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Whale Collections and Exhibitions at the Natural History Museum of the University of Pisa (Italy)

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Abstract: The Natural History Museum of the University of Pisa hosts the most important osteological collection of extant cetaceans in Italy as well as one of the most relevant all over Europe. Furthermore, it also preserves a significant palaeontological collection that includes several holotypes and otherwise unique specimens of Archaeoceti (archaic cetaceans), Mysticeti (baleen whales) and Odontoceti (toothed whales). Here, we provide a historical overview of these collections and the corresponding displays, with special attention paid to the origin, development and design of the 'Archaeocete Hall' and 'Cetacean Gallery'. These comprise what may be the largest exhibition worldwide among those dedicated exclusively to cetaceans—one that includes 28 complete skeletons and one skull belonging to 27 extant species as well as fossils of nine extinct species. Our review also reveals that the museum exhibitions feature the oldest known specimen of *Mesoplodon bowdoini* and the type specimen of *Ziphius savi*, the latter being a validly described species that is currently regarded as a junior synonym of *Ziphius cavirostris*. Also significant is the display of several holotype specimens of fossil species such as the protocetid archaeocete *Aegyptocetus tarfa*, the balaenid baleen whales *Balaena montalionis* and *Balaenula astensis*, and the monodontid *Casatia thermophila*. The Archaeocete Hall and Cetacean Gallery are highly appreciated by visitors as well as perused by the museum's educational team. The online archiving of 3D models of many of the MSNUP specimens on the open-access digital repository Sketchfab and their subsequent dissemination through the Wikimedia platforms has led to the creation of a major osteological resource—one that is broadly accessible to internet users worldwide.

Keywords: Archaeocete Hall; Cetacean Gallery; Archaeoceti; cetacea; mysticeti; odontoceti; online repository; vertebrate palaeontology; *Ziphius savi* Richiardi; 1873; zoology

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1. Introduction

Man's curiosity towards whales and dolphins dates back to the dawn of history. That being said, if it is true that cetaceans were described as early as in the 4th century BC in Aristotle's *Historia animalium* [1] and then in 77–78 AD in Pliny the Elder's *Naturalis historia* [2], research and scientific treatises on these fascinating marine mammals only began to spread during the Renaissance, with the boom of oceanographic explorations and the intensification of whaling.

Frankly speaking, the Renaissance studies on whales are strongly affected by the kind of approach that links science, and in particular zoology, to fantastic imagination, a significant example of which is provided by the Swiss naturalist Conrad Gessner's *Historia animalium* [3]. While recognising the absurdity of many mythical animals, Gessner still described and figured cetaceans with the appearance of sea monsters, and it was only in the

18th century that anatomical studies started to focus on the direct observation of stranded and captured specimens.

The consecration of cetology as a major division of zoology, however, only occurred in the 19th century thanks to a steadily increasing number of studies focusing mainly on anatomy and systematics. The greatest naturalists of the 1800s used to deal both with extant and with extinct cetaceans, thus publishing detailed descriptions of the skeletons of living and fossil taxa that are currently gathered to form rich osteological collections in natural history museums worldwide, and especially in northern Europe.

Among these prominent scholars is the great French naturalist Georges Cuvier, who in his works *Le Règne animal distribué d'après son organisation* [4] and *Recherches sur les ossements fossiles* [5] dealt with the comparative anatomy of different cetaceans, and described new living and fossil species, thus effectively laying the foundations of modern cetology, which was to gain full recognition in the second half of the century with the works of two other great European scientists. Between 1868 and 1880, the Belgian zoologist Pierre-Joseph Van Beneden and the French palaeontologist Paul Gervais published the *Ostéographie des cétacés vivants et fossiles*, an impressive monograph on the skeletal anatomy of living and fossil cetaceans, in which detailed illustrations were provided for dozens of skeletons, most of which are stored in the Muséum national d'Histoire naturelle in Paris [6,7]. Meanwhile, the Englishmen William Henry Flower [8] and John Edward Gray [9] published two important catalogues of the cetacean specimens preserved in the British Museum in London.

On the occasion of the 120th anniversary of the death of Sebastiano Richiardi (b. 1834–d. 1904), who may be regarded as the father of the extant cetological collection of the Natural History Museum of the University of Pisa (=Museo di Storia Naturale dell'Università di Pisa; hereinafter, MSNUP), and the 10th anniversary of the death of Luigi Cagnolaro (b. 1934–d. 2014), who is rightly considered the founder of modern cetology in Italy, the present paper sketches the history of the MSNUP cetological collection and exhibitions, with special attention paid to the present-day 'Archaeocete Hall' and 'Cetacean Gallery'. In doing so, the many singularities and the unique evolutionary rationale behind these scientifically remarkable exhibitions are explained and discussed.

2. The Cetacean Collections of MSNUP

2.1. The Extant Cetaceans

The interest in acquiring skeletons of extant cetaceans dates back to the early days of the MSNUP. In fact, the oldest evidence for the presence of cetaceans in the MSNUP collection can be found in the *Inventario della Galleria e del Giardino de' Semplici di Sua Altezza Serenissima in Pisa* drawn up by Fra' Matteo Pandolfini on 16 July 1626, where remains of at least two skeletons (probably a sperm whale and a baleen whale) are mentioned, which unfortunately are no longer present in the collection [10,11].

The oldest cetacean specimens still preserved in the MSNUP are the incomplete skeleton of a fin whale (*Balaenoptera physalus*) (Figure 1C) and the tooth-bearing mandibles of a sperm whale (*Physeter macrocephalus*) (Figure 1B) that were donated to the Grand Duke Cosimo III de' Medici in 1713 and 1714, respectively [12]. Both specimens derive from strandings that occurred in Populonia (Leghorn Province, central Italy). The presence of these skeletons in the MSNUP was reported as early as in 1723 by the then-director Michelangelo Tilli (b. 1655–d. 1740) in his *Catalogus Plantarum Horti Pisani*. Indeed, Tilli [13] sketchily figured cetacean bones in the map of the Botanic Garden of the University of Pisa (Figure 1A), and wrote the following about the sperm whale remains from Populonia:

Physeteris ossa ex dentium structura ea esse judico, quae in hujus Horti Pisani aditu reperiuntur, et fortasse sunt eadem, quae olim Florentiae, postea huc…

[From the structure of the teeth, I judge that the bones that are found at the entrance of this Garden in Pisa belong to a sperm whale, and perhaps they are the same that were already in Florence, and have since been brought here...]

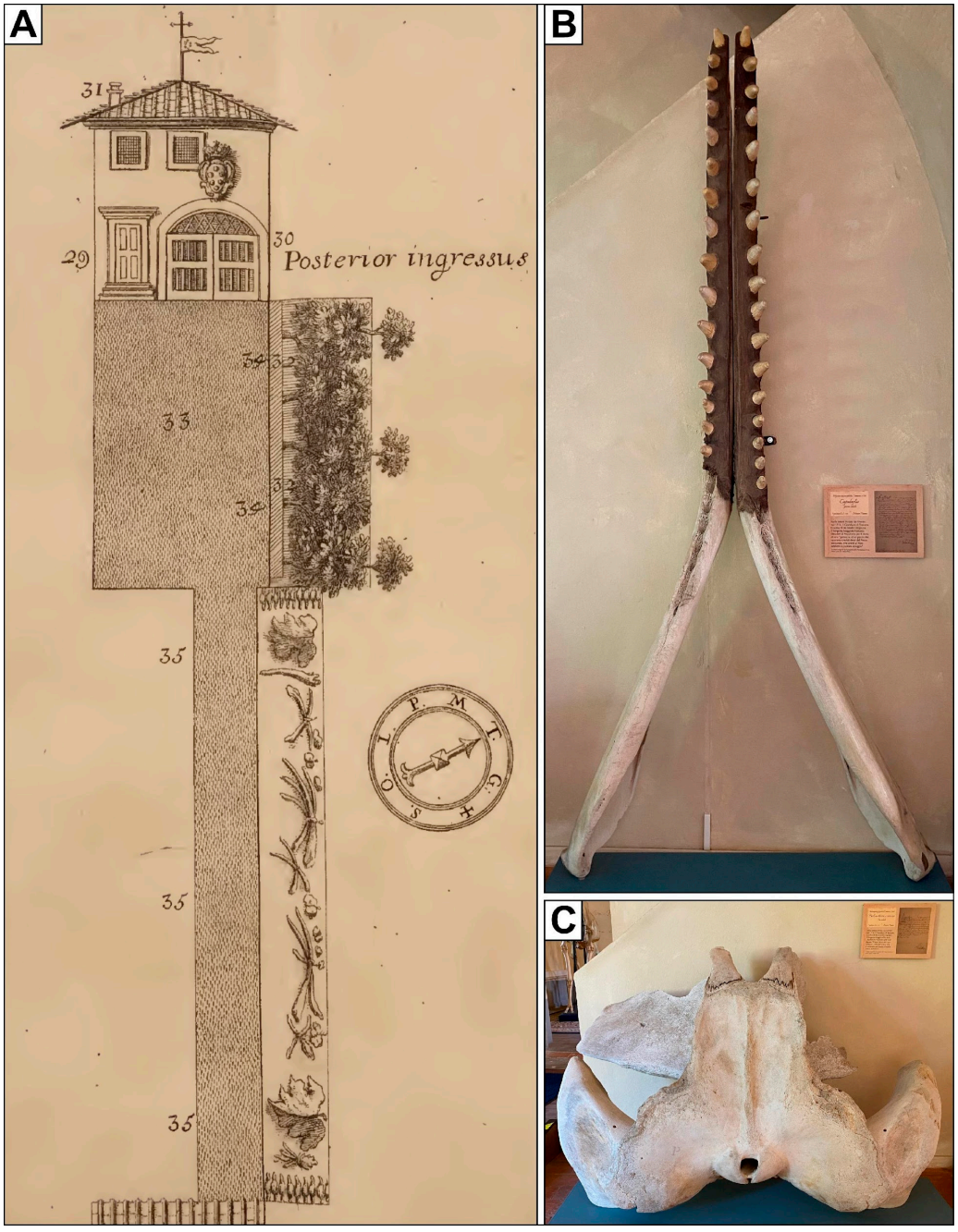

Figure 1. (**A**) Excerpt from the map of the Botanic Garden of the University of Pisa published in the *Catalogus Plantarum Horti Pisani* [13]. Several cetacean bones are sketchily represented along the east side of the path connecting the main and posterior entrances of the Garden. (**B**) Mandibles of the *Physeter macrocephalus* skeleton donated by the Grand Duke Cosimo III in 1714, which are now on display in the Historical Gallery of the MSNUP (other bones of the same skeleton are lost). (**C**) Neurocranium of the *Balaenoptera physalus* skeleton donated by the Grand Duke Cosimo III in 1713, which is now on display in the Historical Gallery of the MSNUP (other bones of the same skeleton are stored in the MSNUP deposit).

During Paolo Savi's direction (1823–1871), the cetological collection of the MSNUP gained some new specimens, so that when Savi's successor Sebastiano Richiardi began his direction (1871–1904) eight skeletons were kept in the MSNUP besides the aforementioned sperm and fin whale remains. According to Richiardi [14], these additional eight skeletons included two fin whales, a bottlenose dolphin (*Tursiops truncatus*), a common dolphin (*Delphinus delphis*), a pilot whale (*Globicephala melas*), a Cuvier's beaked whale (*Ziphius cavirostris*), a beluga (*Delphinapterus leuca*), and an isolated narwhal tusk (*Monodon monoceros*). Except for the two fin whales, all these specimens had already been mentioned by Van Beneden [15]; nowadays, only the pilot whale, the beaked whale and one of the fin whale skeletons are still part of the MSNUP collections [11].

It was Richiardi who had the enormous merit of substantially enriching the MSNUP cetacean collection so much so that at Richiardi's death it was already close numerically to the present one. Indeed, Richiardi aimed at creating a cetological collection that brought together at least one specimen of every living genus. Richiardi's aim was not only purely collectible but also conservational, as he was particularly willing to acquire specimens of species threatened with extinction due to unbridled whaling [16]. To carry out this ambitious project, he exchanged materials with various museums and scientific institutions worldwide, bought several skeletons from private companies, and ordered the collection of cetacean carcasses stranded along the coasts of Italy and Northern Europe. For example, Richiardi bought most of the largest cetacean skeletons, including those of the blue whale (*Balaenoptera musculus*), fin whale, humpback whale (*Megaptera novaeangliae*), sei whale (*Balaenoptera borealis*) and North Atlantic right whale (*Eubalaena glacialis*), from the University Museum of Bergen (a hub for the redistribution of cetacean specimens all over Europe; [17]). In turn, Richiardi purchased the skeletons of a narwhal and an Irrawaddy dolphin (*Orcaella brevirostris*) from the private company Gerrard & Sons in London, whereas the skeletons of a northern bottlenose whale (*Hyperoodon ampullatus*), a killer whale (*Orcinus orca*) and a Ganges river dolphin (*Platanista gangetica*) were bought from the private company of Gustav Adolph Frank in London [11]. Among the skeletons from stranded carcasses gathered by Richiardi, that of a sperm whale from Otranto (Lecce Province, southern Italy) deserves a special mention.

After Richardi's death in 1904, the extant cetological collection of the MSNUP was implemented with a few specimens originating from animals stranded along the Italian coasts. Nowadays, the osteological collection of extant cetaceans of the MSNUP is the most important countrywide [18,19], with as many as seven species being found nowhere else as far as Italian museums are concerned. These include the blue whale, sei whale, Hector's dolphin (*Cephalorhynchus hectori*), white-beaked dolphin (*Lagenorhynchus albirostris*), Indo-Pacific finless porpoise (*Neophocaena phocaenoides*), Andrews' beaked whale (*Mesoplodon bowdoini*) and northern bottlenose whale, all of which are represented by complete skeletons at the MSNUP.

2.2. The Fossil Cetaceans

The collection of fossil cetaceans of the MSNUP originated in the second half of the 19th century. The first fossil cetacean acquired by the MSNUP may have been the baleen whale skull recovered near Montaione (Florence Province, central Italy) in 1871, purchased by the palaeontologist Charles Immanuel Forsyth Major (b. 1943–d. 1923), and eventually donated to the MSNUP in 1874. Thirty years later, this important find was described by Capellini [20] as the holotype of the then-new species *Balaena montalionis* (Figure 2B).

In the same years, the MSNUP received significant donations of fossil cetaceans from Roberto Lawley (b. 1818–d. 1881), a remarkable avocational palaeontologist [21] who collected and studied fossil vertebrates (especially sharks) from various Pliocene localities of Tuscany, central Italy [22,23]. The Lawley collection of the MSNUP includes a mysticete mandible from the Pliocene of Orciano Pisano (Pisa Province), which was certainly stored in the museum as early as 1876 (Figure 2A). This is demonstrated by the work by Trevisan [24], where a letter dated 5 April 1876 from the MSNUP's archive is

mentioned, in which Giovanni Capellini provided information on this fossil to the then-director of the MSNUP, Mario Canavari. The Lawley collection also includes other cetacean remains from the Pliocene of Orciano Pisano that came to be part of the MSNUP as the result of a donation occurring in 1884, and specifically a dolphin skeleton that was first described as '*Steno bellardii* Portis' by Ugolini [25] and then referred to *Etruridelphis giulii* by Bianucci et al. [26].

