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Driggsby the fin whale's museum ecosystem: the collection, conservation, and installation of a new museum icon

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Abstract

A 12-metre long juvenile fin whale (*Balaenoptera physalus* (Linnaeus 1758)) skeleton, named Driggsby, was installed in the Tullie House Museum and Art Gallery in January 2018. The specimen was washed up on the West Cumbrian coast in February 2014. It represents a very rare find for the area and is also significant in terms of its near-completeness, juvenile status, and potential to inspire the public about endangered marine species. This unique project has involved four years of collaboration, working with many people from different sectors which make up Driggsby's 'museum ecosystem'. Most significantly, this included work with the second author in cleaning, conserving, mounting, and installing the specimen. Specialist methods were needed to clean the bones, as the specimen was very fresh. It also involved working with the local community from the outset, in terms of collecting the specimen and then beginning its preparation for display. Tullie House collaborated with the local Carlisle Natural History Society and engaged with museum volunteers. Working with local media has resulted in a plastic-free campaign led by Carlisle City Council. Driggsby's museum ecosystem continues to grow as Tullie House integrates the specimen into work with schools and universities.

Keywords: Fin whale, skeleton, collaboration, conservation, mounting, installation, community, volunteers

Introduction

The discovery of a 12-metre long fin whale *Balaenoptera physalus* (Linnaeus, 1758) carcass on the west Cumbrian coast at Drigg Point near Ravenglass caused quite a stir when the news broke in February 2014, immediately attracting the attention of a local paper (News and Star, 2014). The news quickly reached the attention of staff at Tullie House Museum and Art Gallery (TH) in Carlisle. A campaign began at

the Museum to collect and display the specimen's skeleton, the goal being to create a major museum centrepiece. However, at the time, the full scale of the project and huge logistical challenges involved were not fully appreciated.

The collection, curation, preparation, conservation, and mounting of the specimen (named Driggsby), took almost four years. The project was achieved through collaboration with a number of people from



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different disciplines and sectors. This paper will focus on five particular types of people that TH collaborated with (Figure 1), which broadly charts the most significant chronological episodes of the story: (1) working with the local community in collecting, preparing, and naming the specimen; (2) working with specialist contractors including the conservator, Nigel Larkin (NL) to conserve, mount and install the specimen; (3) working with traditional and social media; (4) working with other museums; (5) working with schools and universities.

In January 2018 the skeleton was installed in the public reception area (Atrium) of Tullie House Museum and Art Gallery (TH) as a major museum centrepiece, to greet and inspire current and future generations of visitors.

Significance of the specimen

Fin whales are the largest extant animal species after the blue whale. The species has a worldwide distribution, and in the northern hemisphere (including the North Atlantic) reaches up to 50 tonnes

in mass (Berta, 2015). Fin whales are regular visitors to British waters. The species is distributed at various localities around the British coast, including the west coast of Scotland (NBN Atlas Partnership, 2017). Sightings are particularly common south of Ireland and in the Western Channel Approaches, where part of the population overwinters and breeds (Reid, Evans and Northridge, 2003), resulting in sightings and strandings of young calves or pregnant females (ibid).

Whale strandings on the West Cumbrian coast, as occurred in this case, (Figure 2) are rare. According to unpublished biological database records (Cumbria Biodiversity Data Centre, 2016) there has only been one other occurrence of a dead fin whale on the Cumbrian coast (Silloth) in the last 100 years, although this represents an underestimate as there is at least one more known from Arnside in 2009 (BBC News, 2009). However, it is almost certain that the 2014 specimen was washed inland from further out, likely during the extreme storms in the winter of 2013/2014 (BBC News, 2013), given the state of

