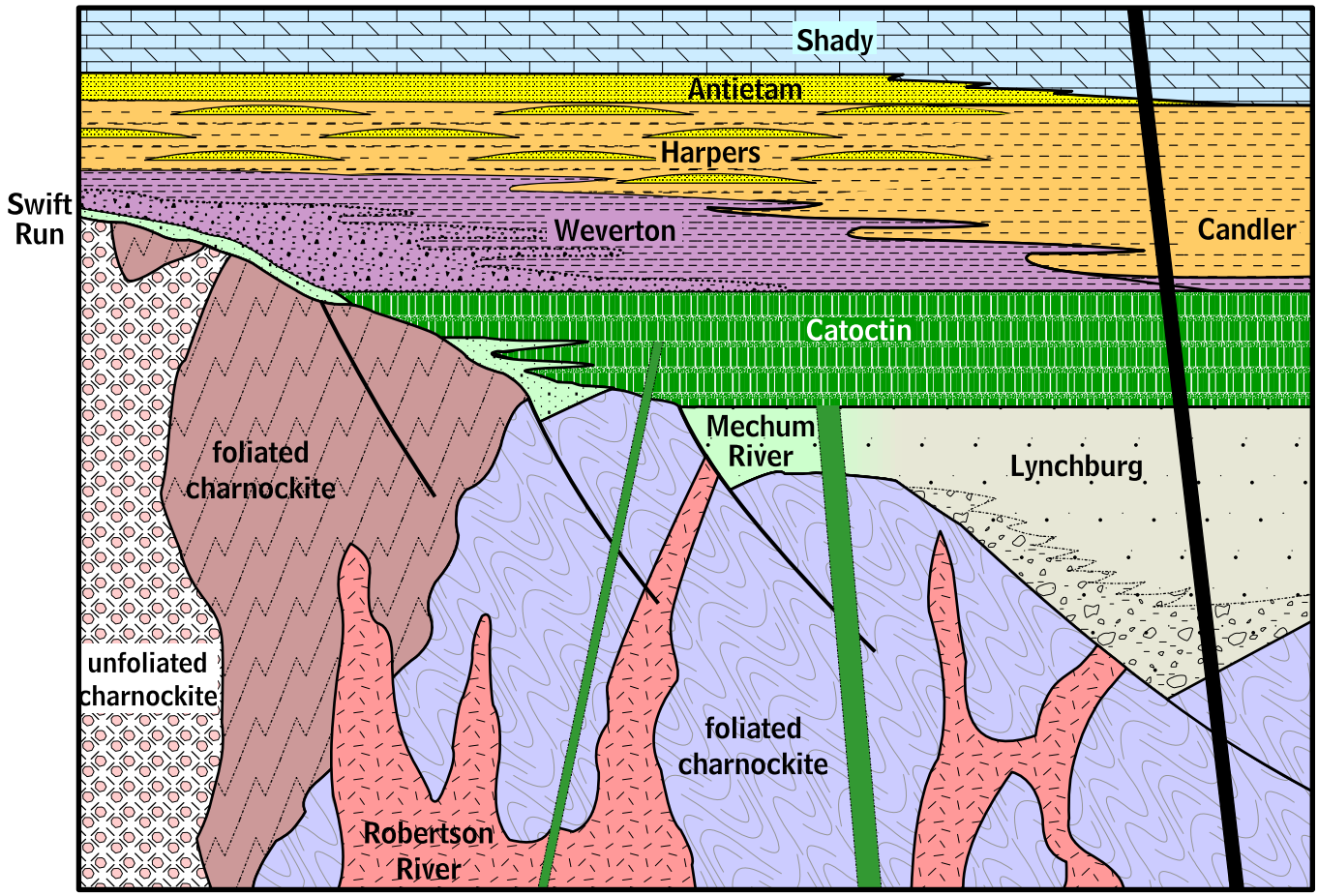
Conceptual Cross Section of the Blue Ridge Province, central Virginia



Feeder Dike Tholeitic basalt. Triassic.

Shady Dolostone with minor limestone and shale. Grades southeastward into shaley dolostone, oolitic limestone and arenaceous limestone. Cambrian.

Antietam Quartz arenite (quartzite) with abundant cross bedding and *Skolithos* trace fossils. Early Cambrian.

Harpers Interbedded shale, siltstone, wacke sandstone and quartzite, dark or greenish gray. Sand is lithic to arkosic, medium- to coarse-grained, pebbly with hummocky laminations. Early Cambrian.

