FIRST ANIMALS
EXHIBITION REPORT

12 July 2019 – 16 March 2020

An exhibition and events programme telling the remarkable story of the origins of animal life.

www.oum.ox.ac.uk/firstanimals

Museum of Natural History

Supported by the EPA Cephalosporin Fund

Research England

Supported using public funding by ARTS COUNCIL ENGLAND

UNIVERSITY OF OXFORD

COLLABORATORS

YOUTH FORUM
3 WORKSHOPS ENGAGING 15 YOUNG PEOPLE EACH TIME

MIGHTY FOSSILS
COLLABORATION TO PRODUCE VIRTUAL MODELS

CRISIS SKYLIGHT
COLLABORATION TO DEVELOP CONFIDENCE & SKILLS THROUGH CREATING A FIRST ANIMALS-INSPIRED TOUR

OXFORD PRINTMAKERS COOPERATIVE
22 PRINTMAKERS CREATED ARTWORKS

OXFORD YOUTH DANCE
COLLABORATION TO INTERPRET FIRST ANIMALS THROUGH PERFORMANCE

VOLUNTEERS
8 INDIVIDUALS TRAINED IN OBJECT HANDLING & PUBLIC ENGAGEMENT

EXHIBITION

219,562 VISITS
42% OF ALL VISITORS TO THE MUSEUM VISITED THE EXHIBITION
882 VISITORS PER DAY ON AVERAGE

RESEARCHERS

18 CONTRIBUTORS TO THE EXHIBITION CONTENT
26 CONTRIBUTORS TO THE ONSITE PROGRAMME
11 CONTRIBUTORS TO THE ONLINE PROGRAMME

WORKED WITH THE MUSEUM PUBLIC ENGAGEMENT AND EVENTS TEAMS

EDUCATION

91 STUDENTS
(UNDERGRADUATE LEVEL) ENGAGED THROUGH FACILITATED VISITS

50 STUDENTS
(POSTGRADUATE LEVEL) ENGAGED THROUGH FACILITATED VISITS

33 STUDENTS
(A-LEVEL) ENGAGED THROUGH FACILITATED VISITS

51 A-LEVEL STUDENTS FROM
5 SCHOOLS
TOOK PART IN A FIRST ANIMALS THEMED STUDY DAY

298 A-LEVEL STUDENTS FROM
17 SCHOOLS
ENGAGED WITH FIRST ANIMALS CONTENT AS PART OF A CELLS STUDY DAY

ONLINE

11 ONLINE TALKS
3,290
LIVE VIEWS BY 2,110 UNIQUE ATTENDEES FROM 61 COUNTRIES
6,500+
VIEWS OF THE RECORDINGS

18,500+
WEBSITE VIEWS

19 VIRTUAL MODELS RELEASED FOR FREE ON SKETCHFAB
1,700+
DOWNLOADS OF THE VIRTUAL MODELS
127,700+
VIEWS OF THE VIRTUAL MODELS

ONSITE PROGRAMME

PRINTMAKING WORKSHOP
7 ATTENDEES

8 ONSITE TALKS
768
ATTENDEES

6 SCIENCE SHORTS
193
ATTENDEES
(58 CHILDREN & YOUNG PEOPLE & 135 ADULTS)

TOURS
23 ATTENDEES

TOUCH TOUR
FOR BLIND & PARTIALLY SIGHTED VISITORS
12 ATTENDEES

1,504
VISITORS TO THE MUSEUM LATE NIGHT EVENT

FIRST ANIMALS: WHEN, WHERE AND HOW?
PANEL DEBATE
117 ATTENDEES
TO THE LIVE EVENT
500+ VIEWS
OF THE RECORDING

SPECIMEN STANDOFF
GAMESHOW
41 ATTENDEES

FAMILY & SCHOOLS ACTIVITIES AT
YORKSHIRE FOSSIL FESTIVAL

758
MUSEUM VISITORS ENGAGED IN VOLUNTEER-LED
OBJECT HANDLING
(376 CHILDREN & YOUNG PEOPLE & 382 ADULTS)

325
FIRST LIFE
VIRTUAL REALITY EXPERIENCES

FAMILY TRAIL IN THE EXHIBITION

1,709
MUSEUM VISITORS ENGAGED IN FAMILY ACTIVITIES
(1,031 CHILDREN & YOUNG PEOPLE & 678 ADULTS)

FIRST ANIMALS

OVERVIEW

"It is a rare, possibly unique, chance to see specimens from the world's three most important Cambrian explosion fossil sites side-by-side. For anyone fascinated by that time and its amazing cast, it is a must-see."

New Scientist, 14th August 2019

First Animals combined the best of the very old – displaying 500–600 million year old fossils – with the best of the very new – using cutting-edge digital technology to bring these fossils to life – to create a unique experience. The exhibition and the accompanying programme have been the most successful in the five years of the Contemporary Science & Society series, in terms of both reach and impact.

The exhibition received a total of 219,562 visitors, averaging 882 visitors per day and exceeding the previous high by 12%. There were 5,123 unique engagements through the onsite programme and, in a new venture, an online programme dramatically extended the reach, facilitating 3,290 additional engagements and connecting with individuals in 61 different countries.

The exhibition and programme had a significant impact at an individual level through increasing knowledge. More than 13,000 individuals contributed to the exhibition evaluation and more than 500 individuals provided detailed feedback on events. Across all forms of evaluation more than 80% of visitors reported that they had learned something new.

More broadly, First Animals created opportunities for positive engagement with scientific content, with 86% of visitors to the exhibition rating their experience as "Excellent" or "Good". The exhibition appealed across interest levels and across age ranges, and content from the exhibition was also used to support the Museum's schools programmes and outreach initiatives including work with Crisis Skylight Oxford, a charity supporting vulnerable and homeless people.

The artistic interventions within the exhibition, created through researcher collaborations with the Oxford Printmakers Co-operative to produce an artwork trail and with Mighty Fossils to produce digital reconstructions, helped to bring the First Animals to life. The digital reconstructions in particular made the exhibition a surprise hit with younger audiences, who were interested in both the outcomes and the process of creating them.

Younger audiiences also engaged with the exhibition content through the Museum's family activities and schools offers. There were more than 1,600 engagements through informal programming and the Museum also provided formal sessions for 382 A-level students through study days and 141 undergraduate and post-graduate students in 7 universities through facilitated visits.

Supporting young people through all stages of their education, First Animals has helped to inspire a new generation of scientists.

"Makes palaeontology seem more relevant."

First Animals programme attendee

THE CONTEMPORARY SCIENCE AND SOCIETY SERIES

The Contemporary Science and Society series uses the public engagement power of Oxford University Museum of Natural History to share and create discussion around current academic research.

Interdisciplinary exhibitions in the Contemporary Science and Society series are based around themes relating to the sciences of the natural environment that have societal relevance and/or present and discuss current scientific advances.

Their aim is to make complex scientific concepts accessible and engaging to the general public and more broadly, through positive experiences, to raise awareness of and invite discussion around the role of scientific research within our everyday lives.

Exhibitions

The exhibitions present scientific content though a variety of different interpretive methods. In particular, in keeping with the history of the Museum as a space where science and art have always come together, the exhibitions are developed through collaborations with artists and creative practitioners as well as researchers.

Programme

Each exhibition is supported by a dynamic programme of events and outreach initiatives designed to reach a broad range of audiences. Opportunities for formal learning – for example, through talks, debates and the Museum's secondary school education offer – are complimented by creative programming that encompasses trails, crafts and handling activities for family audiences and tours, demonstrations and Museum lates.

The strength of the programme lies in its ability to create spaces for interaction between researchers and the public. Working closely with the Museum's award-winning public engagement team, researchers are invited to use the Museum as a platform through which they can share their work and develop their public engagement skills.

The Museum's audiences, including students at the University of Oxford, local residents, and national and international tourists, can take up opportunities to learn from and question active researchers to develop a deeper understanding of and appreciation for their work.

The four major exhibitions in the series - Brain Diaries, Settlers, Bacterial World, and First Animals - have reached approximately **700,000 visitors** in total.

[above] An evening talk by Dr Xiaoya Ma; a First Animals inspired artwork created at a printmaking workshop.

The First Animals exhibition and programme at the Museum of Natural History explored the latest scientific research into the origins of animal life.

What is an animal?

When did they first appear?

How did environmental conditions shape this evolutionary event?

The exhibition transported visitors back in time to the ancient oceans 600 million years ago to find out about the circumstances and events surrounding the Cambrian Explosion, the remarkable evolutionary event that led to the diversification of animal life and the development of all of the major animal body plans that we still see in animal life today.

The exhibition brought together exceptionally preserved fossils from sites all around the world and explored how this amazing fossil evidence, and new approaches to its investigation and interpretation, have revealed new information about our oldest ancestors.