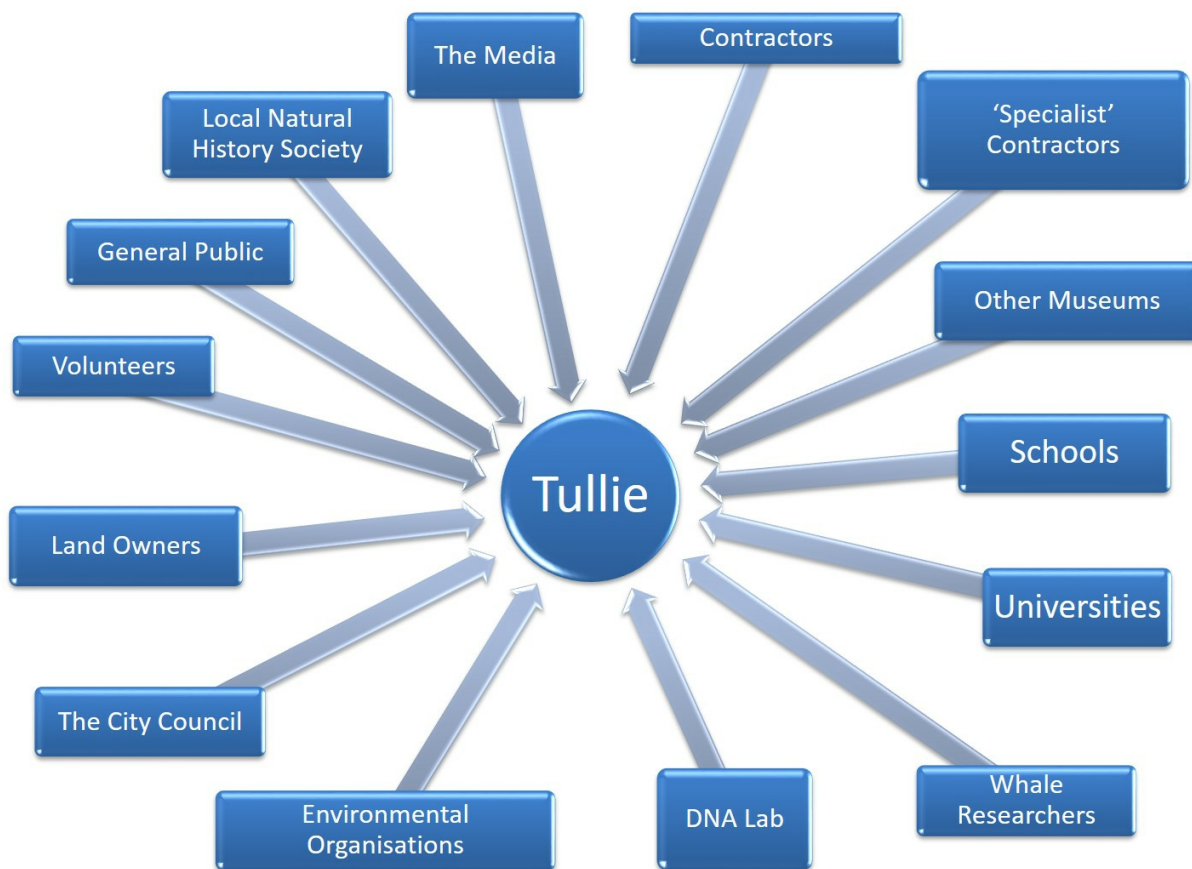


Figure 1. Diagram showing the network of collaboration or 'Museum ecosystem' of the fin whale project at the Tullie House Museum and Art Gallery.

decomposition and loss of colouration which indicates that the specimen had been dead already for a month before it was washed up on the beach (Baxter, 2016).

In the UK, very few fin whale carcasses have been recovered and become museum specimens. Examples include the University of Cambridge Museum of Zoology specimen (from Pevensy, Sussex, 1865), the National Museums Scotland specimen (from the Island of Coll, Scotland, 2004), the National Museum of Ireland specimen (from Bantry Bay, 1802), and seven individuals at the Natural History Museum, London (from the British Isles).

Furthermore, the TH specimen is of scientific significance because it is fairly complete. The specimen also represents a juvenile, and so could potentially provide invaluable information for the study of whale growth, about which very little is known (El Adli, 2016). The extent of fusion in different

parts of the skeleton potentially provides a window into this animal's growth and a single ontogenetic (developmental) stage of the species.