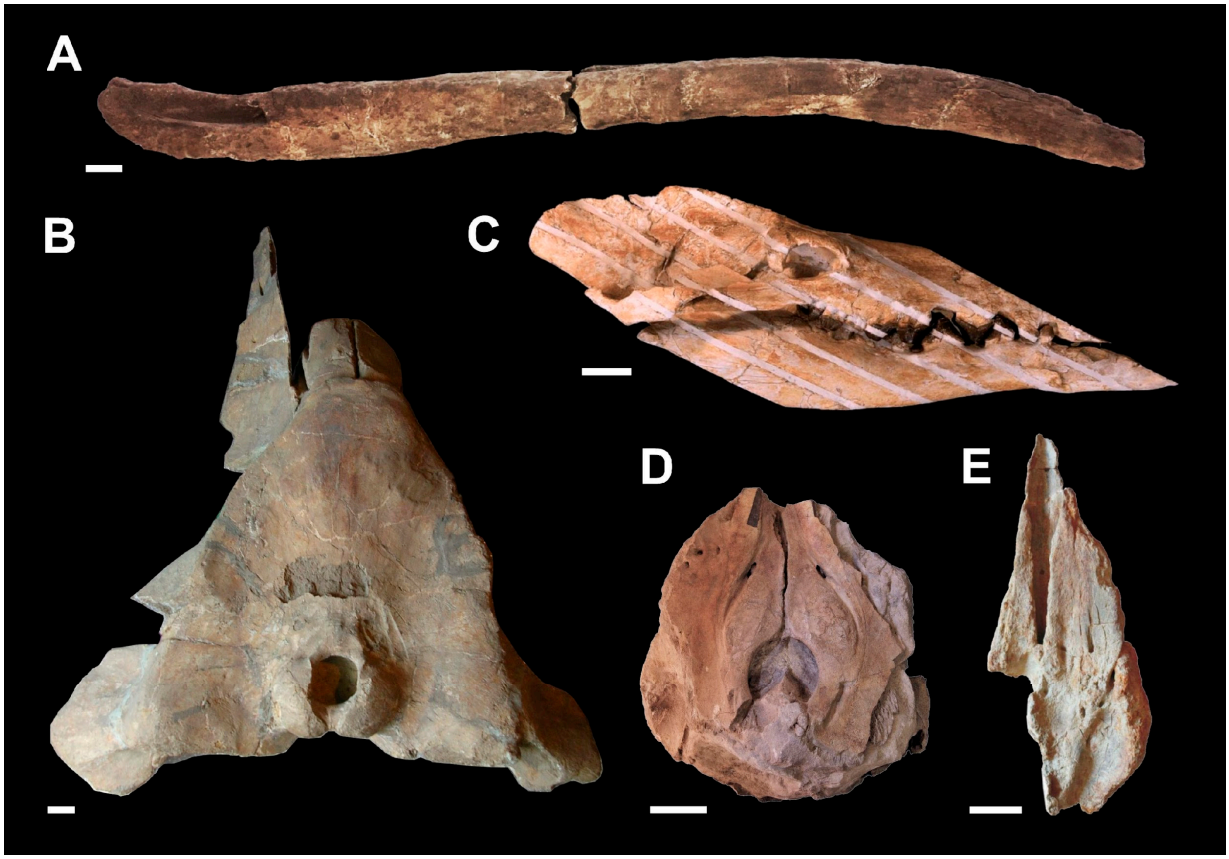

Figure 2. (**A**) Medial view of the mandible of *Balaenula* sp. from the Pliocene of Orciano Pisano (Tuscany, Italy). (**B**) Dorsal view of the cranium of the holotype of *Balaena montalionis* from the Pliocene of Montaione (Tuscany, Italy). (**C**) Lateral view of the skull of the holotype of *Aegyptocetus tarfa* from the Eocene of Wadi Tarfa (Egypt). The striped aspect of the skull is due to its peculiar preservation (it was re-assembled from six saw-cut limestone slabs). (**D**) Dorsal view of the cranium of the holotype of *Casatia termophila* from the Pliocene of Arcille (Tuscany, Italy). (**E**) Dorsal view of the cranium of the holotype of *Pliokogia apenninica* from the Pliocene of Sant'Andrea Bagni (Emilia Romagna, Italy). Scale bars equal 5 cm. All the figured specimens belong to the MSNUP collection.

Between the end of the 19th century and the beginning of the 20th century, Canavari purchased several other fossils of marine vertebrates collected by Antonio Di Paco (a "well-known fossil hunter"; Ugolini [27]) at Orciano Pisano. These fossils, which are still found in the MSNUP collections, include fragmentary mysticete and delphinid remains that were subsequently described by Fucini [28] and Ugolini [27]. Especially important are some odontocete ear bones acquired by the museum in 1896; these were referred to as '*Dioplodon* sp.' by Ugolini [29] and then assigned to the genus *Kogia* by Pilleri [30] and Bianucci [31].

In the first decades of the 20th century, the MSNUP did not acquire significant cetacean fossils, but in 1940 an exceptionally well-preserved baleen whale skull from the Pliocene of Portacomaro d'Asti (Asti Province, northern Italy) was donated to the MSNUP. This significant specimen was described by Trevisan [32] as the holotype of the new species *Balaenula astensis*.

At the beginning of the 1960s, many fragmentary, as yet undescribed remains of both mysticetes and odontocetes from the Miocene Arenarie di Ponsano Formation (Pisa Province) were collected and deposited in the MSNUP [33].

Towards the end of the same decade, Angelo Varola (b. 1939–d. 2019) collected and deposited in the MSNUP several cetacean specimens from the Miocene Pietra Leccese formation (Lecce Province). This material includes a mandibular fragment as well as an isolated tooth referred to as the physeteroid '*Scaldicetus grandis*' by Menesini and Tavani [34]. Many other cetacean fossils were collected in the 1980s–1990s from the Pietra Leccese thanks to the long-lasting collaboration between Varola and the palaeontologists of the University of Pisa. Some such remains were still embedded in limestone when deposited in the MSNUP. Furthermore, a handful of copies of specimens that had already been prepared and published were also deposited in the MSNUP by Varola. Some of the entombed fossils have recently been prepared and studied in detail, including two partial skeletons of physeteroids, one of which was described as the holotype of the new genus and species *Angelocetus cursiensis* [35,36]. The collaboration with Varola also led to the recovery of the almost complete, as yet undescribed skeleton of a Pleistocene dolphin that was found in 2005 in a quarry at Cutrofiano (Lecce Province) and may represent a new genus and species of Delphinidae.

In 1995, the MSNUP recovered a fragmentary Pliocene baleen whale skeleton at a clay pit near Empoli (Florence Province) [37].

Other fragmentary remains of cetaceans preserved in the MSNUP come from field trips conducted in Ecuador from 1987 to 2004 by the palaeontologists of the University of Pisa. These fossils were collected from Mio-Pleistocene deposits exposed in the Esmeraldas [38] and Manta [39] provinces.

In 2002, the MSNUP received reports of presumed "dinosaur" bones visibly preserved in six slabs of nummulitic limestone (a commercial stone) from Egypt. Actually, the bones belong to an archaeocete, of which the skull and parts of the vertebral column and rib cage are preserved. The MSNUP acquired the six slabs and, after a long-lasting preparation, the skeleton was cleaned completely of the hard entombing sediment. Thus, the Egyptian archaeocete was finally studied, and became the holotype of the new genus and species *Aegyptocetus tarfa* [40] (Figure 2C).

The most recent acquisitions of fossil cetaceans made by the MSNUP include the holotype skull of the new monodontid genus and species *Casatia termophila* (Figure 2D), a fragmentary referred skeleton from the Pliocene sands of the Arcille quarry (Grosseto Province, central Italy) [41,42], and the holotype skull of the new kogiid genus and species *Pliokogia apenninica* from the Pliocene of Sant'Andrea dei Bagni (Parma Province, northern Italy) [43] (Figure 2E).

In addition to the aforementioned casts of specimens from the Pietra leccese formation, the MSNUP keeps other casts of fossil cetaceans that were acquired over the years, including: the holotype skulls of the Pliocene delphinids *Hemisyntrachelus cortesi* [44] and *H. pisanus* [45], coming respectively from Colle della Terrazza (Piacenza Province, northern Italy) and Orciano Pisano; a fragmentary rostrum with teeth of *Squalodon* sp. from the Lower Miocene of the Montagna della Majella [46]; and the partial skeleton of *Brachydelphis mazeasi* from the Late Miocene of the Pisco Basin (Peru) [47,48]. Finally, the MSNUP collection also includes the casts of some teeth of the holotype of *Livyatan melvillei* [49] as well as a full-size reconstruction of the skull of this giant extinct sperm whale from the Late Miocene of the Pisco Basin.

3. History and Description of the Cetacean Exhibitions of MSNUP

The most important cetacean specimens pertaining to both the zoological and palaeontological collections of the MSNUP are exhibited in the so-called Archaeocete Hall and Cetacean Gallery (Table 1), the former being located immediately before the latter, of which it represents the natural introduction. Other relevant specimens, including a mandible of the diminutive balaenid *Balaenula* [32] and an incomplete forelimb described by Ugolini [27]

from the historical locality of Orciano Pisano, are on display in the 'Gallery of Geological Eras' (see Collareta et al. [50] for a detailed overview thereof), whereas the oldest extant specimens among those that are found in the present-day collections of the MSNUP (namely, the fin whale and sperm whale specimens recorded by Targioni Tozzetti [12]) are exhibited in the museum's 'Historical Gallery'. In the following, the past and present of the two major cetacean exhibitions of the MSNUP are summarised, and their scientific and museological relevance is briefly discussed.

Table 1. Specimens on display in the present-day Cetacean Gallery. Specimens and taxa added to the exhibitions after the 2015–2018 renewal are highlighted in bold. Although Braschi et al. [51] mentioned the presence of the sei whale (*Balaenoptera acutorostrata*) skull in the then-assembling first Cetacean Gallery, no parts of this specimen were on display when the exhibition opened in 1992. The skeleton of the striped dolphin (*Stenella coeruloalba*) is on display in the Archaeocete Hall. Binomial names of extant species are according to the Committee on Taxonomy [52].

COMPLETE MOUNTED SKELETONS	**Catalogue Number**
ODONTOCETI	
Cephalorhynchus hectori (Van Beneden, 1881) [53]—Hector's dolphin	MSNUP C-292
Delphinapterus leucas (Pallas, 1776) [54]—Beluga whale (two skeletons)	**MSNUP C-276**; C-277
Delphinus delphis Linnaeus, 1758 [55]—Common dolphin	MSNUP C-286
Globicephala melas (Traill, 1809) [56]—Long-finned pilot whale	MSNUP C-302
Grampus griseus (Cuvier, 1812) [57]—Risso's dolphin	MSNUP C-295
Hyperoodon ampullatus (Forster in Kalm, 1770) [58]—Northern bottlenose whale	MSNUP C-268
Lagenorhynchus acutus (Gray, 1828) [59]—Atlantic white-sided dolphin	MSNUP C-290
Lagenorhynchus albirostris (Gray, 1846) [60]—White-beaked dolphin	MSNUP C-291
Mesoplodon bowdoini Andrews, 1908 [61]—Andrew's beaked whale	MSNUP C-269
Monodon monoceros Linnaeus, 1758 [55]—Narwhal (two skeletons)	MSNUP C-274; **C-275**
Neophocaena phocaenoides (Cuvier, 1829) [62]—Indo-Pacific finless porpoise	MSNUP C-279
Orcaella brevirostris (Owen in Gray, 1866) [9]—Irrawaddy dolphin	MSNUP C-293
Orcinus orca (Linnaeus, 1758) [55]—Killer whale	MSNUP C-301
Phocoena phocoena (Linnaeus, 1758) [55]—Harbor porpoise	MSNUP C-278
Physeter macrocephalus Linnaeus, 1758 [55]—Sperm whale	MSNUP C-266
Platanista gangetica (Lebeck, 1801) [63]—Ganges river dolphin	MSNUP C-272
Pontoporia blainvillei (Gervais and d'Orbigny, 1844) [64]—Franciscana	MSNUP C-273
Tursiops truncatus (Montagu, 1821) [65]—Common bottlenose dolphin	MSNUP C-281
Ziphius cavirostris Cuvier, 1823 [5]—Cuvier's beaked whale	MSNUP C-270
MYSTICETI	
Balaenoptera acutorostrata Lacépède, 1804 [66]—Common minke whale	MSNUP C-260
***Balaenoptera borealis* Lesson, 1828** [67]—**Sei whale**	**MSNUP C-262**
Balaenoptera musculus (Linnaeus, 1758) [55]—Blue whale	MSNUP C-250
Balaenoptera physalus (Linnaeus, 1758) [55]—Fin whale	MSNUP C-251
Megaptera novaeangliae (Borowski, 1781) [68]—Humpback whale	MSNUP C-263
Eubalaena glacialis (Müller, 1776) [69]—North Atlantic right whale	MSNUP C-264
SKULL	
ODONTOCETI	
Pseudorca crassidens (Owen, 1846) [70]—False killer whale	MSNUP C-300
BALEEN	
MYSTICETI	
Eubalaena glacialis (Müller, 1776) [69]—North Atlantic right whale	MSNUP C-2764

Table 1. *Cont.*

COMPLETE MOUNTED SKELETONS	Catalogue Number
FOSSILS SKELETONS	
ODONTOCETI	
***Brachydelphis mazeasi* Muizon, 1988 [71] (cast of a partial skeleton)**	**MUSM I-17135**
***Casatia thermophila* Bianucci et al., 2019 [41] (holotype skull)**	**MSNUP I-17602**
***Hemisyntrachelus cortesii* (Fischer, 1829) [72] (cast of the holotype skull)**	**MSNUP I-16836**
***Livyatan melvillei* Lambert et al., 2010 [49] (reconstruction of the holotype skull)**	**MSNUP I-17140**
***Livyatan melvillei* Lambert et al., 2010 [49] (cast of one tooth of the holotype)**	**MSNUP I-16829**
***Messapicetus longirostris* Bianucci et al., 1992 [73] (cast of the holotype skull)**	**MSNUP I-16832**
***Zygophyseter varolai* Bianucci and Landini, 2006 [74] (cast of the holotype skull)**	**MSNUP I-16828**
Undescribed Pleistocene delphinid (almost complete skeleton)	**MUSM I-17134**
MYSTICETI	
***Balaena montalionis* Capellini, 1904 [20] (holotype skull)**	**MSNUP I-12357**
***Balaenula astensis* Trevisan, 1941 [32] (holotype skull)**	**MSNUP I-12555**

3.1. The First Cetacean Gallery

The cetacean osteological collection of the University of Pisa was originally housed in the town centre of Pisa, in a large shed that was built during Richiardi's direction, in 1900. This shed was found in the Pisa city centre, adjacent to the Botanic Garden; here, the largest cetacean skeletons were hanged from the ceiling (Figure 3A). The collection remained there for most of the 20th century, except for a short stay in the friary of S. Croce in Fossabanda in Pisa, until it was transferred to the Charterhouse of Pisa, in the Calci village (ca. 10 km from Pisa), together with the largest majority of the naturalistic collections of the University. This ambitious project of setting up a "Museo di Storia Naturale e del Territorio" was strongly supported by Ezio Tongiorgi (b. 1912–d. 1987), who acted as the (new) museum's first director and personally supervised the transfer of the specimens.