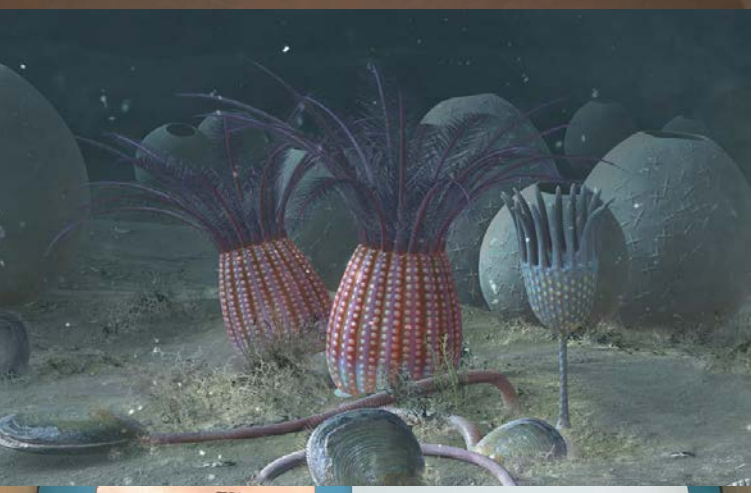
The exhibition content was underpinned by research being undertaken by researchers at the Museum of Natural History. The Museum research was enriched though collaborations with researchers at the Yunnan Key Laboratory for Palaeobiology, and by contributions from researchers working across Oxford and other UK Universities.

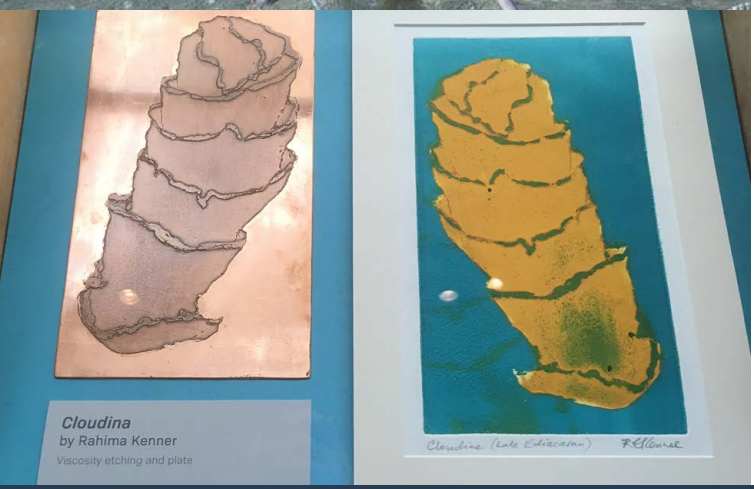
www.oum.ox.ac.uk/firstanimals

www.sketchfab.com/morethanadodo/collections/first-animals

[above] The First Animals exhibition in the Upper East Gallery at the Museum of Natural History.

EXHIBITION HIGHLIGHTS





Through fossil and specimen displays, graphics, text panels, videos, and interactives, visitors were able to learn about how early animals evolved and how they relate to modern animals. There were a range of exhibits exploring the content through different means:

Exceptionally preserved fossils

A unique loan of 55 exceptionally preserved fossils travelled from Chengjiang in China to be shown alongside specimens from the Burgess Shale in Canada, and Sirius Passet in North Greenland. The First Animals exhibition marked the first time that the Chengjiang specimens had been displayed outside China and the first time that specimens from the three key fossil deposits of the Cambrian era could be seen together in the same space.

Virtual reconstructions

Researchers at the Museum worked with palaeoartists Mighty Fossils to create virtual reconstructions of the Ediacaran and Cambrian environments and digital production studio Fish in a Bottle to produce the Cambrian Diver interactive experience which allowed visitors to drive a virtual submarine across the ancient seabed. The digital models, which were also made available for free on the Sketchfab online platform, helped visitors to visualise what the first animals would have looked like, and how they moved and interacted with each other.

Artistic impressions

First Animals also included a series of artworks produced through a collaboration with Oxford Printmakers Co-operative. Twenty-two members of the group created prints that responded to fossils on display. This large body of work was presented in the First Impressions trail around the Museum. An accompanying exhibition at the North Wall Arts Centre also took a selection of prints to new audiences beyond the Museum.

[above] *Misszhouia longicaudata* fossil; a display in the exhibition showing different types of presevation; a digital reconstruction of the Cambrian seabed by Mighty Fossils; artwork by Oxford Printmakers Cooperative on display.

PROGRAMME HIGHLIGHTS

The First Animals programme encompassed a range of different types of activities that were designed to be complementary to the exhibition, offering experiences that built on content in the displays or explored it from a different perspective:

Accessible talks

The evening lecture programme provided an opportunity for deep engagement with the research content. Speakers on the programme tailored their content to ensure that complex concepts could be explained in ways that were accessible to the general public and also answered questions from the audience.

Science Shorts

Science Shorts are lively and informal talks by early career researchers who are asked to explain their work using specimens and physical props, and to think about how they can encourage interaction from the audience. Within the First Animals programme these sessions provided visitors with the opportunity to see original fossils from the three key fossil sites.

Museum late

At a late-night event in November 2019 visitors were given the chance to experience the 'Cambrian Explosion' through live performances by Oxford Youth Dance. They could also explore the ancient seabed through the First Life virtual reality experience and get a taste of the ancient oceans in a 'Cambrian Cocktail' inspired by research into ocean chemistry.

Specimen Standoff

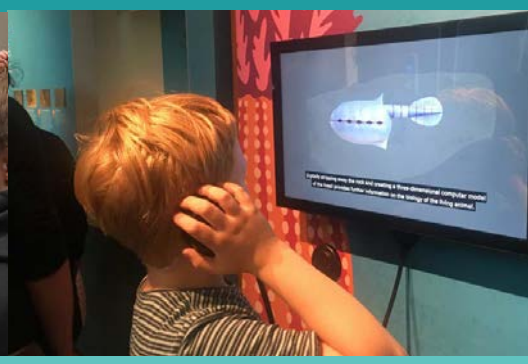
Specimen Standoff was a gameshow-style event in which two teams of researchers competed against each other to convince the audience that their fossils were better and more exciting than their opponent's fossils. The audience were invited to participate by challenging researchers to explain jargon and technical terms, and by voting for their favourite specimens.

Family-friendly activities

The 'Cambrian Close Up' handling activity used real specimens to show how palaeontologists use observations to make links between ancient and modern animals and to enable visitors to put their own skills to the test in a matching game. Visitors also learned about early animal body shapes through family-friendly craft activities during school holidays.

[above] An evening talk by Dr Duncan Murdock; a Science Short by Dr Jack Matthews; Oxford Youth Dance performing at the Museum late; the 'Terrestrial Team' at Specimen Standoff; activities for younger years.

NEW HIGHS FOR THE CONTEMPORARY SCIENCE AND SOCIETY SERIES



A 12% increase on the previous high for the average number of visitors per day.

The exhibition received a total of 219,562 visitors between 12th July 2019 and 16th March 2020. The average number of visitors per day was 882, exceeding the averages for all previous exhibitions of a similar scale in the Museum's Contemporary Science and Society series and exceeding the previous high by 12% (an average of 882 in comparison to 787).

High engagement from young audiences.

There was a significant rise in engagement from young people in comparison to previous exhibitions. The age range of visitors to the exhibition has previously aligned to that of visitors to the whole Museum however 56% of visitors to the First Animals exhibition were 'Under 16' in comparison to 32% of visitors to the Museum in the same period.

A 35% increase in the attendance at onsite events.

Within the accompanying onsite programme, there were 961 instances of engagement through formal talks, debates, tours and evening events and 4,171 instances of engagement through informal and creative programming. Take-up for events was extremely high: 35% higher for formal scientific talks (an average attendance of 96 in comparison to 71) and 71% higher for informal short talks (an average of 32 in comparison to 19) than the previous exhibition.

Online talks that engaged three times the audience that could be expected onsite.

The online programme was initiated as a direct response to the introduction of nationwide lockdown measures in response to the COVID-19 pandemic. The Museum responded quickly to the changing circumstances, the transfer of the talks online allowed the Museum not only to continue the programme but also to expand its reach dramatically: there were 3,290 live views of events in the online programme, around three times the number of attendees that would have been expected had the same talks run in the physical Museum space (projected at 1,056 attendees, based on average attendance), rising to six times the number if subsequent views of the recordings are included (more than 6,500 views).

Twice the dwell time on the online exhibition page.

In addition to the talks, there were more than 18,500 unique page views of the First Animals website and the average dwell time, at 8 minutes 21 seconds, is double the time spent on other exhibition pages.