Working with the community

The collection of the skeleton

When the carcass was found in February 2014, a Cumbria Wildlife Trust Conservation Officer undertook a brief examination of the carcass and suggested several possible causes of death, including ingestion of marine litter; the exact cause is still unknown and no autopsy was undertaken. The examination tentatively identified the specimen as a sub-adult sei whale (*Balaenoptera borealis* Lesson 1828). (SJ later sent a sample to the DNA laboratory at Swift Ecology, where it was conclusively identified as a fin whale.) The remains quickly became a tourist attraction, with some people walking 4 km along the beach to see it (Figure 3).



Figure 2. Map showing the location of Drigg Point, West Cumbria, where the specimen was discovered, relative to Tullie House in Carlisle.



Figure 3. The animal as it was discovered in February 2014 on the west Cumbrian coast. Photograph reproduced with permission of Cumbria Wildlife Trust.

A campaign began at the Tullie House Museum to collect the specimen for display. The campaign was initially led by the (then) Curator of Natural Sciences, Stephen Hewitt, who recognised a gap in the collection in terms of cetacean material, and who proposed that a locally provenanced whale skeleton in the central foyer (Atrium) area would make a bold statement about the building as a museum. The Museum and its Trustees got behind the campaign and were very supportive.

From the outset, it was vital to work with the community in order to recover the specimen. Firstly, permission was required from the landowners, Muncaster Estate. Negotiations were facilitated successfully through one of the TH Trustees, Paul Croft, whose involvement paved the way for further discussions. Permission was also required from Copeland District Council and the Marine Management Organisation in order to 'dispose' of the carcass (in this case, remove the skeleton from the beach). As vehicular access was needed along the Drigg Coast, which is a Site of Special Scientific Interest (SSSI), permission was also required from Natural England.

There were also logistical challenges in terms of collecting the skeleton. The Tullie House Museum is very fortunate in having a good relationship with the local natural history society. For 125 years, the Carlisle Natural History Society has held its meetings at the museum. Indeed, the collecting activities and donations of the Society's members underpins the museum's collection and its significance. The Society includes all sorts of different specialists and prominent county recorders. From this expertise, a

team of knowledgeable and keen volunteers was assembled (see *Acknowledgements*).

The negotiations for permissions and planning the logistics took several months, and it was not until 1 August 2014 that the team was able to return to the site to inspect the specimen. The hot summer weather had assisted in the decay of soft tissue, exposing many of the bones. In particular, the skull and vertebrae were now visible.

The team returned two weeks later, on 14 August, to recover the skeleton. However, the whale was nowhere to be seen. The specimen had been transported further around the point into the estuary towards Ravenglass by summer storms, which had also broken up much of the carcass. Some of the bones were subsequently recovered individually, though many of the caudal and lumbar vertebrae were still articulated and attached by tendons and skin. A veneer of soft tissue remained on many of the ribs and vertebrae, though at this stage the carcass was so well decayed that the team did not need to remove any excess flesh.

Unfortunately, due to this disarticulation, some of the bones were now missing. However, about two-thirds of the skeleton was recovered, including: a near-complete cranium with right maxilla, right mandible, hyoid, sternal plate, both scapulae and humeri, one ulna, 43 vertebrae, 15 pairs of ribs, and 14 chevrons. Due to the sub-adult status of the specimen, the epiphyseal discs had not fused to the ends of the vertebral centra and these were collected as separate and scattered elements. Additionally, some of the vertebral neural spines were incomplete, lacking their distal expansions, and some of these were recovered as individual elements. There were no external signs of injury visible, apart from a small, square cut on the left flank. It is likely that the breakages to the bones occurred during their transport across the beach.

Thanks to Society members and friends, TH had access to the resources to collect and start preparing the specimen. This included the use of a pickup truck to collect and transport the bones, and the use of private property at Birkmere Wood, near Penrith, for the preparation of the bones through burial in raised beds of sand and compost. This method was the most economical and practical way to prepare such a large carcass, allowing the soft tissue to decompose through the action of heat, microbes, and invertebrates. The specimen was left for 18 months before being fully excavated.

