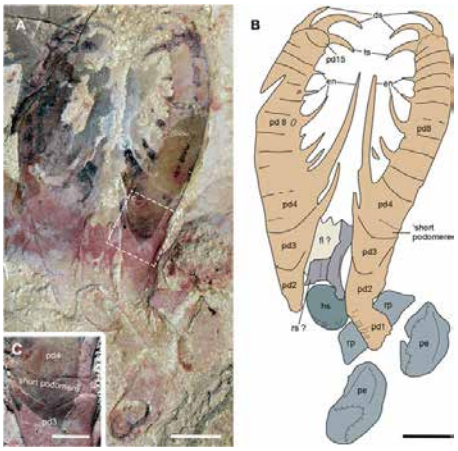
Above: Actual *Amphionides* specimen sequenced © T.-Y.Chan (NTOU, Keelung).

Left: Digital model of *Aquilonifer spinosus*

Leverhulme Trust Research Grant

Allison Daley, Museum Research Fellow, became co-investigator on a project that was awarded a two-year research grant from the Leverhulme Trust. The project, entitled *Anomalocaridids and the origin of arthropods: the view from Chengjiang*, will examine new fossil material of 515 million-year-old apex predators from China. These exceptionally preserved fossils will be used to answer important questions about ecology and anatomical innovation during the earliest stages of animal evolution and the Cambrian Explosion.

The project will be based at the Natural History Museum in London and a collection of dozens of Chengjiang fossils will be brought to the UK for study, with some of the material being examined at the Museum. The grant will also support ongoing fieldwork to collect more specimens from new localities in China.



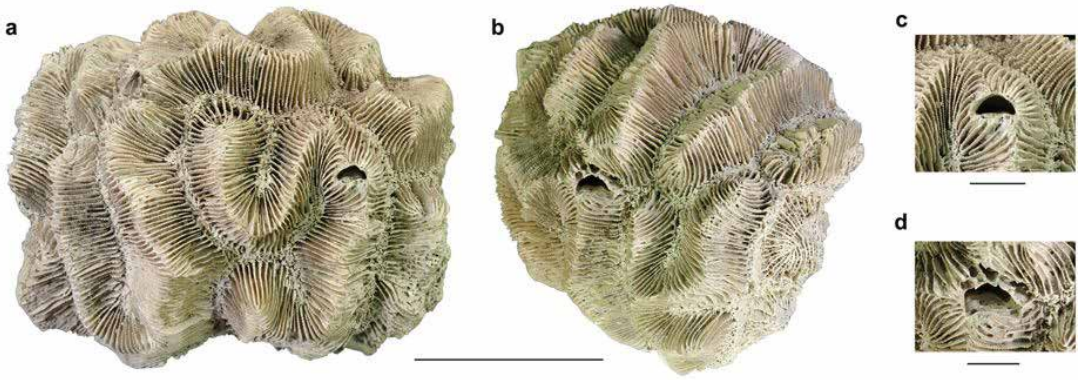
Right: Photographs (A,C) and reconstruction (B) of the frontal appendages of a 515-million-year-old fossil arthropod from China. Reproduced from Cong et al. (2017), licensed under CC BY 4.0.

Crabs – Traces from Space

Museum Research Fellow, Sancia van der Meij, co-authored a paper in the journal *Scientific Reports* on the first fossil evidence of the crab family Cryptochiridae.

To understand how modern species evolved, researchers often turn to the fossil record, but this can be difficult when the animal studied is small and fragile. The coral-dwelling crab family Cryptochiridae has more than 50 species today and occurs worldwide on coral reefs. These small crabs are less than one centimetre in size and have the unique ability to create dwellings in stony corals. This ability makes them a useful object for studying how different species cohabitate on reefs.

Unfortunately, no fossils are known for these crabs but, together with colleagues from the USA, Dr van der Meij discovered evidence of crab dwellings in fossil corals *(Galacticus duerri)* for the first time. The corals are several million years old and originate from Florida and Cuba.



Right: Fossil coral (a,b) with pits (c,d) marking the location of crab dwellings. Reproduced from Klomplamper et al. (2016), licensed under CC BY 4.0.

European Geosciences Union

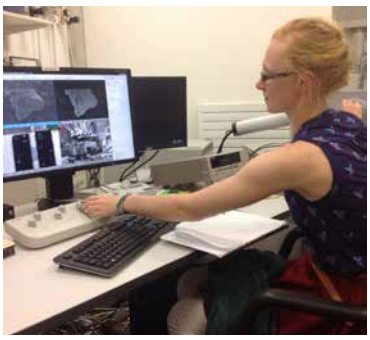
In April, 1851 Research Fellow Imran Rahman was invited to speak in a session on Experimental Palaeontology at the European Geosciences Union (EGU) General Assembly in Vienna, Austria. This is Europe's largest annual geosciences conference, and was attended by around 12,000 delegates from across the world. EGU aims to provide a forum where scientists, especially early-career researchers, can present their work and discuss ideas with experts in the field. Imran gave a talk about his research using computer modelling to test functional and ecological hypotheses in fossils. He also participated in a press conference at the EGU General Assembly on how ancient organisms moved and fed.

Collections

Striking Gold

Oxford Earth Sciences undergraduate Charis Horn worked in the Museum collections during the summer identifying mystery minerals. She struck gold when she found rare gold-bearing crystals of nagyágite and sylvanite on a specimen which for centuries had been mislabelled as the lead mineral galena.

The minerals and their surrounding rock matrix indicate that the specimen came from the gold mines of Săcărâmb in Romania, formerly known as Nagyág – the place where nagyágite was first discovered.



Charis was one of a number of interns funded by the Higher Education Funding Council for England (HEFCE) through the University's Internship Programme to learn more about academic research.

Bluefin Tuna Conservation

Conservation treatment for the bluefin tuna skeleton displayed in the main court was completed in November. This included addressing numerous historical repairs where copper wire and animal glue had been used. One surprising discovery made during the work was finding evidence of tissue remnants in the skull.

Sections of the tuna articulation were adjusted to display the skeletal structure more accurately and a new interpretation completed the specimen's new look. Conducting the treatment in the gallery allowed Museum staff to bring conservation to visitors, including school groups, hopefully inspiring future conservators.

More than Mimicry

A small exhibition opened in the Upper Gallery of the Museum in November, showcasing the work of natural historian Henry Walter Bates. Famous for his work on the form of mimicry now known as Batesian mimicry (when a harmless species mimics the warning colours or behaviour of a harmful species for protection), Collections staff highlighted his wider contribution to science.