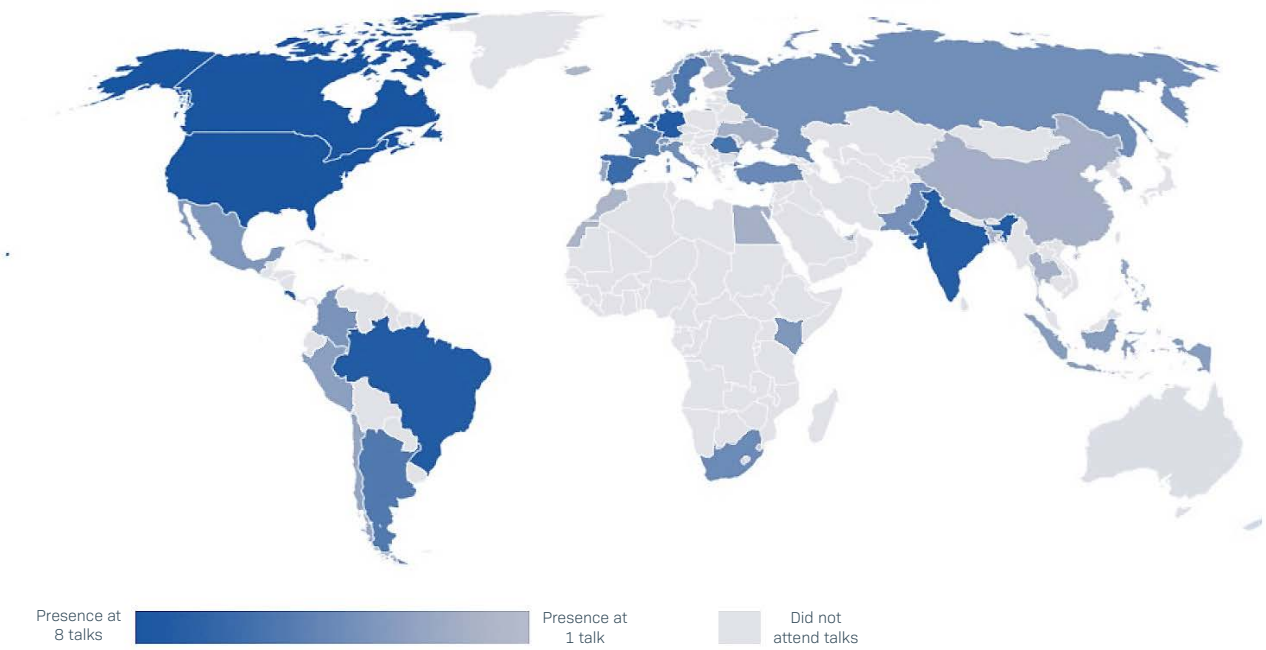
[previous] *'Ottoia'* artwork by Jackie Conway from the Oxford Printmakers Co-operative, inspired by content and specimens from the First Animals exhibition.

[above] An evening talk by Dr Imran Rahman; specimen handling with students from the University of Bristol; a video demonstrating the digital reconstruction process.

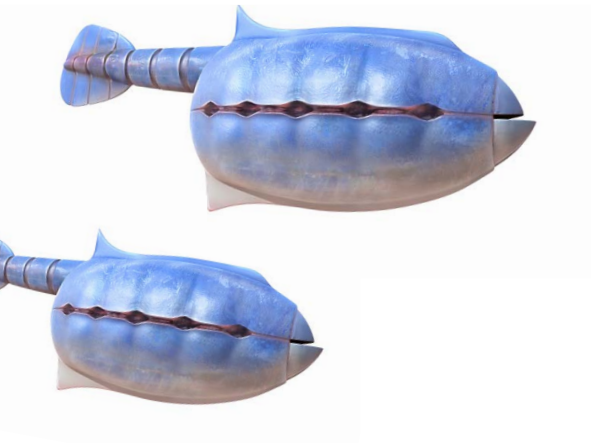
NEW GLOBAL CONNECTIONS FOR THE MUSEUM

First Animals served both the local community in and around Oxfordshire and also brought in audiences from further afield with a new online programme.

International engagement at the online talks programme:



There were **3,290 attendances** at the online talks by individuals from **61 different countries**.



Around the world

First Animals was unique in the Contemporary Science and Society series in its global outlook. The exhibition was inspired by and based around a long-standing collaborative partnership between researchers at the Museum of Natural History and at Yunnan University.

It is also the first exhibition in the series to be supported by an online events programme. The online programme extended the reach of the exhibition and programme, engaging audiences in 61 different countries and the international audience made up 31% of the total online audience.

The online programme opened up new opportunities for international audiences to engage, building on the interest already seen in the exhibition and onsite programme.

[above] A virtual reconstruction by Mighty Fossils of *Vetulicola cuneata*.

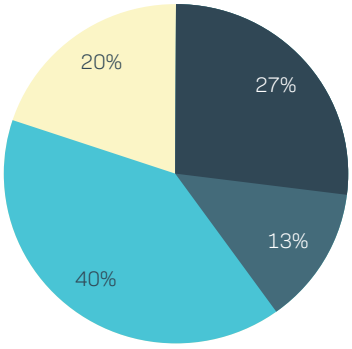
In Oxford

The interest from the international community was complemented by the strong interest from local audiences and First Animals served these audiences equally. Engagement with the local community starts at the very beginning of the development process and the exhibition and programme drew in contributions from many local groups:

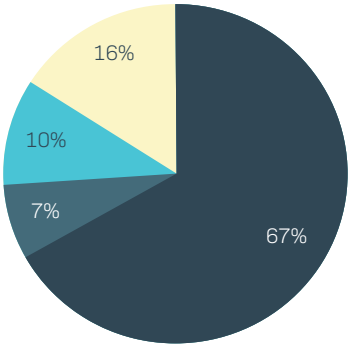
- University of Oxford researchers contributed to the exhibition content and talks
- the Museum's Youth Forum, comprising young people aged 14-19, reviewed different aspects of the exhibition over the course of three separate sessions
- Oxfordshire Printmakers Co-operative worked with researchers to create new artworks
- local dance group Oxford Youth Dance created a bespoke dance performance
- the Museum worked with Crisis Skylight Oxford, a charity supporting vulnerable and homeless people, to help a participant to create and deliver a First Animals inspired tour
- bespoke touch tours were developed as part of the Museum's regular offer for groups of blind and partially sighted visitors
- handling collections were used at the Museum's autism friendly openings

The collaborative development processes helped to ensure the content was relevant to all audiences and both the exhibition and programme appealed to the local community and saw high engagement from Oxfordshire residents:

Exhibition visitors:



Onsite events attendees

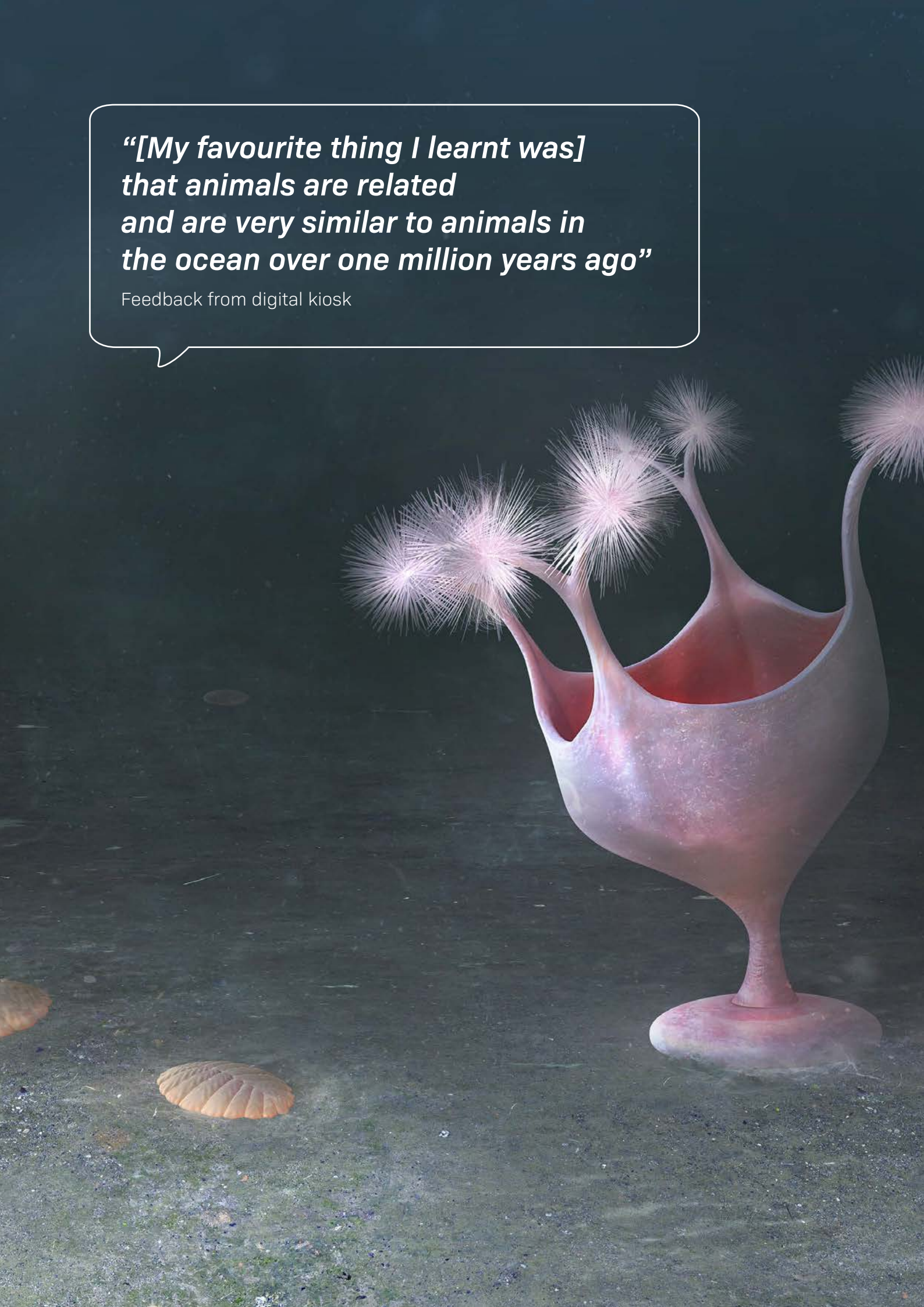


40% of visitors to the exhibition and 73% of attendees to evening talks were from Oxford or the surrounding region (within 20-30 miles).

