Sea Monsters

Prehistoric Ocean Predators

20 November 2020 – 3 May 2021

PRIMARY

Teacher Resource and Curriculum links

Exhibition Producer and Tour Manager

MUSEUM | AUSTRALIAN NATIONAL MARITIME MUSEUM

Queensland Museum Network
Exhibition Partner

PROJECT DIG | BHP

Exhibition Development Partner

QUEENSLAND MUSEUM NETWORK

Queensland Government

Introducing the Exhibition

Sea Monsters: Prehistoric Ocean Predators was developed by the Australian National Maritime Museum in partnership with Queensland Museum.

The exhibition showcases the mighty ancient marine reptiles that hunted the oceans at the same time dinosaurs walked the land: these were the plesiosaurs, ichthyosaurs and mosasaurs.

Through a range of interpretative panels, life size models, fossils, and engaging interactive experiences you and your students will have a terrifyingly great time!

Key themes:

- **Palaeontology** –history, study of fossils, impact of technologies
- **Adaptations to life in the ocean** – movement, sensory information, reproduction, diet and salt excretion, camouflage
- **Ocean predators today** – extinct and extant (living) animal groups, convergent evolution, human impacts, conservation

Complementary messages:

- Our knowledge and understanding of ancient animals can change! Human eyes have never seen a living plesiosaur or dinosaur, so we interpret fossils for evidence of how they looked and behaved. New fossils and or new technologies may reveal additional information.
- The largest known animal to have ever lived, is the Blue Whale, *Balaenoptera musculus*.
- Marine reptiles which are alive today (extant as opposed to extinct groups) are the sea turtles, sea snakes, marine iguanas and crocodiles.
- It is scientifically incorrect to call ancient marine reptiles and flying reptiles “dinosaurs”. Dinosaurs are their own taxonomic group, evolving from separate common ancestors. You could think of dinosaurs as ‘ancient land reptiles’, occurring at the same time as other flying and swimming reptile groups.
- Megalodon is an extinct shark (fish) species, the largest that we know of so far. It lived approximately 23 to 3.6 million years ago, a long time after the ancient marine reptiles went extinct and before humans had evolved.

Stimulus Questions for students visiting the exhibition

What are some of the adaptations (physical features) that allowed ancient marine reptiles to live in the oceans? *Think about how they moved, what they ate or what ate them, how they could breathe and how they reproduced.*

Describe ways are these ancient animals similar to any marine animals that are alive today.

Can you imagine being a palaeontologist? How would you do your job and how has it changed over time?

What are fossils?

Describe some of your favourite animals (fossils, fossil casts, or models) in the exhibition and explain why you chose them.

What did the exhibition make you curious about (did anything make you think deeply, or want to find out more)?

Meet the Curator:

Q & A with Dr Espen Knutsen

Dr Espen Knutsen is Senior Curator Palaeontology at the Queensland Museum Network, based at the Museum of Tropical Queensland campus in Townsville. His position is co-appointed with the College of Science and Engineering at James Cook University.

Espen is a vertebrate palaeontologist, who over the past 12 years has conducted pioneering fieldwork and excavations in Australia, the Arctic, The Netherlands and USA. He has described five new species of Jurassic marine reptiles, and was part of an international multidisciplinary research team studying a newly discovered Jurassic marine ecosystem from the High Arctic archipelago of Svalbard, Norway.

He has a special interest in the diversity, evolution and ecology of Mesozoic reptiles, such as ichthyosaurs, plesiosaurs and dinosaurs. Current projects, involving fieldwork throughout Australia for the Australian Mesozoic Tetrapod Project, aim to fill significant gaps in our knowledge and understanding of the Triassic, Jurassic and Cretaceous vertebrate fauna of the southern hemisphere.

Find out more about Espen's research including links and short videos, here.
https://www.qm.qld.gov.au/Research/People/People/Profile/K/Espen+Knutsen

What is a palaeontologist and did you always want to be one?

A palaeontologist is a scientist who studies the past through fossils. Fossils are the remains of animals, plants and other organisms that lived some thousands to millions of years ago and are preserved in rock.

I didn't always want to be a palaeontologist, but I have always been interested in the natural world whether it was the depths of space or butterflies in my garden.

What are some of things you need to like doing to be a palaeontologist?