Henry Walter Bates, born in 1825, was originally apprenticed to a hosiery manufacturer, but in 1844, he encountered Alfred Russel Wallace in a library, and the two men found they shared a mutual love of nature with Bates introducing Wallace to the field of entomology. A joint expedition to the Amazon turned into an 11-year trip for Bates and when he finally returned to England he had amassed a collection of over 14,000 insects, 8,000 of which were new to science.

The Museum's historical butterfly collection contains over 200 specimens collected by Bates, and there are thousands of other insects collected by him in the wider entomology collections.

Above: Charis Horn identifying minerals during the internship project

Left: Assessing the Bluefin tuna in the Museum's court

Below: Part of the mini exhibition about mimicry

Lyme Regis Fossil Festival

Six members of staff from across the Museum spent their bank holiday weekend at the Lyme Regis Fossil Festival. They showed visitors historic fossils from the Charles Lyell collection as a link to the Lyell Digitisation Project. They also displayed soft-bodied fossils from the Burgess Shale and Chengjiang Lagerstätte and explained how the study of modern animals allows the classification of these Cambrian creatures. Museum staff engaged with approximately 1,440 adults and children, and enjoyed talking about fossils and helping people have fun discovering the wonderful world of geology.

The Museum team ran activities with local school groups in the days leading up to the festival, including a microfossil activity in Dorchester for 480 students from five schools – a new group every eight minutes. Staff also led sessions for 229 students from ten additional schools that were based on a Cambrian Explosion game, developed by Museum research staff.

Above: Staff engaging with Fossil Festival visitors

Right: Fossils from the Museum's Lyell Collection on display at Lyme Regis

Coleopterist Day

In February, staff welcomed 65 entomologists to the 13th Coleopterist Day, the highlight on any beetle student's calendar. The event was hosted by Life Collections staff. This annual meeting is a great way for people to catch up with fellow enthusiasts and experts through lectures and workshops.

During the afternoon, the Museum library was opened to attendees to allow people to browse recent entomological publications and find all-important coleopteran literature. In addition, guests were able to visit the insect collections, identify specimens and browse some of the five million plus specimens housed within the entomology collections.

Left: A selection of images showing activities at the Museum during Coleopterist Day

Charles Lyell Blog

Collections staff have started a blog to record the progress of the Charles Lyell Digitisation Project. This aims to make Lyell's collection of over 16,000 documented fossil specimens publicly accessible through the creation of a user-friendly, image-dense online database linked to his key publications. The database will appeal to a wide range of users from professional and amateur geologists to historians of science, students of all ages and publishers looking for photos of fossils.

https://charleslyell.com/

Below: Digitising items from the Charles Lyell collection

Bones Workshop

On the 5 and 6 March, Collections and Public Engagement colleagues ran a two-day course – An Introduction to Animal Bones and Archaeozoology – in partnership with Oxford University School of Archaeology, Sheffield University, Oxford Archaeology, and with speakers from PalaeoBARN. University students, museum professionals, professional archaeologists and people with a personal interest attended the workshop.

During the weekend, participants looked at the structure and growth of bone, investigated where bones are found in the animal kingdom, and learnt advanced zoo-archaeological techniques such as ageing animals, creating faunal assemblages and considered DNA analyses in interpreting sites. Specimens from the zoological collections and archaeological samples loaned from Sheffield University and Oxford Archaeology gave participants hands-on experience supported by lectures and practical sessions.

Right: Participants getting the chance to learn more about bones using specimens from the collections

Right: A seminar during the Introduction to Animal Bones and Archaeozoology course

Arsenic

Organic objects are prone to pest damage and were historically treated in museums with pesticides. Last year staff carried out a survey of pesticide treatment in the Collections using a portable X-ray (pXRF). The pXRF detects elements above the atomic number 17 using radioisotope-excitation, which means that heavy metals, such as arsenic and mercury, can be detected. The pXRF can also confirm the presence of some organic pesticides, such as those which contain chlorine. The survey showed that many specimens in the collections have a presence of arsenic or chlorine, in addition to a few cases of mercury. The Museum has used this knowledge to put precautions in place, such as handling pre-1980 taxidermy specimens and organic objects wearing gloves, sorting the specimens in boxes or plastic bags, and using a disposable sheet to protect the table-top surface when removing the specimen from its container. These precautions will protect staff and prevent toxins spreading onto commonly used surfaces.

DUMP

May was an exciting month for the Dung Beetle Monitoring Project (DUMP). The team spent a week in Jersey surveying the Island's dung beetle fauna in order to generate species records for the Société Jersiaise, who funded the trip. Two presentations were given about the agricultural importance of dung beetles: one at the Société Jersiaise headquarters on museum collections and the Island's dung beetles, and the other to local farmers.

The week was a success with almost 50 sites surveyed and three species new to Jersey discovered. The visit received media coverage, with a report in the Jersey Evening Post, plus two slots on BBC Radio Jersey. Team members also headed to the Manchester Museum and World Museum in Liverpool to analyse their collections for specimens from Jersey. A full checklist of Jersey Scarabaeoidea and a report were published in the Société's journal.

Additionally, Team DUMP were successful in securing a British Ecological Society Outreach Grant, which enabled the Dung Beetle Detectives Roadshow to visit events across the south-west. On the roadshow stand, people could learn about British dung beetles and their ecology and conservation.

The first outing of the roadshow was at the Oxford Festival of Nature: Wild Fair, run in conjunction with Berks, Bucks and Oxon Wildlife Trust, in June. The live beetles were a hit with old and young alike. The following day, the roadshow moved on to Open Farm Sunday at Lotmead Farm near Swindon where over 700 enthusiastic people visited the stand.

Left: Dung beetle Detectives Roadshow (DUMP) at Wytham Woods.

Left: Fieldtrip to Jersey. DUMP Team members Darren J. Mann, Sally-Ann Spence and Ceri Watkins. Roger Long (Société Jersiaise) and Simon Robson (Local entomologist) alongside local farmer and his Jersey cows.

Gordon Osborn Collection

Earth Collections acquired an interesting geological collection created by the late Gordon Osborn, of Olney, Buckinghamshire, which was generously presented by his widow, Mrs Patricia Osborn. The collection comprises several hundred specimens of minerals, fossils and rocks.

