

Phylum Arthropoda

Arthropoda (see Figs. 4.27 and 4.28) possess an exoskeleton or carapace made of protein. In marine arthropods the carapace is reinforced with calcium carbonate or phosphate. The segmented body is divided into three major sections: head, thorax, and tail. Each segment usually has a pair of jointed appendages, specialized for feeding, sensory, or locomotive functions. In marine arthropods, respiration occurs by gills; in terrestrial arthropods air enters by pores leading to internal tubes. In order to grow, arthropods must shed their exoskeleton and secrete larger ones (molting). Arthropods have a well-developed nervous system and an open circulatory system with a heart, but they have no extensive blood-vessel system. The four main classes of arthropods are Uniramia, Chelicerata, Crustacea, and Trilobita:

Class Uniramia

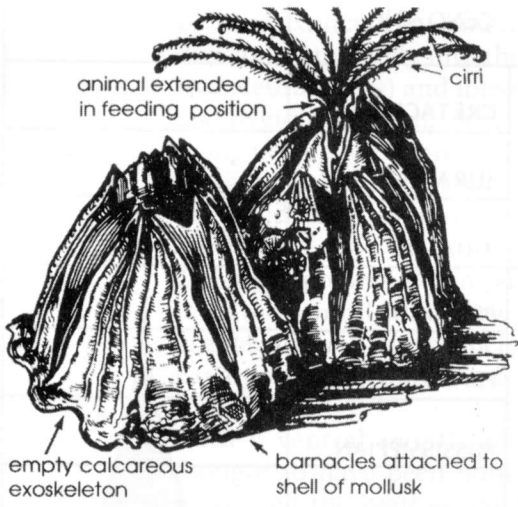
This class consists of onychophorans, centipedes, and insects. Most of the Uniramia have a poor fossil record, but occasional insect specimens are found preserved in amber.

Class Chelicerata

Horseshoe crabs, eurypterids, scorpions, and spiders are chelicerates (see Fig. 4.27). Eurypterids (sea scorpions) lived in marine, brackish, and freshwater environments and can be found in rocks of lower Ordovician to Permian age. They are most common as fossils in the Silurian. The largest eurypterids attained a length of nearly nine feet. Other members of Chelicerata are poorly preserved as fossils.

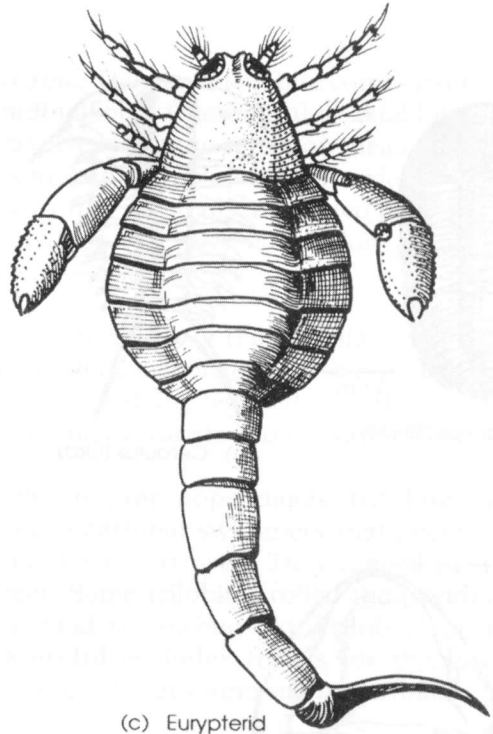
Class Crustacea

This class includes ostracodes, barnacles, crabs, and lobsters (see Fig. 4.27). Only the ostracodes are common as fossils. Ostracodes are bivalved arthropods with shells of chitin and calcite. Their jointed legs can extend between the valves for feeding, swimming, and crawling. Individuals are very small, about 1 millimeter in size. They live in marine and freshwater environments, most commonly in shallow water. Ostracodes range in time from lower Cambrian to Recent. They are abundant in Paleozoic carbonate rocks and some species are useful as index fossils.



