

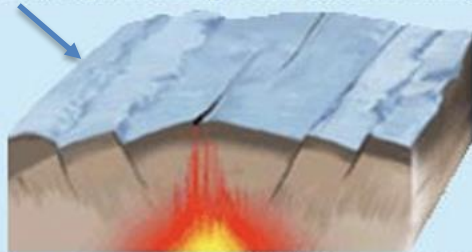
Osher Week #3, January 25th

Review from Week #2

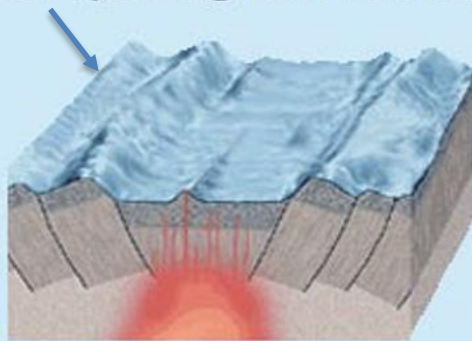
Why was sea level so high – as to cover so much of continent?

1. Sea level is controlled on a large scale by rate of plate tectonic motion

Fast-Spreading Mid-Ocean Ridge



Slow-Spreading Mid-Ocean Ridge



Compare the height and the volume of the Mid Ocean Ridge when spreading is fast vs slow.

Note that ridge is puffed up by heat when Spreading is fast. When slow, ridge has time to cool and sink...

Fast spreading: ridge puffed and high, ocean water sloshes onto continents (Nashville)

Slow spreading: ridge sinks, sea level low

Session #3, January 25th

Review from Session #2

Why does Nashville have so much limestone and no other type of rock – that would not dissolve so much?

The only sediment available was shell material. Land was too far away to provide sediment like rock fragments and quartz sand that would not dissolve.