Several specimens were field-collected by Mr Osborn, including a Carboniferous limestone fossil bivalve from Treak Cliff in Derbyshire, which has colour banding preserved – a feature that is rare in specimens of this age. Gordon Osborn was a Fellow of the Geological Society and of the Linnean Society, and enjoyed talking to the wider public about his interests. The specimens will be preserved in the Museum's permanent collections, with some used for public handling.

Plymouth Illustration Placements

Three students from the BA (Hons) Illustration course at the University of Plymouth came to the Museum for a week's placement in early June. The students (Natalia Patkiewicz, Thomas Simpson and Darius Gilbey) worked with research fellows and collections staff to provide illustrations of specimens which will be used in research publications and exhibits.

The working relationship between the students and museum experts will be examined for an essay by Tom Barwick (one of the lecturers at Plymouth) to go in The Companion Guide to Illustration. Tom was particularly interested in the way that the students worked so closely with the experts from an early stage rather than working retrospectively with a completed body of research, and hopes to examine whether illustrators could become a vital member of a research team, rather than simply acting as educational communicators.

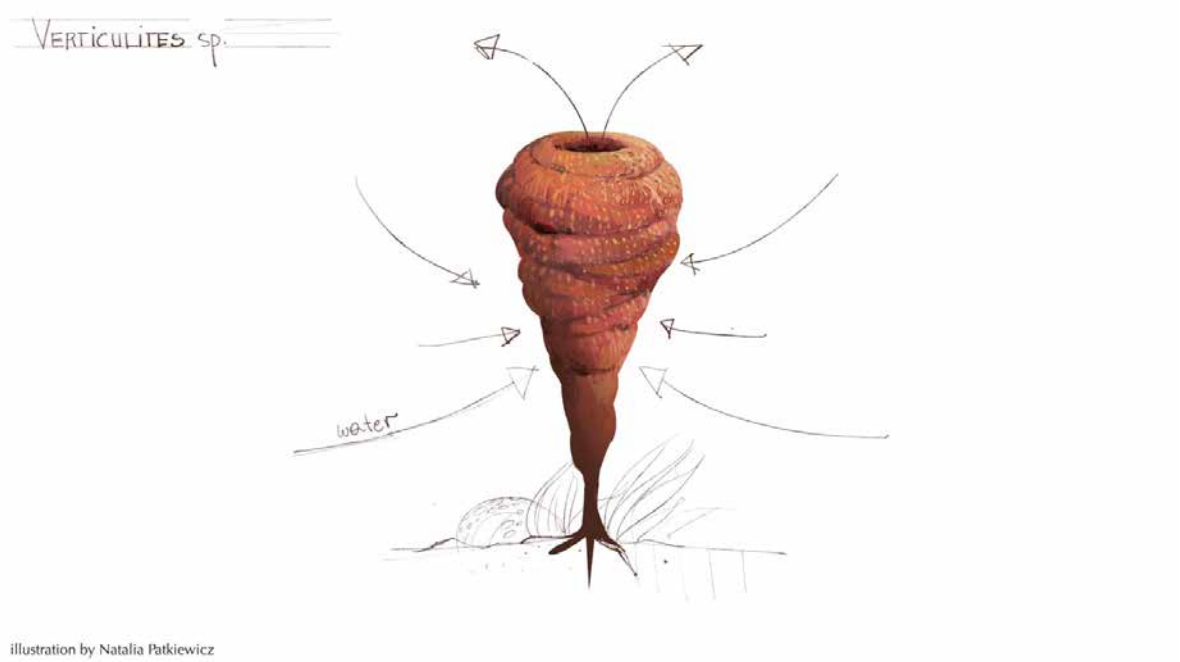


illustration by Natalia Patkiewicz

Above: Fossil bivalve from the Gordon Osborn geological collection

Right: Illustration of a sponge by Natalia Patkiewicz

Partnerships

Sensing Culture Touch Tours

The Oxford University Museums Community Outreach team started a series of audio-described touch tours at the Museum of Natural History, as well as at the Pitt Rivers Museum and Museum of the History of Science as part of the Heritage Lottery-funded Sensing Culture project. During the sessions, the team takes participants around the Museum, describing the building and the objects. The second half of the visit is dedicated to handling museum objects. Training in audio-description will be offered to all staff as part of the project so they can provide special tours.

UK-Brazil Partnership

In July, the Museum was visited by Professora Isabel Landim from the Museu de Zoologia (MZUSP) at Universidade de São Paulo. In recent years, the Museum has been building a partnership with MZUSP that was initially based on research linkages but which is now expanding to encompass the sharing of best practice in public engagement. The next step in building the relationship will be a joint workshop on public engagement which is expected to take place in São Paulo, Brazil during 2017.

Pyrite

In November, a group from the Conservation Centre at the Natural History Museum in London visited the Museum to share thoughts and best practice on anoxic bagging of pyritic specimens. Many fossils and minerals that contain pyrite can suffer from pyrite degradation, when pyrite reacts with oxygen and moisture in the air. The chemical reaction produces small amounts of sulphuric acid and other reaction products which can be damaging to specimens. Transferring specimens to anoxic storage halts the reaction preventing further damage and helping to ensure the long-term future of the Earth Collections. The visit led to revised processes and procedures to improve environmental conditions in both participating museums.

Left: Participants from the NHM and MNH during the pyrite visit

Running the Museum

Lighting

Right: Part of the lighting upgrade in the public areas

Below: Staff moving specimens into the RSL

A lighting and electrical upgrade took place at the Museum during the year. The 80-day programme, moving from outdated and energy-inefficient lighting to more eco-friendly LED lighting, was funded through the University's Estates department. The upgrade was timed to minimise disruption and spread the Estates' costs across budgets. It is hoped that the upgrade will extend from back offices to internal case lighting.

Collections on the Move

The Museum's collections have been held in numerous off-site stores for many years. This has resulted in many collections management challenges. Work has started to consolidate the collections to fewer sites.

The University has allocated space within the basement of the Radcliffe Science Library (RSL) for shared museum research and storage. The initial allocation of space will house osteology from the Engineering basement; large artiodactyl mammal osteology from The Old Power Station (OPS) at Osney and cased taxidermy from the Museum's stairwells. It is hoped that some entomology collections can also be moved there in the longer term.

The movement out of the OPS was funded by a central grant covering project staff and consumables. Funding supports the documentation and databasing of the collections. A Collection Move Oversight Group, chaired by Sir Mark Jones, was set up to report to the Museum's Board of Visitors and to the University Museums Board.