Weverton Arkosic and lithic gravels, coarse sands, and phyllites. Large planar cross beds locally, bouma sequences elsewhere. Fluvial to marine. Early Cambrian.

Swift Run Pebbly quartzite and feldspathic metaconglomerate, feldspathic quartzite, phyllite, slate. Interpreted as marine tubidite. Neoproterozoic.

Catoctin Greenstone, originally tholeitic basalt, with columnar jointing, amygdules, and breccias (at base). Neoproterozoic.

Mechum RIver Interbedded lithic and arkosic sandstones and shales. Graben fill deposits. Neoproterozoic.

Robertson River Bimodal granitoid, with alkali feldspar granite (microcline mesoperthite, quartz,, plagioclase) and more mafic component. Neoproterozoic (~730-700 Ma).

Lynchburg Poorly-sorted pebbly to cobbly lithic meta-conglomerate; meta-graywacke w/graded bedding; fine-grained meta-sandstone, siltstone, mudstone w/abundant synsedimentary folds. Neoproterozoic.

Unfoliated charnokite Poorly foliated to massive; hypersthene granitoid, local garnets. Mesoproterozoic (~1040 Ma).

Foliated charnokite Granulite gneissic charnokite with hypersthene and local garnets. Mesoproterozoic (~1159 Ma).

