

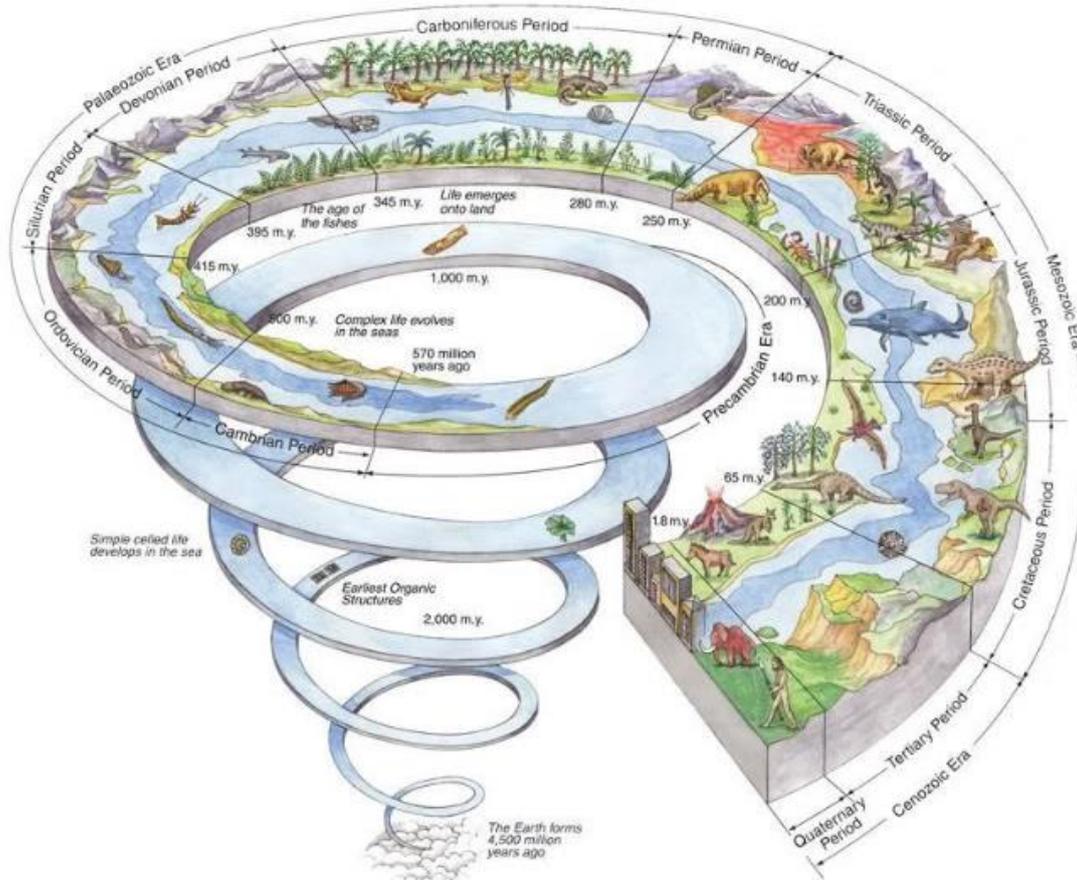


Introduction to Palaeontology

Useful for Module 2: Foundations in Geology – Fossils and Time

All dinosaurs are palaeontology, but not all palaeontology is dinosaurs! The most ancient fossil found on Earth dates to 3.5 billion years and is the stromatolite, made of layers of cemented cyanobacteria.

The time spiral diagram below beautifully expresses evolution through the ages, from the formation of the Earth, through animals venturing onto land in the early Cambrian, to the evolution of humans.



We all had to start somewhere! The earliest known complex multicellular organisms found on Earth are the Ediacaran biota that occurred around 635 – 542 Million Years Ago in a period called the Proterozoic. Some of the most famous Ediacaran are found in England, in Charnwood Forest.

Charnia masoni from Charnwood Forest



Charniadiscus from Charnwood Forest



Evolution has, in part, been made possible by ecological niches becoming available. Some of the biggest events that facilitated this were the 5 big Extinction Level Events (ELEs). The pictures show creatures thought to have gone extinct in each ELE.

The Ordovician Mass Extinction

Date: Around 440 million years ago

Size: 85% of all living species extinct

Cause: Rapid global cooling, and then sea level fall associated with a wide-spread glaciation event.