As well as improving the storage conditions and ease of access for staff and researchers, this is also the first time that the Oxford University Museums have shared a purpose-specific storage space. It will be a challenging but rewarding project to re-home such a huge variety of artefacts and specimens that have come from all over the world, each with their own unique story.

Museum Shop

The Museum shop continues to thrive and generate much-needed, unrestricted income to support Museum activities. Care is being taken to design bespoke product lines which will continue to be desirable beyond the length of the exhibition or activity that inspired their production. A particular success has been the William Smith product line which used the exhibition imagery on stationery. A number of the Museum-branded product lines have been placed in other museum retail outlets, providing both marketing and income benefits. The collaborations with Levon Biss and Kurt Jackson produced exhibition guides with high-quality images, which sold well. The Museum also benefitted from commission on art sales.

Left: Bespoke product line for the Microsculpture exhibition

Below: Exterior of the Museum © Ian Wallman

Staff Changes

The Museum said farewell to Gina Allnatt and Molly Carter during the year – both left at the end of their fixed-term contracts to pursue curatorial positions elsewhere. Dr Sancia van der Meij and Dr Imran Rahman joined the Research team, from Leiden and Bristol respectively. Mark Carnall and Hannah Allum joined Collections. In Operations, the Front of House team welcomed a new manager, Krista Baker, as well as new Visitor Services Assistants Sian Burgess and Ceri Watkins, and lastly, the Executive Team were joined by Emma Thomas who took up the role of Museum Executive Assistant as Ellena Smith moved to the Public Engagement team to work on exhibitions.

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Appendices

Appendix 1: Visitors of the Oxford University Museum of Natural History at 31 July 2016

The Vice-Chancellor: Professor Andrew Hamilton FRS

Pro-Vice-Chancellor (Academic Services and University Collections): Professor Anne Trefethen

Assessor: Dr Patricia Daley

Lord Krebs FRS (Chairman)

Professor Christopher Ballentine

Jana Bennett

Sir Robert Campbell

Professor Philip England FRS

Professor Richard Fortey FRS

Professor Jane Francis

Professor Charles Godfray FRS

Professor Alex Halliday FRS

Professor Gideon Henderson FRS

Professor Peter Holland FRS

Professor Jonathan Michie

Professor Alice Roberts

Dr Emily Scott-Dearing

Professor Paul Smith (Secretary to the Board)

Dr Laura Van Broekhoven

Appendix 2: People

Staff of the Museum 2015-16

Director: Professor Paul Smith

Museum Executive Assistant: Emma Thomas

Life Collections

Head of Life Collections: Darren Mann

Conservators: Bethany Palumbo, Jacqueline Chapman-Gray

Collections Managers: Gina Alnatt, Mark Carnall, Katherine Child, Dr James Hogan, Malgosia Nowak-Kemp, Zoë Simmons, Amoret Spooner

Move Project Assistant: Hannah Allum

TCV Natural Talent Trainee: Ceri Watkins

Earth Collections

Head of Earth Collections: Monica Price

Curator: Dr David Waters

Collections Managers: Philip Hadland, Eliza Howlett, Hilary Ketchum

Earth Sciences Conservator: Juliet Hay

Research

Head of Research: Dr Sammy De Grave

Museum Research Fellows: Dr Tracy Aze, Dr Allison Daley, Dr David Legg, Dr Sancia van der Meij, Dr Imran Rahman

Senior Research Fellow: Professor Derek Siveter

Research Assistant: Dr Carolyn Lewis

Archives and Library

Head of Archives and Library: Kate Diston

Documentation Officer: Dr Sarah Joomun

Information Technology

IT Officer: Sarah Phibbs

IT Assistant: Dr Rosemary Painter

Public Engagement

Head of Public Engagement: Janet Stott

Public Engagement Officer: Scott Billings

Education Bookings: Jenny Hulmes

Education Officers: Chris Jarvis, Sarah Lloyd, Carly Smith-Huggins, Ellena Smith

Interpretation and Education Officer: Rachel Parle

Operations

Head of Operations: Wendy Shepherd

Facilities and Events Manager: Julia Parker

Accounts: Anne Atkinson, Christopher Daniels, Beverly Judd

Cleaner: Gary Coates

Front of House Manager: Krista Baker

Front of House Staff: Sian Burgess, Veronica Cordova De La Rosa, Jane Griffin, Rebecca Hogben, Alaitz Lopez Jauregui, Navigator Ndhlovu, Ben Skarratt, Rebecca Spencer

Workshop and Maintenance: Peter Johnson, Adam Fisk

Retail Manager: Magdalena Molina

Shop Assistants: Safora Bibi, Stuart Booker, Magdalena Molinari, Michelle O'Donohue, Fitri Puspitasari

Joint Museum Education Service

Head of Volunteers and Outreach: Joy Todd

Community Outreach Officers: Nicola Bird, Susan Griffiths

Arts Education Officer: Adrian Brooks

Volunteer and Outreach Assistant: Dr Caroline Moreau

Arts Award Officer: Miranda Millward

Administration Assistant: Simon Glenn

Cross-Museums Fundraising

Oxford University Museums Research Facilitator: Dr Harriet Warburton

Senior Campaign Executive: Jossie Austen

Head of Development: Fiona Gourley

Senior Development Executive: Heidi Kurtz

Development Officers: Emma Bowler, Catherine House

OUM Partnership (OUMP)

Head of OUM Partnership: Lucy Shaw

OUMP Officer: Jessica Suess

OUMP Assistant: Emma Henderson

Reminiscence Officer: Helen Fountain

Honorary Associates

Mr D. Michael Ackland
Dr Jonathan Antcliffe
Mr John B. Davies
Mrs Elizabeth H. M. Cooke
Mr John Cooter
Mr Guillaume de Rougemont
Mr Ray Gabriel
Mr Paul Gatt
Mr Richard Gallon
Dr John W. Ismay
Dr Jeyareney A. Kathirithamby
Dr Tom S. Kemp
Professor W. Jim Kennedy
Dr Stuart Longhorn
Dr George C. McGavin
Mr Roy Overall
Dr Adrian C. Pont
Mr H. Philip Powell
Mr Chris A. O'Toole
Sally-Ann Spence
Professor Keith S. Thomson
Dr Kevin Tilbrook
Dr Yan Wong

Research Units

Environmental Archaeology Unit

Director: Professor Mark Robinson

Appendix 3: Finance

Grants awarded and donations received

£61,383	EPA Cephalosporin Fund, Contemporary Biomedical Science A-level adult DNA workshops and Three Year Internship Programme
$75,000	Negaunee Foundation, Annual project funding

The Museum is extremely grateful to the many individual donors, foundations and trusts who have generously contributed to its work in 2015/16.

