



MONSTERS OF THE SEA

MASSIVE • MIGHTY • MYSTERIOUS

ΦAUREA
EXHIBITIONS



ABOUT THE EXHIBITION

Monsters of the Sea is a comprehensive educational exhibition that plunge visitors in a journey to the past of the acuatic world. Each monster features life-like movements, colors and textures, delivering unique “real life” encounters with these massive creatures.

Our team of scientific experts designed the layout of Monsters of the Sea with careful consideration for even the smallest factual details. Illustrated displays and informational panels provide instructional and educational material for visitors of all ages.





CURATOR ADVISERS

Sea Monsters is curated by Argentinian paleontologist and natural scientist, Dr. Sebastian Apesteguia and Dr. Adrian Giacchino, Director of the Felix de Azara Foundation. The Felix de Azara Foundation of Natural History is a non-governmental, non-profit organization with the aim of contributing to the conservation of nature and cultural heritage, the development of science, and the sustainable use of natural resources.

Since it was founded in 2000, the Foundation has contributed more than fifty research and conservation projects, participated as an editor or sponsor for more than two hundred books and documentaries on science and nature, promoted the creation of nature reserves, worked in the rescue and management of wildlife, promoted research and dissemination of science information for private universities, assisted in the preparation of various environmental laws, organized conferences, courses and nearly one hundred lectures. Within a decade of its conception, the Foundation became synonymous with prestige, quality and excellence as a landmark institution for the development and dissemination of science and conservation of natural and cultural resources in Argentina.



AZARA
FUNDACIÓN DE HISTORIA NATURAL

Great White Shark
"Shark King"
(*Carcharodon carcharias*)


Time Period: Modern
Range: Worldwide
Habitat: Temperate and tropical coastal areas

Maximum Weight: 3,000 kg

colours, when viewed from above, underside would blend in with the lighter sky above. Great white shark can effectively sneak up to its prey before attacking it. Do you know of any animals that employ this method of camouflage?



Exceptional Sense for Hunting
Living organisms produce electric fields around their bodies. Great white sharks have the ability to sense electric stimuli, which help them to home in on prey. Near their heads, around the head and on the underside of the snout are small pores called ampullae of Lorenzini. They pick up the small fields, generated by other animals, which are then transmitted through jelly-filled bulbs that strike the nerves and signal the brain.

Time Period: Late Cretaceous,
83 - 72 million years ago
Places of Discovery: USA, Kansas
(Pierre Shale)

Diet: 

Giving Birth on Land or in Water?
Like most plesiosaurs, *Elasmosaurus* was incapable of raising anything more than its head above the water as commonly depicted (snake and coil-like). The weight of its head above the water as gravity behind the front flippers. Hence, it could only long neck placed the centre of gravity behind the front flippers. Therefore, it could raise its neck and head above the water in shallow water, were it could rest its body on the bottom. The weight of the neck, the limited musculature, and the restricted movement between the vertebrae would have prevented the *Elasmosaurus* from raising its neck and head high. With that, it was highly impossible for the *Elasmosaurus* to breach on land and prop itself out of water. Moreover, their paddles were rigid and were so specialized for swimming that they would not be able to come on land and lay eggs. Like modern sea snakes, the *Elasmosaurus* most likely gave birth to live young.

Time Period: Early Jurassic,
201 - 191 million years ago
Places of Discovery: Europe,
Including Belgium, England,
Germany, and Switzerland

Diet:  

Prey Detection Through its Ears
The *Ichthyosaurus* was very well adapted to an ocean life and hunting in water. Other than relying on its sense of sight for hunting, the solid bone structure of its ear drums suggested that it could detect its prey from a distance by their vibrations made in the water.

A HUGE Whale-Eating Whale
The *Livyatan* was armed with massive teeth in both its upper and lower jaws, and a huge skull that supported its jaw muscles. At 35 cm long, the *Livyatan* had the longest teeth (not including the tusks) of any living or dead animals! It probably hunted baleen whales when it was alive, using its teeth to inflict deep wounds and tear their flesh off.

What's In The Snout?
Similar to modern sperm whales, the *Livyatan* had a spermaceti organ (containing a waxy substance) present in its snout. For modern animals with this spermaceti organ, it is thought to help them in buoyancy control, act as a signalling (since it was found to be significantly bigger in males). Since the *Livyatan* hunted near the water surface and did not dive deep to feed, the organ might have played other functional roles like boosting range during echolocation, acoustic displays, and aggressive head butting among males during fight.



