

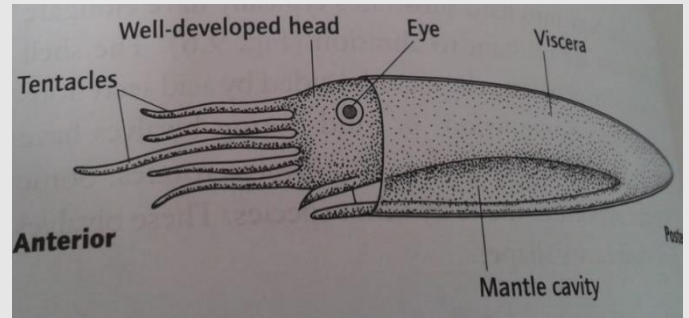
# BELEMNITES

## CLASSIFICATION

Phylum	Mollusca
Class	Cephalopoda
Genus	Belemnite
Extinct	Devonian to Cretaceous
Acme	Jurassic/Cretaceous (Mesozoic)

The class of **cephalopods** (literally meaning head-foot) are characterised by **bilateral body symmetry, a prominent head**, and a **set of arms or tentacles** modified from the primitive molluscan foot.

The order **Belemnoidea**.

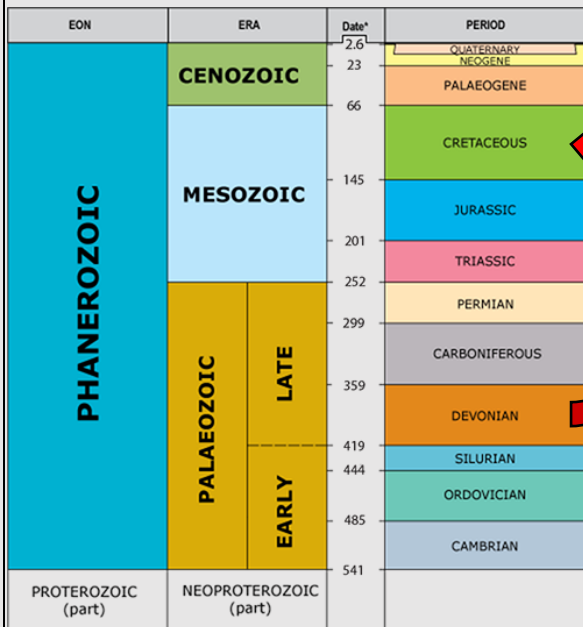


Belemnites (extinct) were very similar to modern squid (part of the subclass Coleoidea), both morphologically and their mode of life.

Like squid, the belemnoids possessed an ink sac, but, unlike the squid, they possessed ten arms of roughly equal length and no tentacles.



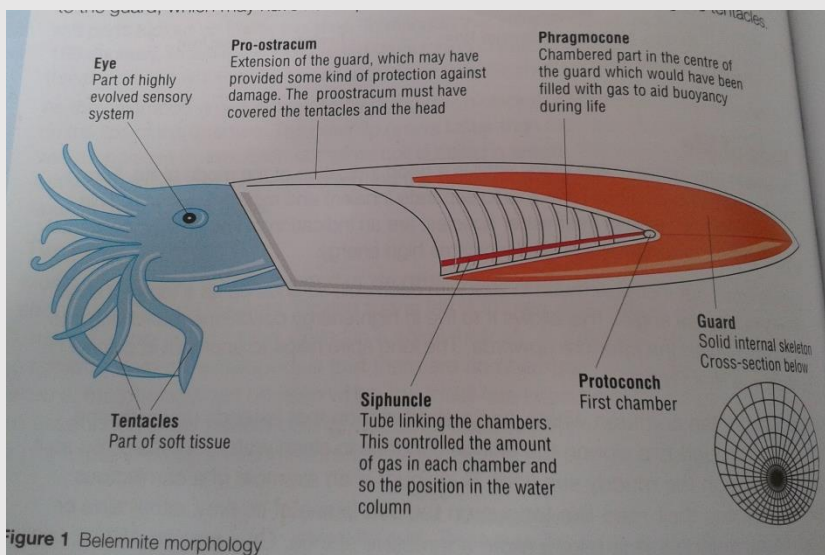
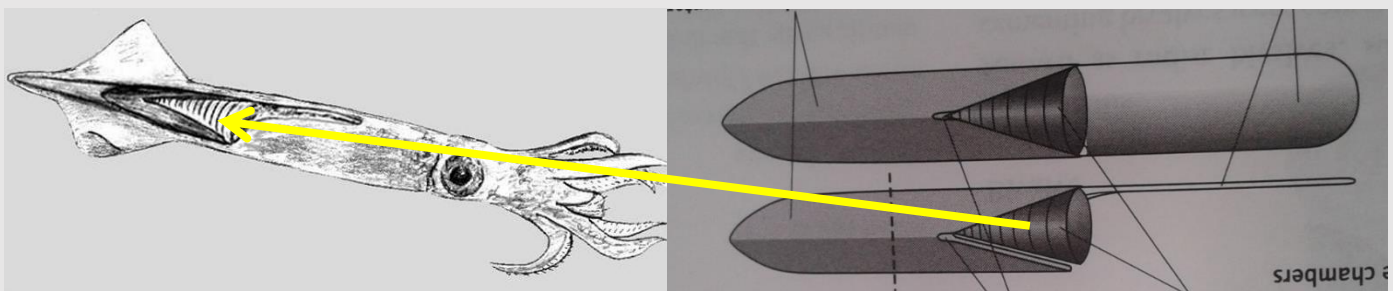
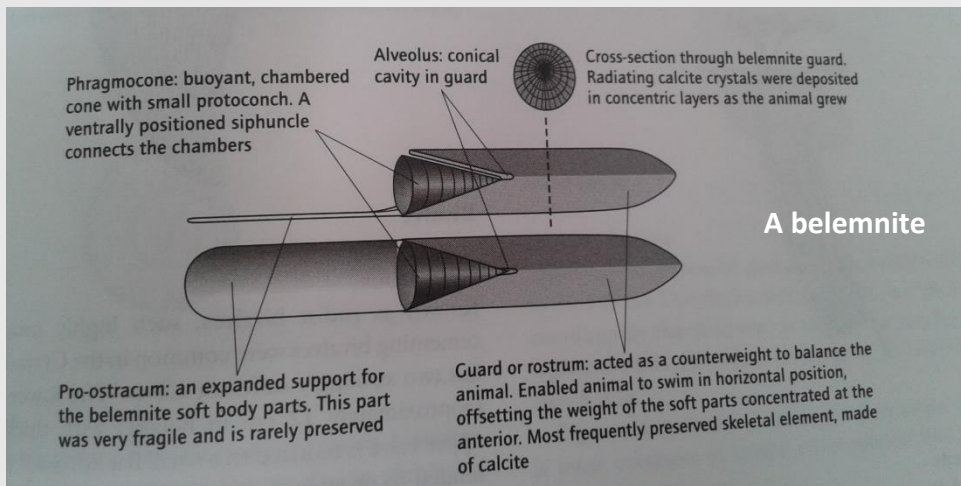
Belemnite fossils are **abundant in the Mesozoic** marine rocks (**Jurassic/Cretaceous**). Belemnoids became extinct at the same time as ammonites (the end of the Cretaceous).