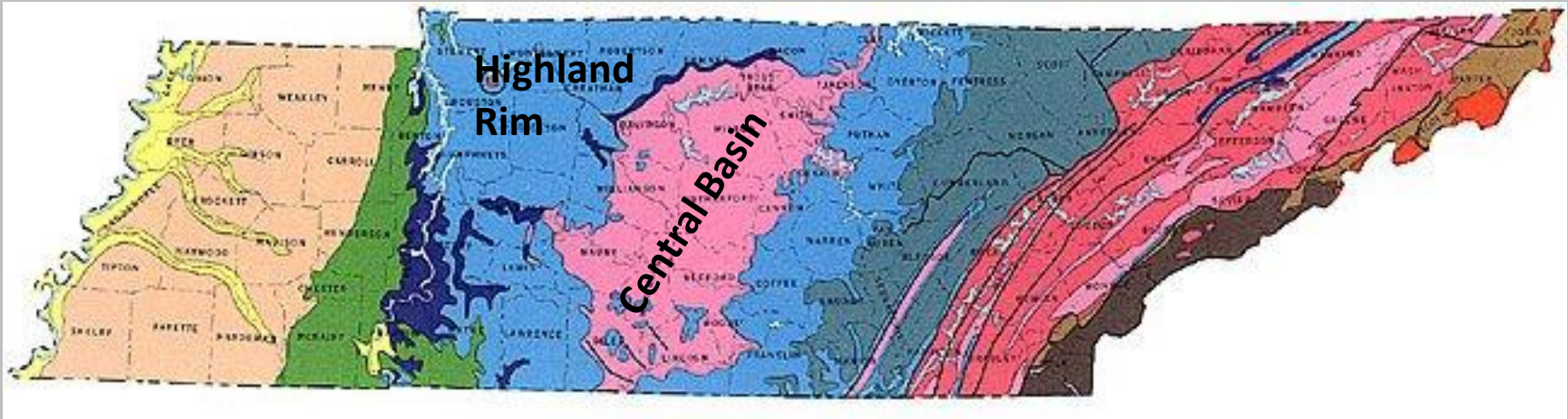


#3 January 25th

Rocks Layers, What it Was Like, When it Was Like That

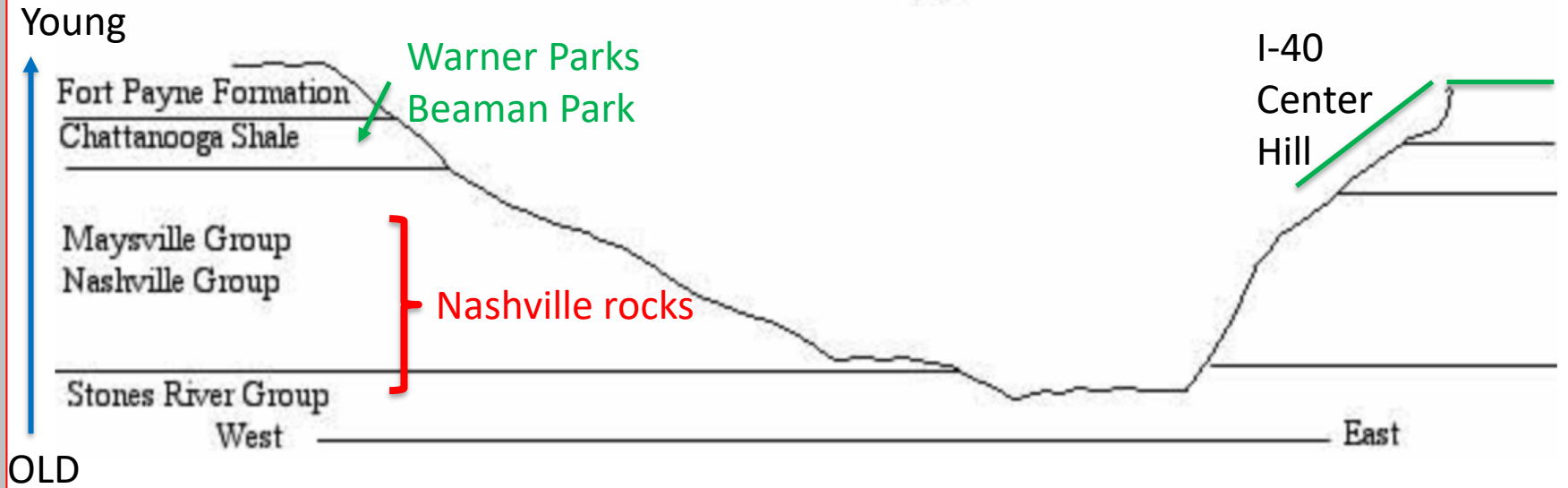
1. Rock Layers - ~ 800 feet of limestone exposed in Mid TN in 17 Formations