Livyatan melvillei
Named after American novelist Herman Melville, author of "Moby Dick"

Time Period: Miocene, 13 - 12 million years ago

Maximum Weight: 50,000 kg

Cause of Extinction?
Interestingly, when the *Livyatan* was alive, it might of crossed path and got into battles with another mega "monster" - the *C. megalodon* which lived during the same time period. With no natural predators, the *Livyatan* was an apex predator during the time it ruled the Miocene oceans. Most likely, it could have extinct due to the changing environmental conditions as apex predators are sensitive to changes in prey populations. The changes in the number, size, and diversity of baleen whales, as well as global cooling, could have led to their eventual demise.



Megalodon
"Big tooth"

Time Period: Miocene to Pliocene,
15 - 2.6 million years ago
Place of Discovery: Worldwide.

Diet:   

Maximum weight: 100,000 kg.

Thermoregulation in a Cold Environment
Carcharodon megalodon were massive animals living in a cold watery environment. Unlike animals that we are familiar with i.e. polar bears or seals, these prehistoric sharks had no layers of blubber (fat) to keep them warm. Instead, the outer layer of muscles and flesh of the large *C. megalodon* held onto heat, insulating the internal organs from the cold environment and allowed the brain and other sensory organs to operate at a warm-blooded metabolism level.

Dinosaurs Were Not Part of Its Meal!
Debunking a misconception, *C. megalodon* did not consume dinosaurs! It only appeared 36 million years after dinosaurs went extinct at the end of the Cretaceous period. Nonetheless, Megalodons were fearsome predators that used their serrated and multiple rows of teeth to latch on to their prey tightly. To enhance their grip, the upper jaw could move in 2 planes - up and down, and forward and backward. Megalodons then shook their head to tear the prey apart before pulling their jaws back for consumption.

How Did Megalodons Go Extinct?
An onset of global cooling would have adversely affected the massive Megalodon since they were not warm-blooded to deal with the sudden drop in temperature. Formation of ice could block their migration routes and confined them to warmer waters where they no longer had a constant year-round access to whales that they were most adapted to hunt. The loss of designated nurseries areas near the coast, where young sharks could live and hunt while being safe from large predators in the ocean, could have led to their demise too.



Mosasaurus
"Meuse River lizard"

Time Period: Late Cretaceous,
72 - 66 million years ago
Place of Discovery: Western Europe, North America.

Diet:   

Weight: 5,000 kg

Eyes Can Tell
Mosasaurus had fairly big eyes, which could be beneficial while hunting or under low light conditions. An animal with forward-facing eyes has binocular vision that helps with perception of depth (how far or near an object is) its side-eye eyes indicated that the *Mosasaurus* had poor binocular vision. It did not rely on gauging the distance between the prey and itself, and was likely not a fast hunter that relied on speed to chase down prey over a distance.

Stealthy Hunter
The *Mosasaurus* was one of the heaviest built among all the mosasaurs. It suggests that it preferred larger and slower prey. *Mosasaurus* hung around oceans, awaited other marine reptiles to surface for air and used its tail to provide quick burst of speed to launch its attack. Prey was usually at its most vulnerable would be in the most lit upper portion of the water while the *Mosasaurus* camouflaged with the darker surroundings as it attacked from below.

Fossilised Pigments Revealed Countershading
Analysis fossils of skeletal remains revealed the presence of the *Mosasaurus* colours - fossilised melanosomes that are pigment-containing cellular organelles. *Mosasaurus* were actually dark-coloured on their upper backs. The pigment used for efficient thermoregulation as dark colour allowed them to heat up faster reach higher temperatures, offer protection against harmful UV rays, as well as provided camouflage from their prey through countershading.

Pliosaurus versus Plesiosaurs
Pliosaurus were massive marine reptiles with short necks and large heads, while the related plesiosaurs had longer necks and smaller heads. Generally, plesiosaurs had front paddles or limbs that were larger than its back limbs, while pliosaurus had larger front limbs.

"Predator X"
When the fragmented remains (around 20,000 pieces) of the pliosaur - *Pliosaurus furskoi* - were discovered in 2006, it was estimated to be 15 meters long and was named "Predator X". After years of analyzing the specimens closely, "Predator X" was found to be around 10 to 12.8 meters long and it was a different species of *Pliosaurus*. Among the various *Pliosaurus* species, *Pliosaurus furskoi* had front paddles that were proportionally longer, (with that had different spacing, as well as a vertebrae with a slight varied shape. Even though it was smaller than previous estimations, its huge size and length of 12 meters was still larger than the largest living apex predator - the killer whale which can grow up to 9 meters long).