[above] Twitter engagement, the online talks were a continuation of the onsite programme allowing attendees to maintain a connection to the Museum.

“[My favourite thing I learnt was] that animals are related and are very similar to animals in the ocean over one million years ago”

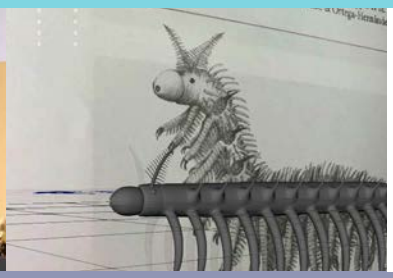
Feedback from digital kiosk



WHAT DID PEOPLE LEARN?

The exhibition and programme had a significant impact and across all forms of evaluation conducted with exhibition visitors, more than 80% reported that they had learned something new.






LEARNING ACROSS SUBJECT AREAS

Visitors and event attendees took away different types of learning from First Animals, however the two most freqently mentioned subect areas were:

THE AGE OF ANIMAL LIFE

For example, expressing surprise at the age of animal life or noting new knowledge about specific geological time periods.

"I was not aware that multicellular organisms had developed so early in the history of life"
Attendee at a talk by Prof Paul Smith

"[I learned that] Ediacaran animals existed before the Cambrian Explosion"
Attendee at a talk by Dr Frankie Dunn

"[My favourite thing I learnt was] the variety of species found, suggesting that even at the earliest stages of prehistory, evolution took hold very quickly and extensively."
Feedback from digital kiosk

THE STUDY OF FOSSILS

For example, about the techniques and processes that scientists and researchers use to learn about early animal life.

"[I learned about the] importance of cholesterol as marker of animality"
Attendee at a talk by Prof Paul Smith

"[I learned] that prior to CT scans some people ground down skulls and drew every little bit"
Attendee at a talk by Dr Stephan Lautenschlager

"[I learned about] using evidence such as burrows in rock to establish life habits"
Feedback from digital kiosk

[previous] Digital reconstruction of the Ediacaran sea floor, Newfoundland, Canada - 560 million years ago.

[above] The panel at the debate "First Animals: When, Where, and How?"; Melisa Garcia presenting at Specimen Standoff; working documents and the finished digital reconstruction of *Onychodictyon ferox*.

LEARNING AT DIFFERENT LEVELS

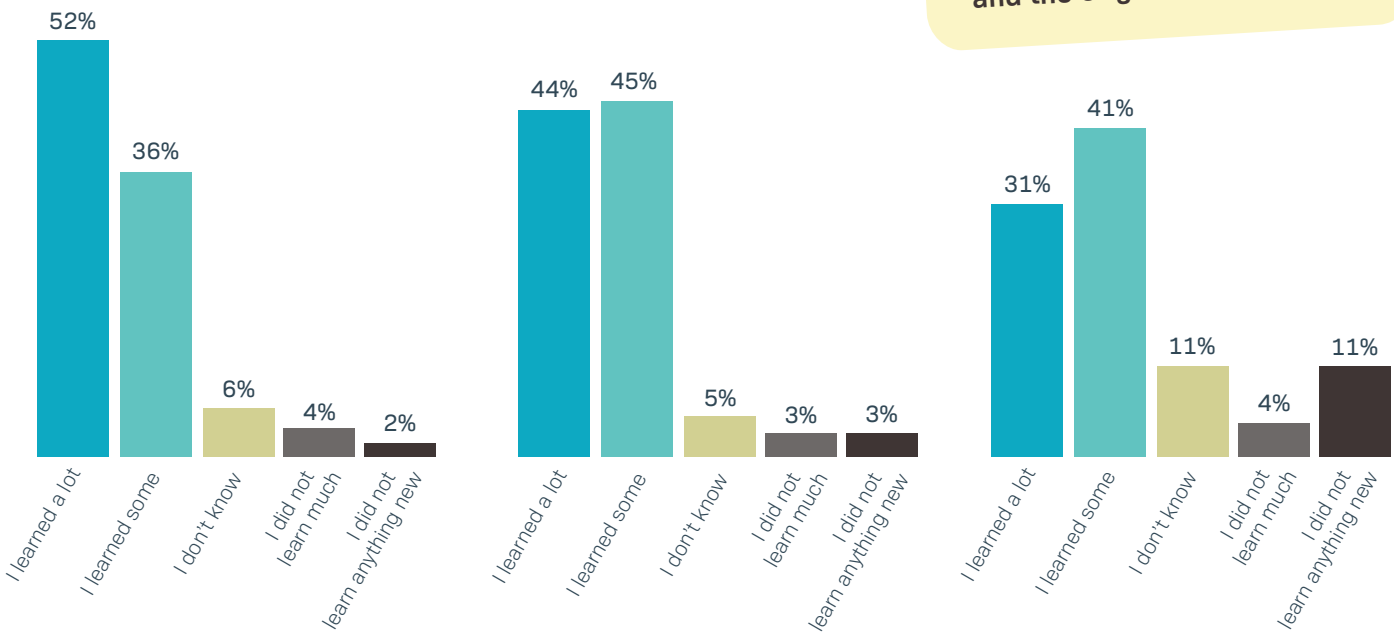
Visitors to the exhibition reported gaining new knowledge regardless of their level of interest in science, showing that the displays provided appropriate content for all levels.

Learning from the exhibition was strongest amongst visitors who identified with the statement "I actively seek out science" however visitors with lower levels of interest also reported learning something new.

80% of all exhibition visitors agreed that they learned **'some'** (33%) or that they learned **'a lot'** (47%).

73% of all exhibition visitors agreed that they had a **'new understanding of fossil evidence and the origins of animal life'.**

Survey results: Did you learn anything new about the first animals and the time at which they first appeared?



Visitors who identified with the statement:

"I actively seek out science"

Visitors who identified with the statement:

"I am interested in science but don't make a special effort to seek it out"

Visitors who identified with the statement:

"Science is not for me"

[above] [top] A virtual reconstruction by Mighty Fossils of *Amplectobelua symbrachiata.* [below] *Amplectobelua symbrachiata* fossil; a display of fossils in the exhibition from Chengjiang, China.

CASE STUDY: SKELETON BUILDING

First Animals included content about the evolution of animal skeletons. It explained how a rise in sea levels washed calcium, phosphate and other life-essential chemicals into the oceans and explored how animals used these chemicals to build skeletons that would allow them to move, feed, grow, dig, and compete with each other in different ways.

There was a range of ways in which audiences were presented with this content, they could engage with text and fossil displays, a video explanation, and an interactive microscope display in the exhibition, and were also able to learn directly from Dr Duncan Murdock in the evening lecture 'When Life Got Hard'. Evaluation of the different elements of the First Animals offer showed learning about this subject from different sources and at different levels.

INTRODUCTORY LEARNING

"[I learned] that minerals that washed into the sea were used to make skeletons and shells."
Feedback from digital kiosk

"I didn't know shells were skeletons!"
Attendee at a talk by Dr Duncan Murdock

"[I learned about the] use of skeletal material to protect from predators."
Feedback from digital kiosk

IN DEPTH LEARNING

"[The lecture] added [to my understanding] - in particular, the evidence for parallel development of different ways of mineralisation"
Attendee at a talk by Dr Duncan Murdock

"You can see how structures have evolved and see links back to animals we've got now, you can see what the earliest skeletons looked like and features of the animals."
Interviewee in the exhibition space

[above] The microscope display allowing exhibition visitors to examine small shelly fossils.

LEARNING IN DIFFERENT WAYS

The exhibition and programme provided different but complementary experiences and there are key differences that can be seen between the feedback for each.

FROM THE EXHIBITION

The most frequently mentioned topics were:

1. **Cambrian/Ediacaran and references to timing (of early animal evolution)**
2. **Describing appearance or activity (of early animals)**
3. **Scientific processes or techniques (for studying early animals)**

In feedback about the exhibition there was a greater focus on the appearance of early animals and links to modern animals. This is possibly attributable to the ability in the exhibition for visitors to see real specimens – both ancient and modern animals – up close, and may also have been due to the strength of the impact of the strong visualisations (the digital reconstructions) in the displays.

> *"[My favourite thing I learnt was] That there are modern day similar animals to trilobites and that there used to be an animal that looks like a pin"*
>
> Feedback from digital kiosk

> *"Chinese fossils were fantastically detailed"*
>
> Feedback from digital kiosk

Engagement with real specimens and through hands on activity was particularly important for those who had a lower interest in science to begin with. Learning by those who identified with the statement 'science is not for me' centred around the physicality of the specimens and in commentary, there were 10 comments overall referencing the microscope and 4 of those (40% of the comments) came from this small sub-group (representing only 11% of the respondents).

