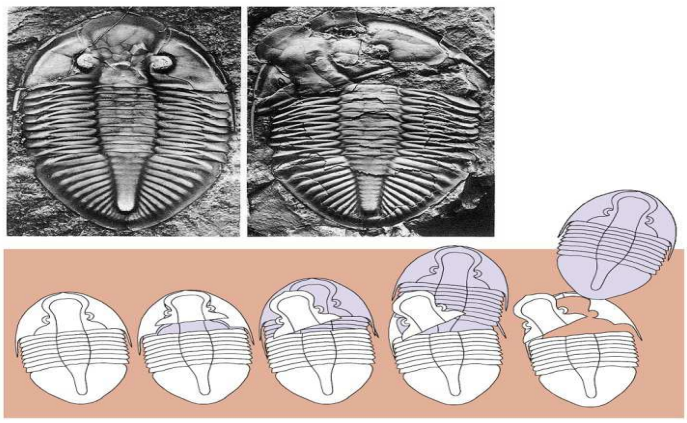
## ECDYSIS

It is thought that trilobites could not grow within their exoskeleton and so had to moult it periodically, a process called ecdysis.

Weaknesses such as the facial suture would be exploited to shed the old exoskeleton and a period of rapid growth would follow before the new exoskeleton hardened.
Many trilobite fossils and fossil fragments are thought to result from this process.

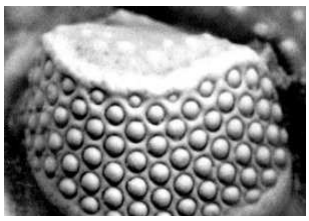


## TRILOBITE EYES

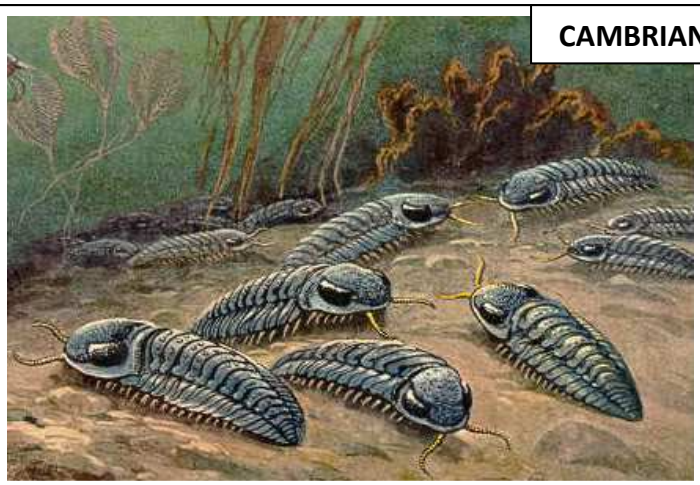
Trilobites were one of the first creatures to develop eyes in the Cambrian period. For the first time creatures could distinguish shapes and movement and not just light and dark.

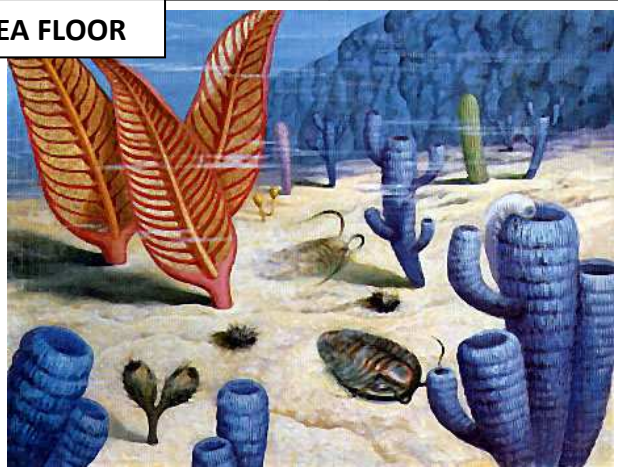
The development of eyes may have been one of the drivers of the rapid period of evolution that occurred in the Cambrian, generating a kind of arms race as predators and prey attempted to out evolve each other.