With the scientific supervision of the Italian cetologist Luigi Cagnolaro, most of the whale skeletons were set up during the direction of Marco Franzini (b. 1938–d. 2010), the successor of Ezio Tongiorgi from 1986 to 1996, in the more-than-100 m-long 'Cetacean Gallery'. The latter was originally the monastic barn, made of brick columns and a roof with wooden beams ad terracotta tiles, used by the monks as a drying place for their crops, as well as a place for their "spatiamentum" (an extended walk performed by the Carthusians as a weekly routine to spend some time together and talk freely) in case of bad weather (Figure 3B). Originally open on both long sides, the barn was closed with glass walls to protect the skeletons and retain the original setting of the building as well as the splendid landscape view on the surrounding valley (Valgraziosa). Transporting and assembling the cetacean skeletons, many of which were huge and heavy, took several years of work [51,75]. The Cetacean Gallery was finally inaugurated in 1992, and remained substantially unchanged for more than twenty years. Here, the giant skeletons acquired by Richiardi found their eventual collocation, one that provides the visitors with the opportunity to be admired in all their majesty in the unique setting of the ancient barn of the Charterhouse.

This first Cetacean Gallery included 23 mounted complete skeletons and two skulls (Table 1) [51]. The skeleton of *Mesoplodon bowdoini* and the baleen of a newborn of *B. physalus* were also added to the exhibition shortly after the inauguration.

The old Cetacean Gallery followed a systematic criterion, with the skeletons of the odontocetes being encountered by the visitors before those of the mysticetes. The smallest skeletons, including those of several odontocete taxa, were mounted on panels and metal structures along the sides of the gallery (Figure 4A), while the larger skeletons (including all the mysticetes, plus the odontocetes *Hyperoodon ampullatus*, *Mesoplodon bowdoini*, *Monodon monoceros*, *Physeter macrocephalus* and *Ziphius cavirostris*) were mounted partly by using their original supports and partly by building robust iron structures to support the heavy

bones (Figure 4B). The explanatory panels were limited to simple captions associated with each specimen, wherein basic information (common and scientific names, and geographic range of occurrence) was reported for each species.

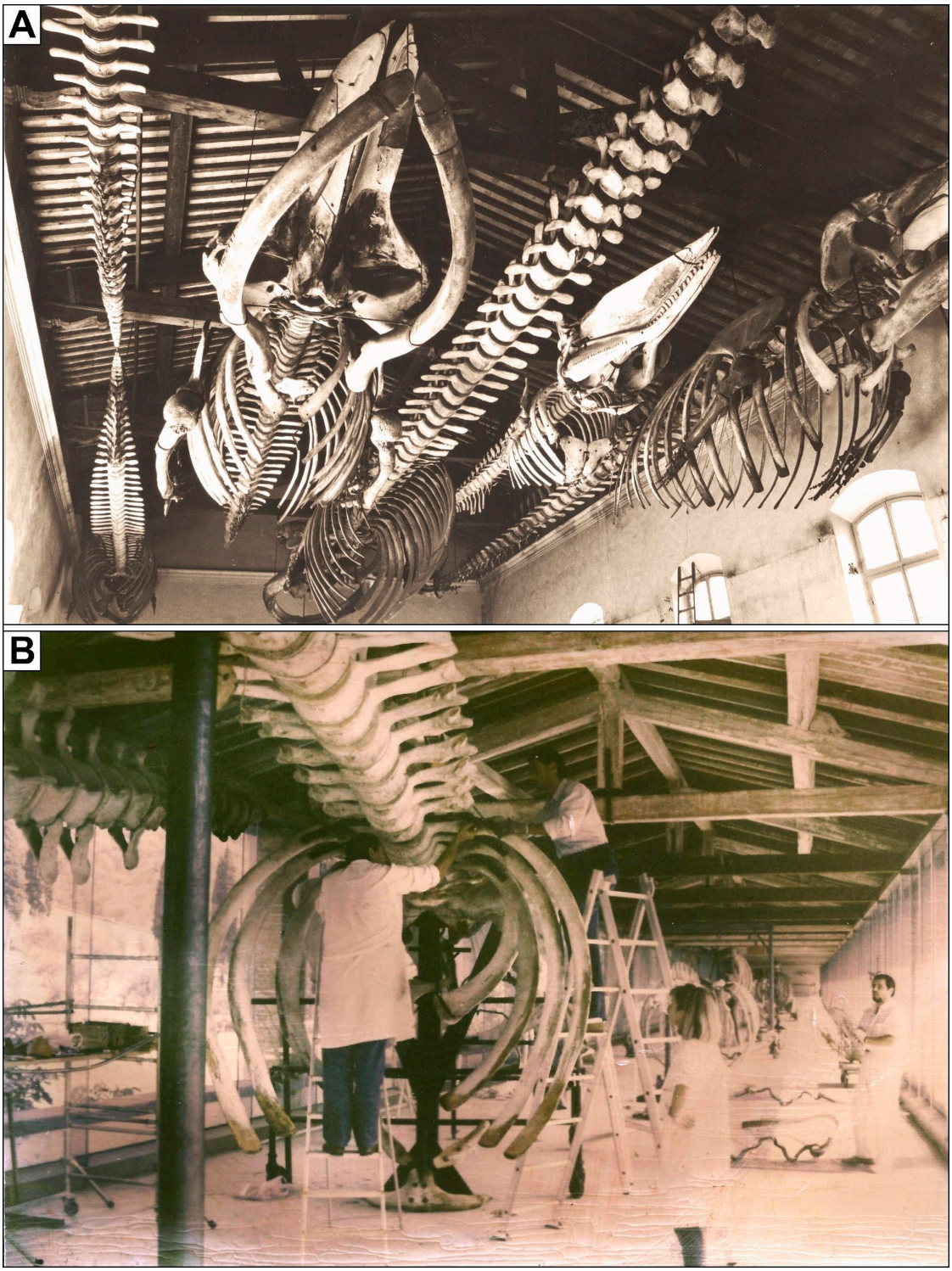

Figure 3. (**A**) Historical photo showing large skeletons hanging from the ceiling, taken in the early 1970s, when the osteological cetacean collection of the University of Pisa was located in a building adjacent to the Botanic Garden. (**B**) Historical photo documenting the mounting of the large fin whale skeleton during the assembly of the first Cetacean Gallery (1988–1990).

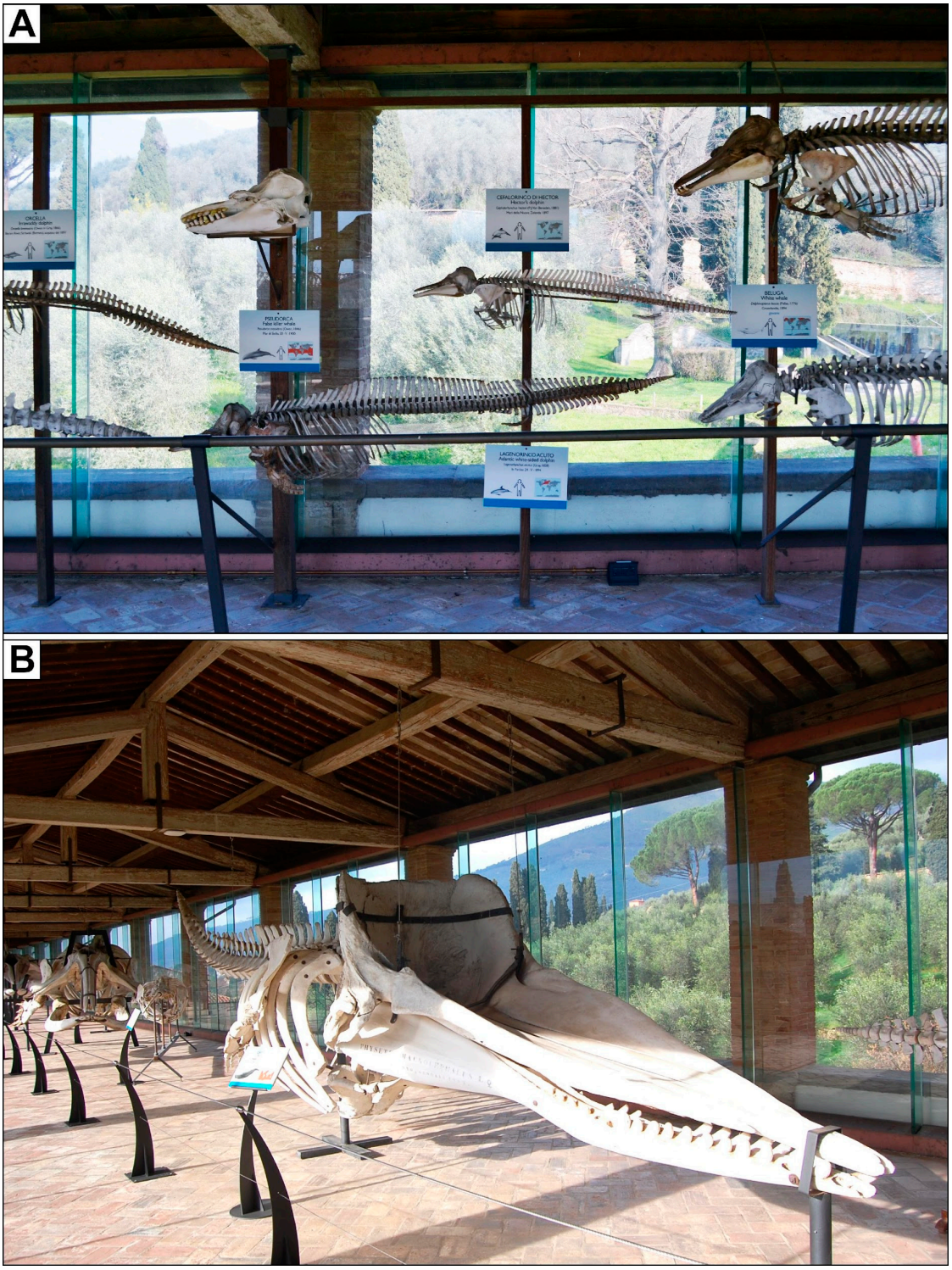

Figure 4. The first Cetacean Gallery. (**A**) Part of the exhibition that was dedicated to the small and medium-sized toothed whales. (**B**) Part of the exhibition that was dedicated to the large whales, with the sperm whale skeleton in the foreground.

3.2. The Archaeocete Hall

Inaugurated in December 2010, the Archaeocete Hall builds upon the principles of universal design in an attempt to prove accessible and captivating for children, adults, the elderly and disabled users, with particular attention being paid to the needs of the visually impaired and blind. The path is thus linear and develops on only one side of a long

room where a handrail guides the visitors to explore the large touchable exhibition, which involves the senses of sight, touch and hearing. All along the platform, the presence of items to touch or audio sources to activate is highlighted by tactile signs. The room is divided by short stairs into three areas located at different levels. The exhibition was designed to associate each of these levels with three distinct phases of the cetaceans' evolutionary transition from land to sea (Figure 5A).

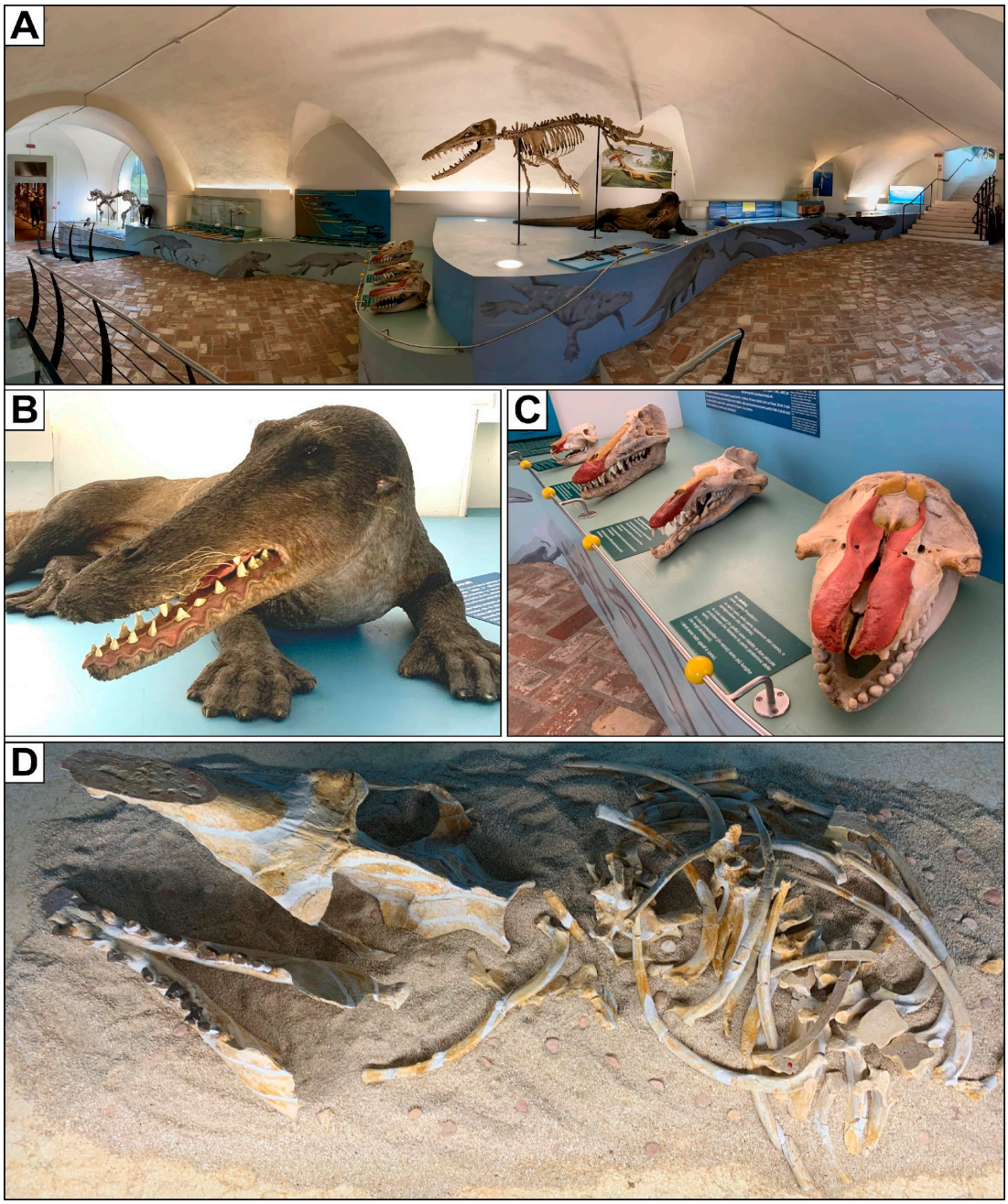

Figure 5. The Archaeocete Hall. (**A**) Overview of the exhibition. (**B**) Life-size reconstruction of *Ambulocetus natans*. (**C**) Comparative display of artiodactyl and cetacean (archaeocete and neocete) skulls, highlighting the progressive osteological adaptations to an aquatic lifestyle. (**D**) Holotype skeleton of *Aegyptocetus tarfa*, shown in the same position in which the carcass of this ancient whale deposited on the Eocene seabed.