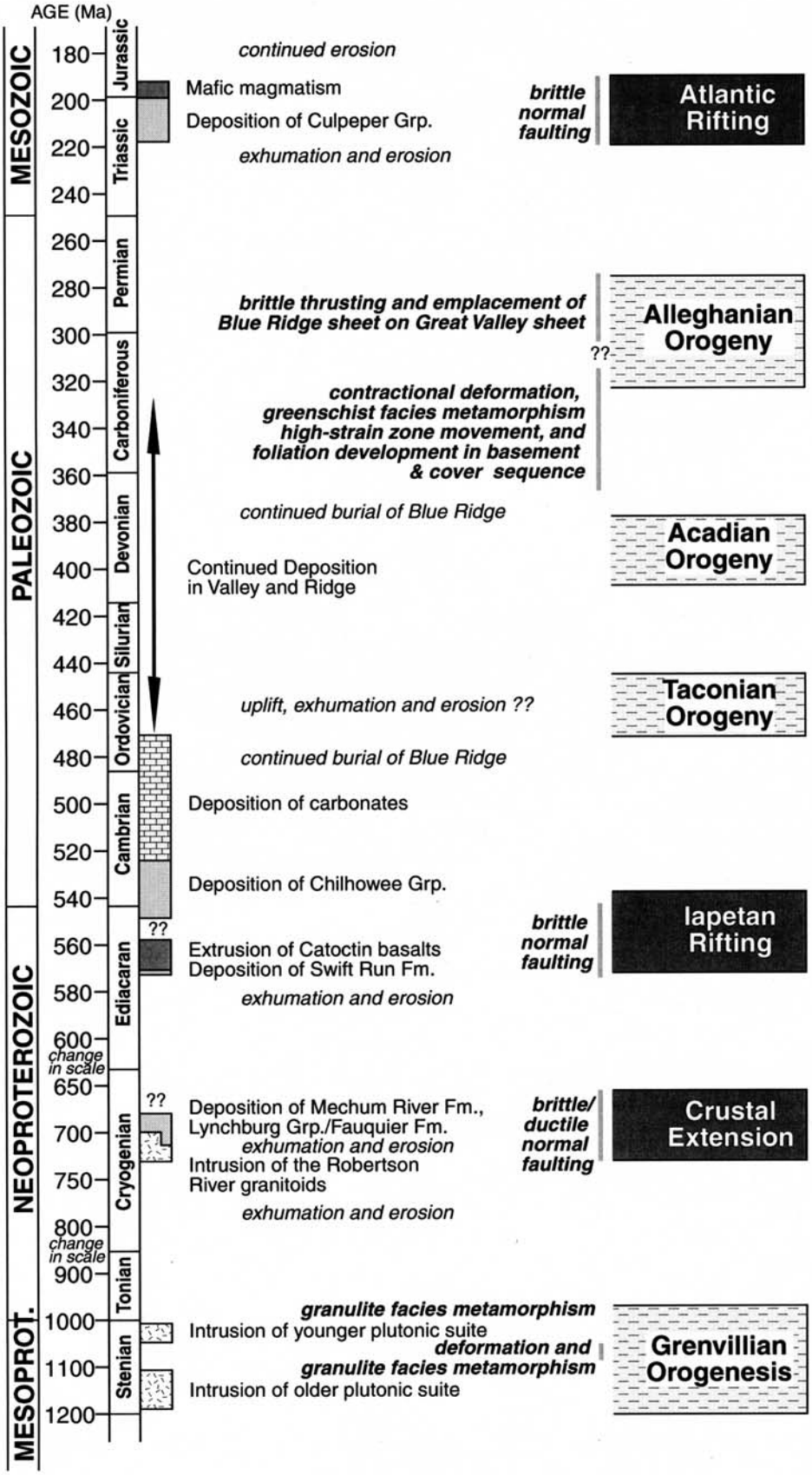
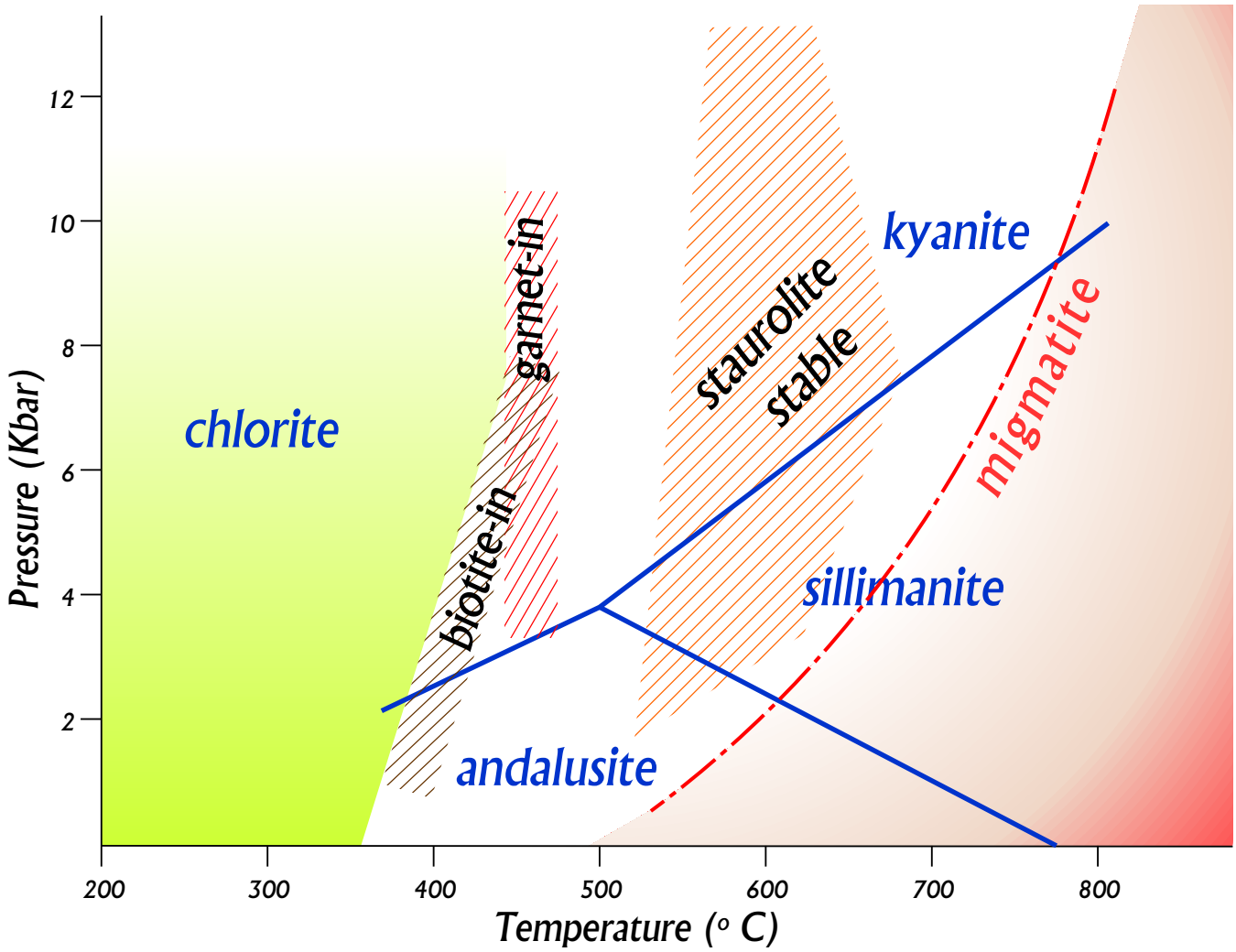