Travel and research grants

£31,500 (I. Rahman)	1851 Research Fellowship
£2,500 (S. van der Meij)	John Fell Fund
£83,503 (D. Murdock)	John Fell Fund
£7,476 (I. Rahman)	John Fell Fund
£7,000 (K. Krakowka)	John Fell Fund
£90,000 (D. Murdock)	Leverhulme Trust

Appendix 4: People

New Acquisitions

Earth Collections

Around 7,500 specimens were received by donation via 10 accession lots to the Department.

Notable accessions donated during the year were:

- A suite of minerals from Peatfold lithium pegmatite, Glenbuchal, Scotland, presented by Roy Starkey, 9 November 2015 (17 specimens)
- A near-complete plesiosaur from Oxford Clay of Must Farm, Cambridgeshire, presented by Forterra Building Products Ltd, 16 November 2015
- Trilobites from Ordovician of Shaanxi Province, China, presented by Zhou Zhiyi, 15 April 2016 (37 specimens)
- The Gordon Osborn geological collection, mainly minerals, presented by Patricia Osborn, 24 June 2016 (several hundred specimens)
- The Martin Brasier fossil collection, mainly from the Ediacaran and Cambrian, transferred from the Department of Earth Sciences, July 2016 (c.6,000 specimens)
- Graptolites from Silurian of Vietnam, presented by Mark Williams, 20 September 2015 (30 specimens).

Life Collections

A total of 38 accession lots of 18,618 new specimens were received by donation to the department.

Significant contributions include the British Beetle collection of David Nash of over 10,000 specimens which spans the life's work of this eminent British coleopterist.

Archive and Library Collections

A total of 43 purchases and 15 items of academic and sector journals were received by donation to the department. 35 books and monographs in series were acquired during the year.

Appendix 5: Loans

Earth Collections

47 loans of 285 specimens in total were sent out, 43 to the UK and 3 to EU countries.

Life Collections

Total of 59 loans of 3,464 specimens, which breaks down to 34 UK loans (2,883 specimens); 11 EU loans (351 specimens); 14 non-EU loans (230 specimens).

Archive and Library Collections

3 loans comprising 10 items were made during the year to UK institutions.

Appendix 6: Enquiries

Earth Collections

In total there were 416 enquiries relating to the Earth Collections.

Life Collections

Staff dealt with 292 enquiries requiring an estimated 249 hours of staff time.

Archive and Library Collections

There were 290 enquiries to the library and archive this year. Dealing with enquiries required an estimated 145 hours of staff time.

Appendix 7: Official Visitors

Earth Collections

There were 124 official visitors in 2015-16, comprising 102 from the UK, 6 from the EU and 16 from other countries, including 10 from the USA.

Life Collections

There were 236 collections-based visitors in total, 203 of which came from the UK, 6 from EU countries and 27 from non-EU countries.

Archive and Library Collections

There were 56 official visitors to the Library and Archive this year. The majority of visitors were from the UK (48). Other visitors came from the USA, Canada and Japan.

Appendix 8: Publications on the Collections and by Museum staff

Museum staff and honorary associates indicated in bold.

Ackland, D.M. (2015). Using glycerine jelly to hold dissections on a microscope slide. *Bulletin of the Dipterists Forum*, **80**, 15-17.

Albino A., Carrillo-Briceño J.D. and **Neenan J.M.** (2016). An enigmatic aquatic snake from the Cenomanian of Northern South America. *PeerJ*, **4**, e2027.

Amorim, D.S., **Pont, A.C.** et al. (2016). Timeless standards for species delimitation. *Zootaxa*, **4137**(1), 121-128.

Anker, A. and **De Grave, S.** (2016). An updated and annotated checklist of marine and brackish caridean shrimps of Singapore (Crustacea, Decapoda). *Raffles Bulletin of Zoology*, Suppl. No. **34**, 343-454.

Antell, G.S. and **Kathirithamby, J.** (2016). Description of novel preservation and distribution of new Strepsiptera (Insecta) species from the Eocene Green River Formation. *Bulletin of the Peabody Museum of Natural History*, **57**, 165e174.

Ashelby, C.W., **De Grave, S.** and M.L. Johnson (2016). Diet analysis indicates seasonal fluctuation in trophic overlap and separation between a native and an introduced shrimp species (Decapoda: Palaemonidae) in the tidal River Thames (U.K.). *Crustaceana*, **89**, 701-719.

Bratton, J.H. and **Ackland, D.M.** (2015). *Egle brevicornis* (Zetterstedt, 1838) (Diptera, Anthomyiidae) on Anglesey. Dipterists Digest, **22**(2), 142.

Briggs, D.E.G., **Siveter, D.J.**, Siveter, D.J., Sutton, M.D. and **Legg, D.A.** (2016). Tiny individuals attached to a new Silurian arthropod suggest a unique mode of brood care. *Proceedings of the National Academy of Sciences*, **113**, 4410-4415.

Briggs, D.E.G., **Siveter, D.J.**, Siveter, D.J., Sutton, M.D. and **Legg, D.A.** (2016). *Aquilonifer's* kites are not mites: a reply to Piper, R. (2016). *Proceedings of the National Academy of Sciences*, **113**, 3320-3321.

Carnall, M.A. (2015). Underwhelming Fossil Fish of the Month, or how to get some use out of your useless fossils. *The Palaeontological Association Newsletter*, **89**, 75-81.

Chan, T-Y, Van Den Beld, I.M.J. and **De Grave S.** (2016). A further record of the rare hippolytid shrimp, *Leontocaris lar* Kemp, 1906 (Decapoda: Caridea) from the Celtic Sea, off north-western France. Crustaceana, **89**, 251-257.

Clarke, R.O.S., **Spooner, A.** and Willers, J. (2015). A new genus of Rhinotragini for *Molorchus laticornis* Klug, 1825 (Coleoptera, Cerambycidae). *Insecta Mundi*, **0452**, 1-6.

Cooter, J. (2015). Observations on Leiodes species with particular reference to *Leiodes cinnamomea* (Panzer, 1793) in a truffle wood (Coleoptera: Leiodidae). *Entomologist's Monthly Magazine*, **151**(4), 289-290.

Couri, M.S. and **Pont, A.C.** (2016). *Coenosia* Meigen (Diptera: Muscidae) from Angola: new species and records. *Zootaxa*, **4103**(6), 501-512, 28 figs.