The lower level deals with the issues of cetacean ancestry, and compares different hypotheses on the cetacean origins by exhibiting a life-size reconstruction of the Eocene artiodactyl *Indohyus* and an original mounted skeleton of *Hippopotamus* '*tiberinus*', a fossil relative of the extant hippos that lived in Italy during the Pleistocene. Between the lower and intermediate levels is a life-size reconstruction of *Pakicetus*, which at ~50 Ma is one of the geologically oldest cetaceans as well as one that walked on land with a quadrupedal gait [76]. At the intermediate level, the transformation of cetaceans from four-legged animals to fish-like swimmers is illustrated by direct comparisons between various anatomical structures (skulls, limbs and tails) in a terrestrial mammal, an archaic cetacean and a modern cetacean (Figure 5C). At the upper level, the first 'attractions' are a cast of the skeleton of *Ambulocetus* [77,78] and the life-size reconstruction of this amphibian, crocodile-like archaeocete (Figure 5B). That said, the most important element of the entire exhibition is certainly the original holotype skeleton of the Eocene protocetid *Aegyptocetus tarfa*, which is exposed in the same position in which the carcass of this ancient whale deposited on the seabed and was buried by sediment 40 million years ago [40] (Figure 5D).

3.3. The Present-Day Cetacean Gallery

In 2015, the Cetacean Gallery began to be renewed with the purpose of updating the display and including several skeletons that were still stored in the MSNUP's deposit. Even without moving the largest skeletons, whose position had to fulfil precise static requirements, the entire exhibition was revised, and its aspect completely changed.

The main goal of the project for the new Cetacean Gallery was to better integrate it with the Archaeocete Hall along the exhibition route. Thus, a large panel with an introductory artistic illustration was placed on the wall that the visitors see while coming from the underlying Archaeocete Hall. Here, the radiation of the two lineages of modern cetaceans (i.e., Neoceti; [79]) is schematically represented, along with some artistic reconstructions of fossil and extant cetaceans, by toothed whales (Odontoceti) on the left side of the panel, and by baleen whales (Mysticeti) on the right, both starting from a derived archaeocete (Basilosauridae) at the bottom centre of the panel. Two monitors running supporting videos are also integral to the panel (Figure 6A).

The Cetacean Gallery is organised around eight distinct thematic areas that follow one another along the gallery. Most thematic areas feature the skeletons of both extant and extinct cetaceans: the main aim here is to highlight common characters in distinct groups of skeletons/species that may be related to similar adaptive-evolutionary drivers. On the one hand, the integration of extant and fossil species in the same exhibition makes some adaptive characters of the extant species more comprehensible (for example, the peculiar cranial morphology and dentition of the extant sperm whale are best explained in terms of differences from those of the Miocene ancestors of *Physeter*, namely *Livyatan* and *Zygophyseter*).

On the other hand, it makes the often-incomplete fossil specimens more readable thanks to the immediate comparison with similar, complete skeletons (including, e.g., the fossil skull of *Balaenula astensis*, which is best understood in parallel with the skeleton of its extant relative, the North Atlantic right whale). More generally, the presence of fossil specimens alongside their extant relatives helps to better integrate the Cetacean Gallery and the contiguous Archaeocete Hall. In light of this, further cetacean skeletons—including representatives of both extant and extinct species—were also added to the exhibition (Table 1). Concerning the extant taxa, these comprise the skeletons of the sei whale, a female narwhal and an adult beluga, whereas the added fossils material in the exhibition include some holotypes (e.g., those of *Balaena montalionis* and *Casatia termophila*), some casts of notable specimens (e.g., that of the holotype skull of *Zygophyseter varolai*) and a full-size reconstruction of the skull of *Livyatan melvillei*.

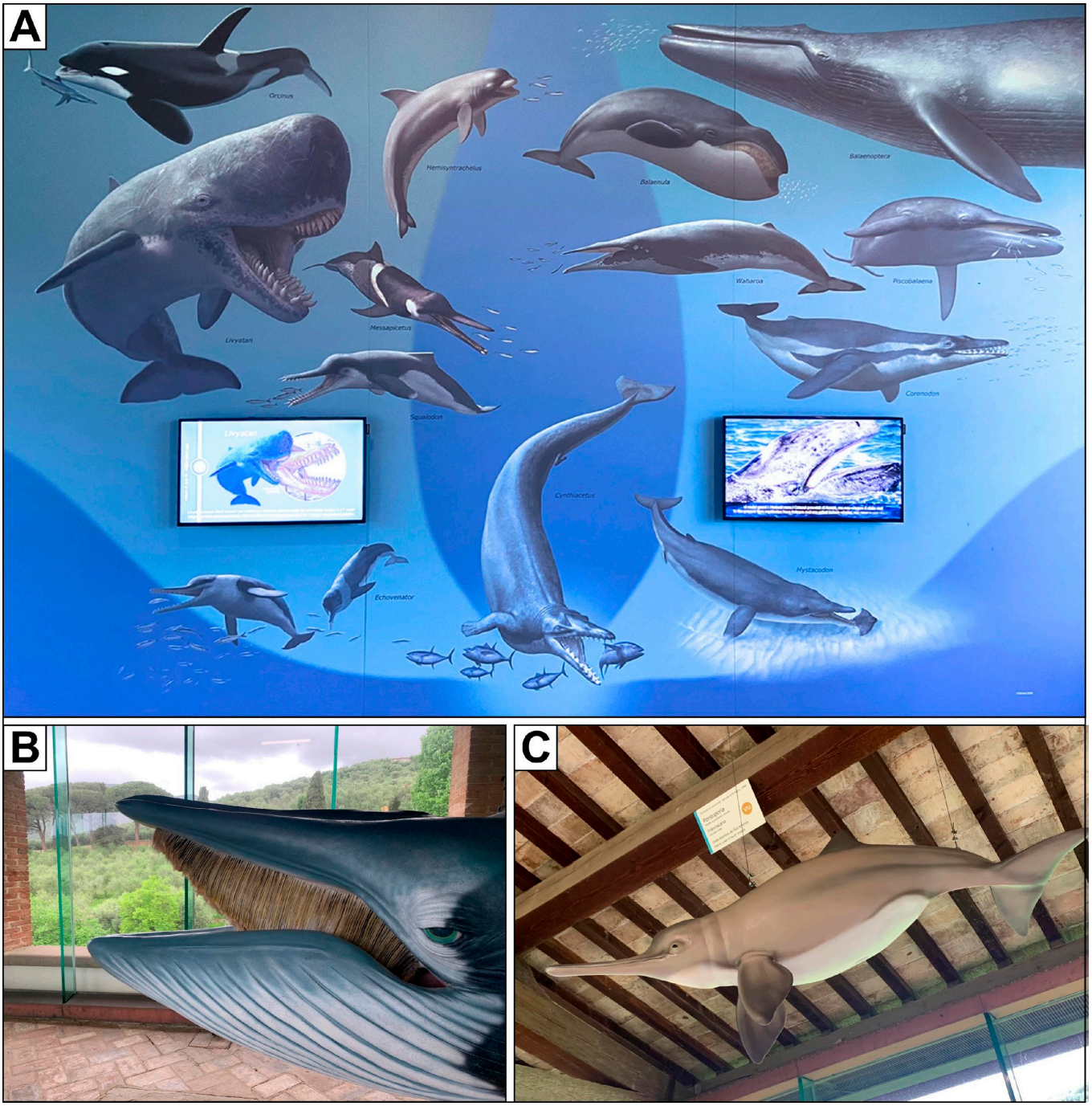

Figure 6. The entrance of the present-day Cetacean Gallery. (**A**) Large introductory panel depicting the neocete radiation. (**B**) Close-up of the life-size body model of a minke whale (*Balaenoptera acutorostrata*). (**C**) Life-size body model of a franciscana (*Pontoporia blainvillei*).

The juxtaposition of skeletons that characterises the present-day Cetacean Gallery was also designed to stimulate comparisons by emphasising similarities and differences between homologous skeletal structures. For example, the male and female narwhal skeletons have been placed close to each other to highlight this species' signature sexual dimorphism (i.e., the elongated tusk that is present in adult males), whereas the adult beluga skeleton has been placed near the skeleton of its juvenile conspecific to point out ontogenetic morphological variations. Similarly, the smaller dolphin skeletons have been

placed near the huge sei whale skeleton to emphasise the broad spectrum of body size values explored by the modern cetaceans.

Furthermore, greater dynamism was given to the set-up, both by changing the disposition of some skeletons from the linear, rigid style that was typical of 19th century preparations to a more dynamic one that reproduces swimming or immersion postures and by substituting the previous iron supports projecting from the floor with steel ropes hanging from the roof beams. When the visitors turn their gaze toward the ancient monastic barn, they find themselves in front of a large 'herd' of different whales swimming together toward them. Most such whales are actually mounted skeletons, although several life-size body models of extant cetacean species are also present in the aforementioned 'herd', besides the corresponding osteological specimens (Figure 6B,C).

Recalling the luminous transparency of the glass walls of the Cetacean Gallery, where skeletons can be admired against the background of the Charterhouse gardens, bilingual (Italian and English) explicative texts are placed directly on eight glass panels placed in correspondence of each thematic area; here, three-dimensional tactile body models of all the cetacean species on display are present in place of traditional, 2D photographs or drawings. All the models were realised at the same scale to better highlight the body size similarities and differences between the various cetacean species. Some full-sized casts of fossils were also placed above the glass panels (i.e., two physeteroid teeth, the partial skeleton of *Brachydelphis mazeasi*, and three whale barnacle shells).

Each skeleton on display is associated with a tag presenting its scientific name, vulgar names (both in Italian and in English), and the conservation status of the species worldwide according to the IUCN (=International Union for Conservation of Nature) Red List. The choice to include the conservation status of the living taxa, which has also been adopted elsewhere in the MSNUP, aims at communicating the importance of safeguarding biodiversity on our planet [80]. In fact, the MSNUP adheres to the #UnitedforBiodiversity Global Coalition for Biodiversity, promoted by the European Commission to raise awareness on the need to protect all forms of life on Earth.

The first thematic area, called 'From Leviathan to Moby Dick', includes the skeleton of the extant suction-feeding sperm whale *Physeter macrocephalus* as well as replicas of the skulls and teeth of its fossil relatives, the macropredators *Livyatan melvillei* and *Zygophyseter varolai* (Figure 7A,B). Special emphasis is given to *L. melvillei* and the Miocene radiation of the macropredatory physeteroids, all of which were equipped with large, robust teeth and a powerful bite [49].

The second thematic area, called 'In the kingdom of the Ice', hosts the skeletons of some extant cetaceans that reside or migrate in cold, (sub)Arctic waters (i.e., the right whale, the narwhal and the beluga whale; [81]) along with the skulls of their fossil relatives that inhabited the then-subtropical waters of the Pliocene Mediterranean (i.e., *Balaena montalionis*, *Balaenula astensis* and *Casatia thermophila*) (Figure 8A,B). The importance of the Quaternary glaciations in driving the evolution and geographical distribution of these cetaceans [82] is underlined in this thematic area.

The third thematic area, called 'The Lords of the Abyss', exhibits the skeletons of three extant beaked whales (the Cuvier's beaked whale, northern bottlenose whale and Andrews' beaked whale) (Figure 9A,B) as well as the skull of their Late Miocene confamilial *Messapicetus longirostris* (Figure 9C). This thematic area focuses on the extreme adaptations to forage by sucking squid in very deep waters, including a drastic reduction in the number of teeth, evolved by the modern representatives of this cetacean family [83–85]. Such characters are not present in the epipelagic feeder *M. longirostris*, which features an elongated rostrum equipped with a complete set of functional teeth [86].

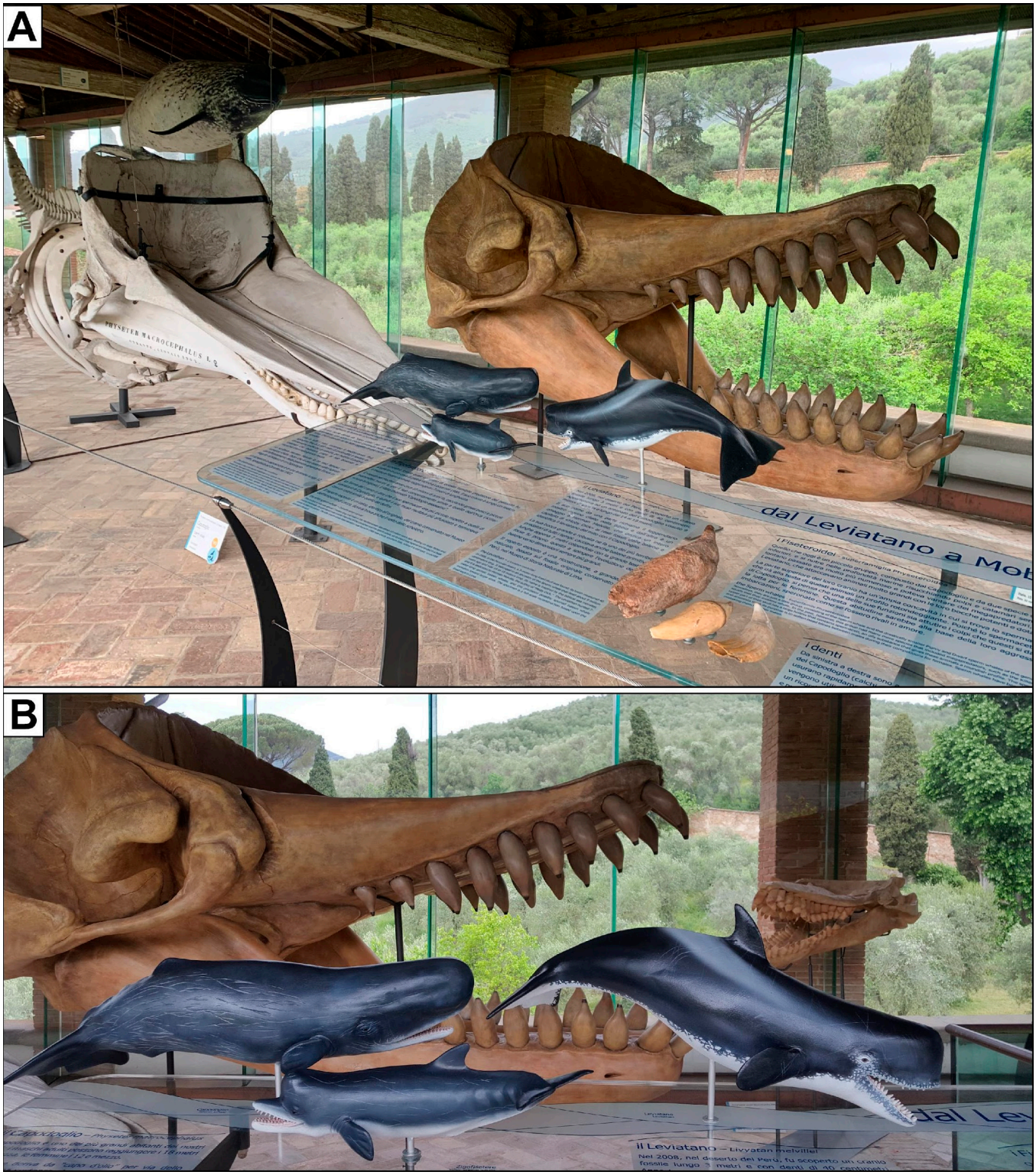

Figure 7. First thematic area of the present-day Cetacean Gallery: 'From Leviathan to Moby Dick'. (**A**) Overview of the thematic area, with the explanatory glass panel in the foreground, and the sperm whale (*Physeter macrocephalus*) skeleton (left) and the reconstruction of the *Livyatan melvillei* skull (right) in the background. (**B**) Detail of the explanatory glass panel, showing the tactile body models of the cetacean species on display.

