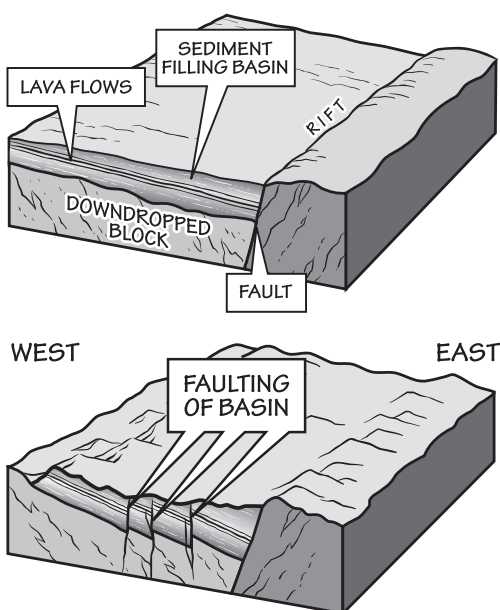




The 2nd Breakup: *Pangea comes apart*

The supercontinent Pangea lasted 100 million years. But the Earth's crust was not static. The direction of plate movement shifted over time and the continents began to pull apart rather than converge. **Rifts** once again developed through Pangea eventually leading to the breakup of the supercontinent. Modern day rifting can be observed in the **East African** Rift Valley. Tension slowly began to pull North America away from the other merged continents.



Figures 1.28 (above): As rifting occurred, blocks of crusts slid down faults to form a basin. The basin was filled with sediment and lava flows. Eventually, the entire basin was tilted and faulted. Figure by J. Houghton.

The rifts occurred along a series of cracks in the Earth's crust roughly parallel to the present coastline. Blocks of crust slid down the faults on the rift margins to form basins bounded by tall cliffs, known as **rift basins** (Figure 1.28). Rift basins at the surface in the Southeast are found in Virginia and North Carolina. Younger sediment buried other rift basins off the east coast and in other Southeast states (Figure 1.29). Alternating with the sandstone and shale being

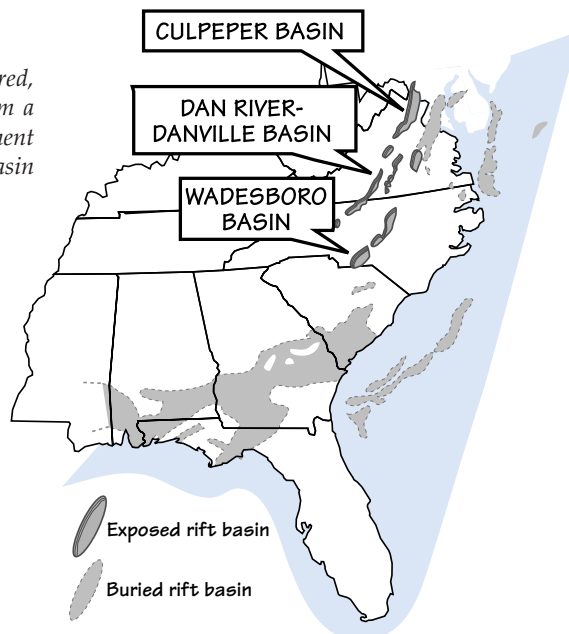


Figure 1.29 (right): The Triassic-Jurassic Rift Basins of the Southeast formed as North America broke away from Pangea. Many basins are buried by younger sediment and some are located on the continental shelf as well. Figure by J. Houghton.

see **Geologic History**, p. ___ for more on the **Rifts**.



The same processes that are today tearing apart **East Africa**, were tearing apart Pangea 180 million years ago. In East Africa, the African plate is pulling away from the Arabian plate, stressing the crust to the point of breaking apart.

The long, narrow **rift basins** formed through the Triassic and early Jurassic periods.

Cenozoic	Quaternary	65	Millions of Years Ago
	Tertiary		
Mesozoic	Cretaceous	255	
	Jurassic		
	Triassic		
Paleozoic	Permian	545	
	Pennsylvanian		
	Mississippian		
	Devonian		
	Silurian		
	Ordovician		
Precambrian	Cambrian	4600	





Geologic History

The **Atlantic Ocean** continues to widen today at about the same rate as your fingernails grow.

deposited in the basins were deposits of ash and lava flows originating from volcanoes in the rift area. Coal was deposited in swamps along streams in the rift basins. The flat-lying rock layers of the basins were eventually faulted again and tilted, exposing the edges of the layers of sediment and cooled lava. The hardened lava was more resistant to erosion in many instances than the sedimentary rocks in the basin, so ridges of cooled lava have been worn into topographic highs.

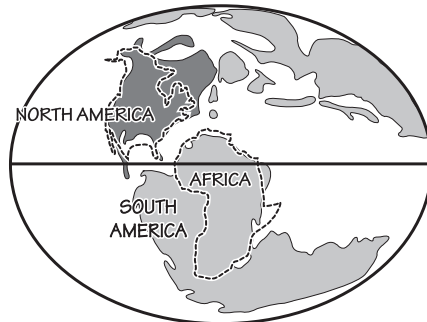


Figure 1.30: Jurassic: 152 million years ago. Shaded areas represent land that was above water. Figure by J. Houghton, after C. Scotese, *Paleomap Project*, 2000.

During the Jurassic, the final break between the plates of North America, Gondwana and Baltica happened. The break occurred along what is now the Mid-Atlantic Ridge. Pangea gradually fragmented into the modern continents, each slowly moving into their present positions (Figure 1.30). The **Atlantic Ocean** began to widen as Africa separated and in the Jurassic, the Gulf of Mexico opened up as South America pulled away (Figure 1.31).

The east coast of North America no longer experienced the strong tectonic activity associated with the compression and rifting of a plate margin.

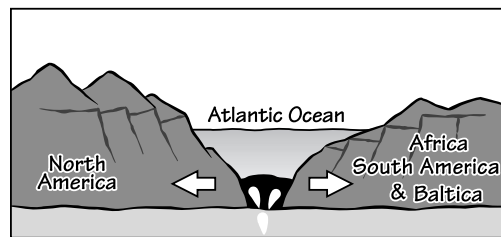


Figure 1.31: A Jurassic cross-section showing the major rift between North America, Gondwana and Baltica. This was the birth of the Atlantic Ocean.

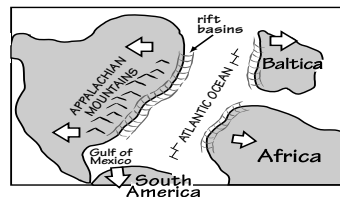
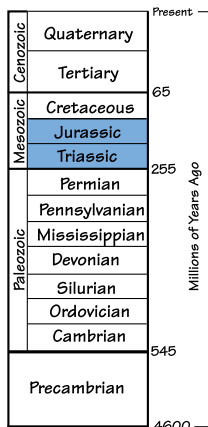


Figure 1.32 *Pangea comes apart*
 -Pangea begins to split; rifts are created in the crust
 -Triassic/Jurassic rift basins form along margin of North America
 -Atlantic Ocean and Gulf of Mexico begin to open