Couri, M.S. and **Pont, A.C.** (2016). New African species of Helina Robineau-Desvoidy (Diptera, Muscidae). *Zootaxa*, **4103**(4), 374-382, 20 figs.

Couri, M.S. and **Pont, A.C.** (2016). Species of *Coenosia* Meigen (Diptera, Muscidae) described by Fritz van Emden from the British Museum Ruwenzori Expedition of 1934-1935. *Zootaxa*, **4144**(4), 529-555, 127 figs.

Daley, A.C. and Drage, H.B. (2015). The fossil record of ecdysis, and trends in the moulting behaviour of trilobites. *Arthropod Structure and Development*, **45**, 71-96.

Daley, A.C. and **Legg, D.A.** (2015). A morphological and taxonomic appraisal of the oldest anomalocaridid from the Lower Cambrian of Poland. *Geological Magazine*, **152**, 949-955.

Dean, C., Sutton, M.D., **Siveter, D.J.** and Siveter, D.J. (2015). A novel respiratory architecture in the Silurian mollusc *Acaenoplax*. *Palaeontology*, **5**, 839-847.

De Grave, S. (2016). Global caridean shrimp fauna. *Freshwater Metadata Journal*, **12**, 1-5.

De Grave, S., Chan, T.-Y., Chu, H.K., Yang, C.-H. and Landeira, J. (2015). Phylogenetics reveals the crustacean order Amphionidacea to be larval shrimps. *Scientific Reports*, **5**, 17464.

De Grave, S., Pachelle, P.P.G. and Wirtz, P. (2016). The first record of *Microprosthema inornatum* Manning and Chace, 1990 (Decapoda: Spongicolidae) from the tropical Eastern Atlantic. Crustaceana, **89**, 123-128.

Dobson, N.C., Johnson, M.L. and **De Grave, S.** (2016). Insights into the morphology of symbiotic shrimp eyes (Crustacea, Decapoda, Pontoniinae); the effects of habitat demands. *PeerJ*, **4**, e1926.

Dunlop, J.A., **Legg, D.A.**, Selden, P.A., Fet, V., Schneider, J.W. and

Rößler, R. (2016). Permian scorpions from the Petrified Forest of Chemnitz, Germany. *BMC Evolutionary Biology*, **16**, 72.

Gabriel, R., **Longhorn, S.J.** and Davis, J.S. (2016). Notes and observations on the breeding of *Brachypelma albopilosum* Valerio 1980 (Araneae: Theraphosidae), with further notes on its identification. *Journal of the British Tarantula Society*, **31**(1), 4-11.

Gabriel, R. and **Longhorn, S.J.** (2015). Revised generic placement of *Brachypelma embrithes* (Chamberlin and Ivie, 1936) and *Brachypelma angustum* Valerio, 1980, with definition of the taxonomic features for identification of female *Sericopelma Ausserer*, 1875 (Araneae, Theraphosidae). Zookeys, **526**, 75-104.

Gabriel, R. (2016). Some notes and observations on the breeding of *Kochiana brunnipes* (Koch, 1842) (Araneae: Theraphosidae). *Journal of the British Tarantula Society*, **31**(1), 19-23.

Gabriel, R. (2016). Revised taxonomic placement of the species in the Central American genera Davus O. Pickard-Cambridge, 1892, *Metriopelma* Becker, 1878, and *Schizopelma* F. O. Pickard-Cambridge, 1897, with comments on species in related genera (Araneae: Theraphosidae) Arachnology, **17**(2), 61-92.

Gabriel, R. (2016). Some notes and observations on the breeding of Haplocosmia himalayana Pocock 1899 (Araneae: Theraphosidae). *Journal of the British Tarantula Society*, **31**(2), 4-9.

Gabriel, R., **Longhorn, S.J.** and Davis, J.S. (2015). Notes and observations on the breeding of whatever it is in the pet trade called *Brachypelma albopilosum* Valerio, 1980 (Araneae: Theraphosidae), with further notes on its identification. *Journal of the British Tarantula Society*, **31**(1), 4-11.

Gatt, P. (2015). The family Ceratopogonidae (Diptera) in Malta. *Bulletin of the Entomological Society of Malta*, **7**, 113-119.

Gatt, P. (2015). The family Simuliidae (Diptera) in Malta. *Bulletin of the Entomological Society of Malta*, **7**, 109-111.

Gatt, P., Kettani, K. and Ebejer, M.J. (2016). New records of lesser dung flies (Diptera, Sphaeroceridae) from Morocco. *Dipterists Digest*, **23**, 77-82.

Gray, C.L., Simmons, B.I., Fayle, T.M., **Mann, D.J.** and Slade, E.M. (2016). Are riparian forest reserves sources of invertebrate biodiversity spillover and associated ecosystem functions in oil palm landscapes? *Biological Conservation*, **194**, 176-183.

Hearing, T.W., **Legg, D.A.**, Botting, J.P., Muir, L.A., McDermott, P., Faulkner, S., Taylor, A.C. and Brasier, M.D. (2016). Survival of Burgess Shale-type animals in a Middle Ordovician deep-water setting. *Journal of the Geological Society*, **173**, 628-633.

Horak, J., Faithfull, J., **Price, M.** and Davidson, P. (2016). Identifying and managing asbestiform minerals in geological collections. *Journal of Natural Science Collections*, **3**. 51-61.

Horká, I., **De Grave, S.**, Fransen, C.H.J.M., Petrusek, A. and Duris, Z. (2016). Multiple host switching events shape the evolution of symbiotic palaemonid shrimps (Crustacea: Decapoda). *Scientific Reports*, **6**, e26486.

Hughes, J. and **Longhorn, S.J.** (2016). Chapter 2: The role of next-generation sequencing technologies in shaping the future of insect molecular systematics. In: Olson, P.D. et al. (eds), Next Generation Systematics: Studying Evolution and Diversity in an Era of Ubiquitous Genomics. Cambridge University Press. Chapter 2. p.28-61.

Kathirithamby, J., Hrabar, M., Delagdo, J.A., Collantes, F., Dötteri, S., Windsor, D. and Gries, G. (2015). We do not select nor are we choosy: reproductive biology of Strepsiptera (Insecta). *Biological Journal of the Linnean Society*, **116**, 221-238.

Kathirithamby, J. and Engel, M.S. (2015). The first twisted-wing parasitoid in Eocene amber from northeastern China (Strepsiptera: Myrmecolacidae). *Journal of Natural History*, **50**, 1305-1313.