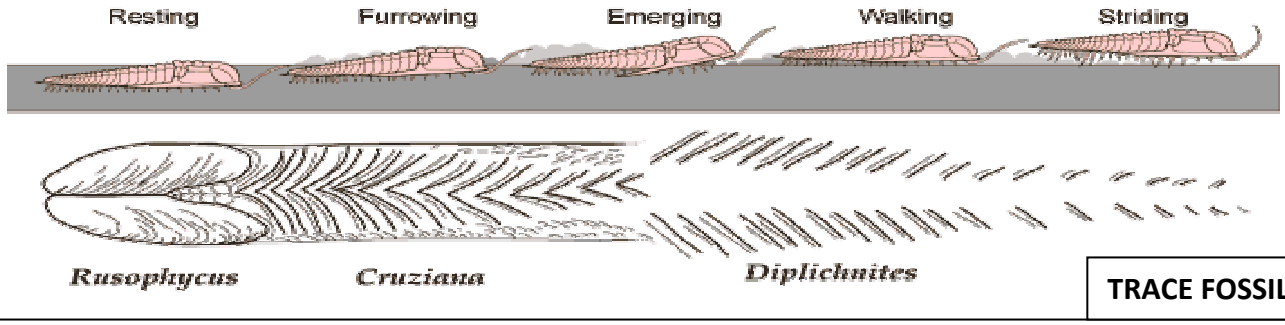
The compound eyes of trilobites made up of many separate calcite lenses were thought to have been particularly efficient.



## CAMBRIAN SEA FLOOR








## TRACE FOSSILS

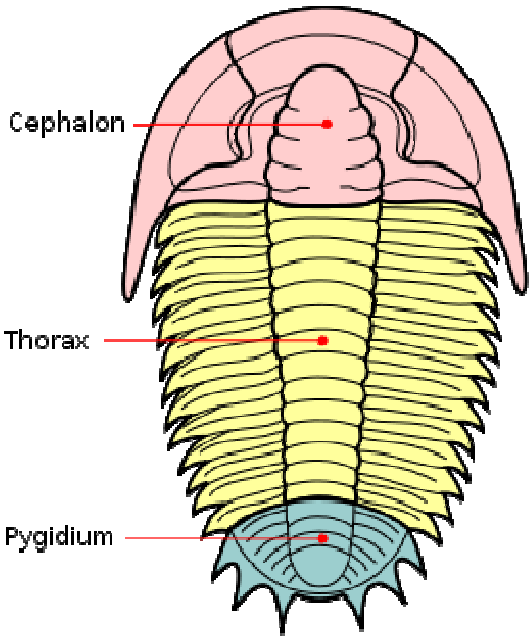
When a trilobite is resting, partially buried in the mud of the benthos, it leaves a bi-lobed impression called a *Rusophycus*, that is sometimes marked by parallel marks that correspond to its legs. *Cruziana* are tracks showing rather clearly defined edge furrows, probably created by a trilobite moving, partially buried, through the mud. The widest part of the shell leaves the parallel outer furrows, while the leg movements create the chevron-shaped marks in the center of the track. Finally, when a trilobite is walking or striding freely upon the surface, it leaves paired leg marks called *Diplichnites*, which can be reduced to rather widely-spaced impressions when the animal is striding at full speed across the substrate. As noted in the illustration above, the three types of traces can grade into one another, and the transitions are related to whether the animal is stationary or moving, the speed of movement, and whether the trilobite is partially buried or fully emerged from the substrate.