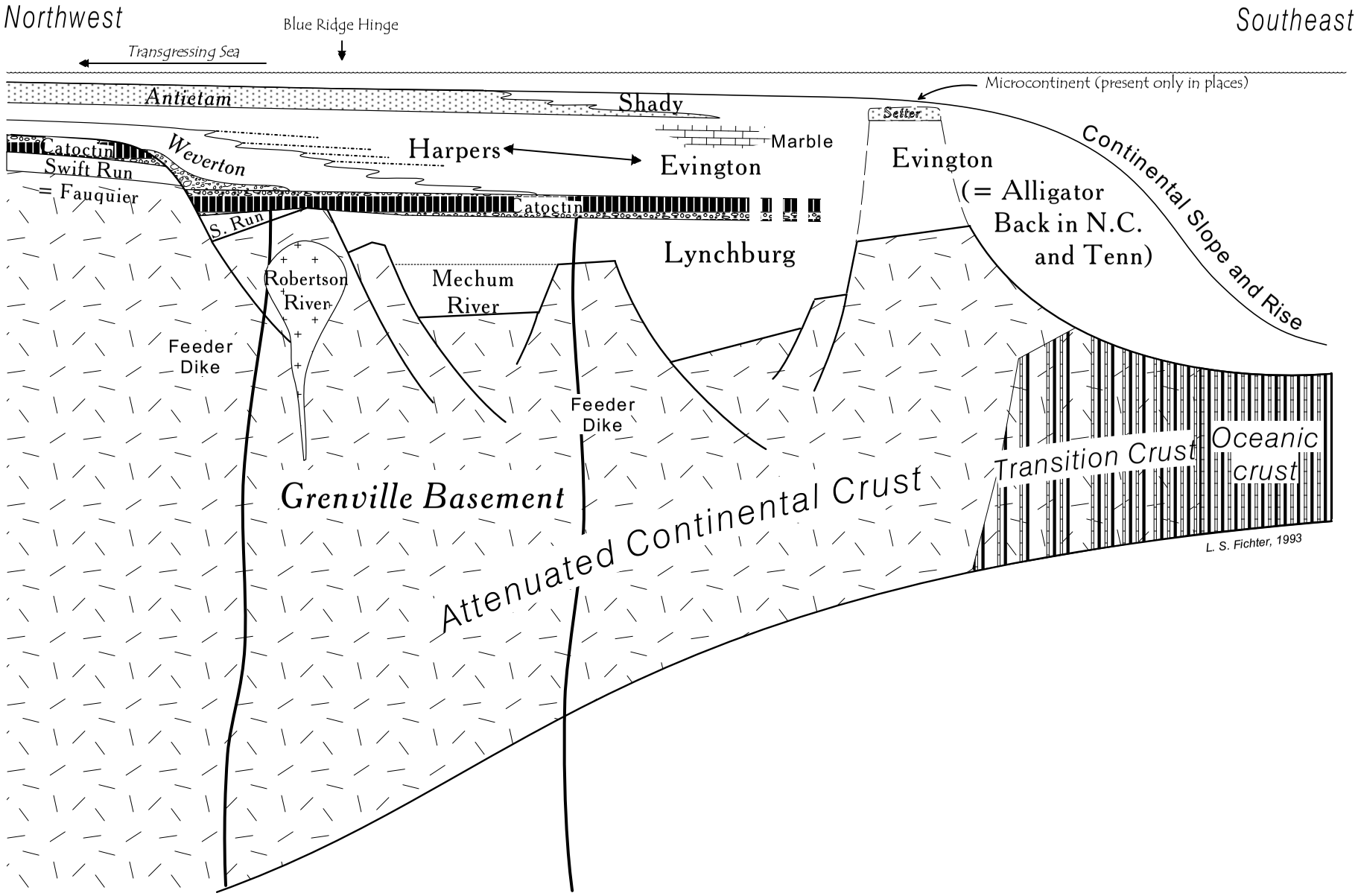
Figure 6. Generalized geologic and tectonic history of the Blue Ridge.