Kemp, T.S. (2015). The origin of higher taxa: palaeobiological, developmental, and ecological perspectives. Oxford University Press, Oxford, 320 pp.

Kennedy, W.J. (2015). Les ammonites. 120-159, figs 90-137. In: Morel, N. (coordinator). *Stratotype cénomanien*. Muséum national d'Histoire naturelle, Paris and Biotope, Méze.

Kennedy, W.J. and Gale, A.S. (2015). Turonian ammonites from northwestern Aquitaine, France. *Cretaceous Research*, **58**, 265-296, 26 figs.

Kennedy, W.J. and Gale, A.S. (2015). Upper Albian and Cenomanian ammonites from Djebel Mrhila, Central Tunisia. *Révue de Paléobiologie*, **34**, 235-261, 24 pls, 34 text-figs.

Kennedy, W.J. and Gale, A.S. (2015). Late Turonian ammonites from Haute Normandie. *Acta Geologica Polonica*, **65**, 507-524, 7 figs.

Kennedy, W.J. (2015). The Ammonoidea of the Lower Chalk, Part 6. *Monograph of the Palaeontographical Society*, **169** (645), 404-459.

Kennedy, W.J. and Klinger, H.C. (2015). Cretaceous faunas from Zululand and Natal, South Africa. The Albian ammonite genus *Douvilleiceras* de Grossouvre, 1894. African Natural History, **11**, 43-82, 23 figs.

Kennedy, W.J. and Machalski, M. (2015). A late Albian ammonite assemblage from the mid-Cretaceous succession at Annopol, Poland. *Acta Geologica Polonica*, **65**, 545-553, 2 figs.

Kennedy, W.J., Bilotte, M. and Melchior, P. (2015). Turonian ammonite faunas from the southern Corbières, Aude, France. *Acta Geologica Polonica*, **65**, 437-494, 29 text-figs.

Klompmaker, A.A., Portell, R.W. and **van der Meij, S.E.T.** (2016). Trace fossil evidence of coral-inhabiting crabs (Cryptochiridae) and its implications for growth and paleobiogeography. *Scientific Reports*, **6**, 23443.

Klotz, W. and **De Grave, S.** (2015). *Elephantis jaggeri*, a replacement name for *Elephantis natalensis* (Bouvier, 1925), a junior primary homonym of *Caridina nilotica* var. *natalensis* De Man, 1908. Crustaceana, **88**, 1463-1465.

Komai, T., **De Grave, S.** and Saito, T. (2016). Two new species of the stenopodidean shrimp genus *Spongiocaris* Bruce and Baba, 1973 (Crustacea: Decapoda: Spongicolidae) from the Indo-West Pacific. Zootaxa, **4111**, 421-447.

Legg, D.A. and Hearing, T.W. (2015). A late surviving xenopod (Arthropoda) from the Ordovician Period, Wales. *Geological Magazine*, **152**(5), 1-7.

Legg, D.A. (2015). The morphology and affinities of *Skania fragilis* (Arthropoda) from the middle Cambrian Burgess Shale. *Bulletin of Geosciences*, **90**, 509-518.

Legg, D.A. (2016). An acercostracan marrellomorph from the Lower Ordovician of Morocco. *The Science of Nature*, **103**, 21.

Lord Cranbrook and **Mann, D.J.** (2016). Alfred Russel Wallace and his collections in the Malay Archipelago, with a proposal for international cooperation to produce a digital catalogue. In: *Naturalists, Explorers and Field Scientists in South-East Asia and Australasia* (pp. 15-50). Springer International Publishing.

Meyers-Muñoz, M.A., van der Velde, G., **van der Meij**, **S.E.T.**, Stoffels, B.E.M.W., van Alen, T., Tuti, Y. and Hoeksema, B.W. (2016). The phylogenetic position of a new species of Plakobranchus from West Papua, Indonesia (Mollusca, Opisthobranchia, Sacoglossa). *ZooKeys*, **594**, 73-98.

Morgan, N. and Powell, H.P. (2015). *The geology of Oxford gravestones*. Geologica Press, Chadlington, x + 140 pp.

Neenan, J.M., Li, C., Rieppel, O., Scheyer, T.M. (2015). The cranial anatomy of Chinese placodonts and the phylogeny of Placodontia (Diapsida: Sauropterygia). *Zoological Journal of the Linnean Society*, **175**, 415-428.

Pachelle, P.P.G. and **De Grave, S.** (2015). New records of the rare shrimp genus *Discias* Rathbun (Decapoda; Caridea: Disciadidae). Crustaceana, **88**, 1467-1474.

Palin, R.M., Searle M.P., St-Onge M.R., **Waters D.J.**, Roberts N.M.W., Horstwood M.S.A., Parrish R.R. and Weller O.M. (2015). Two-stage cooling history of pelitic and semi-pelitic mylonite (sensu lato) from the Dongjiu–Milin shear zone, northwest flank of the eastern Himalayan syntaxis. *Gondwana Research*, **28** (2), 509-530.

Palin, R.M., Weller, O.M., **Waters, D.J.** and Dyck, B. (2016). Quantifying geological uncertainty in metamorphic phase equilibria modelling; a Monte Carlo assessment and implications for tectonic interpretations. *Geoscience Frontiers*, **7**, 591-607.

Price, M.T. (2016). Corsi's polished stones. Association of *Oxford University Pensioners Newsletter*, **52**, 11-15.

Robinson, J., Hancock, E.G., Hewitt, S. and **Mann, D.J.** (2015). The terrestrial invertebrate fauna of Mingulay, including 18 new species records for the Outer Hebrides. *The Glasgow Naturalist*, **26**(2), 71-83.

Robinson, M. and Rowan, E. (2015). Roman food remains in archaeology and the contents of a sewer at Herculaneum. In: Wilkins, J. and Nadeau, R. (eds) *A Companion to Food in the Ancient World. Wiley-Blackwell*, Oxford, UK, 105-115.

Rossi, N., **De Grave, S.** and Mantellato, F.L. (2016). A note on the correct spelling of the name of the freshwater shrimp *Macrobrachium olfersii* (Wiegmann, 1836) (Decapoda, Palaemonidae). *Zootaxa*, **4141**, 587-589.

Rougemont, G. de, (2015). New Oriental and Papuan *Pseudolathra* (Coleoptera, Staphylinidae, Paederinae). *Linzer biologisch Beiträge*, **47**, 2: 1785-1799.