Formation = Mappable rock unit – recognizable from place to place

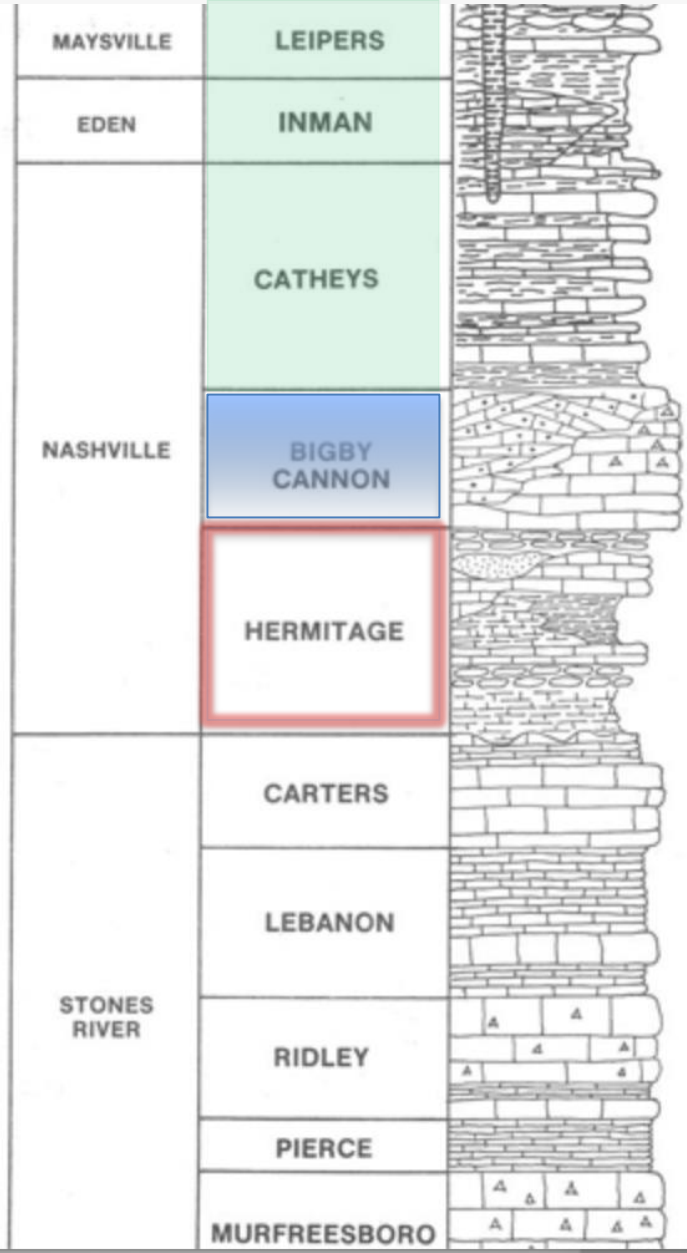


Cross Section of the Nashville Basin

vertical dimension exaggerated



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I-65 North - Rivergate

I-40 west, Bellevue; Vietnam Veterans

Capitol Hill, Fort Negley

I-440, I-40 downtown

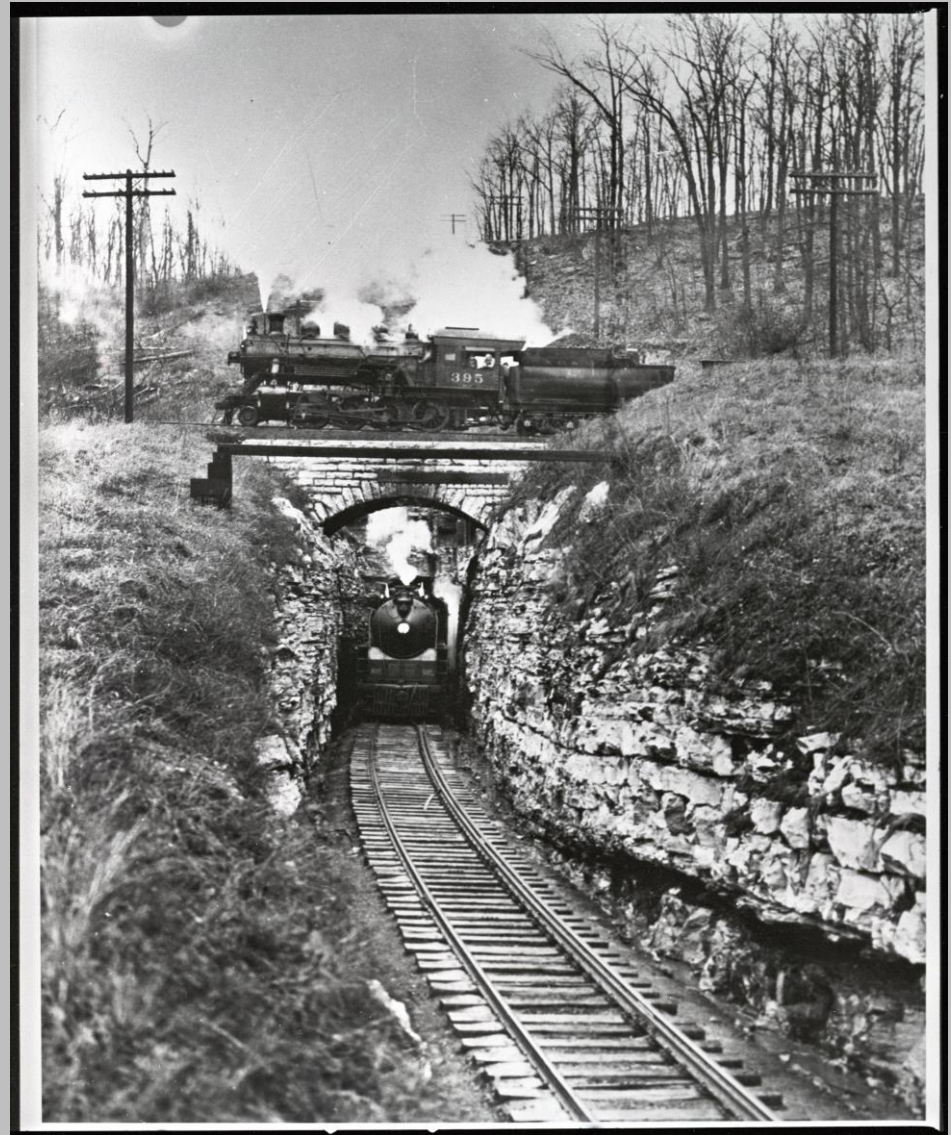
Striped limestone – airport, I-24 & I-40