Pliosaurus
"More lizard"

Time Period: Late Jurassic,
5 million years ago
Discovery: Europe

"Flying" Through Water
Pliosaurus were built for speed and had limbs that were paddle-shaped to help them move swiftly through the water. Most likely, they swam very quickly and chased down their prey before ambushing them with a bite. Pliosaurus hunted in the shallow seas and were known to consume their long-necked cousins - the plesiosaurs. The stomach contents of some plesiosaurs revealed that they also consumed dinosaurs and could indicate that they fed on dinosaur carcasses that might have floated out to sea. Eventually, the majestic mosasaurs took over the feeding niche of the pliosaurus in the prehistoric seas.



Ophthalmosaurus
"Eye lizard"

Time Period: Middle to late Jurassic,
168 to 145 million years ago
Place of Discovery: Europe and North America.

Diet:  

Maximum Weight: 3,000 Kg.

Huge Eyes
Among the sea creatures in the late Jurassic seas, the *Ophthalmosaurus* possibly had the proportionally largest eyes at a diameter of 22 cm for its body length, with an aperture (opening) of around 10 cm! Bigger eyes can house more retinal photoreceptive cells and a wider aperture allows the eyes to receive more light. These traits helped to provide the *Ophthalmosaurus* vision under low light conditions as it dived deep for nocturnal activities, deep water hunting, or to avoid marine predators like the *pliosaurus* and *liopleurodon*. Well-developed scleral ring, which are bony growths around the eyes, supported and protected their eyes from the crushing pressure in greater depths.



Adapted to Deep Diving
Other than seeing under low light in the deep oceans, the *Ophthalmosaurus* had a well-compacted backbone with minimal gas spaces. This reduced the occurrence of gas and pressure build-up in the backbone, due to the varying water pressure, as it dived deep and surfaced. It has been calculated that an *Ophthalmosaurus* could stay submerged for at least 20 minutes - duration enough to dive down to 800 meters and back!

Specialised Squid Hunter
Its elongated snout and almost toothless jaw were highly adapted for catching squid and fish. With its streamlined body and ability to see well under low light conditions, you can picture the *Ophthalmosaurus* diving very deep at a fast speed to snap up deep sea squids and quickly swimming up to the surface to catch its breath.



Plesiosaurus
"Almost lizard"

Time Period: Late triassic - Early Jurassic, 209 - 191 million years ago
Place of Discovery: England - Lias Group.

Diet:   

Well-Adapted to a Watery Life
Plesiosaurus had stiff flippers that were more effective for paddling and getting around in water. These same flippers would be too cumbersome on land and were suitable for lifting its bulky body off the ground. *Plesiosaurus* used both its fore and back flippers in an alternating fashion, when it swam. By combining both the down stroke of its two sets of flippers (fore and back) at the same time, this movement may give the *Plesiosaurus* short bursts of speed for hunting or strike prey by surprise.

Long Neck
Plesiosaurus had a long neck with about 40 vertebrae. Its neck served as a strong piece of evidence that it led to an entirely aquatic lifestyle. Albeit being long, it was surprisingly inflexible and the most stable posture was when the *Plesiosaurus* projected its neck horizontally forwards. If it went out of the water, it would not be able to support its head. Its long neck served to strike out at its fish prey.

Fully or Partially Aquatic?
Many used to or wondered how long did plesiosaurs spend their time in water, with many early artworks that depicted them as being able to leave the ocean to walk on land. Through studies on their morphology through fossil studies and comparison to modern animals, plesiosaurs most likely led a fully aquatic life as they would not be able to haul themselves up onto land, nor were they able to support their body weight out of water. Since they likely led a fully aquatic life, plesiosaurs most likely gave birth in water.

INFORMATIVE CONTENT

Editable panels.

Shark
"Shark King"

Time Period: Modern

Maximum Weight: 3,000 kg

...with a lower side. With countershading, a huge animal like the white shark can blend in with the surroundings before sneaking on its unsuspecting prey. Interestingly, the coloration and upper surface with its patterns of lines and spots for each white shark are unique. They will remain the same throughout its life span, making it ideal for identification of individuals.