> *"[My favourite thing was] seeing stuff close up to see the detail"*
>
> Feedback from digital kiosk

FROM THE TALKS

The most frequently mentioned topics were:

1. **Scientific processes or techniques (for studying early animals)**
2. **Cambrian/Ediacaran and references to timing (of early animal evolution)**
3. **How evolution works**

In feedback from events there were a greater number of comments relating to evolutionary processes. This possibly reflects the fact that the talks provided an opportunity for complex processes to be explained in a high level of detail and for attendees to gain a comprehensive understanding.

> *"[I gained an] overview of evolution, its mechanism and way of determining the position of organisms in the tree"*
>
> Attendee at a talk by Prof Peter Holland

> *"The order in which features evolve continues to surprise"*
>
> Attendee at a talk by Dr Imran Rahman

> *"[the talk] re-emphasised that evolution occurs repeatedly when the conditions are right"*
>
> Attendee at a talk by Dr Duncan Murdock




CASE STUDY: THE GREAT DEBATE

The cause of the Cambrian explosion is a source of great debate and a thriving research area. At the event 'First Animals: When, Where and How?' on 11th February 2020 a panel of experts discussed a range of topics including the timing of animal origins, the influence of developmental and environmental factors, and the emergence of modern oceanic ecosystems.

At the debate a live voting platform was used to measure the opinion of the audience before and after the debate. The audience responded to a question about the causes of the Cambrian Explosion and over the course of the debate a change of opinion was observed, showing that the audience were responding to new learnings gained from the presentations by the speakers. By the end of the debate, all of the four suggested options had moved to a different position. The panellists had changed attendees views and the proportion who were 'not sure' had reduced from 10% to 7%.

BEFORE THE DEBATE

Highest ranked answer

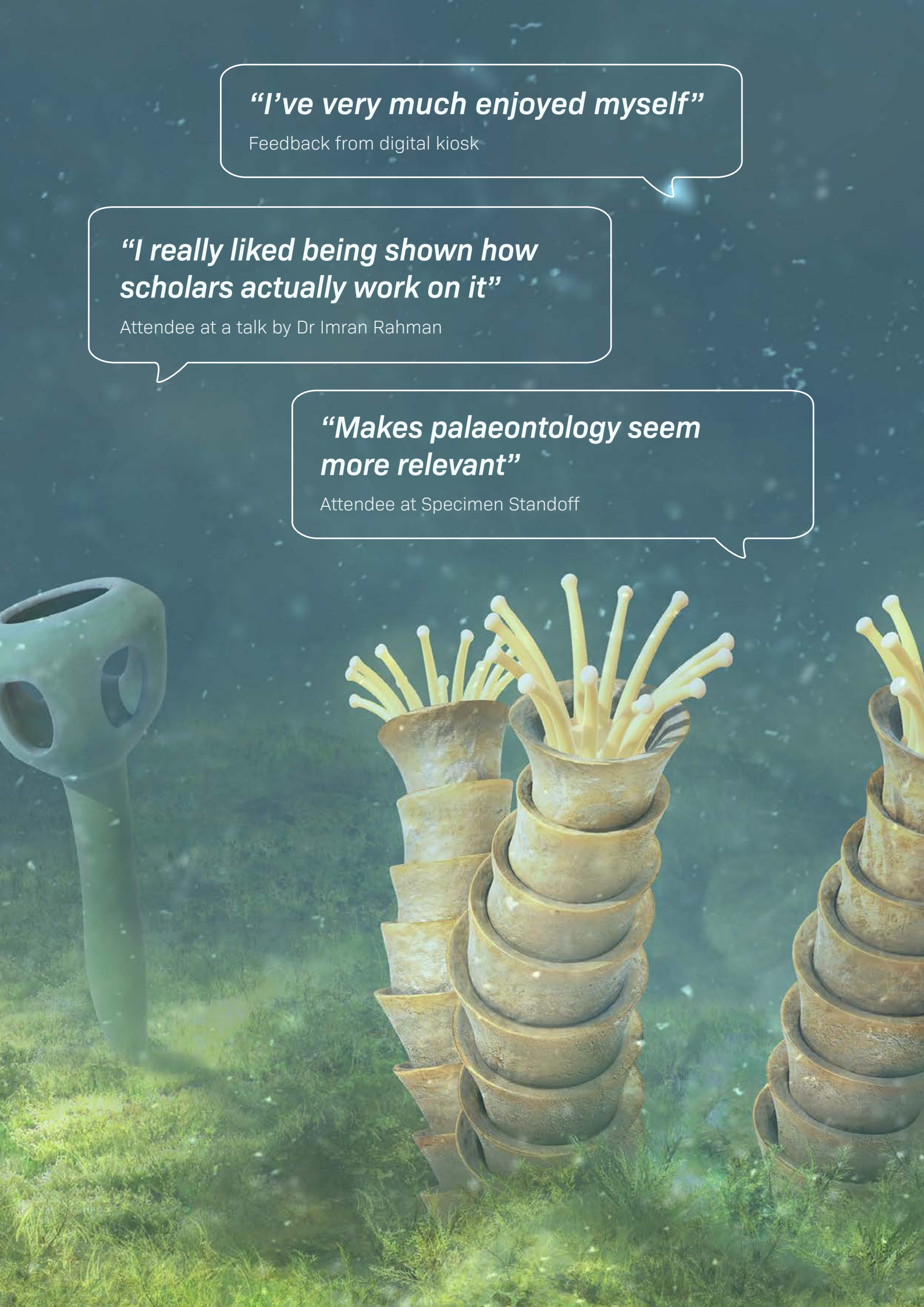
- Interactions between animals and their environment drove the process
- Changes in ocean chemistry created the right environmental conditions
- Geological processes created new habitats and opportunities
- Genetic changes created larger-scale evolutionary opportunities
- I'm not sure yet, this subject is new to me!

AFTER THE DEBATE

Highest ranked answer:

- Changes in ocean chemistry created the right environmental conditions
- Interactions between animals and their environment drove the process
- Genetic changes created larger-scale evolutionary opportunities
- Geological processes created new habitats and opportunities
- I'm still not sure!

[above, clockwise from top left] Professor Allison Daley, University of Lausanne; Professor Philip Donoghue, University of Bristol; Professor Rosalind Rickaby, University of Oxford; Professor Peter Holland, University of Oxford.


“I’ve very much enjoyed myself”
Feedback from digital kiosk
“I really liked being shown how scholars actually work on it”
Attendee at a talk by Dr Imran Rahman
“Makes palaeontology seem more relevant”
Attendee at Specimen Standoff

HOW DID PEOPLE FEEL?

Individuals engaging with the First Animals exhibition and programme noted that they gained a new appreciation for the work involved in scientific research and its importance.

The exhibition also provided positive experiences for all, regardless of individual levels of interest.





APPRECIATING SCIENCE

Museums have many functions and appeal to people for many different reasons, they are ideal places in which people can be exposed to new ideas and new ways of thinking.

First Animals aimed to present research in a way that would be accessible to all, and to build a connection between researchers and the public. This connection, promoting an increased understanding and appreciation for research, is crucial to maintaining and building public trust in science.

The exhibition and programme offered the public a variety of ways to learn about research methods including through text and videos within the exhibition and by hearing directly from researchers at events. In feedback from the exhibiton and events, references to scientific processes or techniques featured in the top three most frequently mentioned specific types of learning and, in addition to gaining new knowledge, individuals also noted they had gained a new appreciation for the work that is involved in scientific investigation.

"I had no idea how complex the topic/ research is"

Attendee at a talk by Dr Xiaoya Ma

"The dedication and teamwork of these scientists convinces me that they have truly figured out details explained"

Attendee at a talk by Prof Paul Smith

Within the public programme, particularly at innovative events like the Specimen Standoff and at Museum Lates events, researchers were encouraged to be more active in engaging with the audience and found innovative ways to explain the relevance of their work.

"I had not realised how findings from fossils can be applied to species and events such as climate change today"

Attendee at Specimen Standoff

[previous Digital reconstruction of the Ediacaran sea floor, Namibia, South-west Africa - 543 million years ago.

[above] Dr Jack Matthews showing specimens; Dr Xiaoya Ma sharing research; a video of Dr Duncan Murdock in the exhibtion; equipment and specimens used for live demonstration; Dr Jordan Bestwick explaining research processes.

ENJOYING SCIENCE

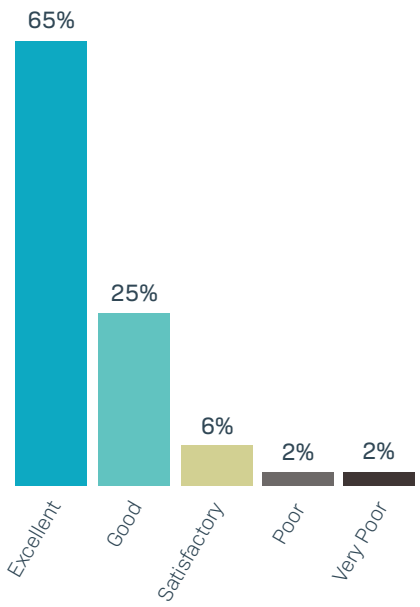
Audiences across all levels of background knowledge and all levels of interest reported that they enjoyed their experiences.

Positive experience can be expected from individuals who are already engaged with science, however, the exhibition also provided positive experiences for those with lower levels of interest. 11% of visitors to the exhibition identified with the statement 'Science is not for me' but the same proportion of this group rated their experience 'excellent' as in other groups.