Enter Driggsby the whale: naming the skeleton

Whilst the specimen was buried, SJ took over leading the project and fundraising began. The original goal was to raise £50,000 (the total cost of the project is now around £86,000). As part of this campaign, TH devised a 'Name the Whale' competition, launched in Spring 2016. For a £1 donation, people could submit their suggestions on an envelope within the outline of a cartoon whale, which could then be posted in the Museum. Many entries were received, including predictable ones such as Moby, and some that were topical of the time, such as Boney McWhaleFace, after 'Boaty McBoatface', the 2016 winner of the popular vote to name a British Antarctic Survey research vessel (Ellis-Petersen, 2016). However, variations on Drigg, after where it was found at Drigg Point, were most popular, and the name Driggsby was selected by a TH panel from the shortlist.

The main purpose of the campaign was to create a sense of ownership of the whale within the local community, and was underpinned by a key objective of the (then) new TH Manifesto (Tullie House Museum and Art Gallery, 2016), to work and co-create with the community. The name Driggsby has fondly been accepted and has become a popular social media hashtag in its own right (#Driggsby). Furthermore, the adoption of the name Driggsby was key to gaining the support of the local Drigg Parish, who provided funding towards the project (via The Drigg Charity Board) and helped to organise work with local schools (see *Working with schools and universities*, below).

Working with volunteers

After the bones had been exhumed and transported back to Tullie House, preliminary cleaning was undertaken to remove the sand and compost which coated the bones after their long burial. Museum volunteers undertook this work (Figure 4). At TH, volunteers are a vital part of the workforce and are involved in a large number of collections projects. The fact that a volunteer team was already in place meant that cleaning could start immediately. In addition, due to the media attention and high profile of the project, it was relatively easy to recruit more volunteers to join the project workforce.

Volunteers can also come from unexpected places. Carlisle Scaffolding built outdoor shelving for the bones. In order to support the project, as a form of in-kind sponsorship, the company were able to provide (at no extra cost) a flatbed truck vehicle in order to

collect the whale from the Penrith wood, and a driver to transport the material and also help with the packing.



Figure 4. Tullie House volunteers cleaning the sand and compost off the whale bones, following their burial for 18 months in a Penrith wood.

In addition to cleaning, the volunteers helped with documentation and photography of the bones. Many of them were university students studying courses such as Zoology and Wildlife and Media. As volunteers they learned about whale anatomy and marine wildlife, thus enriching their studies. During the summer of 2016, 86 hours of volunteer labour were recorded. Without this assistance, the project would have taken months longer.

Working with specialist contractors

It was clear at an early stage of the project that TH would need to work with a specialist conservator to fully clean the bones, mount them, and then install them at the Museum. The Natural Sciences Collections Association mailing list and forum was consulted for recommendations, and Nigel Larkin (NL) was chosen for the project. At the time, in 2016, NL was completing a project to disassemble, clean, conserve, and reinstall the famous 21-metre long adult fin whale skeleton at the University of Cambridge Museum of Zoology (Larkin, 2015).

The whale bones were transported to NL's rented workshop in Shropshire for cleaning, conservation, and mounting. This included removing sand which still covered some bones, particularly the fragile skull elements, using soft brushes, a vacuum cleaner and compressed air (Figure 5), and removing remains of soft tissue, including gristle, with scalpels and tweezers. A more detailed description of the cleaning

and conservation work will be published in a future paper by the authors.

Many of the bones still retained a very bad odour. Some of the vertebrae from the rear half of the skeleton were still quite oily, black, and foul-smelling, with white adipocere on their surfaces. Conventional methods such as using poultices of ethanol and 3% ammonia in water (1:1:1) (e.g. Turner-Walker, 2012) did little to remove the oils or improve the smell or appearance of the bones tested. Discussions with colleagues in the field of natural history conservation led to dialogue with John Ososky, a specialist at the Smithsonian Institution who has successfully cleaned and mounted many whales (Ososky, 2012). Ososky buries his whale bones in elephant dung for weeks or months depending on need. It is not essential that elephant manure is used; the dung of any large herbivore should work (Ososky, 2017), as long as the manure is kept moist or even quite wet. Burial in manure appears to clean bones of oils, fats and adipocere. It is not known if this is through microbial or invertebrate action or high temperature, or a combination of these. This methodology was very successfully applied to the worst-smelling bones of Driggsby, using horse manure (Figure 6) as elephant dung was not available. These included all the caudal and lumbar vertebrae and associated chevrons, the two humeri, the ulna and sternum, amounting to

about 120 pieces of bone as epiphyses were not fused. They were all placed on a deep layer of horse manure within large containers, and covered with another 18 inches of horse manure.