# geographyjohn

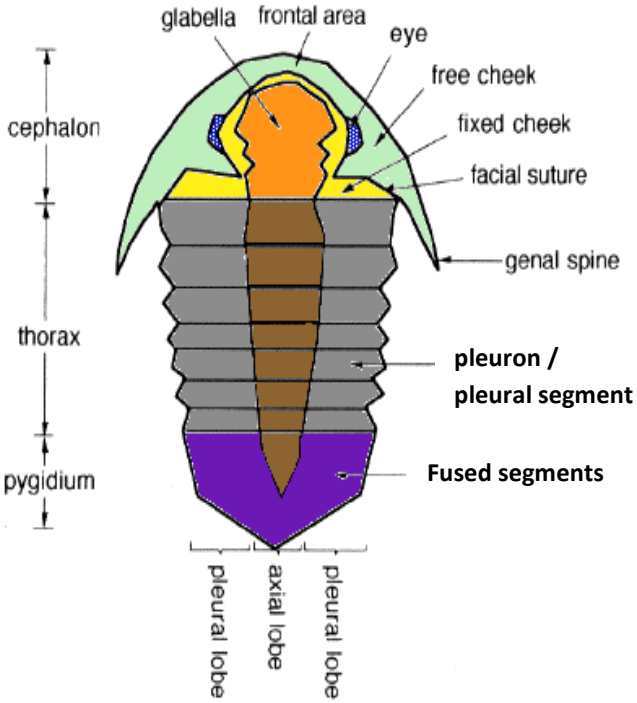
# A2 GEOLOGY

# CASE STUDY REVISION BOOKLET

## TRILOBITES




**Trilobites are remarkable, hard-shelled, segmented creatures that existed over 520 million years ago in the Earth's ancient seas. They went extinct before dinosaurs even came into existence, and are one of the key signature creatures of the Palaeozoic Era, the first era to exhibit a proliferation of the complex life-forms that established the foundation of life as it is today.**




**Trilobites** were among the early **arthropods**, a phylum of hard-shelled creatures with multiple **body segments** and **jointed legs** (although the legs, antennae and other finer structures of trilobites only rarely are preserved).

Whatever their size, all trilobite fossils have a similar body plan, being made up of three main body parts: a **cephalon** (head), a segmented **thorax**, and a **pygidium** (tail piece) as shown above. However, the name "trilobite," which means "**three lobed**," is not in reference to those three body parts mentioned above, but to the fact that all trilobites bear a long central **axial lobe**, flanked on each side by right and left **pleural lobes** (pleura = side, rib). These three lobes that run from the cephalon to the pygidium are what give trilobites their name, and are common to all trilobites despite their great diversity of size and form.

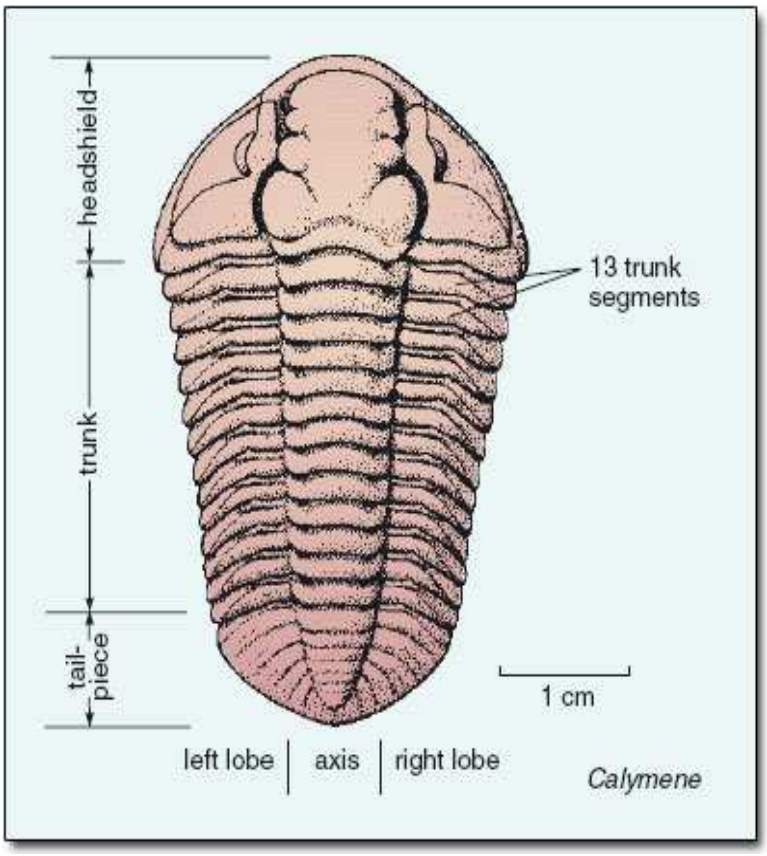
**EVOLUTION AND ADAPTIVE RADIATION**

Despite the most recognised Trilobite being the Calymene, other trilobites had evolved to different modes of life and thanks to adaptive radiation had evolved different physical adaptations.