86% of all visitors to the First Animals exhibition enjoyed their experience and rated it either 'good' (19%) or 'excellent' (67%).

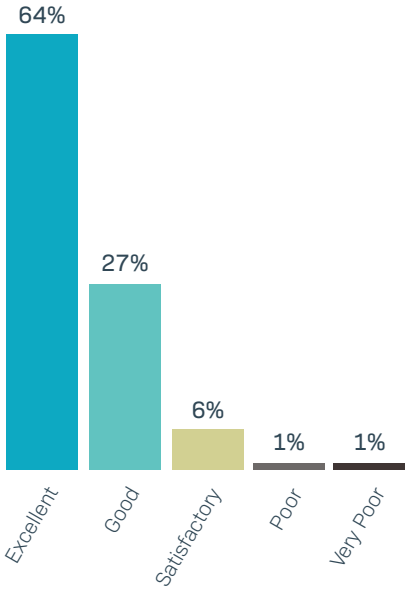
88% of all attendees to talks had positive experiences and either 'enjoyed it' (35%) or 'enjoyed it a lot' (53%).

Survey results: How would you rate the First Animals exhibition overall?



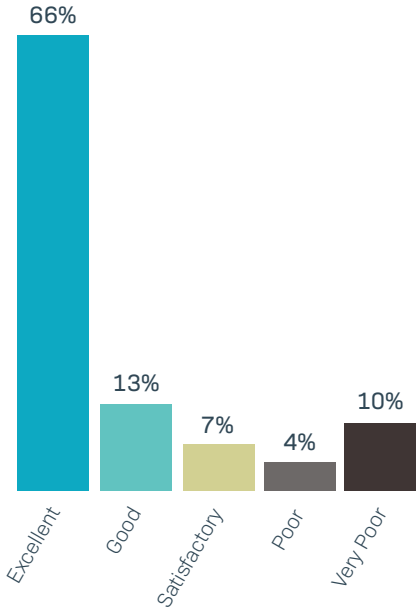
Visitors who identified with the statement:

"I actively seek out science"



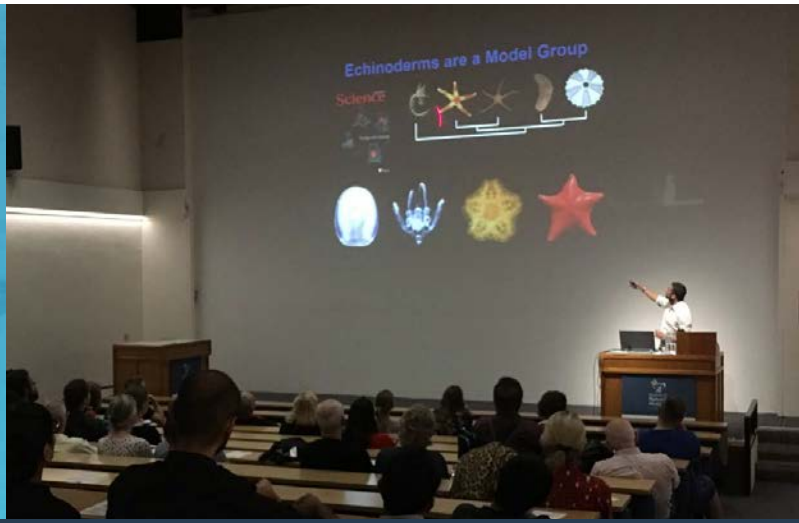
Visitors who identified with the statement:

"I am interested in science but don't make a special effort to seek it out"



Visitors who identified with the statement:

"Science is not for me"



[above] [top] A virtual reconstruction by Mighty Fossils of *Eoredlichia intermedia* [below] *Eoredlichia intermedia* fossil; an evening talk by Dr Imran Rahman.

Within feedback on the public programme, 94% of all attendees to talks stated that they either 'enjoyed' their experience or 'enjoyed it a lot'. Commentary from attendees demonstrated wide appeal to and enjoyment by individuals of all ages and knowledge levels, even those not normally engaged with the subject matter.

"Great presentations of fossils in an exciting way."

Attendee at Specimen Standoff

"Fantastic speaker, made a topic I had only a passing interest in really fascinating"

Attendee at a talk by Dr Imran Rahman

"The audience was more varied in diversity, particularly in age, than I anticipated. It was brilliant and surprising to see all equally engaged"

Feedback from researcher participating in Specimen Standoff

"It has certainly broadened my understanding as a 60+ female with only A level biology to fall back on!"

Attendee at a talk by Prof Paul Smith

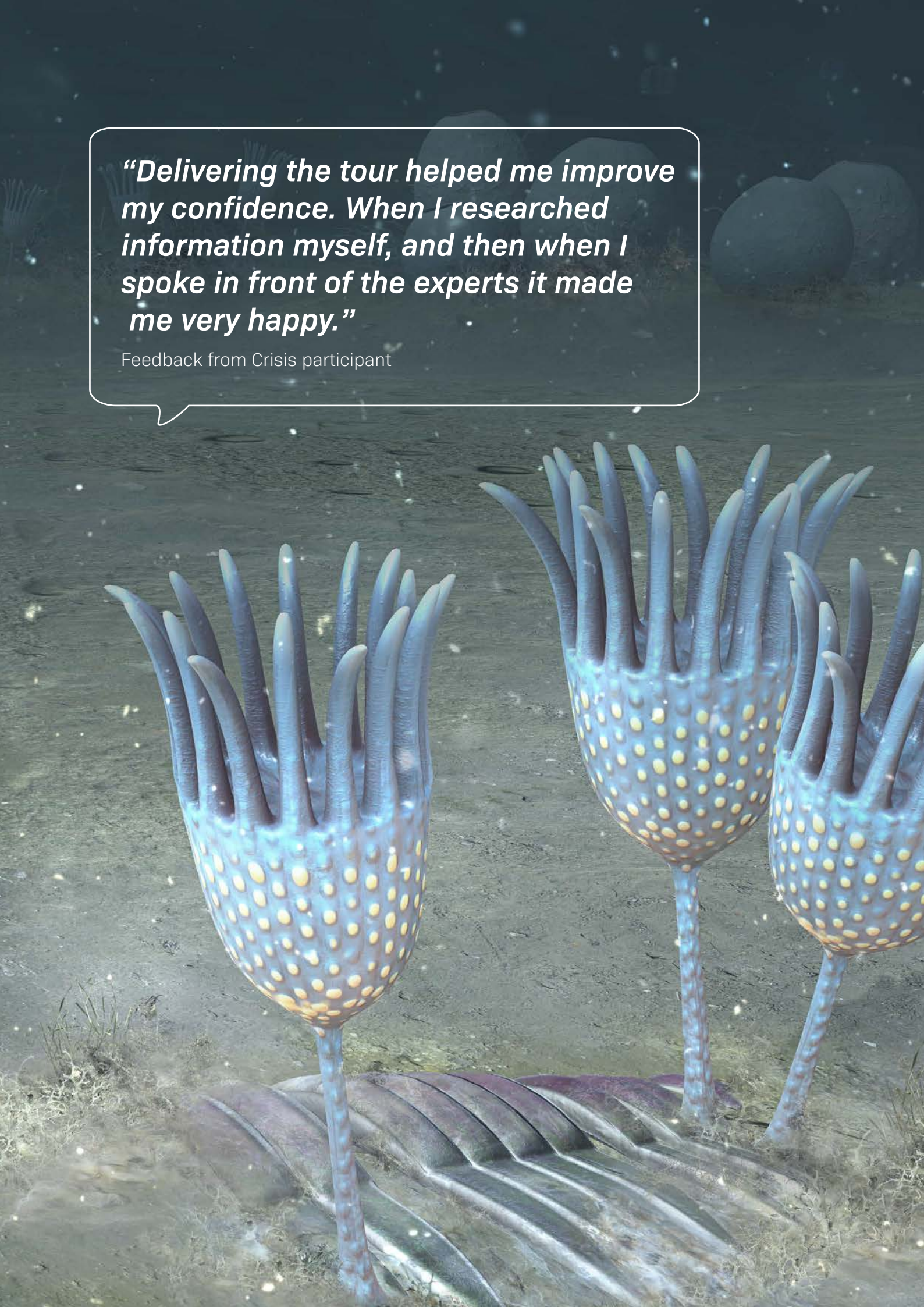
"A good and simple presentation, accessible to different generations and backgrounds"

Attendee at a talk by Dr Imran Rahman

"Both educative and entertaining: the lecture was concise, yet managed to fully cover the topic. I had a great time!"

Attendee at a talk by Prof Paul Smith

[above] The panel of the "First Animals: When, Where, and How?" debate, chaired by Professor Paul Smith



“Delivering the tour helped me improve my confidence. When I researched information myself, and then when I spoke in front of the experts it made me very happy.”

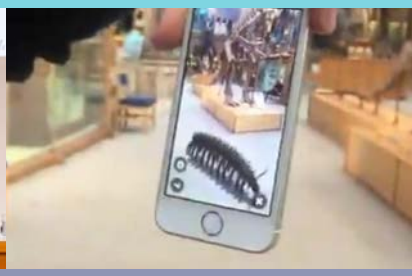
Feedback from Crisis participant

HOW DID PEOPLE CHANGE?