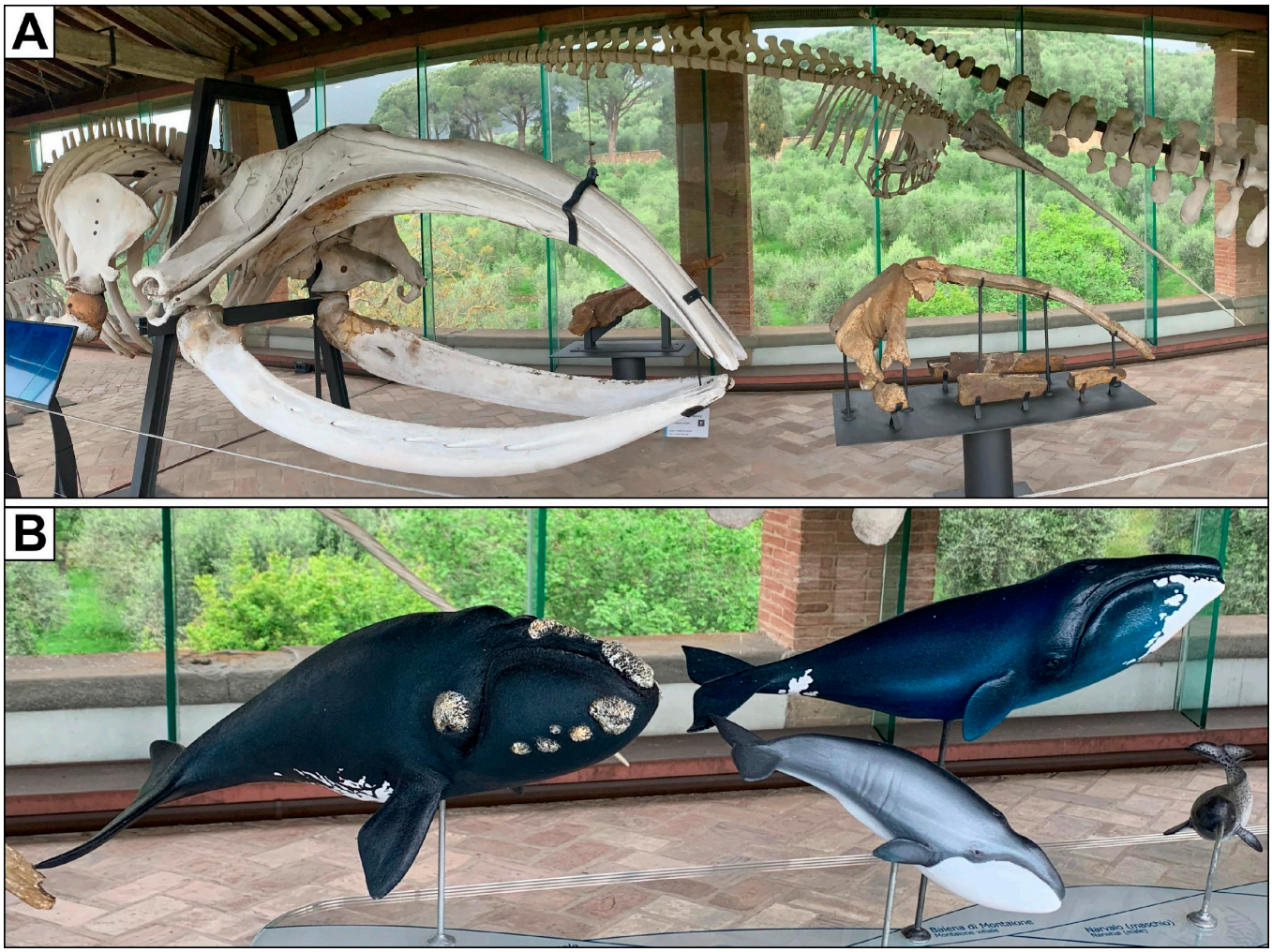

Figure 8. Second thematic area: 'In the kingdom of the Ice'. (**A**) From left to right, the North Atlantic right whale (*Eubalaena glacialis*) skeleton, the male narwhal skeleton (top) and the *Balaenula astensis* holotype skull from the Pliocene of Portacomaro d'Asti (Piedmont, Italy). (**B**) Tactile body models of the North Atlantic right whale (left), *Balaena montalionis* (top right) and *Balaenula astensis* (bottom right).

The fourth thematic area deals with the humpback whale, and is centred around the skeleton of this marine giant (Figure 10A,B). The name of this area, 'Submerged songs', recalls the ability of these cetaceans (and other mysticetes as well) to communicate over long distances through low-frequency sounds [87]. The extraordinary migrations of these cetaceans [88] are also evoked by replicas of three fossil whale barnacle shells (Figure 10C), which provide indirect but robust evidence of ancient migratory routes [39,89].

The fifth thematic area, called 'A large family', is dedicated to the oceanic dolphins (family Delphinidae), a clade of odontocetes that has radiated explosively in relatively recent times [90], so much so that nowadays the delphinids comprise the most speciose cetacean family [91]. The skeletons of eight extant species of delphinids (i.e., the Atlantic white-sided dolphin, bottlenose dolphin, common dolphin, false killer whale—skull only, killer whale, pilot whale, Risso's dolphin and white-beaked dolphin) and the remains of two fossil delphinids (the skeleton of an as-yet undescribed Pleistocene dolphin from Apulia and the cast of the skull of the Pliocene *Hemisyntrachelus cortesii*) are exposed herein (Figure 11A,B). Adaptations to different feeding strategies are associated with different morphologies of the skull and dentition as well as with remarkably different body sizes [92].

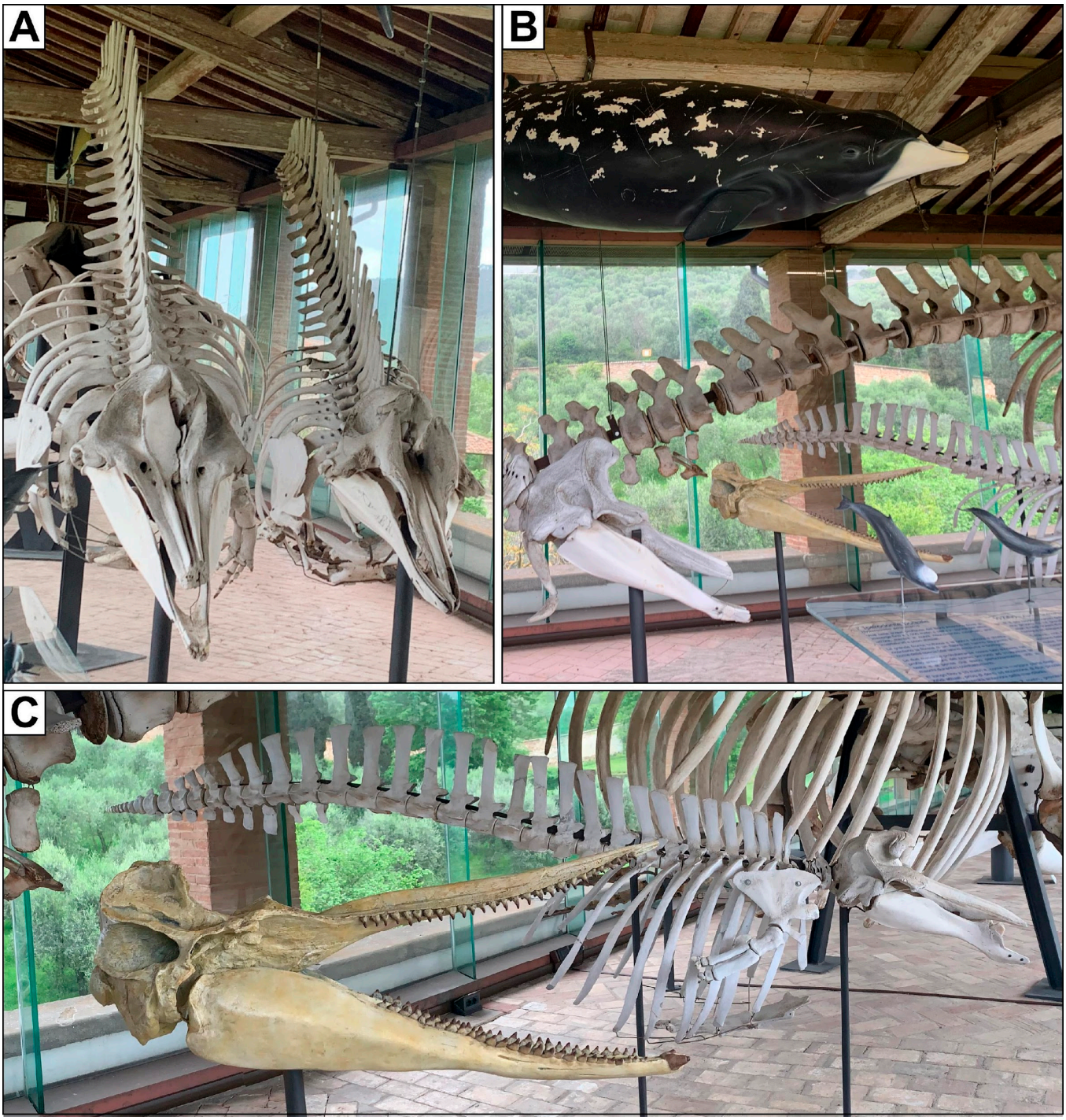

Figure 9. Third thematic area: 'The Lords of the Abyss'. (**A**) Cuvier's beaked whale (*Ziphius cavirostris*, left) and northern bottlenose whale (*Hyperoodon ampullatus*, right) skeletons. (**B**) Overview of the thematic area, showing the life-size model of the Andrews' beaked whale (*Mesoplodon bowdoini*) at the top. (**C**) Cast of the holotype skull of *Messapicetus longirostris* from the Late Miocene of the Salento Peninsula (Puglia, Italy) and skeleton of the Andrews' beaked whale (in the background).

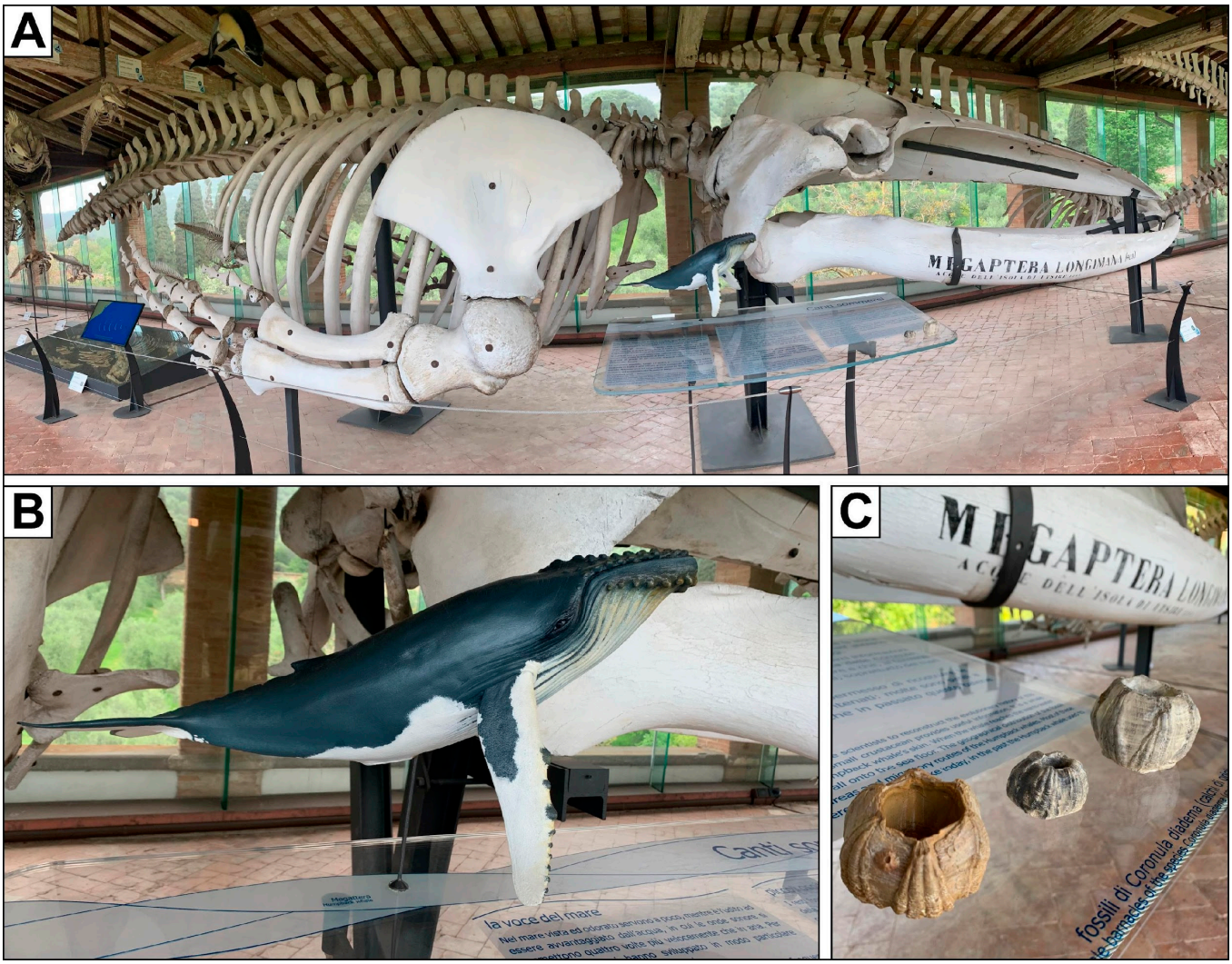

Figure 10. Fourth thematic area: 'Submerged songs'. (**A**) Humpback whale (*Megaptera novaeangliae*) skeleton. (**B**) Tactile body model of the humpback whale. (**C**) Casts of fossil whale barnacle shells (*Coronula diadema*).

Seven skeletons of small odontocetes, including the finless porpoise, franciscana, harbor porpoise, Hector's dolphin, Irrawaddy dolphin and south Asian river dolphin, are grouped together in the sixth thematic area, called 'Small but not too much' (Figure 12A–C). Three aspects of this seemingly homogeneous set of cetacean taxa are emphasised herein: (1) it is not a monophyletic group, but rather the result of distinct adaptations due to similar selective pressures (e.g., in riverine habitats); (2) due to physiological evolutionary constraints, these dolphins are "small but not too much" (i.e., not less than 1 m in total length, not even in the diminutive fossil pontoporiid *Brachydelphis*, whose skeleton is also on display in the form of a cast positioned on the glass panel to be explored by touch); (3) most of these species are vulnerable and seriously threatened by human activity (e.g., Reeves and Martin [93]).