Tylosaurus
"Knob lizard"

Time Period: Late Cretaceous,
88 - 78 million years ago

A Hunter and Scavenger
The late Cretaceous oceans were thriving with life. Other than consuming marine reptiles and fish that were plentiful, the *Tylosaurus* might have scavenged on the occasional carcasses of dinosaurs that might have drifted out to the sea. A particular fossil specimen (a hadrosaur) was found with puncture marks that matched the tooth arrangement and size of a *Tylosaurus*. Sea birds, like the *Hesperornis*, and pterosaurs might have unfortunately crossed paths with the *Tylosaurus* and became its meal.

Tail of a Tail
Tylosaurus was one of the bigger mosasaurs around and was dubbed "Predator of the late Cretaceous Seas". Other than having a hydrodynamic body, it relied on its muscular, long and vertically flattened tail to propel itself through water. The tail had more than 80 vertebrae and each vertebra was shaped in a way to give the *Tylosaurus* maximum pushing power in water. Its fins functioned more like the rudders of a ship to guide its directions.

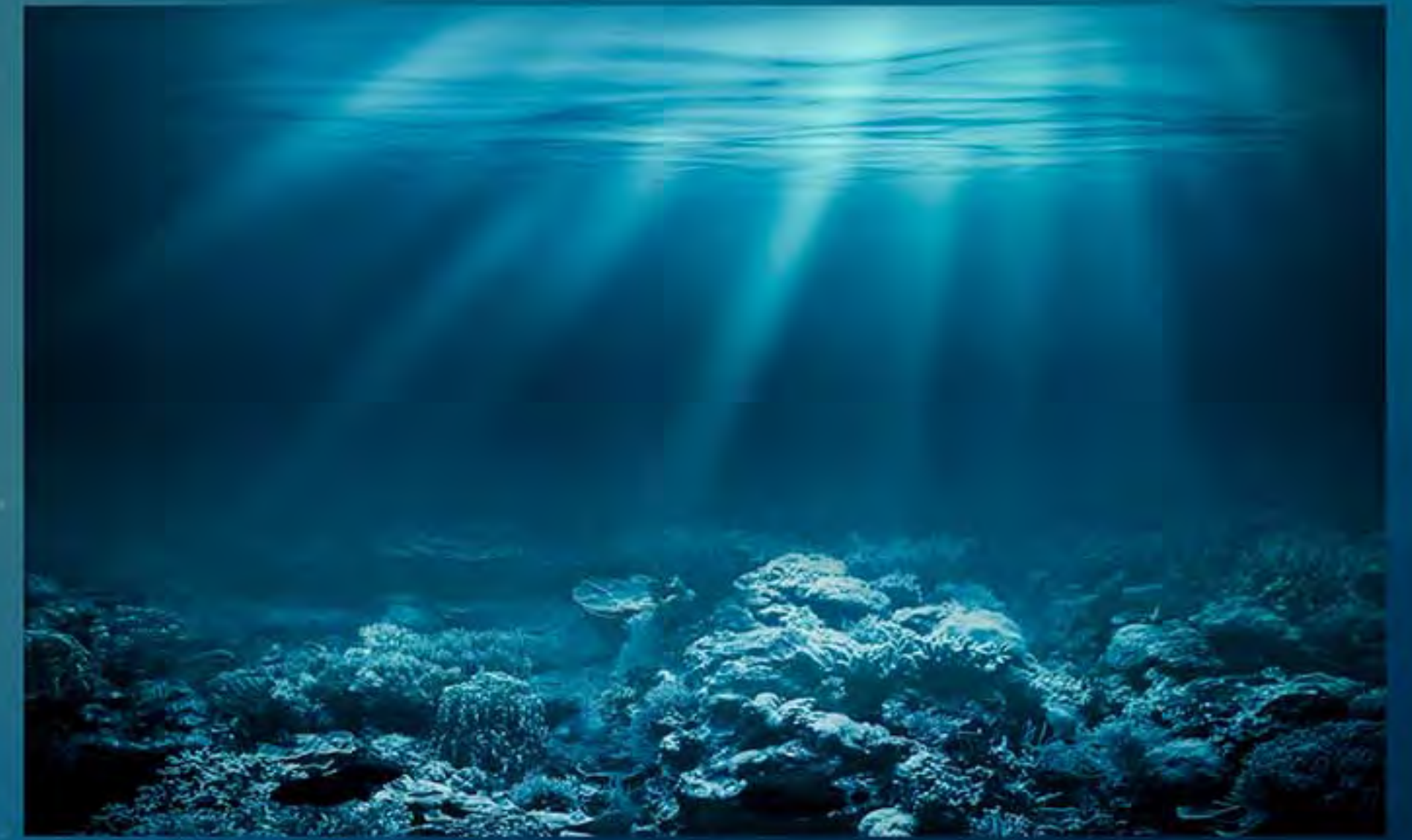


Purussaurus
"Purus River reptile"

Time Period: Middle to late Miocene.

