



Geologic History

Mountain Building Part III: *the Acadian Mountains*

The **Acadian Mountains** are the ancestral northern Appalachian Mountains, which were compressed further during a later mountain building event.

A **microcontinent** is a piece of continental crust, usually rifted away from a larger continent. Microcontinents and other smaller fragments of continental crust (such as the Piedmont Terrane) had their own, often complex, geologic history before they were tacked onto the margin of another continent. Part of the Avalon microcontinent added the easternmost section of New England. Another related (but separate) part of the Avalon microcontinent added the outer Piedmont region to the Southeast. This part of Avalon is often called the Carolina Terrane. In this guide we will refer to both the Northeast and Southeast section of the microcontinent as Avalon.

The **deltaic sediment** eroded from the Acadian Mountains is known as the Catskill Delta.

The **Avalon Rocks** includes the microcontinent of Avalon, sediment that was deposited on the ocean bottom around Avalon, other small fragments of continental crust, and volcanic islands that were attached to the Southeast in the late Devonian.

Around 380 million years ago, in the middle Devonian, Baltica (proto-Europe) collided with the northeastern part of North America. As a result of this collision (the Acadian Orogeny), the **Acadian Mountains** formed along the northeastern margin of North America in a process that was similar to the creation of the Grenville and Taconic Mountains. Caught in between Baltica and North America was part of the Avalon **microcontinent** that geologists believe originated from proto-Africa. The Southeast was minimally affected by Baltica's collision with the Northeast. **Deltaic sediment** from the eroding Acadian Mountains spread only as far south as central Virginia, and were thickest in Pennsylvania and New York.

In the late Devonian, however, another section of the Avalon microcontinent collided with the Southeast, also known as the Carolina Terrane, as North America and Africa (part of Gondwana) converged. Sediment that had been deposited on the ocean bottom between Avalon and North America were pushed up onto the continental margin along with the Avalon microcontinent (Figure 1.20). The collision caused the **Avalon Rocks** and the eastern margin of North America to be squeezed, folded, metamorphosed, and intruded by magma.

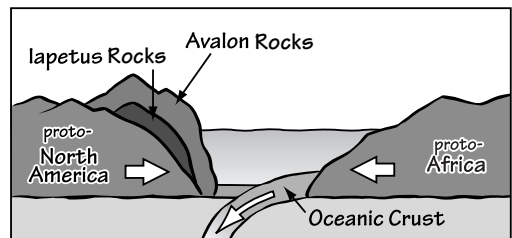


Figure 1.20: A Devonian cross-section showing the Avalon microcontinent squeezed between the converging plates of North America and Africa (part of Gondwana.). The Iapetus Terrane was attached to North America during the Taconic mountain building event.

During this time, North America gradually began to move closer to its present geographic position and assume the north-south alignment we see today (Figure 1.21).

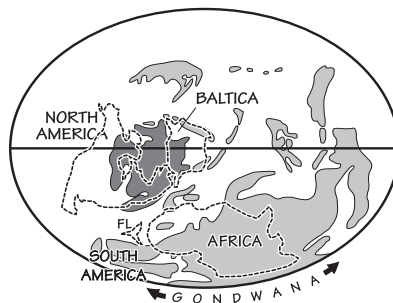
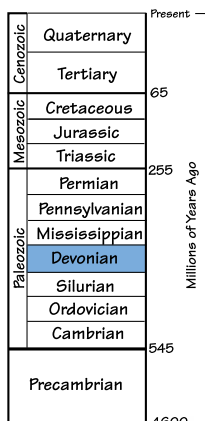


Figure 1.21: Devonian: 390 million years ago. Shaded areas represent land that was above water. Figure by J. Houghton, after C. Scotese, Paleomap Project, 2000.





At the time of the Acadian mountain building and subsequent erosion during the Devonian, the Southeast was at the Equator. This caused a tropical climate similar to climates along the equator today. Baltica (proto-Europe) and North America were united as one larger landmass. Africa, South America, India, Australia, Antarctica and what is now Florida were all combined as one continent (Gondwana) in the southern hemisphere. Most or all of the continental landmasses were gradually coming closer together.

*From the time of the Acadian mountain-building event until the Triassic, the Appalachians of North America (including the Acadian Mountains) were continuous with the Caledonide Mountains of northwestern Europe (Baltica) and Greenland because these landmasses were **united**.*

Between mountain-building events: deposition in the inland ocean

The Southeast was not continuously experiencing dynamic mountain-building events. There were quieter times as well between the rise of great mountains and crushing crusts of colliding plates. The quiet times were marked by erosion of the highlands and very little plate movement and compression within the Northeast region. The building of the Taconic Mountains was over by the late Ordovician. Throughout the following Silurian period, the Southeast experienced a quiet time in which erosion from the Taconic highlands and deposition in the inland sea were the main events. Huge thicknesses of sedimentary rocks accumulated in and on the margins of the inland sea during part of the Silurian.

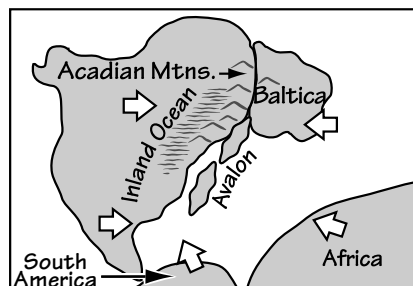


Figure 1.22: Acadian Mountain Building
 -Baltica collides with the Northeast
 -Acadian Mountains form (northern Appalachians)
 -Avalon Rocks collides with Southeast in late Devonian

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