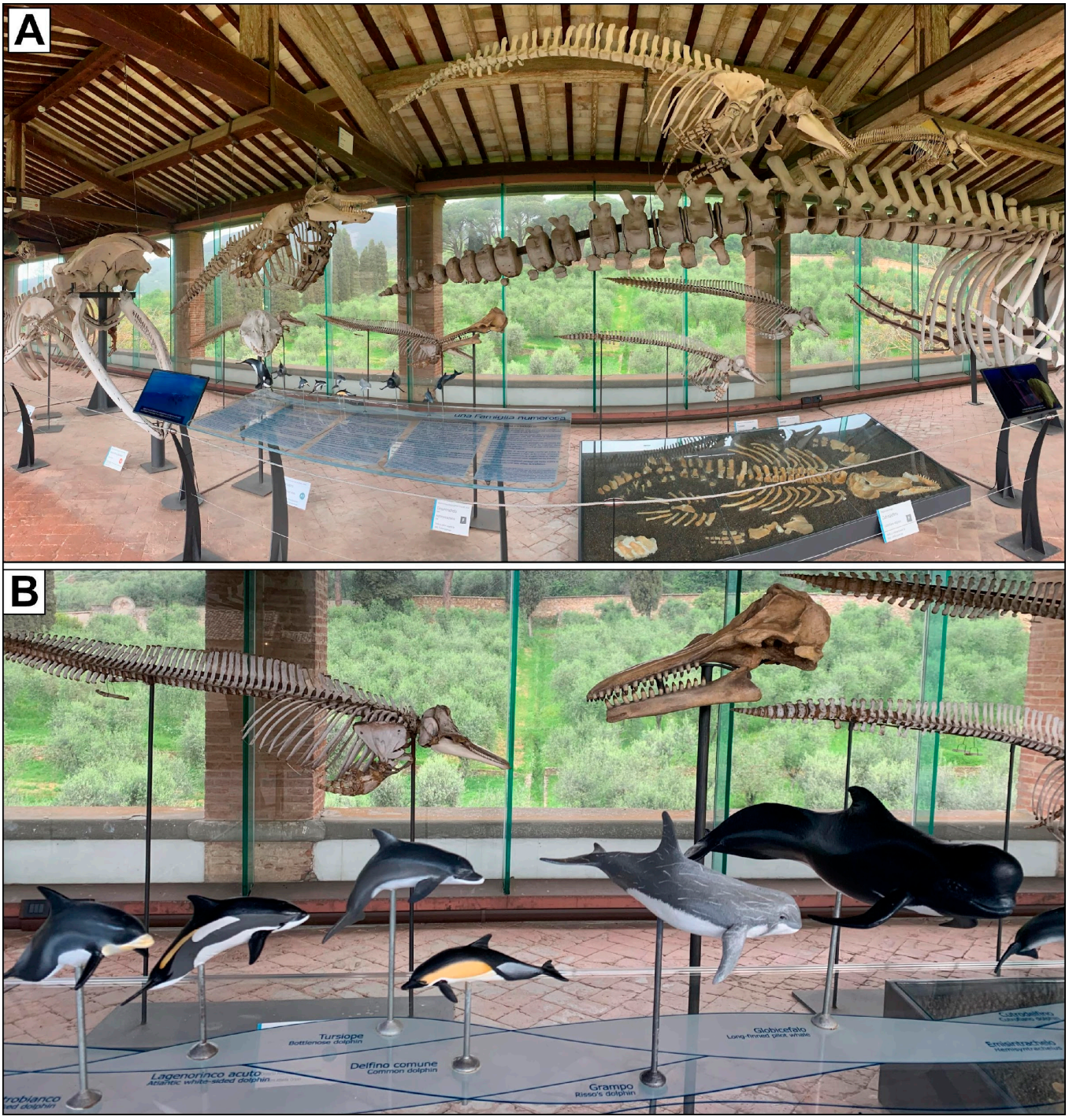

Figure 11. Fifth thematic area: 'A large family'. (**A**) Overview of the thematic area dedicated to the oceanic dolphins. (**B**) Tactile body models of the cetacean species on display; the skeleton of the Atlantic white-sided dolphin (*Lagenorhynchus acutus*, left) and the cast of the holotype skull of *Hemisyntrachelus cortesii* (right) from the Pliocene of Castell'Arquato (Emilia Romagna, Italy) are shown in the background.

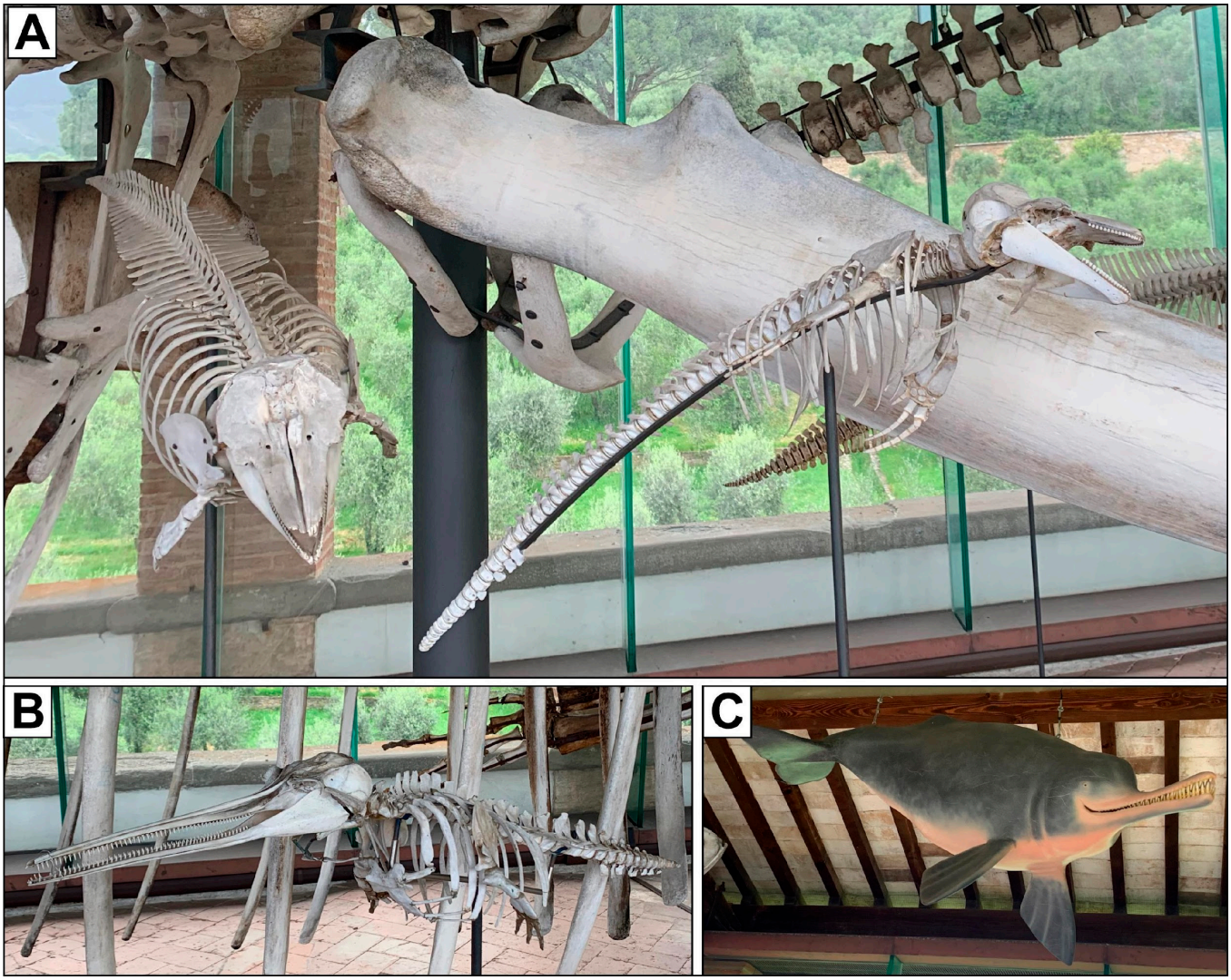

Figure 12. Sixth thematic area: 'Small but not too much'. (**A**) Skeletons of the harbour porpoise (*Phocoena phocoena*, left) and finless porpoise *(Neophocaena phocaenoides*, right) with the huge sei whale (*Balaenoptera borealis*) mandible in the background. (**B**) Skeleton of the franciscana (*Pontoporia blainvillei*). (**C**) Life-size body model of the Ganges river dolphin (*Platanista gangetica*).

The seventh thematic area, called 'The giants of the sea', includes the skeletons of three rorquals: the fin whale (Figure 13B), sei whale and common minke whale (Figure 13A). It is underlined that, in spite of their huge body size, these cetaceans have a streamlined body that is well-suited for fast swimming. Emphasis is also given to the causes that are suspected to have led these and other baleen whales to evolve gigantism in the course of the last few million years [94–96].

Directly connected to the aforementioned is the eighth and final thematic area, which is dedicated to the 'Queen of the oceans' (i.e., the blue whale) (Figure 14A,B). In front of the more-than-20 m-long skeleton of this whale, the unique characters of what is the largest living animal are illustrated along with the devastating effects of over 100 years of unbridled whaling that brought this and other giants of the sea to the brink of extinction [97].

Figure 13. Seventh thematic area: 'The giants of the sea'. (**A**) Sei whale (*Balaenoptera borealis*) skeleton, and anterior part of the common minke whale (*Balaenoptera acutorostrata*) skeleton (top left). (**B**) Fin whale (*Balaenoptera physalus*) skeleton, and explanatory glass panel with the tactile body models of the cetacean species on display.

At the very end of the Cetacean Gallery, a reconstruction of the studio of Sebastiano Richiardi was set up as a tribute to his effort in acquiring a good deal of the cetacean skeletons that are now on display at the MSNUP. Through audio/video supports, some excerpts from the correspondence of Richiardi are disseminated as a testament to the remarkable personality and endurance of a scientist whose dedication led to creating a collection unique in the world.

Figure 14. Eighth thematic area: 'Queen of the oceans'. (**A**) Blue whale (*Balaenoptera musculus*) skeleton. (**B**) Tactile body model of the blue whale.

4. Scientific Relevance of the Cetacean Exhibitions

At some 135 m of linear length and more than 900 m^2 of surface area, the MSNUP exhibition of extant and extinct cetaceans may be the largest worldwide. Even in terms of numbers of specimens and taxa, the MSNUP exhibition is possibly unrivalled, counting as it does as many as 28 complete skeletons plus one skull of extant cetaceans belonging

to 27 different species (Table 1). The fossil cetaceans on display, though less consistent in number and taxonomic richness than the extant ones, feature the holotypes of as many as nine extinct species (including four original specimens and five casts). The cetacean exhibition of the MSNUP is also impressive in the way it displays two skeletons longer than 20 m as well as another four skeletons between 10 and 20 m in length. Furthermore, five of these skeletons belong to some of the largest animals worldwide, namely the blue, fin, sei, right and humpback whales.

Concerning the fossils on display, the holotypes of *Aegyptocetus tarfa*, *Balaena montalionis* and *Balaenula astensis* are by all means unique specimens that comprise the only known representatives of the corresponding extinct species. Along with the holotype of *Casatia thermophila*, they are a testament to major episodes of the evolutionary history of cetaceans, including their archaic amphibious stage (*A. tarfa*), the Neogene radiation of various lineages of diminutive baleen whales (*B. astensis*), the (sub)tropical roots of iconic inhabitants of the high latitudes such as the monodontids (*C. thermophila*), and the rise of the modern genera (*B. montalionis*).

With respect to the extant specimens, it is worth mentioning the large (female) sperm whale skeleton, which measures 10.38 m in length without considering the spaces of the missing intervertebral discs (estimated body length of the specimen: 11.28 m). It is likely that the body size of this animal was close to the maximum documented body size for females of *Physeter macrocephalus* (12.3 m; [98]). Although the humpback whale skeleton does not reach the record-breaking length of 16.60 m reported by Braschi et al. [11], at 13.26 m (the length obtained by removing the space between the vertebrae in the mounted skeleton) it is still remarkable, as it evokes an animal well over 14 m in total body length (adults of *M. novaeangliae* are typically in the 14–15 m length range; [99]).

The MSNUP skeleton of the Andrews' beaked whale, *Mesoplodon bowdoini*, had been regarded for a long time as belonging to the Sowerby's beaked whale, *Mesoplodon bidens* [100]. This specimen is also particularly significant as it represents one of the few musealised skeletons of this rare species [101]. Interestingly, the MSNUP skeleton of the Andrews' beaked whale was acquired by the museum in 1897; that is, as many as eleven years before Andrews [102]) described the then-new species *M. bowdoini* based on a specimen stranded in 1904. Therefore, the MSNUP specimen represents the oldest known skeleton of *M. bowdoini*—though one that went unrecognised for a long time.

Still concerning the ziphiids, the MSNUP Cuvier's beaked whale skeleton also deserves a mention, having been figured in two tables, featuring detailed illustrations of the bones, drawn by Sebastiano Richiardi under the new name 'Ziphius Savi' [11]. Braschi et al. [11] considered this specimen (MSNUP C 270) to represent an invalid type due to the lack of a formal description and because Richiardi's plates have never been formally published. However, the following facts should be taken into account: 1) as clearly stated by Braschi et al. [11], Richiardi's plates were widely distributed to museums and other colleagues by Richiardi himself; 2) Richiardi's intention to describe a new taxon is clear from the tables themselves, which include the binomial name of the proposed new species (as 'Ziphius Savi N. Sp.'), the repository of the figured material (as 'Mus. Pis.'), and the expected publication year (1873). Therefore, in our opinion, Richiardi's plates fall within the requirements of article 12.2.7 of the International Code of Zoological Nomenclature (ICZN, 1999) regarding names published before 1931: the name is to be considered described by indication as only the plate exists, without any accompanying description.

In conclusion, *Ziphius savi* Richiardi, 1873 is a validly described and available species name, regardless of the fact that *Z. savi* has been considered a junior synonym of *Ziphius cavirostris* from Van Beneden and Gervais [7] onwards. Another interesting piece of historical information regarding the type of *Ziphius savi* is that it was mentioned for the first time as well as rightly referred to as *Ziphius cavirostris* by Flower [102]. Indeed, Flower [102]) recorded this specimen as follows in a list of the eleven skeletons of *Z. cavirostris* known at his time: "*A skeleton in the Museum at Pisa from the Mediterranean. Professor Gervais has informed me of this specimen, which has not been described*". Interestingly, the type skeleton of

Ziphius savi originates from a beaked whale individual that stranded in 1824 at Forte dei Marmi (Lucca Province, central Italy); as such, it may represent the second oldest skeleton ever collected of this species after the famous Cuvier's skull, which beached in 1804 at the Bouches-du-Rhône (Mediterranean France).