One of the Most Powerful Bites Among the Tetrapods
Tetrapods are four-footed animals. This majestic and huge animal had an estimated sustained bite force of 7,000 kg! That is almost twice the bite force of the once-thought strongest land animal - *Tyrannosaurus rex*. Compared to a living shark, the *Purussaurus*' bite force is 20 times of a great white shark!

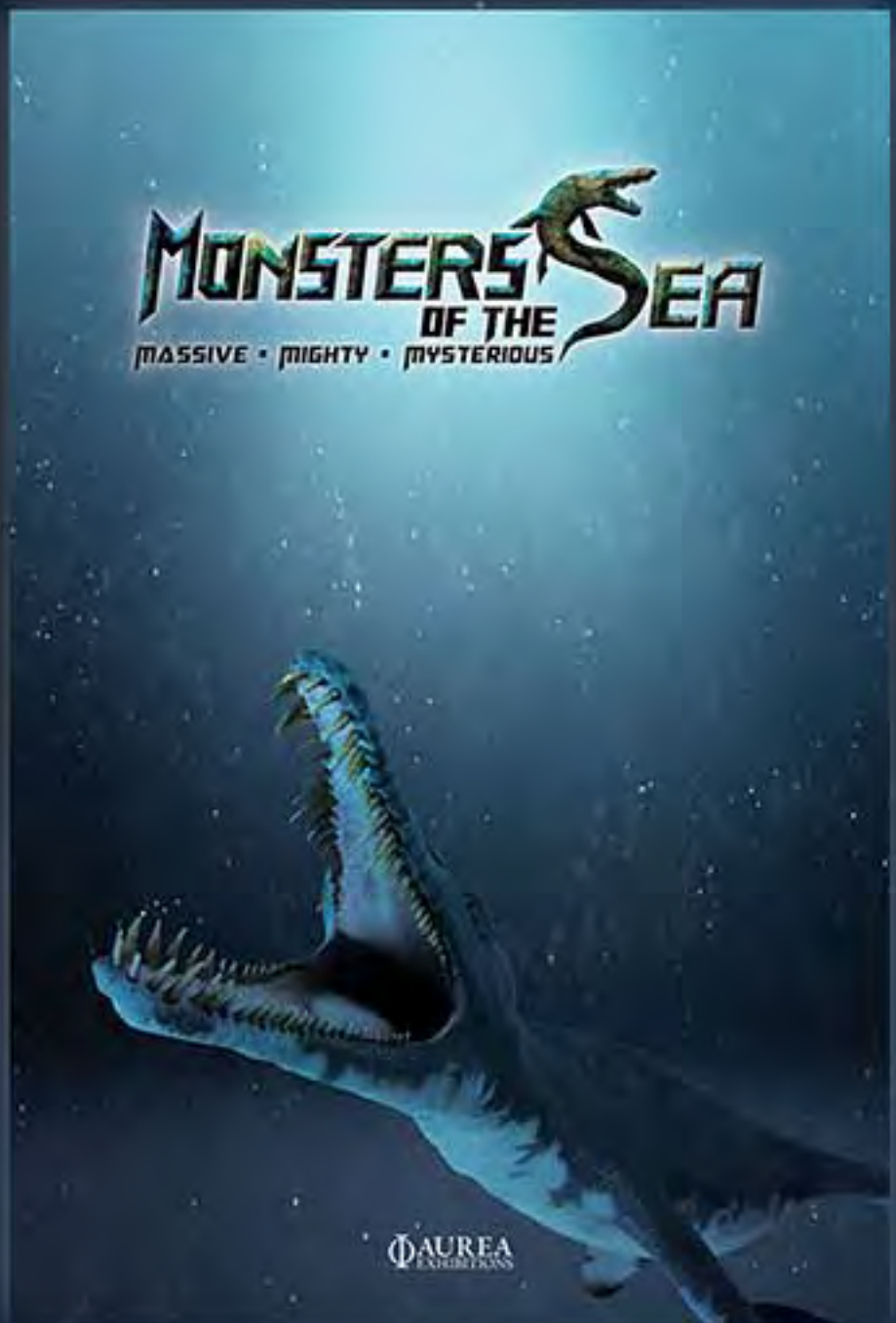
