



## Fossils of the Appalachian/Piedmont Region 2

The Paleozoic fossils in the Appalachian/Piedmont region are generally the same as those of the Inland Basin because the rocks were originally sediments deposited along the same inland ocean. The rocks of the Appalachian/Piedmont, however, are in general more *deformed* structurally because they were closer to or part of the Taconic, Acadian and Alleghanian mountain-building events. Because of the deformation, the fossils in this region are less well preserved. The Triassic and Jurassic age Rift Basin fossils, however, are only found in the Appalachian/Piedmont and the Exotic Terrane region.

### Cambrian

Cambrian rocks in the Appalachian/Piedmont record the erosion of sediment from the Grenville Mountains into the Iapetus Ocean. Early Cambrian fossils near Lancaster, Pennsylvania are among the earliest fossils found in Paleozoic rocks and in the entire Northeast (See **LAGERSTATTEN** below.) Western Vermont and northern New Jersey also have early Cambrian shale containing the trilobite *Olenellus*. Late Cambrian *stromatolites* are found in Washington County, Maryland and Bucks County, Pennsylvania (Figure 4.18).



Figure 4.18: Stromatolite, Cambrian (14.5 cm long).

#### STROMATOLITES

*Stromatolites are layers of millimeter thick laminations that were once bacterial mats (full of photosynthetic cyanobacteria) at the surface of very shallow water. Cyanobacteria emit a sticky substance that binds settling clay grains and creates a chemical environment leading to the precipitation of calcium carbonate. The calcium carbonate then hardens the underlying layers of bacterial mats, while the living bacteria move upward so that they are not buried. There are still stromatolites today, but they form thick layers only in 'stressful environments', such as very salty water, that exclude animal grazers.*

#### LAGERSTATTE

A locality of Cambrian fossils near Lancaster, Pennsylvania, is an example of a lagerstatten. Lagerstatten are deposits containing animals or plants that are preserved unusually well, sometimes even including the soft organic tissues. Lagerstatten are important for the information they provide about soft-bodied organisms that we otherwise would know nothing about. Lagerstatten form in chemical environments that slow decay of organic tissues or enhance preservation through mineralization. Also, quick burial of the organism leaves no opportunity for disturbance of the fossils.

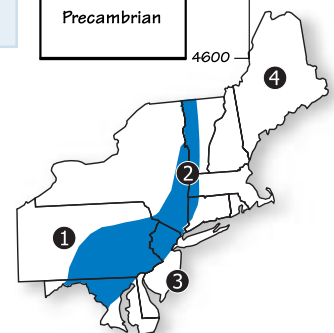
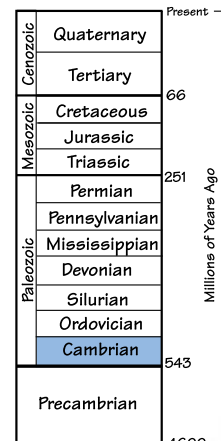
see *Fossils*, p.84, for fossils of the Inland Basin.



#### When fossils are deformed:

- the carbonate in the shell material may recrystallize, often obliterating the original shape of the shell;
- they are often deformed in shape, which can be used by structural geologists to determine the amount and direction of stress;
- the sediments surrounding the fossil are sometimes altered so that it is more difficult to discern the type of environment in which the organism lived.

see *Geologic History*, p. 7, for more on the Cambrian.





# Fossils

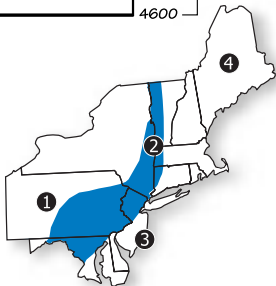
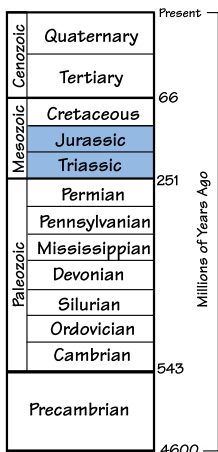


see *Fossils*, p.85  
for more on fossils  
that lived in  
shallow marine  
environments



see *Fossils*, p.97,  
for more on rift  
basin fossils.

Trace fossils receive Latin names independent of the species name of the organism that created them, largely because the species is not known with certainty. Apparent **Coelophysis** tracks in Nyack, New York, near New York City, are the only dinosaur fossils known from New York State.



## Ordovician to Devonian

There are some fossil-rich Ordovician and Silurian (and a few Devonian) sites in the Appalachian/Piedmont region, in spite of the deformation of the rocks from the various Paleozoic mountain-building events. For example, eastern Pennsylvania and western Vermont both preserve assemblages of brachiopods, trilobites, corals, bryozoans, clams, and other organisms typical of shallow marine environments.

## Triassic to Jurassic

The Appalachian/Piedmont has extensive outcrops of Mesozoic rocks, preserved in the rift basins that formed during the Age of Reptiles, when Pangea was breaking apart (Figure 4.19). The sedimentary rocks preserved in the rift basins record the presence of dinosaurs in the Northeast. In particular, the extensive **dinosaur trackways** found in these rocks have become among the most publicly known fossils in the Northeast. Many of the small three-toed dinosaur footprints are known as *Grallator*, and were probably made by the late Triassic dinosaur known from the southwestern United States as **Coelophysis**.

Some areas contain not only footprints, but also abundant freshwater fish, mollusks, and plant fossils such as cycads, ferns, conifers, and ginkos. A locality in Princeton, New Jersey, for example, contained hundreds of coelocanth (known in the fossil record as ‘lobe-finned’ fish) and small bony fish. In general, however, the Northeast rift valley deposits have relatively few vertebrate bone fossils compared to footprints.

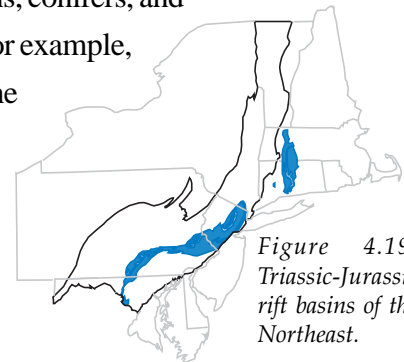


Figure 4.19: Triassic-Jurassic rift basins of the Northeast.

## The Age of Reptiles

The Mesozoic Era is commonly known as the Age of Reptiles, a time dominated both on land and in the sea by large reptiles. ‘Dinosaur’ technically refers to the group of land reptiles with a common ancestor and thus certain anatomical similarities, including long anklebones and erect limbs. At the same time as the dinosaurs, other reptile groups also became important: the pterosaurs, flying reptiles with wingspans up to 15 meters, and plesiosaurs, mosasaurs and ichthyosaurs, marine reptiles that were probably similar in size and habitat to toothed whales, dolphins and large sharks of today. Mammals, evolving from a group known as the ‘mammal-like reptiles’ that were a dominant land animal in the Permian and Triassic. Mammals appeared at roughly the same time as the dinosaurs in the mid-Triassic. Mammals, however, occupied only rodent-like niches until the dinosaurs went extinct. All the large reptile groups disappeared at or before the mass extinction at the end of the Cretaceous.

