Lecture 17

Caledonian-Appalachian Mountains
Caledonian and Appalachian orogenic belt
Caledonian Orogeny
The Caledonian orogeny was a mountain building era recorded in the northern parts of the British Isles, Scandinavia, Svalbard, eastern Greenland and parts of north-central Europe.

- Ordovician to Early Devonian, roughly 490-390 million years ago (Ma).
- Caused by the closure of the Iapetus Ocean when the continents and terranes of Laurentia, Baltica and Avalonia collided.

The Caledonian orogeny is named for Caledonia, the Latin name for Scotland.
Cambrian paleogeography and Iapetus
Zones of the Appalachian Orogen

Figure 1: Realms and zones of the Appalachian Orogen, defined on the basis of Middle Ordovician and older geological history. Boxes outline areas shown in figures 4 and 5.
Appalachian-Caledonian orogenic belt
Figure 6. Cartoon depicting possible tectonic evolution of the northern Appalachians. A and B = Early to Middle Ordovician, C and D = Middle to Late Ordovician.
Ophiolite Obduction  

Table Mountain peridotite (Gros Morne, Newfoundland)

The park's rock formations include oceanic crust and mantle rock (peridotite) exposed by the plate-teconic obduction

Peridotite lacks the usual nutrients required to sustain most plant life, hence its barren appearance.

The rock is very low in calcium, very high in magnesium, and has toxic amounts of heavy metals. Peridotite is also high in iron, which accounts for its brownish colour.

ultramafic peridotite forms a table-top plateau
Figure 5. Distribution of Middle Ordovician and older elements in the southern Appalachians.
Figure 8. Cross-section of the southern Appalachians showing major features of the Alleghanian thrust system. Line of section shown in figure 5, no vertical exaggeration.
Pangea

Late Permian 255 Ma

PANTHALASSIC OCEAN

PANGEA

PALEO-TETHYS OCEAN

TETHYS OCEAN

GONDwANA

Ancient Landmass
Modern Landmass
Subduction Zone (triangles point in the direction of subduction)
Sea Floor Spreading Ridge
1 b.y. of plate motion

Scotese, 2004