Cedars or Lebanon State Park

Percy Priest Lake shoreline



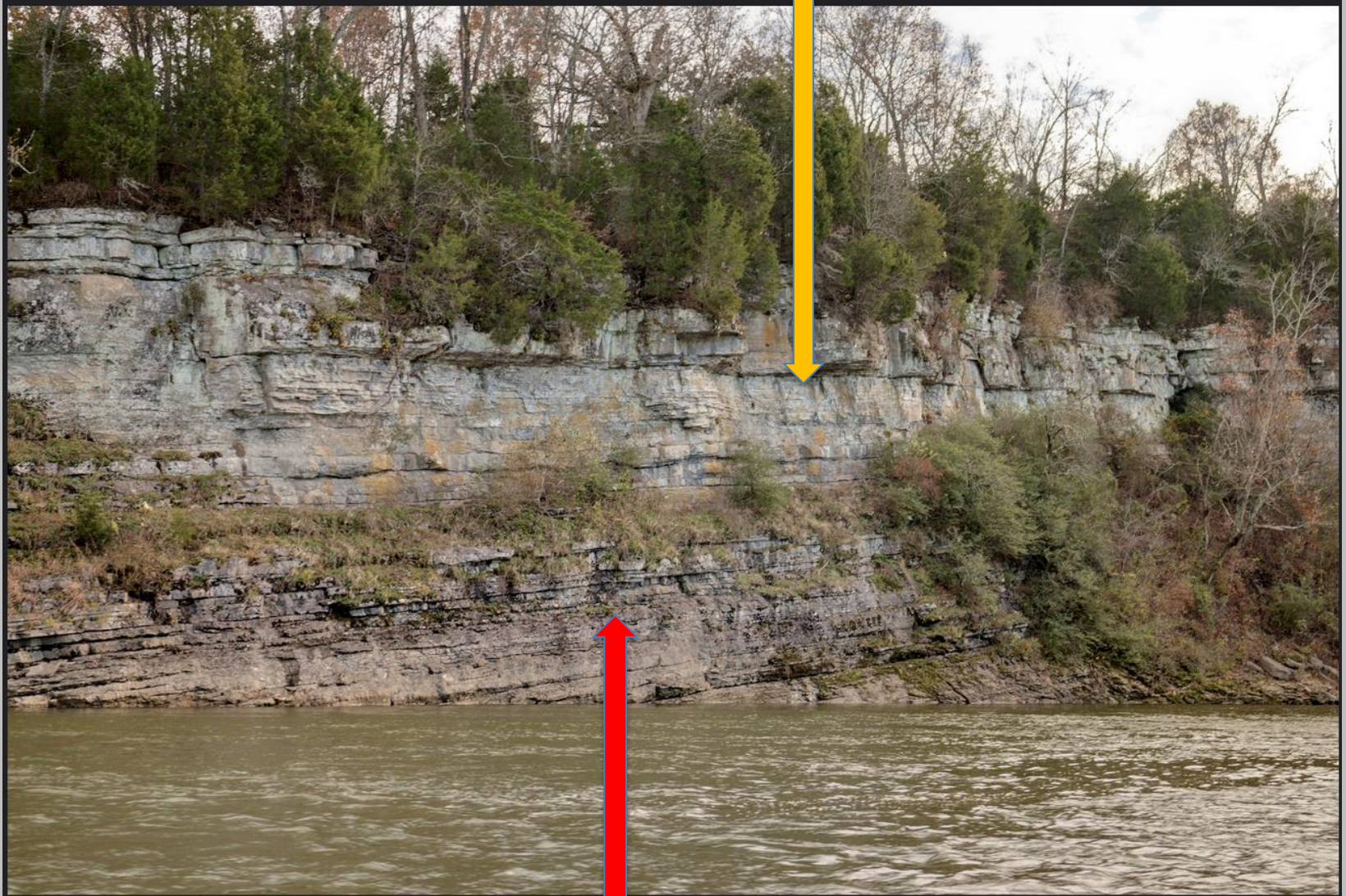
Charles W. Wilson, Jr –
Vanderbilt Professor – 1931-1971
Made maps showing formations
240 maps – all of Mid Tennessee