Much of this evolution came in the Cambrian 'explosion' as life adapted to inhabit a whole new set of ecological niches.

## Trilobites modes of life

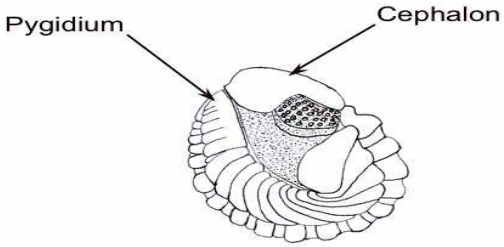
Trilobites occupied a huge set of **habitats** and **palaeolatitudes**, from tropical shallows and reefs, to polar depths, and wide-ranging pelagic habitats in between. Their **diversity** of form suggests many modes of life. There has been a long history of speculation about the feeding habits of trilobites, ranging from predators, scavengers, filter-feeders, and free-swimming planktivores. Using modern-day crustaceans as an analog, it is reasonable to suggest that the majority of trilobites may have been predator-scavengers, as the majority of marine crustaceans are today. Nonetheless, among today's crustaceans are filter-feeders (such as barnacles), planktivores (the majority of larval crustaceans fall into that category), and herbivores (many small shrimp species).

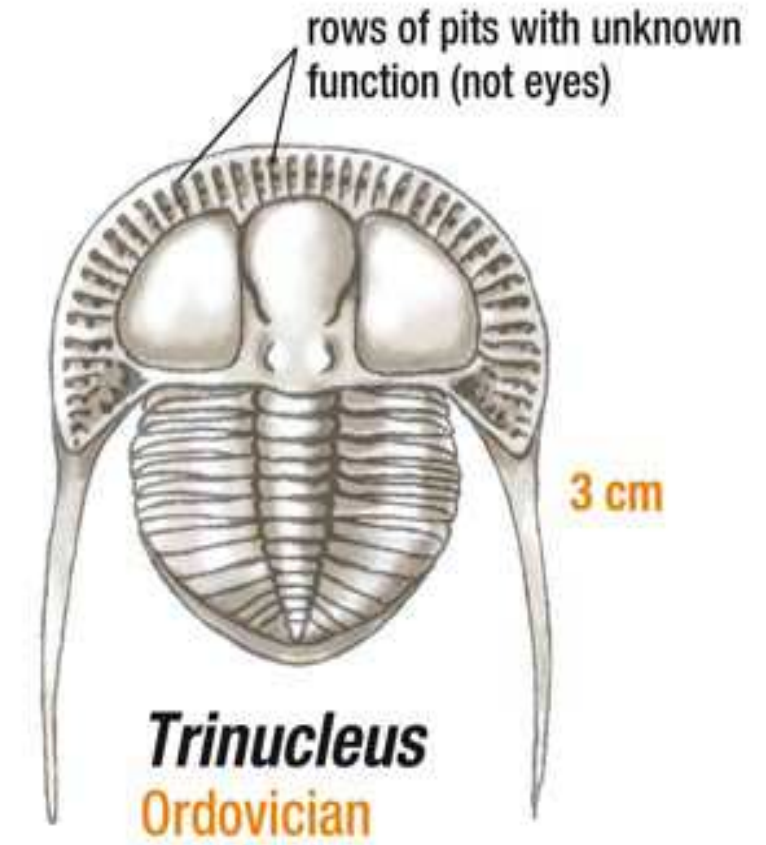



**BENTHONIC / EPIFAUNAL HUNTER / SCAVENGER**

## CALYMENE

- Compound eyes on the top (dorsal surface) of the trilobite
- Eyes with 360 degree vision, useful as a predator or if predated
- Complex compound eyes, very good vision
- Many pleura, therefore many legs and many gills, walked on sea bed/substrate
- Flexible thorax allowed the trilobite to enroll and protect the softer underbody
- Quite large trilobite that left trace fossils on the sea bed where it rested or walked