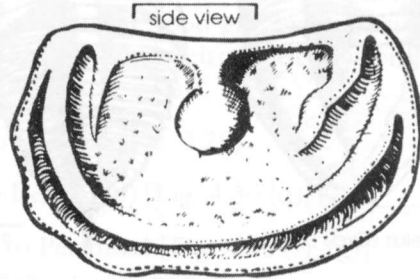
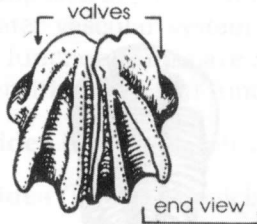
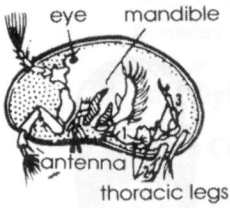
0.5X

(a) Balanus: Acorn Barnacle
(Eoc-Rec)



(c) Eurypterid

CLASS CHELICERATA



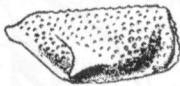
~ 70 X

(b)

Ostracode: Morphology



(d) Paraechmina
(30X) (Sil-Dev)



(e) Monoceratina
(40X) (Dev-Tert)



(f) Zygobolba
(10X) (Ord-Dev)



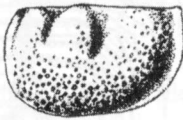
(g) Hollinella (26X)
(Dev-Perm)



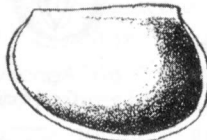
(h) Tetradella
(20X) (Ord-Dev)



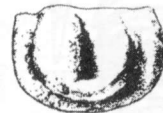
(i) Primitia (12X)
(Ord-Perm)



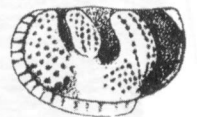
(j) Zygobeyrichia
(9X) (Sil-Dev)



(k) Leperdita (3X)
(Ord-Penn)



(l) Bolla (18X)
(Ord-Dev)



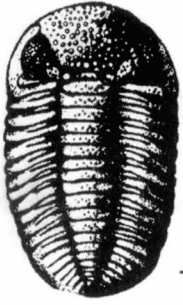
(m) Beyrichia (16X)
(Ord-Penn)

OSTRACODES

PHYLUM ARTHROPODA

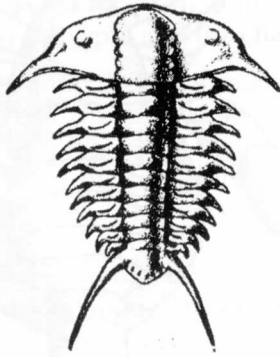
CLASS CRUSTACEA

Figure 4.27 Phylum Arthropoda, classes Crustacea and Chelicerata



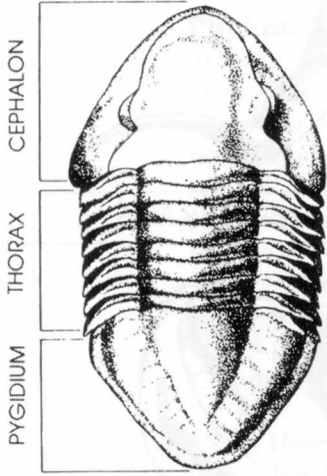
(a) Phacops (Sil-Dev)

1 cm

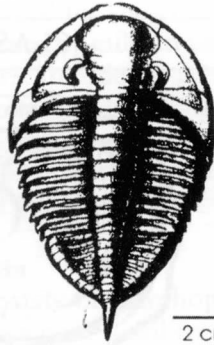


(b) Ceraurus (Ord)