No freeways – railroad cuts
Problem: new rock exposures on freeways
not mapped – maps are outdated

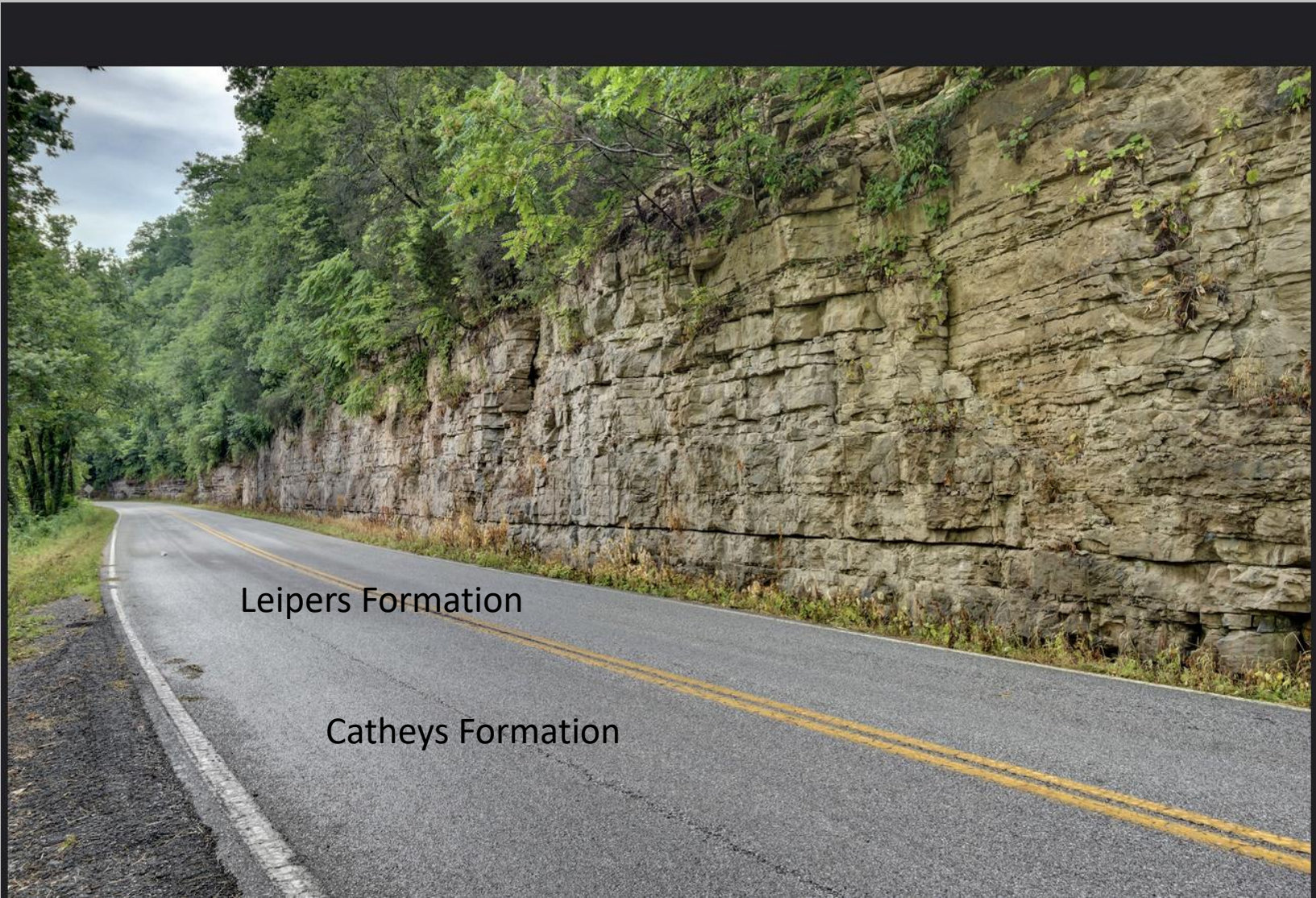
West Nashville quarries - Rock Island Marina