During burial, the temperature at depth was mostly in the 20°C to low 30°C range, with brief periods at around 50°C. After five months, the bones were removed. They were rinsed with water, then soaked in ammonia hydroxide at 4% in water for a minimum of a week to kill any bacteria and reduce the strong odour. The large lidded polypropylene tubs containing the ammonia solution were kept outside and under cover, to reduce risk of ammonia fumes affecting health. Goggles, rubber gloves, and an apron were worn at all times when making up the ammonia solution and when submerging and removing the bones.

At least 17 vertebrae were never recovered from the beach (the number of vertebrae in fin whales varies between 60 and 63 (Gambell, Ridgeway and Harrison, 1985). If all of the missing vertebrae were replicated, the whale would not fit into the tight exhibition space. 13 vertebrae were successfully recreated by NL, by moulding the vertebra adjacent to the gap in each instance and then making Jesmonite acrylic and glass fibre casts, which were painted to match the bones. However, as both of the lower forelimbs were



Figure 5. N. Larkin cleaning the skull of Driggsby (CALMG:2016.70), which is upside-down with the anterior end to the left and the posterior end to the right. The white spots in the middle are patches of adipocere yet to be removed. Adipocere is a greyish waxy substance formed by the decomposition of soft tissue in dead bodies subjected to moisture, and besides being unsightly can stain bones over the long term.



Figure 6. N. Larkin placing some caudal vertebrae and associated epiphyseal discs into a large tub of fresh horse manure to clean them of oils and fats. These were covered with another 18 inches of manure before the lid was replaced.

missing (apart from one ulna), an alternative method of replication was necessary for these elements. The University Cambridge Museum of Zoology fin whale skeleton was being disassembled during the autumn of 2016, just before conservation of Driggsby began, so the complete articulated forelimbs were accessible and permission was kindly given to copy them. Stephen Dey of ThinkSee3D (a 3D printing and photogrammetry company specialising in working with museums) has worked with NL on many osteological and palaeontological projects (Larkin et al., 2016; Lomax et al., 2017) and was available to scan the complete forelimb of the Cambridge specimen using photogrammetry and convert the data to create a detailed 3D digital model. This enabled all the bones of the forelimb below the 'elbow' to be 3D printed at the correct size to match the skeleton of Driggsby, using the preserved ulna as a size guide. The models were made using a 3DS x60 3D Printer with a core powdered material consisting mostly of gypsum. The same methodology was also used to 3D print the missing pelvis bones, also based on those of the Cambridge specimen.

Frequent communication was integral to the success of the project. At the start, this included on-site meetings between NL, the structural engineer (Bingham Yates), and TH staff, to discuss the most appropriate method of installation. An early plan by SJ to suspend the specimen in the centre of the Atrium had to be rejected, as all of the missing bones

could not be recreated within the budget. SJ's alternative proposal was chosen instead: to suspend the right side of the specimen only, in order to conceal the missing left elements (maxilla, mandible, lower forelimb), next to the Atrium wall directly above reception. A decision was reached, using the engineer's advice, to hang the specimen from a beam connected to a central rafter in the ceiling (able to support up to 4 tonnes). We also followed the advice of NL regarding the need to use steel brackets between the skeleton and the wall, to hold the ribs in place and mitigate the sideways torsion of the asymmetrical skull and mandible.