## Key terms

- **Guard:** the solid internal calcite mass that counterbalanced the head and tentacles. This bullet-shaped component is most commonly preserved and is sometimes named the **rostrum**.
- **Rostrum:** the solid internal calcite mass that counterbalanced the head and tentacles. This bullet-shaped component is most commonly preserved and is sometimes named the **guard**.
- **Phragmocone:** the chambered part of the centre of the guard, within the soft tissue, which would have been filled with gas to aid buoyancy during life. It includes the anterior body chamber and empty chambers linked by a siphuncle.
- **Proostracum:** a flattened extension to the guard that was only occasionally preserved and may have provided some protection by covering the head and tentacles.
- **Siphuncle:** a tube interconnecting the chambers of the phragmocone, able to aid buoyancy by altering the amount of gas in individual chambers. This changes the position in the water column.
- **Palaeocurrent:** the direction of the water movement preserved in the fossil record.

The shell of a belemnite is **enclosed by soft body parts**. The fact that they are closely related to squid and cuttlefish means that it can be inferred that belemnites possessed a head with tentacles/arms.

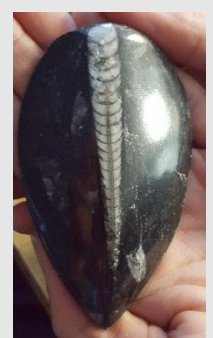


The **only part normally preserved** is the **guard**, a **bullet-shaped calcite mass**. It has a **conical part** in the **anterior** in which the **more fragile, chambered phragmocone** might be found fossilised in better-preserved organisms.

The **phragmocone is chambered** and each chamber represents a growth stage of the animal, with the **last body chamber open**. The phragmocone is **positioned centrally in the guard**.

The chambers were connected by a **siphuncle** and could be used to **aid buoyancy**. The gas in the chambers is adjusted to change the position in the **water column**.

The **guard acts as a counterweight** needed to balance the head and tentacles.



Occasionally, the **proostracum** is preserved; an **extension to the guard** and had a **protective function**, perhaps covering the **tentacles and head**. The guard, phragmocone and proostracum were all internal to the living creature, forming the **internal shell** which was enclosed entirely by soft muscular tissues.

The **guard** is composed of **calcite**. The **phragmocone** is composed of **aragonite**.

The guard thus preserves better as calcite is a more robust polymorph of calcium carbonate than aragonite. Moreover, the guard is not as fragile. A broken guard will show a structure of radiating calcite fibres / **concentric rings of growth**.



## MODE OF LIFE

Belemnites were **nektonic swimmers** (just like squid). As with modern analogues, they could have swum both vertically and horizontally.

**The vertical motion** was controlled by the **adjustment of gas** within the chambers of the **phragmocone** by the **siphuncle**.

**Horizontal movement**, on the other hand, was largely controlled by **the tentacles/arms and jet propulsion** (through the **hyponome**). Contraction of the **hyponome** expands and then contracts, **expelling a jet of water**.

When they died, their streamlined shape meant that they would have become aligned with the water currents when on the water bed. The **alignment of the bullet-shaped guards** by the **water currents** provides an excellent **palaeocurrent indicator** as a death assemblage.