To be a palaeontologist you must like making discoveries and solving mysteries. Every fossil we collect has its own story to tell, and it is up to us to use all the techniques we have available to find out what these stories are and what they can teach us.

Most palaeontologists also have to like spending time outdoors. Every year we leave our museum offices to search for new fossils. This can mean spending weeks away sleeping in tents, or it can be daytrips to fossil-bearing rocks nearby. We then study them back at the museum.

How many fossils have you found so far? Do you have a favourite?

So far, I have found hundreds of fossils from tiny marine animals to plants and dinosaurs. Finding the fossil is only part of the process, however; especially when it comes to larger animals such as marine reptiles or dinosaurs. Once found, the fossil needs to be safely collected, which requires days to weeks of excavation. Then, when it has finally made its way back to the museum lab, we spend months removing the surrounding rock and stabilising the fossil with glue, before we can start studying the bones. By looking at how the bones are similar or different from other fossils, we can find out if what we have is something new or the same as a known species.

My favourite marine reptile would have to be the long-necked elasmosaurs because of their amazingly long necks with up to 76 vertebrae (neck bones)!

Why shouldn't we call ancient marine reptiles dinosaurs?

We distinguish between marine reptiles and dinosaurs because marine reptiles evolved from different ancestors, which were not directly related to dinosaurs. Ancient marine reptiles swam in the seas, dinosaurs walked on land and ancient flying reptiles flew in the skies. Marine reptiles alive today include sea turtles, saltwater crocodiles, sea snakes and marine iguanas.

What are you currently working on?

I work on a lot of different projects all the time. The mains things I am working on right now are Jurassic (201-145 million years ago) plants and animals from Australia and Triassic (252-201 million years ago) amphibians and reptiles from Queensland. The Jurassic fossils are very important as we only have very few of these in all of Australia. The Triassic fossils are important because they show us what happens to nature before and after mass extinctions (that is when a huge amount of all life on Earth dies very suddenly, for example when the dinosaurs died because of volcanic eruptions and an asteroid strike).

What kind of technologies are you working with?

A lot of different new technologies have been made available to palaeontologists in the past 10-20 years. For example, x-rays which allow us to look inside fossils and also see fossils still within the rock. 3D scanning is another, which helps us in studying how these animals moved, and to more easily compare them to one another.

What is your favourite part of the exhibition and why?

My favourite part of the Sea Monsters exhibition is the huge life-sized skeletons, because they really show us how large and scary these creatures were.

What is your favourite thing about working at the museum?

My favourite part about working at the museum is that I am always doing what I love and find interesting. I get to go to places where most people don't go, and discover animals and plants never before seen by any human.

Primary Australian Curriculum Links

Ancient marine animals were ***once*** living things and therefore connect to *Science Understanding* content in past tense. For example, ancient marine reptiles had a variety of structural features and adaptations which enabled them to breathe, move, eat, reproduce and sense their surroundings in aquatic environments. The exhibition also supports *Science as a Human Endeavour* content by examining how palaeontology as a scientific discipline has changed over time and refers to the individual contributions of past and contemporary palaeontologists.

Primary Science	
Strand: Science Understanding	
Sub-strand: Biological Sciences	
Foundation	Living things have basic needs, including food and water (ACSSU002)
Year 1	Living things have a variety of external features (ACSSU017) Living things live in different places where their needs are met (ACSSU211)
Year 2	Living things grow, change and have offspring similar to themselves (ACSSU030)
Year 3	Living things can be grouped on the basis of observable features and can be distinguished from non-living things (ACSSU044)
Year 4	Living things have life cycles (ACSSU072) Living things depend on each other and the environment to survive (ACSSU073)
Year 5	Living things have structural features and adaptations that help them to survive in their environment (ACSSU043)
Year 6	The growth and survival of living things are affected by physical conditions of their environment (ACSSU094)
Strand: Science as a Human Endeavour	
Sub-strand: Nature and development of science	
Foundation	Science involves observing, asking questions about, and describing changes in, objects and events (ACSHE013)
Year 1-2	Science involves observing, asking questions about, and describing changes in, objects and events (ACSHE021) & (ACSHE034)
Year 3-4	Science involves making predictions and describing patterns and relationships (ACSHE050) & (ACSHE061)
Year 5-6	Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions (ACSHE081) & (ACSHE098)