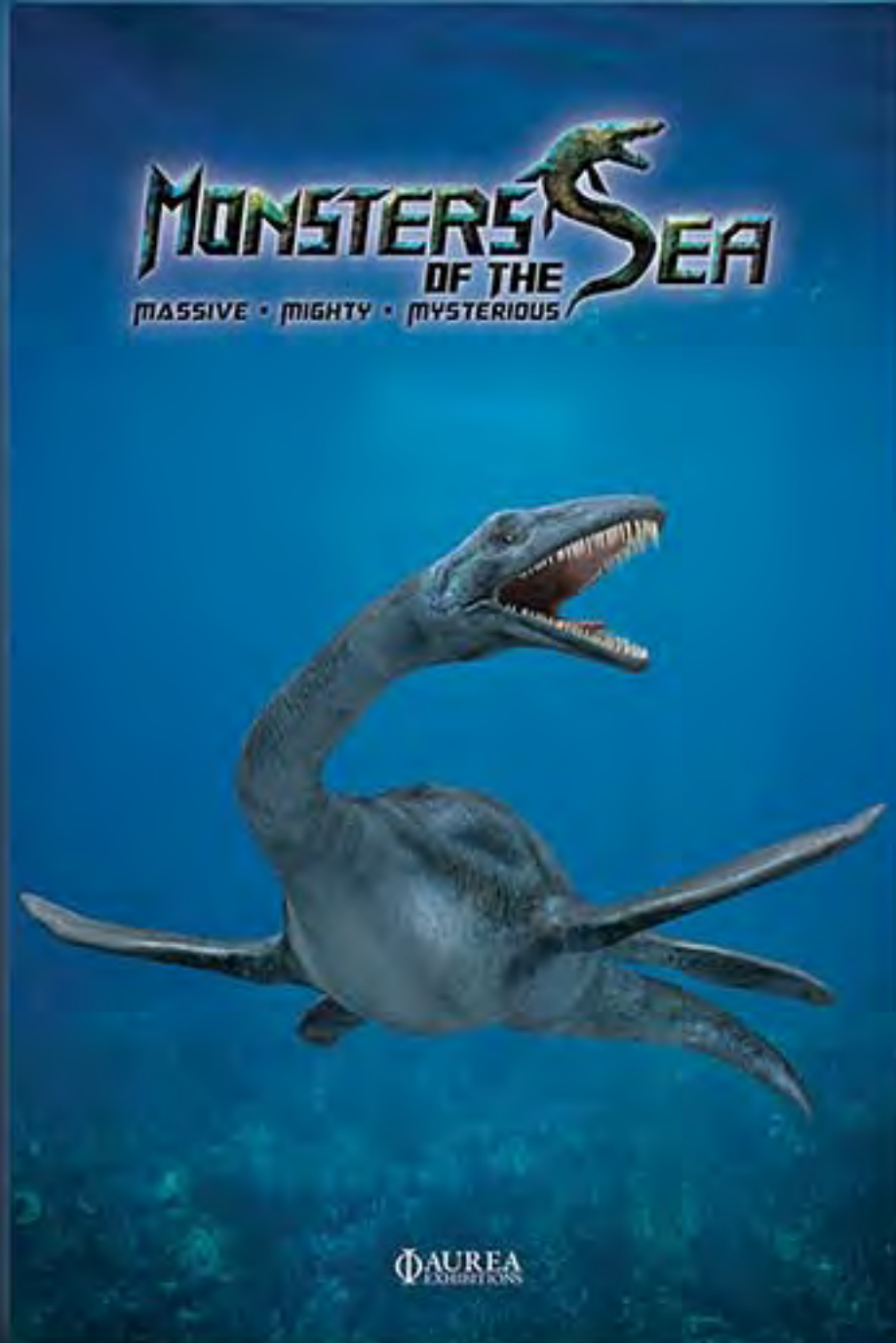
Right Tools for the Right Job
Check out the conical teeth that are housed within its skull and robust jaws that curve backwards and slightly inwards, making them ideal for ambushing and crushing. When alive, the teeth had high resistance to bending forces and torsion. *Purussaurus* was handling bones that it ingested. Its teeth were used to crush bones.