Parent Rocks and Their Metamorphic Equivalents

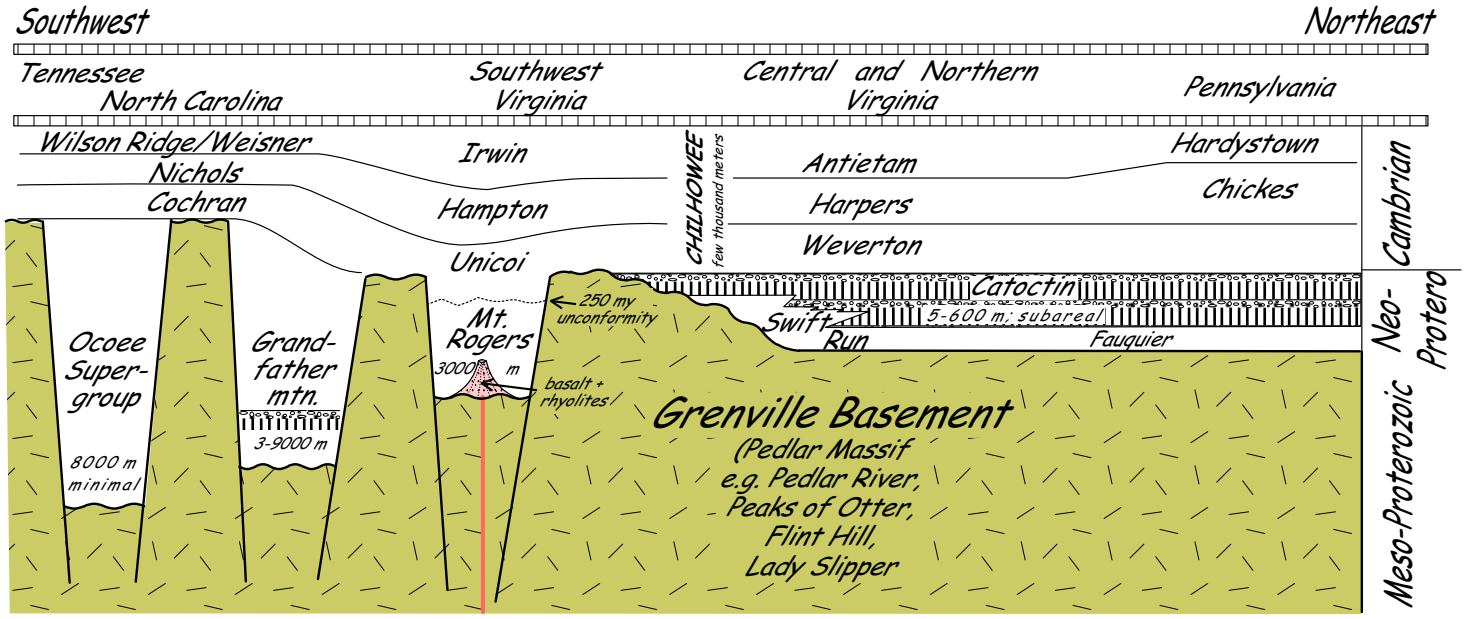
Parent Rock	Barrovian			Contact	Hydro. Thermal	Eclogite
	Greenschist	Amphibolite	Granulite			
Shale	SLATE/ PHYLLITE	SCHIST	GNEISS	HORN-FELS		
Basalt and other mafic rocks	GREEN-SCHIST	AMPHIBO-LITE	GRANU-LITE	META-BASALT	Soapstone Serpentinite	
Granite and other coarse felsic/inter. rocks	GNEISS	GNEISS	GNEISS		PEGMA-TITE	
Peridotite						ECLO-GITE
Quartz. sandstone	QUARTZ-ITE	QUARTZ-ITE	QUARTZ-ITE	QUARTZ-ITE		
Quartz wacke and other shale rich rocks	SANDY PHYLLITE	SCHIST	GNEISS	Sandy Hornfels		
Lithic wacke and other shale rich rocks	SANDY PHYLLITE	SCHIST	GNEISS	Sandy Hornfels		
Limestone	MARBLE	MARBLE	MARBLE	MARBLE	SKARN	