5. Visitors' Experience and Dissemination Strategies

The MSNUP is a large and constantly growing museum. In 2023, it totalled 73,977 visitors, the highest number ever reached since it was moved to the Charterhouse. For years, the museum has systematically monitored visitors' satisfaction by using a bilingual (Italian and English) questionnaire to analyse the socio-demographic profile of the visitors as well as their level of appreciation of the museum experience. Since its renewal was completed in 2018, the Cetacean Gallery has constantly polled as the most or second-most appreciated exhibit of the MSNUP. In the 2018–2023 five-year time period, 144 teaching activities and 761 guided visits were held at the Archaeocete Hall and Cetacean Gallery by the museum itself. These figures should be read against the fact that access to the MSNUP and in-person events have been severely limited and at times even forbidden between 2020 and 2022 due to the COVID-19 pandemic. On the whole, the undertaken activities targeted a remarkably heterogeneous audience, including adults, young people, children, students, teachers and persons with special needs. In addition, two temporary exhibitions were organised in the Cetacean Gallery, being dedicated respectively to the problem of plastic pollution [103] and to the history of the Cetacean Gallery itself. All these data indicate that the Archaeocete Hall and Cetacean Gallery are highly appreciated by the general public as well as perused by the museum's educational team.

The outstanding cetacean exhibitions of the MSNUP have been recently subjected to a project of digital archiving and dissemination aimed at further promoting their scientific and museological impact [104]. Several odontocete skeletons and mysticete cranial and postcranial elements have been surface-scanned through an EinScan Pro HD handheld structured light scanner. All the resulting 3D models, which occasionally underwent some degree of post-production, were then uploaded onto the open-access digital repository Sketchfab and made freely accessible at the following link: https://sketchfab.com/MuseoStoriaNaturaleUnipi (accessed on 1 August 2024). At present, the Sketchfab profile of the MSNUP numbers 175 3D models in several collections. All the scanned extant cetaceans are included in either the "Cetaceans" collection (https://sketchfab.com/MuseoStoriaNaturaleUnipi/collections/cetaceans; accessed on 1 August 2024) or the "Fossils" collection (https://sketchfab.com/MuseoStoriaNaturaleUnipi/collections/fossils; accessed on 1 August 2024). This new way of disseminating the cetological collection and exhibitions of the MSNUP aligns the latter to the largest and most important natural history museums while making an invaluable osteological resource broadly accessible to internet users worldwide. Not only the general public, but also the scientific community takes advantage of the digitization of the MSNUP cetacean collections: as a matter of fact, eight different professional researchers have asked to date for high-resolution versions of the 3D models that are found on the museum's Sketchfab profile, which has since resulted in at least one published article that expressly acknowledges the contribution of such an effort of digital archiving [105]. Furthermore, earlier this year, the MSNUP joined the project "Tutti i musei su Wikipedia" and was selected as the recipient of a related grant by Wikimedia Italia. With this project, which will end in October 2024, the Museum has made one hundred 3D models from the Sketchfab collections available through the Wikimedia platforms (including Wikimedia commons and Wikipedia), thus further promoting broad access to its online osteological resource. Such models, which include all the complete skeletons included in the "Cetaceans" collection on Scketchfab, can indeed be downloaded for free under a CC BY-SA 4.0 license at the following link: https://commons.wikimedia.org/wiki/Category:STL_files_from_Museo_di_storia_naturale_dell%27Universit%C3%A0_di_Pisa (accessed on 1 August 2024). To date, the 3D models uploaded by the MSNUP onto the Wikimedia platforms have totalised almost one billion views.

6. Conclusions

The rearrangement of the Cetacean exhibitions of the MSNUP according to an adaptive-evolutionary criterion rather than a strictly systematic one has allowed to increase the number of skeletons on display as well as the inclusion of fossils and life-size body models of some of the most representative skeletons with the aim of integrating the Cetacean Gallery and Archaeocete Hall along a unified exhibition route. At some 135 m of linear length and more than 900 m^2 of surface area, with 28 complete skeletons of extant species (two of which are longer than 20 m, while four are in the 10–20 m length interval) and fossil representatives of nine extinct species (including the holotypes of *Aegyptocetus tarfa*, *Balaena montalionis*, *Balaenula astensis* and *Casatia thermophila*), the cetacean exhibition of the MSNUP may be the largest worldwide. The gallery is organised around eight distinct thematic areas that in most cases feature the skeletons of both extant and extinct cetaceans with the aim of highlighting common characters in distinct groups that may be related to similar adaptive-evolutionary drivers, and making the contents clearer and more easily understandable for visitors. Our review made it possible to verify that the Cetacean Gallery includes the oldest Andrews' beaked whale specimen existing worldwide as well as the type specimen of *Ziphius savi* (a validly described species and a junior synonym of *Ziphius cavirostris*). The cetacean exhibitions of the MSNUP are perused by the museum's educational team and highly appreciated by visitors. The digitization of many of the MSNUP specimens, their subsequent archiving on the on the open-access online repository Sketchfab and their dissemination through Wikimedia platforms such as Wikimedia commons and Wikipedia has led to the creation of a major osteological resource that is broadly accessible to internet users worldwide.

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References

1. Aristotle. *History of Animals (Historia Animalium)*. Translated by D'Arcy Wentworth Thompson. Available online: http://classics.mit.edu//Aristotle/history_anim.html (accessed on 5 August 2024).
2. Pliny the Elder. Naturalis Historia. Available online: https://www.perseus.tufts.edu/hopper/text?doc=Perseus:text:1999.02.0138 (accessed on 5 August 2024).
3. Gesner, C. *Historia Animalium*; Froschauer: Zürich, Switzerland, 1551–1558.

4. Cuvier, G. *Le Règne Animal Distribué d'après Son Organisation, pour Servir de Base à L'histoire Naturelle des Animaux et D'introduction à L'anatomie Comparée*; Déterville: Paris, France, 1817.
5. Cuvier, G. *Recherches sur les Ossements Fossiles: Où L'on Rétablit les Caractères de Plusieurs Animaux dont les Révolutions du Globe Ont Détruit les Espèces*; Tome Cinquième, I partie; Dufour et d'Ocagne: Paris, France, 1823; p. 405.
6. Van Beneden, P.J.; Gervais, P. *Ostéographie des Cètacés. Atlas*; Bertrand: Paris, France, 1868–1879.
7. Van Beneden, P.J.; Gervais, P. *Ostéographie des Cètacés Vivants et Fossiles. Comprenant la Description et L'iconographie du Squelette et du Sistème Dentaire de Ces Animaux ainsi que des Documents Relatifs a Leur Histoire Naturelle*; Bertrand: Paris, France, 1880; p. 634.
8. Flower, W.H. *Recent Memoirs on the Cetacea by Professors Eschricht, Reinhardt, and Lilljeborg*, 1st ed.; Ray Society: London, UK, 1866; p. 317.
9. Gray, J.E. *Catalogue of Seals and Whales in the British Museum*, 2nd ed.; Taylor & Francis: London, UK, 1866; p. 402.
10. Garbari, F.; Tongiorgi Tomasi, L.; Tosi, A. *Giardino dei Semplici—L'Orto Botanico di Pisa dal XVI al XX Secolo*; Pacini: Pisa, Italy, 1991; p. 397.
11. Braschi, S.; Cagnolaro, L.; Nicolosi, P. Catalogo dei Cetacei attuali del Museo di Storia Naturale e del Territorio dell'Università di Pisa, alla Certosa di Calci. Note osteometriche e ricerca storica. *Atti Soc. Tosc. Sci. Nat. Mem. Ser. B* **2007**, *114*, 1–22.
12. Targioni Tozzetti, G. *Relazioni D'alcuni Viaggi Fatti in Diverse Parti della TOSCANA, per Osservare le Produzioni Naturali, e gli Antichi Monumenti di Essa*; Stamperia Imperiale: Florence, Italy, 1751; p. 456.
13. Tilli, M.A. *Catalogus Plantarum Horti Pisani*, 1st ed.; Tipis Regiae Celsitudinis apud Tartinium & Franchium: Florence, Italy, 1723; p. 187.
14. Richiardi, S. Sulle variazioni individuali della *Balaenoptera musculus*. *Atti Soc. Tosc. Sci. Nat.* **1875**, *1*, 246–259.
15. Van Beneden, P.J. Les squelettes de cétacés et les musées qui les renferment. *Bull. Acad. R. Belg.* **1868**, *25*, 88–125.
16. Ficalbi, E. Sebastiano Richiardi. *Monitore Zool. Ital.* **1904**, *15*, 366–371.
17. Simon-Ekeland, A.A.; Delsett, L.L. Whales as a Nordic speciality: Collecting cetaceans for Natural History Museums (1860s–1910s). *Nord. Museologi* **2024**, *36*, 28–43. [CrossRef]
18. Cagnolaro, L.; Podestà, M.; Affronte, M.; Agnelli, P.; Cancelli, F.; Capanna, E.; Carlini, R.; Cataldini, G.; Cozzi, B.; Insacco, G. Collections of extant cetaceans in Italian museums and other scientific institutions. A comparative review. *Atti Soc. Ital. Sci. Nat.* **2012**, *153*, 145–202. [CrossRef]
19. Cagnolaro, L.; Maio, N.; Vomero, V. I Cetacei nei musei Italiani: Un grandioso patrimonio zoologico tra ricerca scientifica e valorizzazione storica. *Mus. Sci. Mem.* **2014**, *12*, 8–12.
20. Capellini, G. Balene fossili toscane. II. Balaena montalionis. *Mem. R. Acc. Sci. Ist. Bologna* **1904**, *6*, 47–55.
21. Manganelli, G.; Benocci, A.; Spadini, V. The scientific bibliography of Roberto Lawley (1818–1881) and his contribution to the study of fossil sharks. *Arch. Nat. Hist.* **2003**, *33*, 267–281. [CrossRef]
22. Lawley, R. Dei resti di pesci fossili del Pliocene toscano. *Atti Soc. Tosc. Sci. Nat. Mem.* **1875**, *16*, 59–66.
23. Lawley, R. *Nuovi Studi Sopra i Pesci ed Altri Vertebrati Fossili delle Colline Toscane*; Tipografia dell'arte della Stampa: Firenze, Italy, 1876; pp. 1–122.
24. Trevisan, L. Revisione dei resti di balene fossili del Museo geopaleontologico di Pisa. *Atti Soc. Tosc. Sci. Nat. Proc. Verb.* **1941**, *49*, 2–10.
25. Ugolini, P.R. Lo Steno bellardii Portis del Pliocene di Orciano Pisano. *Atti Soc. Tos. Sci. Nat. Mem. Ser. A.* **1899**, *17*, 132–143.
26. Bianucci, G.; Vaiani, S.C.; Casati, S. A new delphinid record (Odontoceti, Cetacea) from the Early Pliocene of Tuscany (Central Italy): Systematics and biostratigraphic considerations. *Neues Jahrb. Geol. Paläontol. Abh.* **2009**, *254*, 275–292. [CrossRef]
27. Ugolini, P.R. Resti di vertebrati marini del Pliocene di Orciano. *Atti Congr. Natur. Ital.* **1907**, 3–15.
28. Fucini, A. Sopra il rinvenimento ad Orciano di un secondo individuo di *Steno Bellardii* Portis. *Soc. Tosc. Sci. Nat. Proc. Verb.* **1906**, 1–2.
29. Ugolini, P.R. Di un resto fossile di *Diplodon* del giacimento pliocenico di Orciano. *Atti Soc. Tos. Sci. Nat. Mem. Ser. A.* **1900**, *18*, 1–8.
30. Pilleri, G. *The Cetacea of the Italian Pliocene with a Descriptive Catalogue of the Species in the Florence Museum of Paleontology*; Brain Anatomy Institute, University of Berne: Berne, Switzerland, 1987.
31. Bianucci, G. I cetacei fossili del Museo di Storia Naturale dell'Università di Pisa. *Atti Soc. Tos. Sci. Nat. Mem. Ser. A.* **1996**, *103*, 63–69.
32. Trevisan, L. Una nuova specie di *Balaenula* pliocenica. *Palaeontogr. Ital.* **1941**, *40*, 1–13.
33. Bianucci, G.; Landini, W. Change in diversity, ecological significance and biogeographical relationships of the Mediterranean Miocene toothed whale fauna. *Geobios* **2002**, *35*, 19–28. [CrossRef]
34. Menesini, E.; Tavani, G. Resti di *Scaldicetus* (Cetacea) nel Miocene della Puglia. *Boll. Soc. Paleontol. Ital.* **1968**, *7*, 85–91.
35. Peri, E.; Collareta, A.; Bianucci, G. A new record of Physeteroidea from the upper Miocene of the Pietra leccese (southern Italy): Systematics, paleoecology and taphonomy of a fossil macroraptorial sperm whale. *Riv. Ital. Paleontol. S.* **2020**, *126*, 751–769.
36. Peri, E.; Collareta, A.; Aringhieri, G.; Caramella, D.; Foresi, L.M.; Bianucci, G. A new physeteroid cetacean from the Lower Miocene of southern Italy: CT imaging, retrodeformation, systematics and palaeobiology of a sperm whale from the Pietra leccese. *Boll. Soc. Paleontol. Ital.* **2022**, *61*, 187–206.
37. Bianucci, G. A new record of baleen whale from the Pliocene of Tuscany (Italy). *Atti Soc. Tos. Sci. Nat. Mem. Ser. A.* **1995**, *102*, 101–104.