- Comprehensive copy panels
- Different species of animatronic sea monsters with full range of motion and scientifically accurate coloring and textures.
- Multimedia experiences
- Exhibit theme music (Surround sound system)
- Landscape backdrops and curtains
- Scenery including plants, trees, rocks and sea weed.
- Truss and structural elements
- Rustic railings and barricades



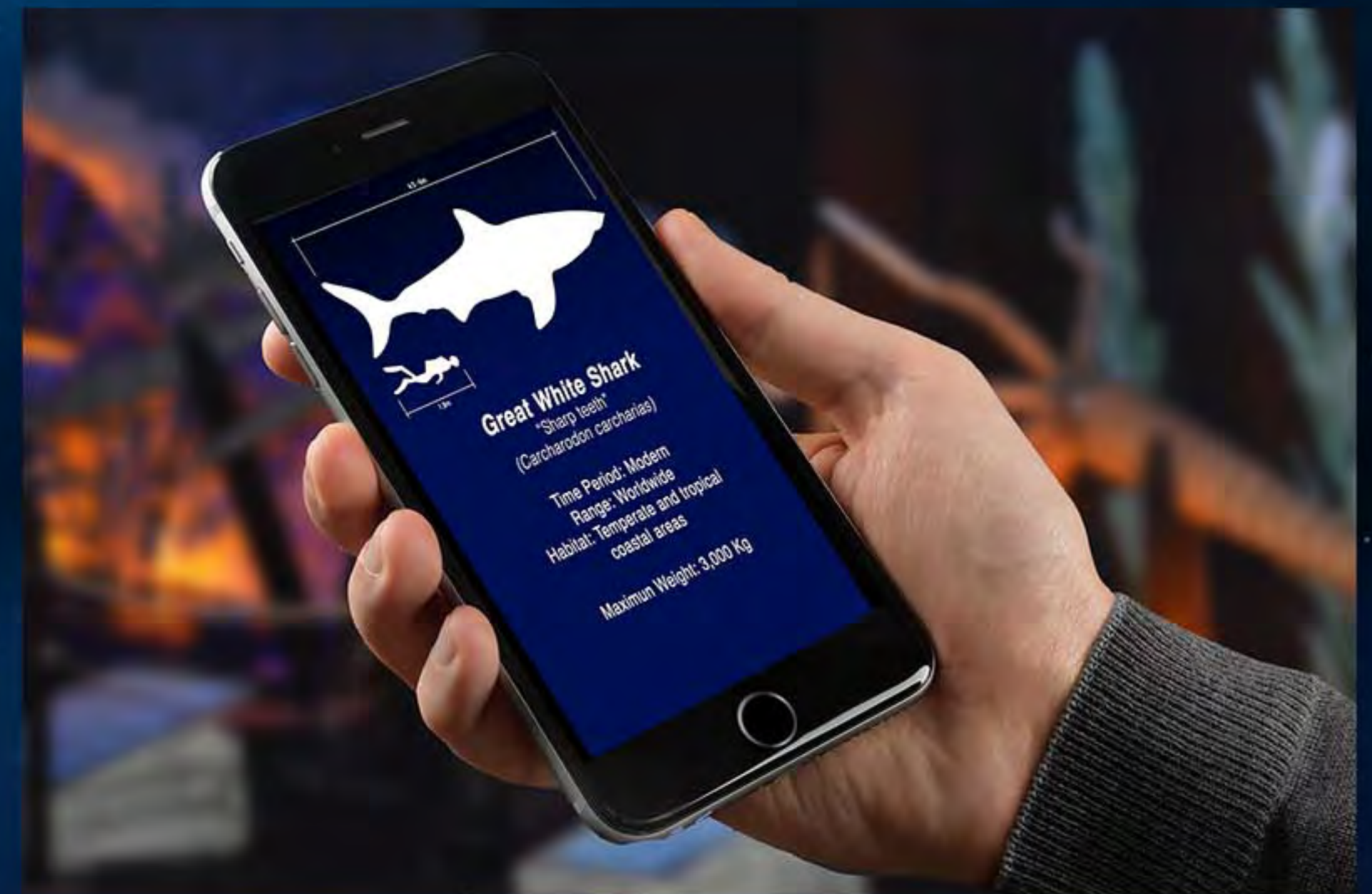
ARTWORK ASSETS : Editable artwork





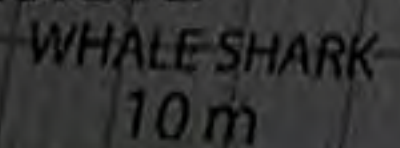
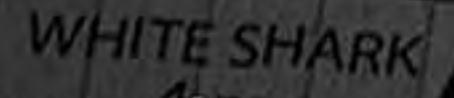
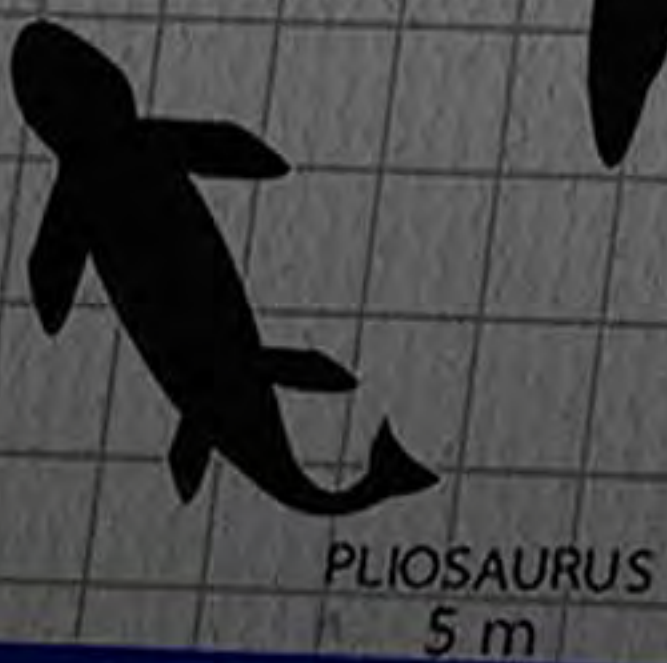
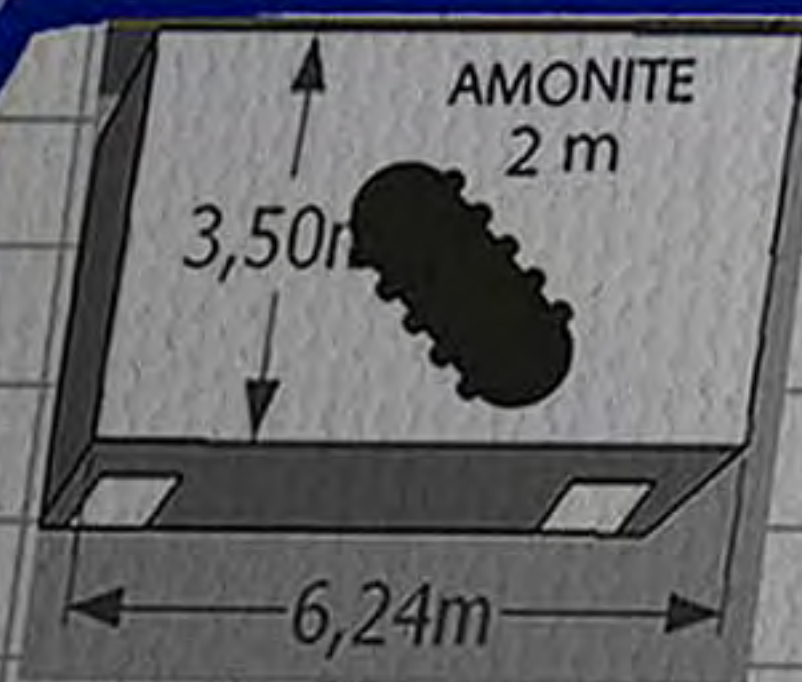
INTERACTIVE AND ENTERTAINMENT AREA

- Children's creativity and drawing area
- Fossile replica area
- Photo opportunity
- Free app (IOS & Android)



MONSTERS OF THE SEA

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REQUIREMENTS:

- Space required: Ideal 1000 to 2500

also adaptable to smaller venues

- Display period: 3 to 12 months

- Shipping requirement: four 40' shipping containers

39,29m

21,67m



TOPICS

- Learn about the origins of life, 4,000 million years ago in a very different world as we know it today.
- See the Armoured fish that lived 400 million years ago when all the sea animals were only 10 to 15 cm long, this 6 to 9 meters long fish had a 540 kg pressure bite.
- Mesozoic marine reptiles, the origins of all terrestrial dinosaurs.
- Sharks (living fossils) that are 200 million years older than the dinosaurs.
- Come face to face with the largest shark ever found, the 15 m Megalodon.
- Cetaceans, whales that ate whales.
- Crocodiles that measured over 13m long.
- This incredible, interactive show is exiting, engaging and educational for visitors of all ages.

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EXHIBITIONS

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