First Animals sparked an interest, individuals noted an intent to learn more and some put this into action by attending multiple events in the onsite and the online programmes.

Specialists who helped to develop and deliver First Animals noted changes to the way they think about their research and practice, and perceptions changed as First Animals showed that the Museum of Natural History is a leading centre for palaeontological research and academic collaboration.



TAKING ACTION

The exhibition and programme met the needs of audiences in relation to learning and engagement and in some cases, visitor and attendees were inspired to learn even more:

"A great series of rare fossils. I must read more about them."
Feedback from digital kiosk

"[the talk] got me interested in getting Dr Holland's book"
Attendee at a talk by Prof Peter Holland

"I need to read and read more about fossils and plants. Fantastic lecture got me thinking!"
Attendee at a talk by Dr Frankie Dunn

Through a collaboration with Crisis Skylight Oxford, a charity supporting vulnerable and homeless people, the Museum worked with a Crisis participant to support them in developing and delivering a First Animals-inspired tour. The opportunity to engage with research in a supported environment had a significant impact on the participant's confidence and this positive experience may help them to engage with similar opportunities in the future.

"I taught 2 people from Crisis (who hadn't been involved in the training) the facts on the tour which was great... I would love to volunteer at the museum in the future."
Crisis participant

"Her desire and ability to try new things increased and her pride in delivering a tour so independently was a real joy to behold."
Crisis coordinator

[previous] Digital reconstruction of the Cambrian sea floor, Yunnan Province, China - 518 million years ago.

[above] Dr Frankie Dunn presenting her research at an evening talk and on a video in the exhibition; Professer Peter Holland at the debate; *Onychodictyon ferox* on the sketchfab app - a new way of bringing research to life.

DEVELOPING PRACTICE

The First Animals exhibition and programme was developed collaboratively, drawing on the knowledge and experience of palaeontological experts and also bringing in insights from other disciplines. Working on the programme had a deep impact on those involved, changing the way they thought about their professional practice. For researchers in particular, the opportunity to reflect on how research is communicated brought new learnings with the potential to apply within both academic and non-academic contexts.

"I learned how to pace the talk correctly, keep it moving forward while keeping everyone engaged."

Researcher

"Specimen Standoff highlighted just how jargon filled science is and how inaccessible most outreach events still are... Specimen Standoff forced me to completely rethink and was, as a result, far more successful in my opinion."

Researcher

"Distilling a body of work into a talk is always useful for helping to identify the key messages I should be trying to get across in scientific papers, as well as public engagement."

Researcher

"The innovative methods used to illustrate the organisms and their environment were spectacular: in particular the use of the interactive screens showing the Cambrian sea floor and the use of virtual reality headsets to show the way these animals lived. This has been inspiring for me and I hope to be able to obtain some similar headsets to use in my regular teaching sessions in the future."

Programme Director, MSc Palaeobiology, University of Bristol

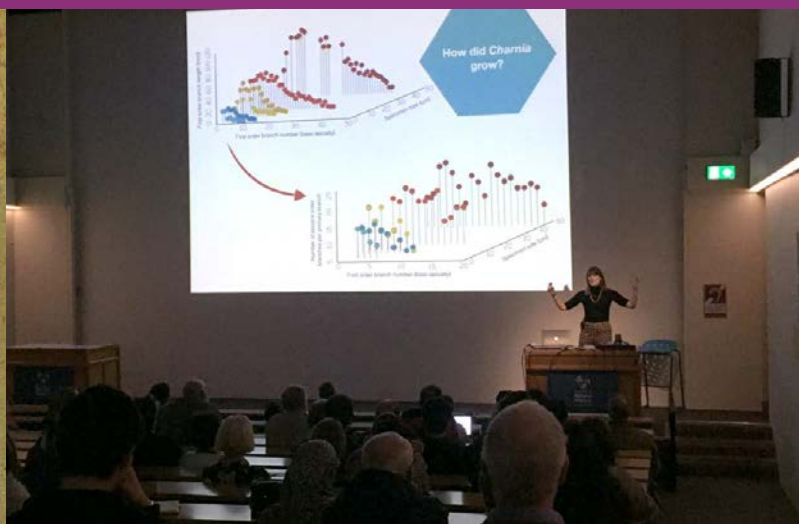
"As well as providing a fresh range of subjects for my work, the project has influenced my approach to the use of sources and research."

Printmaker collaborating with researchers

[above] Chris Stockey, the overall winner of Specimen Standoff on behalf of the 'Marine Team', won the audience over with the sock-puppet 'Connie the Conodont'.

"A multitude of new fossil discoveries from the Cambrian and Ediacaran sites has provided an ever richer and more complete picture of the seemingly alien forms of early animals.... The Museum of Natural History at the University of Oxford brings this history to life with its exhibition 'First Animals' that combines authoritative science with a combination of classical specimen showcases and more playful interactive exhibits to tell the story of the origins of animals from many different angles."

The Palaeontology Newsletter, March 2020



CHANGING PERCEPTIONS

First Animals was well received by the scientific press, it put forward a unique and compelling offer for the palaeontological community and both students and established researchers took up the opportunities to engage and valued their experiences.

"It brought to life and clarified what I'd only vaguely grasped from books and charts. Fantastic!"

Attendee at a talk by Prof Paul Smith

"First Animals shone a light on research the public isn't used to seeing, it was a far cry from the usual "highlights" e.g. dinosaurs and as a researcher these are the programmes we enjoy the most."

Feedback from researcher at Specimen Standoff

Beyond the academic community, First Animals also helped to raise awareness more broadly amongst the general public of the Museum's role as a research institution.

"Very informative - particularly how current all the research seems to be!"

Attendee at a talk by Prof Paul Smith

"I had been less aware of the outward-looking research taking place at the Museum, and had thought much more of it was collections based than it probably is."

Printmaker collaborating with researchers

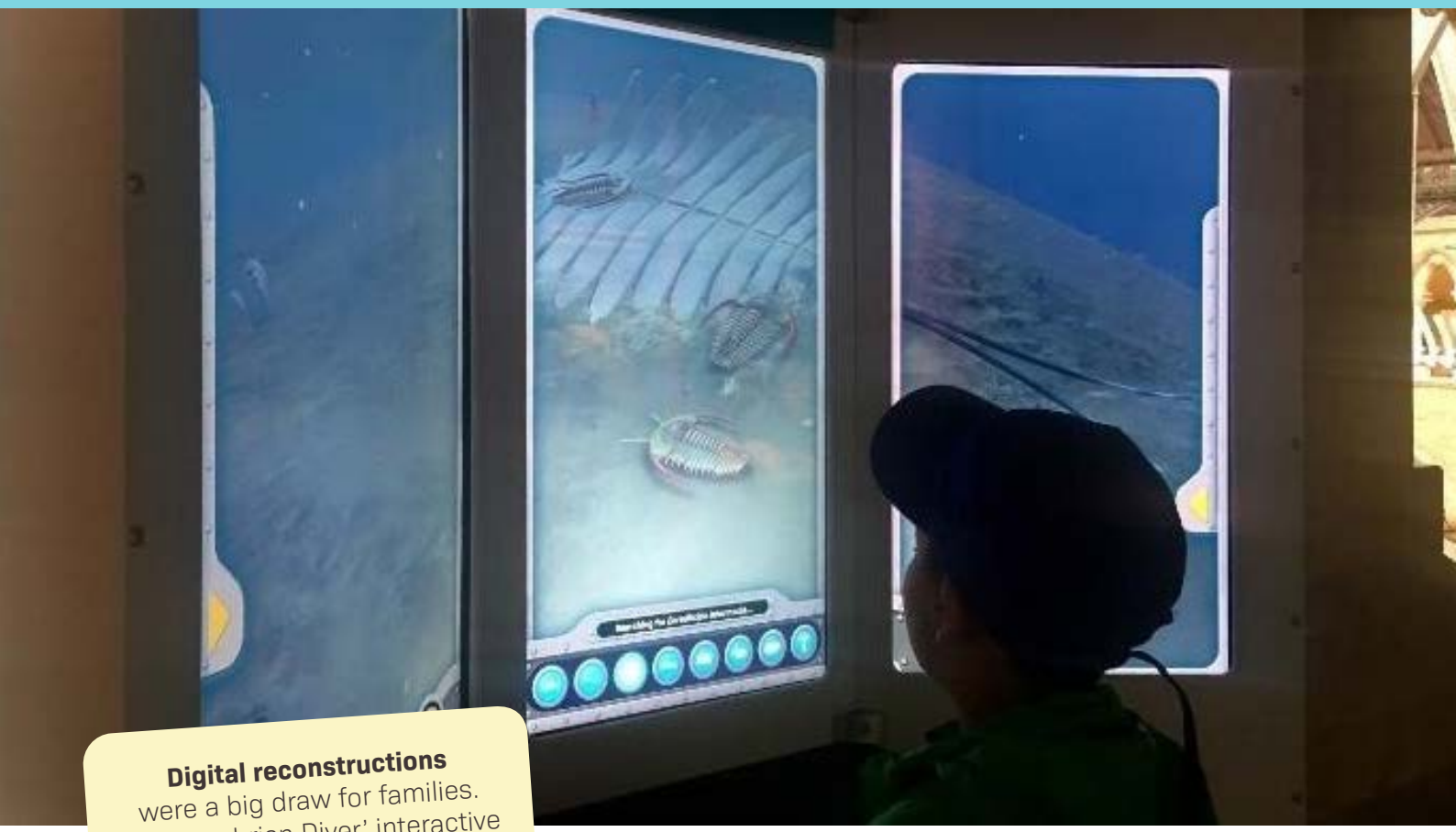
79% of visitors 'agreed' or 'strongly agreed' that **'The Museum of Natural History is a place where I can come into contact with current science and research.'**

[above] *Longtancunella chengjiangensis* fossil; Dr Frankie Dunn presenting new research into the growth patterns of *Charnia*.