Bigby Cannon Formation



Hermitage
Formation

Canyons near airport
Striped rock



Leipers Formation

Catheys Formation



Nashville West – behind Target: Bigby-Cannon or Catheys Formation?? Built in 2007

Rocks Layers, What it Was Like, When it Was Like That

2. What was it like? Look at features.... And compare with those in modern settings...

Bigby Cannon
Formation

On ramp to I-40
East from
Demonbreun

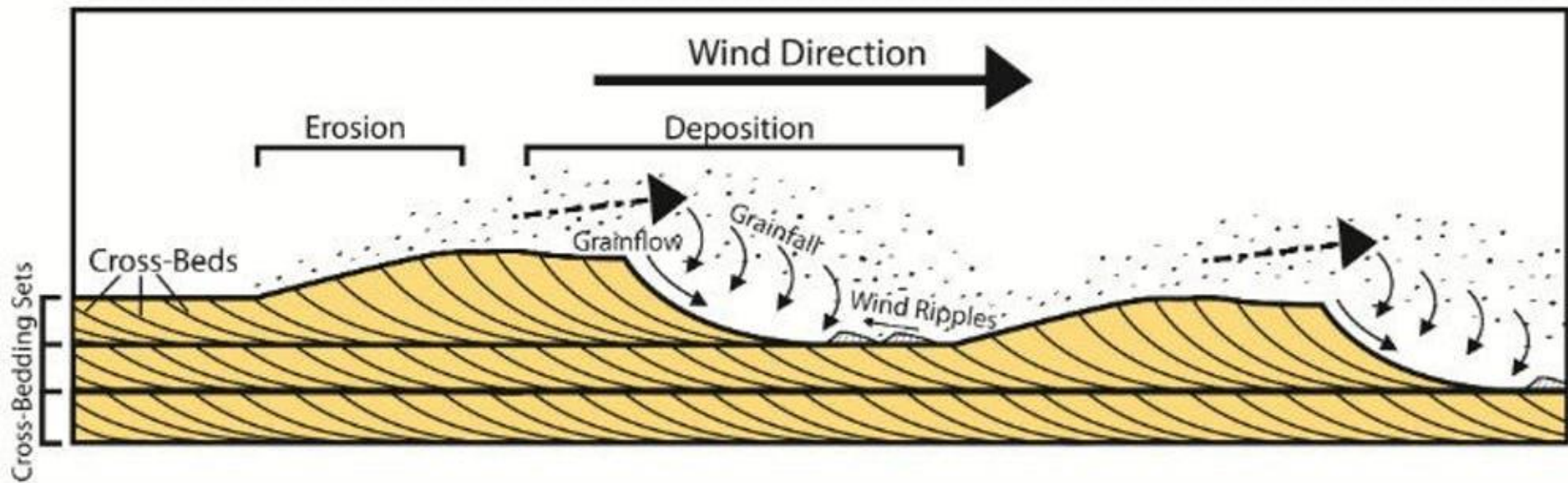


Cross-bedding
(slanted)



Horizontal
layers above
A
and below







flow direction





Large-scale dunes in shallow ocean water – Bahamas
In side view – show cross-bedding



Barnstable Harbor, Cape Cod, MA





burrows in limestone - few shells; Lebanon Fm. Cedars of Lebanon



Bahamas – mosaic of different environments all at one time (now)

“Dove-colored member”

Bigby-Cannon Formation

“False Dove-colored
Member”

Catheys Formation

Really light colored layer
common in Nashville’s
freeway cuts

has mudcracks

Significance: exposed to air
(above sea level)