Photo: *Cameroceras*



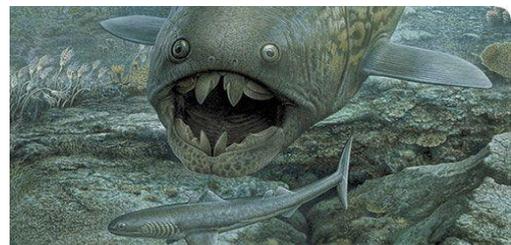
The Devonian Mass Extinction

Date: Around 375 million years ago

Size: 80% of all living species extinct

Cause: Global cooling triggered by mass volcanism (also – a possible meteorite strike)

Photo: *Dunkleosteus*



The Permian Mass Extinction

Date: Around 250 million years ago

Size: 96% of all living species extinct

Cause: Unknown – but possibly volcanic activity and resultant climate change

Photo: *Dinogorgon*



The Triassic – Jurassic Mass Extinction

Date: Around 200 million years ago

Size: > 50% of all living species extinct

Cause: Major volcanic activity (flood basalts), global cooling, and ocean acidification

Photo: *Temnospondyls*



The K-T Mass Extinction

Date: Around 65 million years ago

Size: 75% of all living species extinct

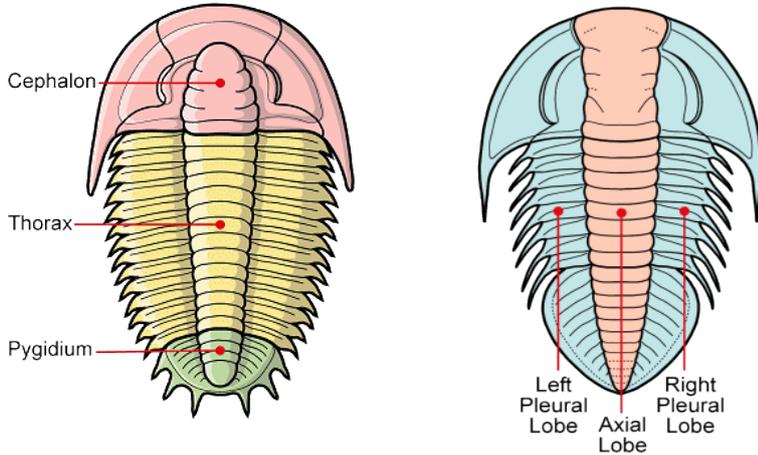
Cause: Extreme asteroid or meteorite impact

Photo: Dinosaurs!



One of the key skills for a Palaeontologist is to identify key nuances in specimens. A good place to start is the humble trilobite

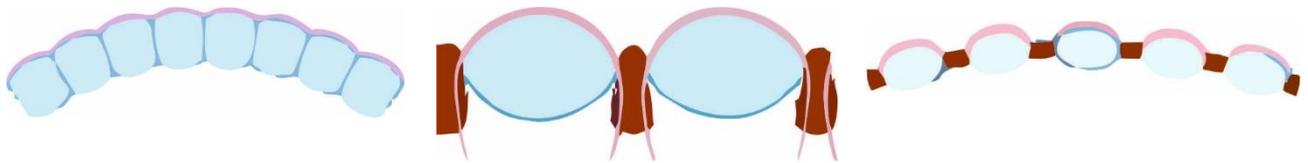
Key Trilobite Facts: Trilobites are extinct arthropods that existed from the Early Cambrian Period until the Permian-Triassic mass extinction (although, the diversity had already decreased dramatically during the Devonian)



‘Tri’ typically means ‘three’. In this case, it doesn’t refer to the three main body parts (cephalon, thorax, and pygidium) but actually the fact the body is divided into three lobes (left pleural lobe, axial lobe, and the right pleural lobe).

Try recreating both of the sketches on the left with enough detail that the divisions can be clearly identified.

There are three main types of trilobite eye; holochroal, schizochroal, and abathochroal. These are displayed in order from left to right. The cornea is represented by the pink colour – can you describe how this differs throughout the different eye types? For information, the light blue represents the lenses and the dark red represents the sclera (similar to the white outer layer of your eyeball)



Describe the differences between the corneas:

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A bit like modern-day shrimp, trilobites shed their shells as they grew. They detached their old shell by opening facial sutures! Can you draw a simple sketch of the three main types of facial sutures (shown in red) using the images below and describe how they are different?

Proparian Facial Suture

Gonatoparian Facial Suture

Opisthoparian Facial Suture