38. Bianucci, G.; Landini, W.; Valleri, G.; Ragaini, L.; Varola, V. First cetacean fossil records from Ecuador, collected from the Miocene of Esmeraldas Province. *Riv. Ital. Paleontol. S.* **2005**, *111*, 345–350.
39. Bianucci, G.; Landini, W.; Buckeridge, J. Whale barnacles and Neogene cetacean migration routes. *New Zeal. J. Geol. Geop.* **2006**, *49*, 115–120. [CrossRef]
40. Bianucci, G.; Gingerich, P.D. *Aegyptocetus tarfa*, n. gen. et sp. (Mammalia, Cetacea), from the middle Eocene of Egypt: Clinorhynchy, olfaction, and hearing in a protocetid whale. *J. Vertebr. Paleontol.* **2011**, *31*, 1173–1188. [CrossRef]
41. Bianucci, G.; Pesci, F.; Collareta, A.; Tinelli, C. A new Monodontidae (Cetacea, Delphinoidea) from the lower Pliocene of Italy supports a warm-water origin for narwhals and white whales. *J. Vertebr. Paleontol. 39*, e1645148. [CrossRef]
42. Merella, M.; Collareta, A.; Granata, V.; Casati, S.; Bianucci, G. New remains of *Casatia thermophila* (Cetacea, Monodontidae) from the lower Pliocene marine vertebrate-bearing locality of Arcille (Tuscany, Italy). *Riv. Ital. Paleontol. S.* **2022**, *128*, 229–240. [CrossRef]
43. Collareta, A.; Cigala Fulgosi, F.; Bianucci, G. A new kogiid sperm whale from northern Italy supports psychrospheric conditions in the early Pliocene Mediterranean Sea. *Acta Palaeontol. Pol.* **2019**, *64*, 609–626. [CrossRef]
44. Cortesi, G. *Saggi Geologici degli Stati di Parma e Piacenza*; Torchj del Majno: Piacenza, Italy, 1819; 165p.
45. Simonelli, V. Avanzi di "Tursiops" del Pliocene Senese. *Mem. R. Accad. Sci. Ist. Bologna Cl. Sci. Fis.* **1911**, *8*, 249–260.
46. Collareta, A.; Di Cencio, A.; Ricci, R.; Bianucci, G. The shark-toothed dolphin *Squalodon* (Cetacea: Odontoceti) from the remarkable Montagna della Majella marine vertebrate assemblage (Bolognano Formation, central Italy). *Carnets Geol.* **2020**, *20*, 19–28. [CrossRef]
47. Gutstein, C.S.; Cozzuol, M.A.; Vargas, A.O.; Suárez, M.E.; Schultz, C.L.; Rubilar-Rogers, D. Patterns of skull variation of *Brachydelphis* (Cetacea, Odontoceti) from the Neogene of the southeastern Pacific. *J. Mammal.* **2009**, *90*, 504–519. [CrossRef]
48. Gioncada, A.; Gariboldi, K.; Collareta, A.; Di Celma, C.; Bosio, G.; Malinverno, E.; Lambert, O.; Pike, J.; Urbina, M.; Bianucci, G. Looking for the key to preservation of fossil marine vertebrates in the Pisco Formation of Peru: New insights from a small dolphin skeleton. *Andean Geol.* **2018**, *45*, 379–398. [CrossRef]
49. Lambert, O.; Bianucci, G.; Post, K.; De Muizon, C.; Salas-Gismondi, R.; Urbina, M.; Reumer, J. The giant bite of a new raptorial sperm whale from the Miocene epoch of Peru. *Nature* **2010**, *466*, 105–108. [CrossRef] [PubMed]
50. Collareta, A.; Sorbini, C.; Farina, S.; Granata, V.; Marchetti, L.; Frassi, C.; Angeli, L.; Bianucci, G. Reviewing the palaeontological and palaeoenvironmental heritage of the Monti Pisani massif (Italy): A compelling history of animals, plants and climates through three geological eras. *Geosciences* **2023**, *13*, 332. [CrossRef]
51. Braschi, S.; Cagnolaro, L.; Zuffi, M.A.L. *Guida alla Galleria dei Cetacei*; Tipografia dell'Università di Pisa: Pisa, Italy, 1990; p. 48.
52. Committee on Taxonomy. List of Marine Mammal Species and Subspecies (Society for Marine Mammalogy). Available online: www.marinemammalscience.org (accessed on 5 August 2024).
53. Van Beneden, P.J. Notice sur un nouveau dauphin de la Nouvelle-Zélande. *Bull. Acad. Roy. Sci. Lett. B.-Arts Belgique* **1881**, *3*, 877–887.
54. Pallas, P.S. *Reise durch Verschiedene Provinzen des Russischen Reichs*; Kayserliche Academie der Wissenschaften: St. Petersburg, Russia, 1776; pp. 1–454.
55. Linnaeus, C. *Systema Naturae sive Regna Tria Naturae, Secundum Classes, Ordines, Genera, Species, cum Characteribus, Differentiis, Synonymis, Locis, Tomus I*; Editio Decima, Reformata; Laurentius Salvius: Stockholm, Sweden, 1758; p. 824.
56. Traill, T.S.T. Description of a new species of whale, *Delphinus melas*. In a letter from Thomas Stewart Traill, M.D. to Mr. Nicholson. *J. Nat. Phil. Chem. Arts.* **1809**, *22*, 81–83.
57. Cuvier, G. Rapport fait à la classe des Sciences mathématiques et physiques, sur divers Cétacés pris sur les côtes de France, pricipalement sur ceux qui sont échoués près de Paimpol, le 7 janvier 1812. *Ann. Mus. Hist. Nat. Paris* **1812**, *19*, 1–16.
58. Kalm, P. *Travels into North America: Containing Its Natural History, and a Circumstantial Account of Its Plantations and Agriculture in General, with the Civil, Ecclesiastical and Commercial State of the Country, the Manners of the Inhabitants, and Several Curious and Important Remarks on Various Subjects*; William Eyres: Warrington, UK, 1770; Volume 1, pp. 1–400.
59. Gray, J.E. *Spicilegia Zoologica or Original Figures and Short Systematic Descriptions of New and Unfigured Animals*; Part 1; Treüttel, Würtz and Co.: London, UK, 1828.
60. Gray, J.E. On the British Cetacea. *Ann. Mag. Nat. His.* **1846**, *17*, 82–85. [CrossRef]
61. Andrews, R.C. Description of a new species of *Mesoplodon* from Canterbury Province, New Zealand. *Bull Am. Mus. Nat. Hist.* **1908**, *24*, 203–215.
62. Cuvier, G. *Le Règne Animal Distribué d'apres Son Organisation, pour Servir de Base à L'histoire Naturelle des Animaux et D'introduction à L'anatomie Comparée*, 2nd ed.; Déterville: Paris, France, 1829; 406p.
63. Lebeck, H.J. Delphinus delphis beschrieben von Herrn Heinrich Julius Lebeck. *Gesellsch. Naturforsch. Fr. Berlin N. Schr.* **1801**, *2*, 280–282.
64. Gervais, P.; D'Orbigny, A. Mammalogie. *Bull. Soc. Philomath.* **1844**, 38–40.
65. Montagu, G. Description of a species of *Delphinus*, which appears to be new. *Mem. Wer. Nat. Hist. Soc.* **1821**, *3*, 75–82.
66. De Lacépède, B.G. *Histoire Naturelle des Cétacées*; Plassan Imprimeur-Libraire: Paris, France, 1804; 329p.
67. Lesson, R.P. *Histoire Naturelle Générale et Particulière des Mammifères et des Oiseaux Décoverts depuis 1788 jusqu'a Nos Jours*; Chez Baudouin Frères: Paris, France, 1828; p. 442.
68. Borowski, G.H. *Gemmeinuzige Naturgeschichte des Theirreichs. Band 2*; Gottlieb August Lange: Berlin, Germany, 1781; 196p.

69. Müller, O.F. *Zoologiae Danicae Prodromus, seu Animalium Daniae et Norvegiae Indigenarum Characteres, Nomina, et Synonyma Imprimis Popularium*; Hallager: Copenhagen, Denmark, 1776; p. 282.
70. Owen, R. *A History of British Fossil Mammals and Birds*; John van Voorst: London, UK, 1846; p. 560.
71. De Muizon, C. Les Vertébrés de la Formation Pisco (Pérou). Troisième partie: Les Odontocètes (Cetacea, Mammalia) du Miocène. *Trav. Inst. Fr. Études Andin.* **1988**, *42*, 1–244.
72. Fischer, J.B. *Synopsis Mammalium*; J.C. Cotta: Stuttgart, Germany, 1829; 752p.
73. Bianucci, G.; Landini, W.; Varola, A. *Messapicetus longirostris* a new genus and species of Ziphiidae (Cetacea) from the Late Miocene of "Pietra leccese" (Apulia; Italy). *Boll. Soc. Paleontol. Ital.* **1992**, *31*, 261–264.
74. Bianucci, G.; Landini, W. Killer sperm whale: A new basal physeteroid (Mammalia, Cetacea) from the Late Miocene of Italy. *Zool. J. Linn. Soc.* **2006**, *148*, 103–131. [CrossRef]
75. Franzini, M. Museo di Storia Naturale e del Territorio dell'Università di Pisa—Una settimana di apertura al pubblico. *Mus. Sci.* **1988**, *1-2*, 83–87.
76. Gingerich, P.D.; Wells, N.A.; Russell, D.E.; Shah, S.I. Origin of whales in epicontinental remnant seas: New evidence from the early Eocene of Pakistan. *Science* **1983**, *220*, 403–406. [CrossRef]
77. Thewissen, J.G.; Hussain, S.T.; Arif, M. Fossil evidence for the origin of aquatic locomotion in archaeocete whales. *Science* **1994**, *263*, 210–212. [CrossRef]
78. Thewissen, J.G.M.; Madar, S.I.; Hussain, S.T. *Ambulocetus natans*, an Eocene cetacean (Mammalia) from Pakistan. *Cour. Forsch. Inst. Senckenberg* **1996**, *191*, 1–86.
79. Geisler, J.H. Neoceti. In *Encyclopedia of Marine Mammals*, 3rd ed.; Würsig, B.G., Thewissen, J.G.M., Kovacs, K.M., Eds.; Academic Press: San Diego, CA, USA, 2018; pp. 631–632.
80. Farina, S. Biodiversità e Musei: Un progetto espositivo pluriennale. *Nat. Sci.* **2022**, *3*, 63–67.
81. Laidre, K.L.; Regehr, E.V. Arctic marine mammals. In *Encyclopedia of Marine Mammals*, 3rd ed.; Würsig, B.G., Thewissen, J.G.M., Kovacs, K.M., Eds.; Academic Press: San Diego, CA, USA, 2018; pp. 34–40.
82. Harington, C.R. The evolution of Arctic marine mammals. *Ecol. Appl.* **2008**, *18*, S23–S40. [CrossRef] [PubMed]
83. Heyning, J.E. Comparative Facial Anatomy of Beaked Whales (*Ziphiidae*) and a Systematic Revision Among the Families of Extant Odontoceti. Ph.D. Thesis, University of California, Los Angeles, CA, USA, 1989; pp. 1–64.
84. Schorr, G.S.; Falcone, E.A.; Moretti, D.J.; Andrews, R.D. First longterm behavioral records from Cuvier's beaked whales (*Ziphius cavirostris*) reveal record-breaking dives. *PLoS ONE* **2014**, *9*, e92633. [CrossRef] [PubMed]
85. MacLeod, C.D. Beaked whales, overview. In *Encyclopedia of Marine Mammals*, 3rd ed.; Würsig, B.G., Thewissen, J.G.M., Kovacs, K.M., Eds.; Academic Press: San Diego, CA, USA, 2018; pp. 80–83.
86. Bianucci, G.; Collareta, A.; Post, K.; Varola, A.; Lambert, O. A new record of *Messapicetus* from the Pietra Leccese (Late Miocene, Southern Italy): Antitropical distribution in a fossil beaked whale (Cetacea, Ziphiidae). *Riv. Ital. Paleontol. S.* **2016**, *122*, 63–74.
87. Dudzinski, K.M.; Gregg, J.D. Communication. In *Encyclopedia of Marine Mammals*, 3rd ed.; Würsig, B.G., Thewissen, J.G.M., Kovacs, K.M., Eds.; Academic Press: San Diego, CA, USA, 2018; pp. 210–215.
88. Waugh, C.A.; Nichols, P.D.; Noad, M.C.; Nash, S.B. Lipid and fatty acid profiles of migrating Southern Hemisphere humpback whales *Megaptera novaeangliae*. *Mar. Ecol. Prog. Ser.* **2012**, *471*, 271–281. [CrossRef]
89. Buckeridge, J.S.; Chan, B.K.; Lee, S.W. Accumulations of fossils of the whale barnacle *Coronula bifida* Bronn, 1831 (Thoracica: Coronulidae) provides evidence of a late Pliocene cetacean migration route through the Straits of Taiwan. *Zool. Stud.* **2018**, *57*, e54.
90. Belluzzo, A.; Lambert, O. A new delphinid from the lower Pliocene of the North Sea and the early radiations of true dolphins. *Foss. Rec.* **2021**, *24*, 77–92. [CrossRef]
91. Jefferson, T.A.; LeDuc, R. Delphinidae, Overview. In *Encyclopedia of Marine Mammals*, 3rd ed.; Würsig, B.G., Thewissen, J.G.M., Kovacs, K.M., Eds.; Academic Press: San Diego, CA, USA, 2018; pp. 242–246.
92. Bianucci, G.; Geisler, J.H.; Citron, S.; Collareta, A. The origins of the killer whale ecomorph. *Curr. Biol.* **2022**, *32*, 1843–1851. [CrossRef]
93. Reeves, R.R.; Martin, A.R. River dolphins. In *Encyclopedia of Marine Mammals*, 3rd ed.; Würsig, B.G., Thewissen, J.G.M., Kovacs, K.M., Eds.; Academic Press: San Diego, CA, USA, 2018; pp. 827–829.
94. Marx, F.G.; Fordyce, R.E. Baleen boom and bust: A synthesis of mysticete phylogeny, diversity and disparity. *R. Soc. Open Sci.* **2015**, *2*, 140434. [CrossRef]
95. Slater, G.J.; Goldbogen, J.A.; Pyenson, N.D. Independent evolution of baleen whale gigantism linked to Plio-Pleistocene ocean dynamics. *Proc. R. Soc. B Biol. Sci.* **2017**, *284*, 20170546. [CrossRef]
96. Bianucci, G.; Marx, F.G.; Collareta, A.; Di Stefano, A.; Landini, W.; Morigi, C.; Varola, A. Rise of the titans: Baleen whales became giants earlier than thought. *Biol. Lett.* **2019**, *15*, 20190175. [CrossRef]
97. Clapham, P.J.; Young, S.B.; Brownell, R.L. Baleen whales: Conservation issues and the status of the most endangered populations. *Mammal Rev.* **1999**, *29*, 37–62. [CrossRef]
98. Clarke, R.; Paliza, O.; Van Waerebeek, K. Sperm whales of the Southeast Pacific. Part VII. Reproduction and growth in the female. *Lat. Am. J. Aquat. Mamm.* **2011**, *10*, 8–39. [CrossRef]
99. Clapham, P.J. Humpback Whale: *Megaptera novaeangliae*. In *Encyclopedia of Marine Mammals*, 3rd ed.; Würsig, B.G., Thewissen, J.G.M., Kovacs, K.M., Eds.; Academic Press: San Diego, CA, USA, 2018; pp. 489–492.
100. Repetti, U. Il Museo Pisano di Storia Naturale. *Ann. Univ. Toscana Sez. Sci. Med. Fis. Mat. Nat. N. Ser.* **1925**, *10*, 171–180.

101. Baker, A.N. Status, relationships, and distribution of *Mesoplodon bowdoini* Andrews, 1908 (Cetacea: Ziphiidae). *Mar. Mammal. Sci.* **2001**, *17*, 473–493. [CrossRef]
102. Flower, W.H. On the recent ziphioid whales, with a description of the skeleton of *Berardius arnouxi*. *Trans. Zool. Soc. Lond.* **1872**, *8*, 203–234. [CrossRef]
103. Merlino, S.; Locritani, M.; Farina, S.; Sorbini, C.; Battaglini, S.; Dellacasa, M.; Scaglia, P.; Marchi, D.; Bonaccorsi, E. Plastic and Us: Looking at the marine litter problem from inside the rubbish. An unusual temporary exhibition at the Natural History Museum of the University of Pisa. *Mediterr. Mar. Sci.* **2022**, *23*, 338–356. [CrossRef]
104. Merella, M.; Farina, S.; Scaglia, P.; Caneve, G.; Bernardini, G.; Pieri, A.; Collareta, A.; Bianucci, G. Structured-light 3D scanning as a tool for creating a digital collection of modern and fossil cetacean skeletons (Natural History Museum, University of Pisa). *Heritage* **2023**, *6*, 6762–6776. [CrossRef]
105. Laeta, M.; Oliveira, J.A.; Siciliano, S.; Lambert, O.; Jensen, F.H.; Galatius, A. Cranial asymmetry in odontocetes: A facilitator of sonic exploration? *Zoology* **2023**, *160*, 126108. [CrossRef]