The dynamic curvature seen in the specimen now on display in TH was achieved thanks to collaboration between the authors. In order to achieve a realistic diving pose, SJ first studied photographic material of diving whales available online and existing museum specimens, and ultimately sought the advice of whale experts. Jerry Herman (Senior Curator of Vertebrates at National Museums Scotland) was consulted, and he also recommended whale specialist Christian Ramp, who was able to provide more distinct parameters on what was realistic. SJ then created an authentic and ambitious curvature in a 2D schematic at a 1:20 scale, working with a design company (Vincent and Bell Graphic Design) (Figure 7), after which NL went through the complicated process of recreating it in 3D, in a series of sections. Collaboration with the structural engineer included superimposing an

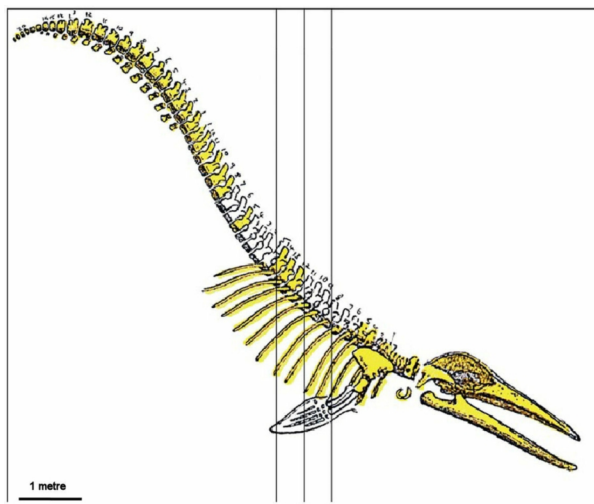


Figure 7. The 2D schematic produced by S. Jackson, which was reproduced in 3D by N. Larkin in his Shropshire workshop.

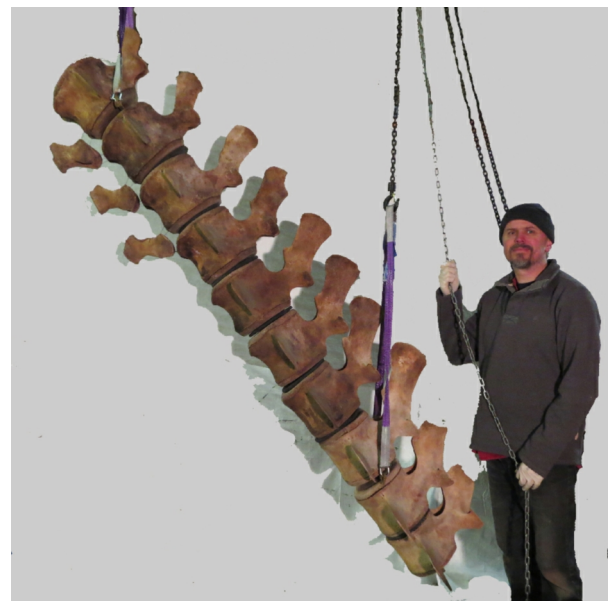


Figure 8. N. Larkin with one of the four sections of the vertebral column, consisting of vertebrae and replica vertebrae mounted on a shaped steel bar, with hanging points welded in place.

outline of the skeleton over the schematic building plans, to ensure that the curved skeleton would fit in the space. There was no room for error in the curvature: the skeleton was 12 metres long when lying flat, and the space in which it was to be installed was only 9.5 m wide. A hollow, square cross-section steel beam was shaped by NL, to follow the curvature envisaged, and was then threaded through a hole (25-50 mm diameter) drilled into the centre of each centrum (Figure 8) using a wide 'spade' drill bit. 50 mm holes were necessary for the front portion of the vertebral column to accommodate the thicker bar that had to take more weight. Towards the rear of the vertebral column, as vertebrae decrease in size, the metal bar required for support and articulation needed to be thinner and therefore increasingly smaller holes were required in the centra (Figure 8).

Working with traditional and social media

During the course of the project, TH was assisted by extensive media coverage. The Cumberland Newsgroup produced six newspaper articles (e.g. News and Star, 2017) after the initial announcement of the discovery. At certain landmarks of the project, a press release was presented to the media and then TH responded to visiting journalists and photographers. The media interest grew from local to regional via BBC Radio Cumbria, and included a visit from a radio presenter in May 2016 to inspect the outside storage of the bones and interview SJ. In May 2016, BBC Look North covered the story, including an interview and also filming the volunteers undertaking some of the preliminary work. Undoubtedly, this helped to maintain their enthusiasm and engagement with the project.

