

## State of the Arch: The recent removal, conservation, 3D scanning and reinstatement of the large 135-year-old 'double' whalebone arch located in The Meadows in Edinburgh, UK.

**Mr Nigel Larkin**, Mr Steven Dey

<sup>1</sup>*School of Biological Sciences, University of Reading, Whiteknights, Reading, RG6 6EX, Reading, United Kingdom*

Edinburgh's famous double whalebone arch comprising four huge bones made from the lower jaws of two very large baleen whales originally formed part of a stand manned by the Shetland and Fair Isle Knitters at the International Exhibition of Science and Art which took place in Edinburgh in 1886. The knitters gifted the arch to the city after the exhibition and it became a well-loved local landmark in 'Jawbone Walk', one of the entrances to the park known as The Meadows. However, after withstanding the Scottish weather for over 130 years without protection but with occasional repairs, they had deteriorated to the point that they were no longer considered safe to walk under. Large areas of bone had rotted away or fallen out, as had some old repairs. The four bones – all about 6 meters long and weighing around a quarter of a ton each - were carefully removed and allowed to dry out, and then were assessed, cleaned, consolidated and repaired with a bespoke lime mortar (including NHL2 lime that would ensure the fills were breathable and relatively flexible). After conservation work was complete each bone was 3D scanned in detail before being given protective coats of casein-infused limewash. The scaled 3D digital models of the bones were particularly useful for designing the new supportive metal armature that will hold the bones securely in place when they are reinstalled. Just as importantly, the digital 3D models will be useful for conservators in the future to assess the degree of degradation of the bones from weathering compared to the point in time when the scans were undertaken, after the conservation work was completed. In due course, these scans could even allow the bones to be replaced with identical replicas to save the original specimens, either by 3D printing them in a suitable medium, or by being cast in bronze. The conservation work had to take into consideration the large volumes of bone loss, how different materials would respond differently to constantly fluctuating environmental conditions and how the bones would be moved and handled, considering their large size and weight.