FIRST ANIMALS & THE FUTURE OF RESEARCH

Hands on experiences and 3D visualisations helped to bring the First Animals to life and despite being aimed primarily at an adult audience, the exhibition was a surprise hit with children and young people, inspiring the next generation.

First Animals content fed into both family programming and study days that were delivered to 349 A-level students, and provided a basis for visits from undergraduate and postgraduate groups.



Digital reconstructions were a big draw for families. The 'Cambrian Diver' interactive was one of the **most popular** and **most frequently mentioned**, aspects of the exhibition.

First Animals proved to be particularly successful with audiences at, and even below, the target age for exhibitions in the Contemporary Science and Society series of 12+ years.

Engagement from young people was significantly higher than for previous exhibitions, more than half (56%) of the visitors were under 16 in comparison to around a third at previous exhibitions in the Contemporary Science and Society series.

[above] The Cambrian Diver interactive allowing visitors to drive a virtual submarine around a virtual reconstruction of the Cambrian ocean environment.

[My favourite thing that I learned was] "about all of the sea creatures on the Cambrian Diver."
Feedback from digital kiosk
(kiosk survey respondent aged under 16)

"My son loved the interactive parts"
Feedback from digital kiosk

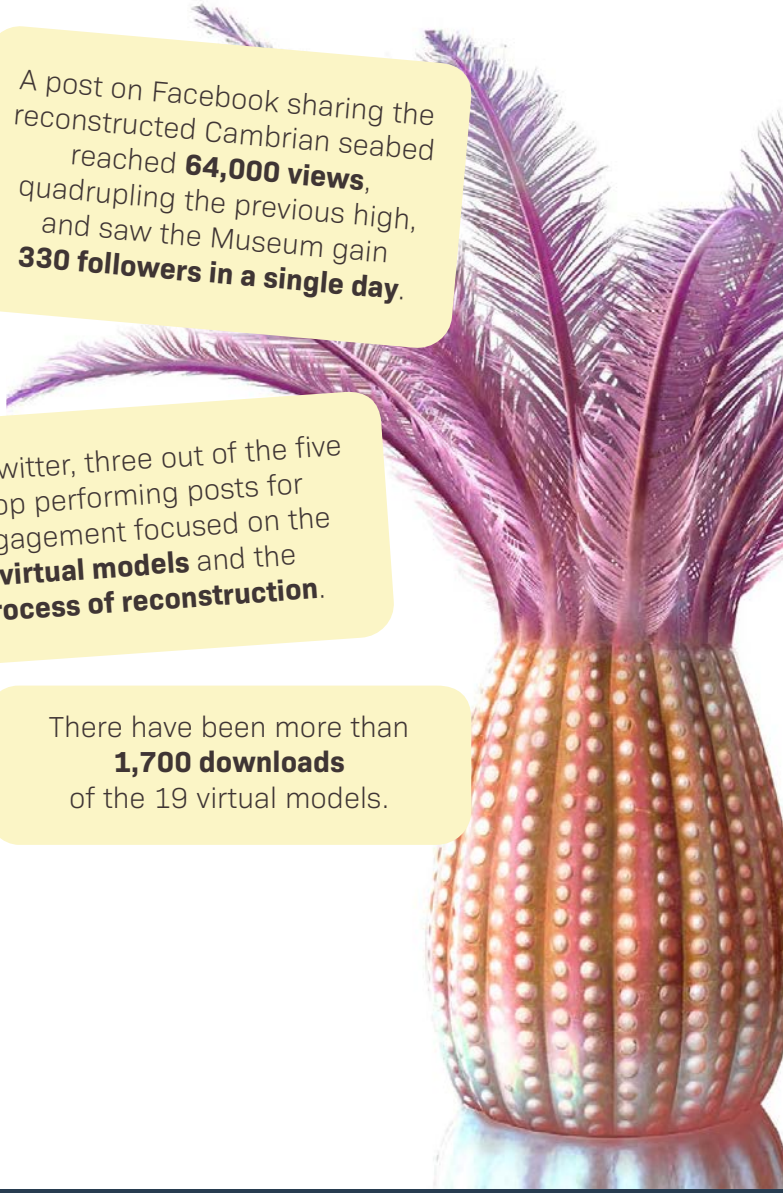
"I'm doing [studying] computer science and philosophy... I was most fascinated by the graphics... you get to really bring to life something as if you're there. I think there's something really appealing about that."
Interviewee in the exhibition

In addition to the interactive itself, there has been specific interest from young audiences in online content revealing the development processes behind the visualisations, showing that the content is helping to inspire an interest in scientific research.

A post on Facebook sharing the reconstructed Cambrian seabed reached **64,000 views**, quadrupling the previous high, and saw the Museum gain **330 followers in a single day**.

On Twitter, three out of the five top performing posts for engagement focused on the **virtual models** and the **process of reconstruction**.

There have been more than **1,700 downloads** of the 19 virtual models.



27 [above, left] Tweets referencing the interactive and the digital recontructions. [above, right] Digital reconstruction by Mighty Fossils of *Xianguangia sinica*.

Through information and creative programming there were more than 4,000 instances of engagement, over 1,600 of which were with children and young people. In particular, within the Science Shorts, children and young people made up 30% of the audiences (in comparison to the adult audience at evening events) and the 'Specimen Standoff' also attracted a younger demographic. Attendees reported they had a positive experience and it was evident through feedback that the more direct and interactive way of presenting – using specimens and exploring more creative approaches – helps to positively engage younger audiences.

> *"I like the happy worm story"*
> Attendee at a Science Short

> *"Really didn't know much about marine fossils [until] tonight. Was well impressed!"*
> Attendee at Specimen Standoff

> *"Paleontologists are cool - it was such a fun night!"*
> Attendee at Specimen Standoff

There was a high level of engagement with children and young people through the schools programme. Through study days and facilitated visits students were able to engage with curriculum content in new and different ways, including through case studies, as featured in the exhibition.

> *"In year 13 Geology we research studies of exceptional preservation of fossils and on our visit to the Museum we listened to several lectures on early life including the Sirius Passet Lagerstatte of North Greenland..... The students have benefitted by gaining a more complex understanding of the early development of multicellular life on Earth. The extent of the impact has been measured subjectively via discussions in class and a perceived improvement in understanding."*
>
> Teacher, A-level Geology, Poole Grammar School

First Animals was specifically relevant to undergraduate and postgraduate students in palaeobiology, evolutionary biology, and geology. Researchers at the Museum led facilitated visits by students from the University of Bristol, Cardiff University, Imperial College London, the University of Oxford, the University of Nottingham, the University of Southampton and the University of Warwick, welcoming 141 students in total. The visits provided opportunities for in-depth engagement with the exhibition and specimens, and allowed the students to hear directly from researchers.

[above, left] Tweets about school and university engagement throughout the course of the exhibition.

FIRST ANIMALS AND FUTURE PROGRAMMING



"Ultimately it's not easy to bring a subject like this to life, based as it is on ancient rocks and academic theory. The curators here have done an excellent job.... certainly a must-see for fossil-enthusiasts but also fascinating for anyone interested in the origins of animal life."

Geographical, 2nd August 2019

The First Animals exhibition and the accompanying programme have been the most successful to date in the Contemporary Science and Society series both in terms of reach and impact. Through the evaluation it has been possible to identify factors that contributed to this success and which can be built upon in future programming.

Developing interpretation

- **artistic interpretations and visualisations increased engagement and enjoyment across all ages and audiences**
- **direct engagement with researchers helped to increase appreciation of science**
- **the processes behind the outcomes were of specific interest to young audiences**
- **hands on experiences and engagement with specimens was important to audiences with low levels of initial interest**

Developing programming

- **programming provides different, and complementary, types of learning and engagement**
- **experimentation with new programming formats brings benefits for both audiences and for participating researchers**
- **extending programming online dramatically increases reach**

[above] Artwork by the Oxford Printmakers Cooperative; digital reconstruction of *Vetulicola cuneata;* Chris Stockey presenting at Specimen Standoff.

ACKNOWLEDGEMENTS

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Dr Imran Rahman
Professor Paul Smith

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With support from the Gardens, Libraries & Museums Outreach team.

Finally a special thanks to the Museum Youth Forum and to the many researchers and volunteers who contributed to the programme of events and activities accompanying this exhibition.

[previous] *Xianguangia* artwork by Charlie Davies of the Oxford Printmakers Co-operative, inspired by content and specimens from the First Animals exhibition.

www.oum.ox.ac.uk/firstanimals

Museum of Natural History

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