During the second night of the seven-day installation, BBC Look North returned to TH to do an on-site live broadcast. This was excellent footage to promote the project. However, even though it was only a five-minute broadcast, it took about an hour to carefully choreograph the sequence of the footage. This did not present a major delay, but this sort of potential interruption needs to be borne in mind and ideally incorporated into the installation programme.

The media coverage culminated in an announcement by the Carlisle City Council that they were launching a 'Plastic-free Carlisle' campaign (News and Star, 2018a). This followed a News and Star (2018b) interview with SJ, and then a one-to-one discussion between the Leader of the Council, Mr Colin Glover, and SJ in the new Tullie House whale gallery during the January 2018 Driggsby launch event. Mr Glover

was particularly moved by the possibility that Driggsby had been killed by plastic pollution. The Council are pushing to entirely eliminate the use of single-use plastics across all City Council bases and operations, and are urging local businesses and organisations to follow suit. The Council has also had discussions with local environmental charities, who are keen to help with the challenges presented by plastics. Subsequently, Tullie House has promoted this campaign through national events, including Green Great Britain Week.

Social media was used throughout the project. Facebook and Twitter were used in the community competition to name the whale (#namethewhale). Many Twitter posts were also released to coincide with broader hashtags, including #WhaleWednesday. #Driggsby and #Tulliewhale were also used for many posts and were adopted by NL and the 3D printing/scanning company, ThinkSee3D. They have now also been adopted by the general public. The importance of using consistent hashtags was learnt early on in the project, and choosing a name for the specimen helped with this. In the six months leading up to the January 2018 installation, Facebook, Twitter and Instagram were used to build excitement about the project; for instance, a slideshow of NL doing mounting work was created in one Instagram post, which was then automatically posted through Twitter. The greatest interaction with posts (in terms of likes and re-tweets) occurred during the installation week. TH continues to target relevant hashtag events (e.g. #WorldOceansDay (8 June), which is a global celebration of the world's oceans) to promote Driggsby.

Working with other museums

The whale installation was accompanied by a new, small, permanent gallery, exploring the story of Driggsby, whale evolution and whale conservation. The gallery contains a viewing window looking onto the skeleton. Manchester University Museum provided two loans, which included the skull of a minke whale (*Balaenoptera acutorostrata* Lacépède, 1804) and also a cast of the skull of the fossil ancient whale, *Dorudon atrox* Andrews, 1906. These objects greatly strengthen the exhibition: the minke whale skull contains baleen (most of which unfortunately was not recovered with Driggsby) and is a useful resource for school teaching to explain how whales feed (see below). The fossil whale skull is part of the display on the evolution of whales, entitled 'Rise of Driggsby', which explains how whales became

adapted to a completely aquatic existence (for instance, almost completely losing the hindlimbs). It was planned from an early stage in the project to have an associated gallery, and approximately £5,000 was allocated towards this. (It was delivered for £4,500.)

Working with schools and universities

TH has an award-winning schools programme, which worked with over 14,000 children in 2017. Driggsby is a great addition to this programme, because it provides new natural history content with a local connection to the subject. Sessions for Key Stage 1 and 2 have been developed, as well as a workshop for Early Years children focusing on Driggsby, including its life, anatomy, whales in general, and the process we went through to preserve the specimen. These sessions include a series of practical experiments aimed to reproduce the preparation steps undertaken. The sessions, provided for Gosforth and Seascale Primary Schools, aim to promote awareness of how our actions impact the environment, particularly bearing in mind that Driggsby may have been killed by plastic pollution. Subsequently, the children have created a small whale artwork made from plastic, inspired by Driggsby. This work with the schools was set up in direct collaboration with the Drigg Parish, who provided funding towards the delivery of the sessions.

The skeleton has also provided new content for teaching zoology to undergraduate students from the University of Cumbria. One in-house practical session uses TH specimens to investigate adaptations of tetrapod forelimbs. The new whale skeleton increases the range of species present that can be studied and drawn by students, to investigate how the forelimb has evolved to adapt to different ecological niches.