Composite Reconstruction Across the Blue Ridge During the Lower Cambrian



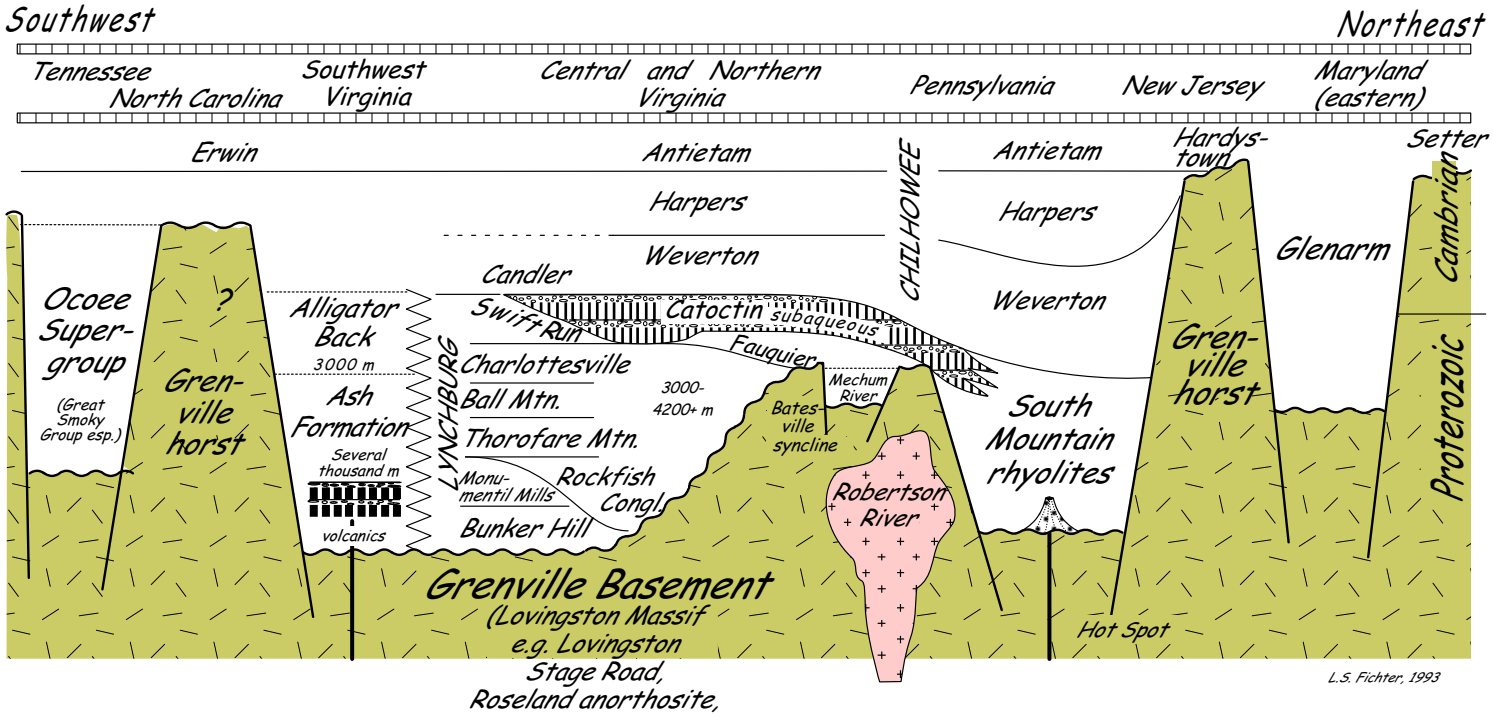
Rock Units Along Northwest Flank Of The Blue Ridge Just Before and During the Protoatlantic Rifting



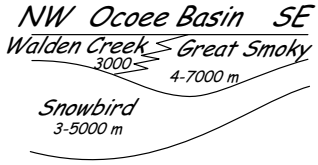
L.S. Fichter, 1993

Notes:
> Chilhowee thickens to southwest
> Formations not drawn thickness proportional
> Age relationships broadly accurate but individual contacts not precise
> Graben fault margins not preserved anywhere

Rock Units Along Southeast Flank Of The Blue Ridge Just Before and During the Protoatlantic Rifting



L.S. Fichter, 1993



Notes:
> Drawing not thickness proportional
> Age relationships broadly accurate but individual contacts not precise
> Evington group extends length of Blue Ridge in western piedmont and is likely continuous with Glenarn in Maryland
> Graben fault margins not preserved anywhere

Figure 11.15. Reconstruction of the rock units and facies relationships along the norwest (top) and southeast (bottom) flanks of the Blue Ridge from Pennsylvania to Tennessee during the Middle Proterozoic (Grenville), Late Proterozoic (rift stage), and Early Cambrian (stabilization stage).

Stratigraphy of the Central and Northern Shenandoah Valley, and Eastern West Virginia