Rougemont, G. de, (2016). Boothia, a new genus with four new species from Borneo (Coleoptera, Staphylinidae, Staphylininae). *Entomologist's Monthly magazine*, **152**, 165-171.

Rougemont, G. de, (2016). Corrigendum. *Entomologist's Monthly magazine*, **152**, 148.

Rougemont, G. de, (2016). New Bornean Staphylinidae (Coleoptera). *Linzer biologisch Beiträge*, **48** (1), 559-572.

Rougemont, G. de, (2016). Two new species of *Rougemontius* (Staphylinidae, Aleocharinae, Termitopaediini). *Entomologist's Monthly Magazine*, **152**, 115-119.

Rougemont, G. de, (2016). Two new species of *Stiliderus*; new data on *Stiliderus* and *Stilicoderus*; distribution of the Brendelli group (Coleoptera, Staphylinidae, Paederinae). Entomologist's Monthly magazine, **152**(1), 37-42.

Sagastume-Espinoza, K.O., **Longhorn, S. J.** and Santibáñez-López, C.E. (2015). A new scorpion of genus *Diplocentrus* Peters 1861 (Scorpiones: Diplocentridae) endemic to Islas de la Bahia, Honduras. *Comptes Rendus Biologies*, **338**, 502-510.

Schilthuizen, M., Vairappan, C.S., Slade, E.M., **Mann, D.J.** and Miller, J.A. (2015). Specimens as primary data: museums and 'open science'. *Trends in Ecology and Evolution*, **30**, 237-238.

Searle, M.P., **Waters, D.J.**, Garber, J.M., Rioux, M., Cherry, A.G. and Ambrose T.K. (2015). Structure and metamorphism beneath the obducting Oman ophiolite: Evidence from the Bani Hamid granulites, northern Oman mountains. *Geosphere*, **11** (6).

Sherwood, D., **Longhorn, S.J.** and Kirby, J. (2016). A new Nicaraguan theraphosid in the hobby. *British Tarantula Society*, **31**(2), 42-47.

Sorokina, V.S., and **Pont, A.C.** (2015). A review of the genus *Drymeia Meigen*, 1826 (Diptera: Muscidae) in Russia. *Zootaxa*, **4000**(2), 151-206, 21 figs.

Spooner, A. and Santos-Silva, A. (2016). Notes on some species of *Myzomorphus* Sallé, 1850 (Coleoptera, Cerambycidae, Prioninae, Anacolini). *Insecta Mundi*, **0471**, 1-12.

Stoffels, B.E.M.W., **van der Meij, S.E.T.**, Hoeksema, B.W., van Alphen, J., van Alen, T., Meyers-Muñoz, M.A., de Voogd, N.J., Tuti, Y. and van der Velde, G. (2016). Phylogenetic relationships within the Phyllidiidae (Opisthobranchia, Nudibranchia). *Zookeys*, **605**, 1-35.

Švec, Z. and **Cooter, J.** (2015). A new Dermatohomoeus Hlisnikovský, 1963 (Coleoptera: Leiodidae, Leiodinae) from China. *Entomologist's Monthly Magazine*, **151**(3), 165-167.

Telfer, M.G. and **Hogan, J.** (2015). The status of *Carabus convexus* Fabricius (Carabidae) in Britain and Ireland. *The Coleopterist*, **24**(2), 106-112.

Tilbrook K.J. and Gordon, D.P. (2016). Checklist of Singapore Bryozoa and Entoprocta. *Raffles Bulletin of Zoology*, Suppl. **34**, 593-603.

van der Meij, S.E.T. and Nieman, A.M. (2016). Old and new DNA unweave the phylogenetic position of the eastern Atlantic gall crab *Detocarcinus balssi* (Monod, 1956) (Decapoda: Cryptochiridae). *Journal of Zoological Systematics and Evolutionary Research*, **54**, 189-196.

van der Meij, S.E.T., Fransen, C.H.J.M., Pasman, L.R. and Hoeksema, B.W. (2015). Phylogenetic ecology of gall crabs (Cryptochiridae) as associates of mushroom corals (Fungiidae). *Ecology and Evolution*, **5**, 5770-5780.

van Tienderen, K.M. and **van der Meij, S.E.T.** (2016). Occurrence patterns of coral-dwelling gall crabs (Cryptochiridae) over depth intervals in the Caribbean. *PeerJ* **4**, e1794.

Veraldi, S., D'Agostino, A., Pontini, P., Guanziroli, E, and **Gatt, P.** (2016). Nasal polyps: a predisposing factor for cutaneous leishmaniasis of the lips? *International Journal of Dermatology*, **55**, 443-445.

Vogel, S., Märker, M., Rellini, I., Hoelzmann, P., Wulf, S., **Robinson, M.**, Steinhübel, L., Di Maio, G., Imperatore, C., Kastenmeier, P., Liebmann, L., Esposito, D. and Seiler, F. (2016). From a stratigraphic sequence to a landscape evolution model: Late Pleistocene and Holocene volcanism, soil formation and land use in the shade of Mount Vesuvius (Italy). *Quaternary International*, **394**, 155-179.

Watkins, C., Spence, S.A. and **Mann, D.J.** (2016). Review and preliminary checklist of the Scarabaeoidea of Jersey. *The Annual Bulletin Société Jersiaise*, **30**(4), 654-684.

Weller, O.M., St-Onge, M.R., Rayner, N., Searle, M.P. and **Waters, D.J.** (2016). Miocene magmatism in the Western Nyainqentanglha mountains of southern Tibet: An exhumed bright spot? *Lithos*, **245**, 147-160.

White, A.J.R., **Waters, D.J.** and Robb, L.J. (2015). Exhumation-driven devolatilization as a fluid source for orogenic gold mineralization at the Damang deposit, Ghana. *Economic Geology* **110** (4), 1009-1025.

Wright, C.W. and **Kennedy, W.J.** (2015). The Ammonoidea of the Lower Chalk, Part 6. In: *Monographs of the Palaeontographical Society*, **169**(645), pp. 404-459., pls 124–145, text-figs 157–180.

Wu, Y., Fu, D., Zhang, X., **Daley, A.C**. and Shu, D. (2016). Dimorphism of Bivalved Arthropod *Branchiocaris? yunnanensis* from the Early Cambrian Chengjiang Biota, South China. *Acta Geological Sinica*, **90**, 818-826.

Front and back cover:
Detail from one of the carved capitals around the main court