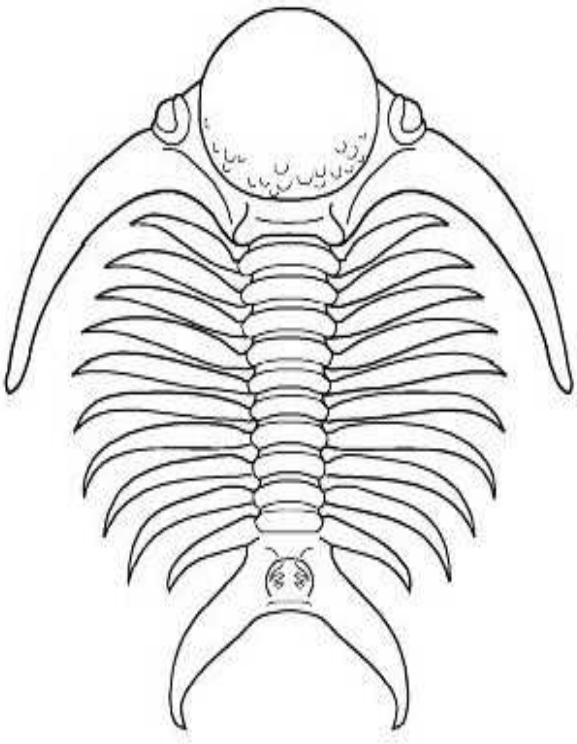



**BENTHONIC / INFAUNAL BURROWER**

## TRINUCLEUS

- No eyes. Trinucleus probably lived in the deep ocean where there was no light and probably burrowed in the organic ooze found there as a filter feeder
- It may have burrowed for protection also
- It had long genal spines that may have been used for protection or to spread the weight of the creature on the soft sea floor
- A large head, it is MICROPYGOUS, may have helped to spread its weight or may have been used as a digging tool
- The cephalic fringe was pitted, this may have been sensory, to enable it to detect movement of prey and chemicals in the water

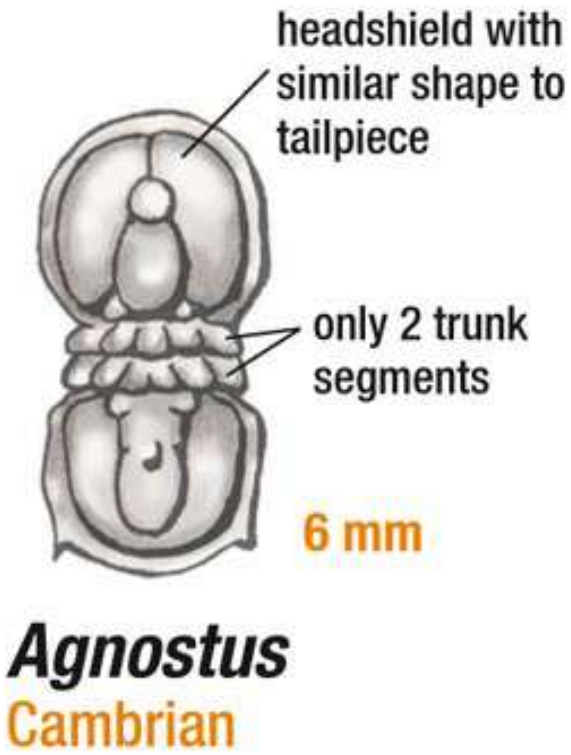


**DEIPHON**

**PELAGIC / NEKTONIC SWIMMER / HUNTER**

## DEIPHON

- A large, inflated glabella filled with gas or fat that may have acted as a floatation device
- Eyes at the front rather than on top and often on stalks gave Deiphon the ability to look forward and down indicating a pelagic mode of life in the water column
- Complex, compound eyes giving it the ability to hunt visually
- Very small so that it could more easily float
- Many legs to aid swimming
- Pleura separated into spines that increased the surface area to aid buoyancy




PELAGIC / PLANKTONIC FILTER FEEDER? BENTHONIC?

## AGNOSTUS

- Very small so that it may have floated in the water column
- Only two pleura, so probably only two legs, limited movement may have been used to steer
- No eyes. It was probably a filter feeder, but may have lived on the sea bed feeding on the organic muds found there
- Inflated gas or fat filled glabella to aid buoyancy
- ISOPYGOUS, cephalon and pygidium the same size may have flapped to aid movement