Sequence	AGE	West FORMATION East	Thickness	DESCRIPTION	Interpretation
KASKASKIA	Miss.	MAUCH CHUNK		Coarse ss, silt, shale. Channels. Plant fossils common in places. Coal	Begin Alleghenian Orogeny
		GREENBRIAR		Carbonate dominated (oolites, biosparites)	Orogenic Calm
		POCONO	300-1700'	Quartz sandstone & conglomerate; coarse, thick, large cross beds	Acadian Orogeny: Armorica terrane collides with east coast (survives as Avalon terrane).
	Devonian	HAMPSHIRE (Catskill)	2000'	Point Bar Sequences; red	
		GREENLAND GAP GROUP (former Chemumg) — FOREKNOBS / SCHEER	2000'	Thick hummocky sequences; at top interbedded red and green fine sands and silts	
		BRALLIER (Portage *in Pa.*)	1500-1700'	Bouma sequences	
		MILLBORO (Used south of Shenandoah Co.) — Tully; Harrel; Mahantango; Marcellus	900'; 350-500	Dark gray to black silts and fine sands	
		NEEDMORE · · · Tioga bentonite ·	100-530'	Olive gray fine sands, silts, and shales; fossils abundant in places	
		Wallbridge Unconformity			
TIPPECANOE		ORISKANY	10-125'	Quartz arenite; white, gray, tan; abundant fossils	Orogenic Calm
		HELDERBERG GROUP — LICKING CREEK; MANDATA; NEW SCOTLAND; NEW CREEK; KEYSER	70-150'; 17-50'; 70-600'	Carbonates of many kinds; sometimes with cherts, or interbedded with shale or quartz arenites; fossils very abundant	
	Silurian	(Salina *in WVa.*) TONOLOWAY	50-250'	Tidal carbonates; ALM, ALD; mud cracks; salt casts; evaporitic to west	
		CAYUGA: WILLS CREEK; WILLIAMSPORT — BLOOMSBURG	0-400'	Bloomsburg: red very fine sands/silts/shale	
		CAYUGA: MCKENZIE	0-75'	Yellow calcareous shale; fossils	
		CLINTON: KEEFER; ROSE HILL; TUSCARORA — MASSANUTTEN	70'; 650; 50-250; 700-1200'	Massanutten: coarse friable quartz arenites and conglomerates with large planar X-beds. Tuscarora/Keefer: quartz arenites; ripples. Skolithus. Rose Hill: red fine - coarse sands and shales; loads, ripples, trace fossils	
	Ordovician	JUNIATA — OSWEGO (? "Cub ss")	0-200'; 0-375	Red X-bedded ss; Skolithus; bedded w/sh — Gray/white, coarse X-bedded sands (? Hummocky)	Taconic Orogeny: Chopawamsic/Arvonia Terrane collides with East Coast
		REEDSVILLE — MARTINSBURG	3000'	Clastic hummocky sequences — Feldspathic/lithic Bouma sequences	
		"TRENTON GROUP" — Oranda (Liberty Hall)	40-60'	Carbonate hummocky sequences (?) — Gray silty/shale	
		"BLACK RIVER GROUP" — EDINBURG (Lantz Mills)	425-600'	Carbonate hummocky sequences — Black massive micrites and shale	
		LINCOLNSHIRE	25-170'	Micrites, bio- and pelmicrites, chert abundant fossils, darkens up section	
		NEW MARKET	40-250	Very pure micrites; tidal features	Divergent Continental Margin
		Knox Unconformity			
		BEEKMANTOWN (Rockdale Run)	2500'	Thick bedded dolomite, black chert; tidal	
		STONEHENGE (Chepultepec)	500'	Thick bedded micrite, blue; tidal features	
SAUK	Cambrian	CONOCOCHEAGUE	2500'	LS/dolo/qtz arenite ; abndt tidal structures	
		ELBROOK	2000'	LS/dolo/ blue-gray; tidal features	
		ROME (Waynesboro)	2000'	Red/green shale/dolo/micrite; very variable	
		SHADY	1600'	Dolomite (granular); LS at top and bottom	
		CHILHOWEE: ANTIETAM — HARPERS	500-1500'	Quartz arenite; abndt X-beds. Skolithus. Thin bedded shale and graded sandstones	Rifting: Opening of the Protoatlantic
		CHILHOWEE: WEVERTON — HARPERS	2000'; 800'	Crs feldspathic sands; large planar X-beds and Bouma sequences	
	? Vendian	CATOCTIN	2000'	Subareal , tholeiitic, flood basalts (now greenschist)	
		SWIFT RUN (LYNCHBURG) *East of Blue Ridge*			
		GRENVILLE BASEMENT			

L.S.Fichter, 1991 (reformatted 1996)

Major North American Tectonic Events From the Rodinia Supercontinent Through the Pagaea Supercontinent

West Coast History

Rocky Mountain Orogenies
Cascade; Front Range; Basin and range; Colorado Plateau; Columbia Plateau, Yellowstone; etc.

Laramide Orogeny

Orogenic Calm

Sevier Orogeny

Nevadan Orogeny

Orogenic Calm

Sonoma Orogeny

Ancestral Rocky Mtns.

