



FIGURE 8.2

Trilobites may have been the primitive ancestors of crabs, shrimps, and insects. They became extinct 225 million years ago. (Courtesy Lloyd and Val Gunther.)

extinct trilobites, have continued to the present day. They are now more modern in appearance, but since 500 million years ago there have been no new forms or structures introduced in the world of invertebrate animals.

The rapid expansion in both abundance and variety of the shell-bearing marine invertebrates (without internal backbone or skeleton) was shortly followed by the appearance of the marine vertebrates (with internal backbones and skeletons). The first forms with semblances of internal skeletons seemed to have been mainly mud-grubbers. Lacking jaws and teeth, these are called the jawless fishes. Although they are thought to have arisen from the marine invertebrates, there is no fossil record of a transition.

Like the marine invertebrates, the first vertebrates simply appear in the fossil record. The star of the first act walks -- or rather swims -- on stage without introduction.

The first internal supports of the vertebrates were composed of cartilage rather than bone as is characteristic of the sharks of today. By 350 million years ago all major groups of fish had appeared in the record. Their internal skeletons were composed of bone, and with this structural advantage they became the masters of the sea. The period from 400 to 350 million years ago is known as the Age of Fishes.

While most shell-bearing animals and fish have continued to change in size and diversity up to the present time, their basic form and composition were completed during their early history. Few new characters have been introduced into the drama of life in the sea.

However, radically new life entered the sea about 200 million years ago in the form of fish-like and serpent-like dinosaurs. Except for sea turtles, these great monsters of the ancient seas became extinct about 63 million years ago. They were replaced by the mammals that invaded the sea in the form of dolphins, seals, and whales. The development of the dinosaurs and mammals will be covered in the following chapter dealing with life on the land.

LIFE IN THE AIR

About 400 million years ago, during the Age of Fishes, greenbelts were spreading into low-lying continental terrain. Fern-like trees made their appearance. The first airborne life with wings were flying insects. Because of their small size, they are relatively poorly