Conclusions

Whilst there are several other whale skeleton displays in the UK, the combination of the conservation challenges we faced with such a fresh specimen, the highly dynamic and ambitious posture of the whale, and the large amount of collaboration with the community and other organisations make this project unique. As such, there are many things we have learnt that can be shared with the wider museum and heritage community.

Working with the local community was vital to the success of the project. Allowing the public to name

the whale created a sense of ownership, whilst helping to raise vital funds for the project. Furthermore, the naming of the whale after its location at Drigg facilitated the financial support of the local Parish (via the Charity Board), who helped to organise Driggsby-based school sessions with local West Coast schools.

One of the TH Trustees paved the way in obtaining permission from the landowners of the Muncaster Estate to access the site. However, it still took several months to complete negotiations with organisations for permission to dispose of the carcass and make preparations to collect the specimen. During this time, the specimen had decayed considerably, causing disarticulation of many elements and the loss of around a third of the skeleton. This demonstrates that such negotiations and logistical planning should ideally be completed within a shorter timeframe. In theory, this would have allowed virtually all of the specimen to be collected and would have significantly reduced costs incurred through replication of missing elements.

The skills and resources of the Carlisle Natural History Society were vital, and without their assistance the project would not have even started. The work of the volunteer team saved a huge amount of Museum staff labour, and they also benefited, gaining knowledge relevant to their university degrees.

Working with specialist contractors, particularly NL, allowed this highly ambitious project to be completed. Many museums do not have in-house conservators and must turn to external expertise; in this case we needed a contractor to undertake the conservation, mounting, and installation of the whale. Good communication between the conservator, engineer, and TH was also vital to the project, including the selection of an appropriate method for suspending the whale. On-site meetings at TH and in the conservation workshop in Shropshire facilitated this communication and ensured that the whale fittings met the specific requirements of the beam.

In an age that can seem dominated by social media, this project has proved that traditional media (local newspapers, radio, and TV) can still be a very powerful vehicle to promote museum work. The Carlisle City Council's 'plastic-free' campaign came about, at least in part, as a result of the project, demonstrating that it had a considerable impact. However, working with the media can be time-

consuming, and this needs to be factored into project planning.

The total project cost approximately £86,000. This covered the conservation, mounting, and installation of the whale and the replication of missing parts. It also included the design and installation of the beam by the structural engineers, the modification of the Atrium including solar films in the windows above, and a cooling air conditioning system. It also included the costs associated with the new whale gallery, including design and printing of panels. Following the discovery of the whale, the total project costs could only be crudely estimated. Unfortunately, as stated previously, one third of the specimen was not collected, which considerably increased the total project costs. This reiterates the importance of the point above in collecting specimens whilst they are complete in order to avoid replication costs.

TH has been able to so far cover about half of these costs through fundraising. This included grants from public funding (Arts Council England (ACE)), local

organisations, a charitable trust and a small amount from the Name the Whale community campaign. The total project cost was also spread over 4 financial years which also helped to plan and absorb the costs. The whale is seen as a long-term investment, and we are striving to cover the remaining costs through increased visitor numbers and secondary spending in the shop; our visitor numbers have increased by 27,109 people in 2018 (comparing 16 January - 13 November 2018 to the same period in 2017). However, there have been other major exhibitions at the museum, making it hard to attribute specific numbers to the success of the whale. We are also using the whale to secure grants from other bodies for related projects. For instance, 'Whale Tales' is a major HLF-funded engagement programme aimed at early years pupils from the West Coast of Cumbria, which will see children, parents and teachers tell the story of Driggsby the Whale through developing their own exhibition, illustrated book, and events programme from February 2019 – June 2020.



Figure 9: The skeleton of the fin whale, Driggsby (CALMG:2016.70), at Tullie House Museum and Art Gallery in Carlisle, Cumbria, UK.

Large vertebrate specimens, known as 'charismatic megafauna', make fantastic displays to inspire the public to care about endangered animals and their natural world. The exhibit raises awareness of issues around whaling and the importance of caring for our environment. The associated interpretation in the TH galleries was greatly strengthened by the loan of Manchester Museum specimens. Driggsby's museum ecosystem continues to grow, as TH is now integrating the skeleton into university and school teaching and, in so doing, inspiring future generations (Figure 9).

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