CENOZOIC		
MESOZOIC	CRETACEOUS	
	JURASSIC	
	TRIASSIC	
PALEOZOIC	PERMIAN	
	PENNSYLVANIAN	
	MISSISSIPPIAN	
	DEVONIAN	
	SILURIAN	
	ORDOVICIAN	
	CAMBRIAN	

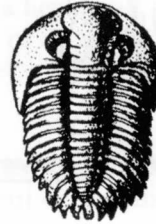


(c) Isotelus (Ord)



(d) Dalmanites (Sil-Dev)

2 cm

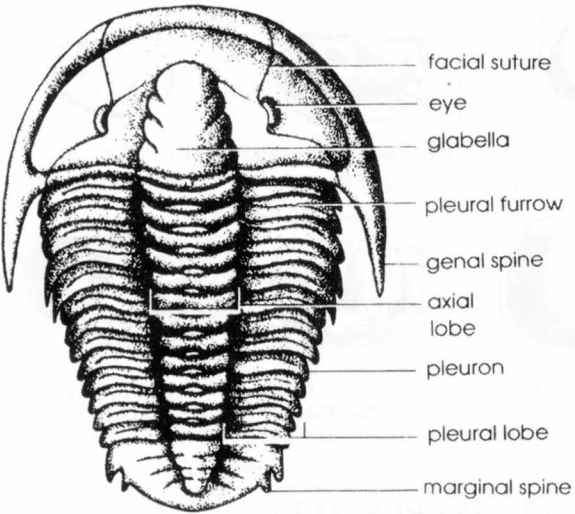


(e) Greenops (Dev)

1 cm



(f) Illaenus (Ord-Sil)

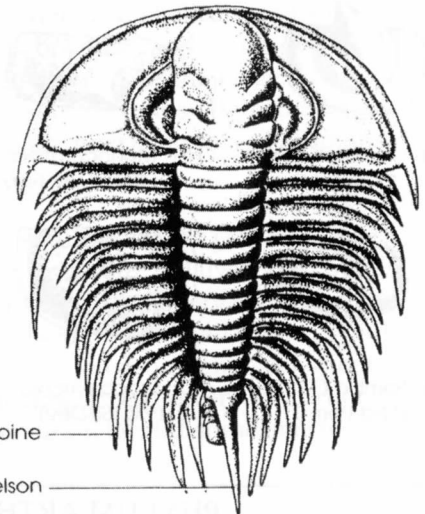


(g) Trilobite morphology



(h) Agnostus, Cambrian

2 mm



(i) Olenellus, Cambrian

PHYLUM ARTHROPODA

CLASS TRILOBITA

Figure 4.28 Phylum Arthropoda, class Trilobita

Class Trilobita

Trilobites (see Fig. 4.28) are abundant fossils in lower Paleozoic rocks but became extinct at the end of the Paleozoic. The name trilobite comes from the division of the body into three longitudinal lobes (the central or axial lobe and two pleural lobes) and into three transverse lobes, the cephalon (head), thorax, and pygidium, or tail. Since trilobites molted their skeletons in order to grow, many head, thorax, and tail sections are often found disarticulated in rocks. To each thoracic segment was attached a pair of legs, which are seldom preserved. The head and pygidium were often composed of fused segments.

Trilobites possessed compound eyes on either side of the glabella. The mouth is on the ventral side below the glabella. The appendages were biramous (two-branched) with one branch consisting of a walking leg, and the other branch having a gill. Definite trilobite trails and burrows are found in the fossil record.

With a ventral mouth and walking/swimming appendages, trilobites are thought to have been bottom-dwelling occasional swimmers that grazed or scavenged the seafloor, and some may have burrowed. They ranged in size from less than an inch to nearly 2 feet. Some trilobites rolled the pygidium under the cephalon for protection, as modern sowbugs do. Trilobite species were relatively short-lived and are useful as index fossils for the lower Paleozoic. Their geologic range as a group is lower Cambrian to Permian.