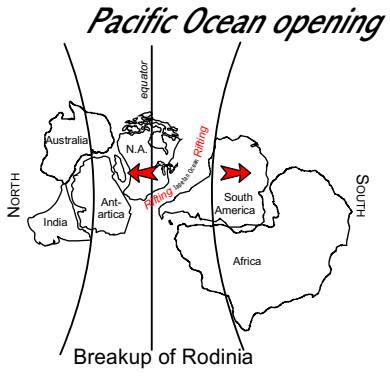
Orogenic Calm

Antler Orogeny

Unconformity

(Gondwana continent assembly)

To Drift
Divergent Continental Margin:
Pacific Ocean opening

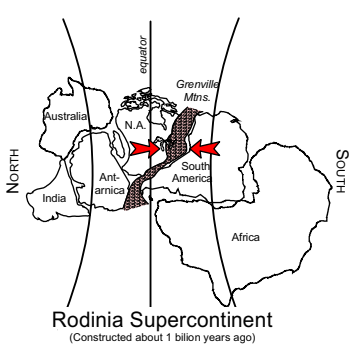


Breakup of Rodinia

Rifting of western Rodinia

AUSWUS Western Rodinia Supercontinent

Western Rodinia Assembly
docking of South China, Australia, East Antartica onto a Divergent Continental Margin



Rodinia Supercontinent
(Constructed about 1 bilion years ago)

Rejuvenation

To Drift: Atlantic DCM

Pangae Rift:
Initiation of Atlantic Ocean

Unconformity

Allghenian, Ouachita, Marathon Orogenies

Orogenic Calm; Rheic Ocean

Acadian Orogeny

Caledonian Orogeny
docking of Baltica

Orogenic Calm; Rheic Ocean

Taconic Orogeny
docking of Carolina terrane

To Drift : Divergent Continental Margin (DCM)

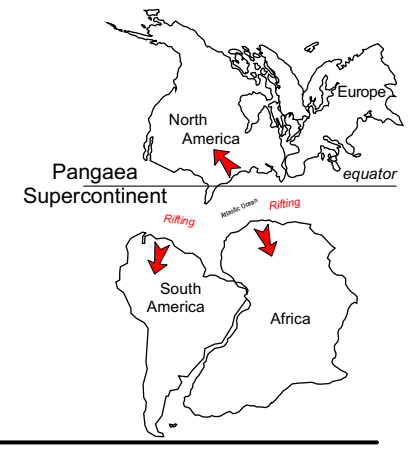
East Rodinia Rift
Initiation of the Proto-Atlantic (Iapetus) Ocean

Early Rifting and the Crossnore Volcanic/Plutonic Complex (A type granites)

Unconformity

Grenville Orogeny - eastern Rodinia assembly
docking of Amazonia/west Africa and Baltica

North American Continent



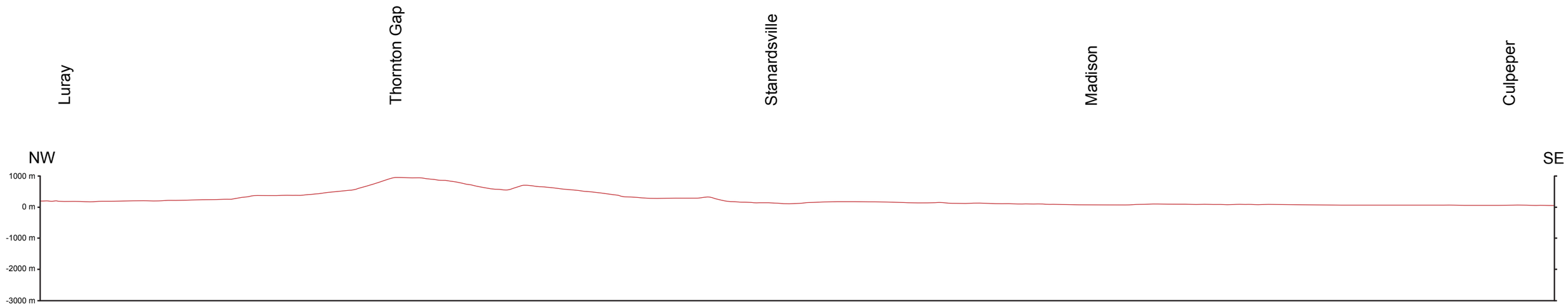
Pangaea Supercontinent

Laurissia (Old Red SS continent)

Laurentia Eastern Rodinia Supercontinent

East and Gulf Coast History

Lynn S. Fichter
Department of Geology/Environmental Science
James Madison University
2012


Luray
Thornton Gap
Stanardsville
Madison
Culpeper
NW
SE
1000 m
0 m
-1000 m
-2000 m
-3000 m

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