Modern mudcracks



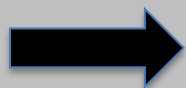
In rocks



Broken shells

By waves, currents

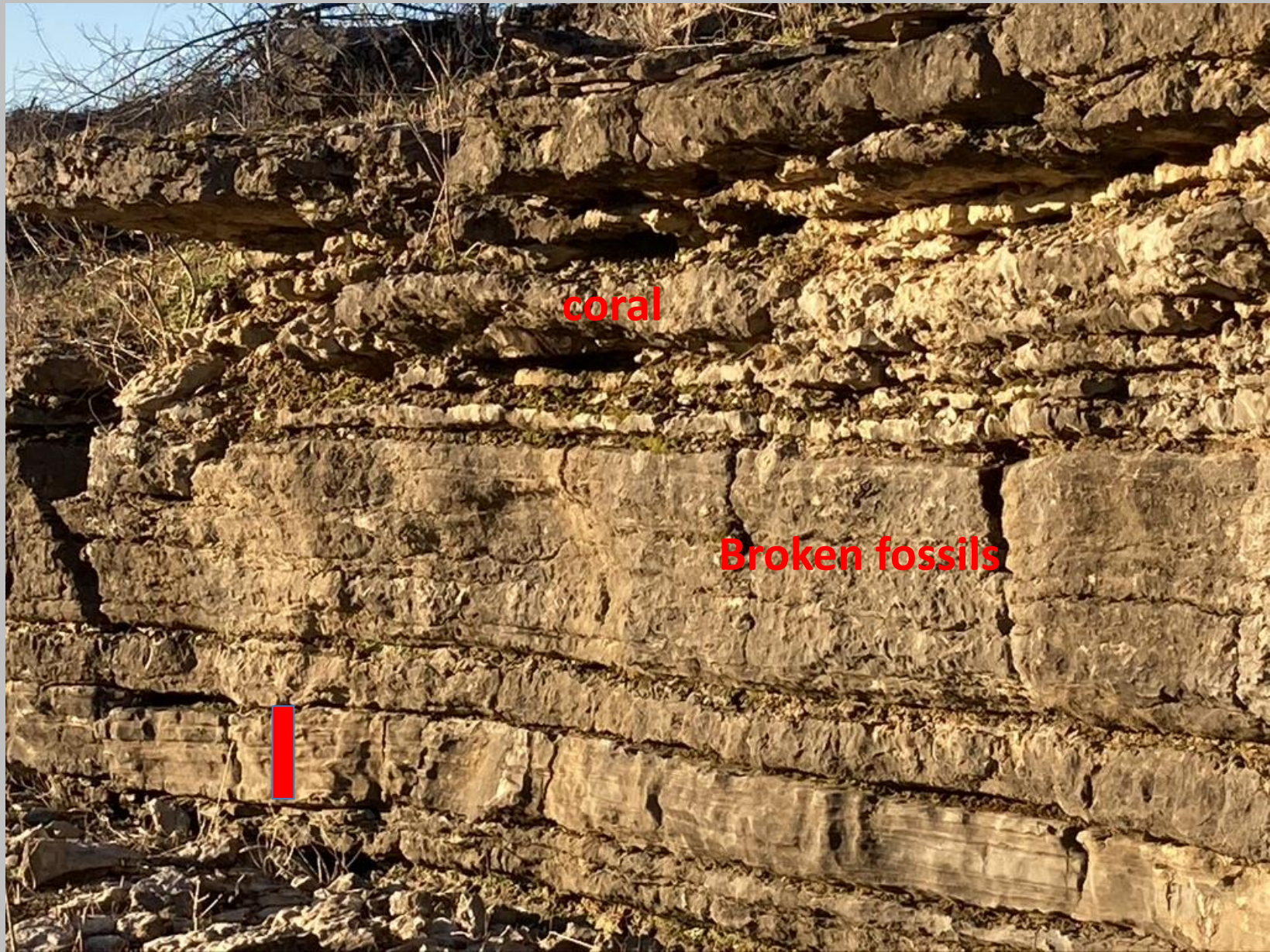
Top view



Side view



1 cm



Fort Negley cliffs





How did this layer form?

Why does it have clear layers whereas layers above and below do not?

Interpretations: Based on modern processes: what forms distinct bedded units in shallow marine settings?

Answer: Hurricanes. Big events that erode and redeposit much sediment. Geologists study and describe deposits of modern hurricanes, and this layer resembles a hurricane deposit.

2. What was it like? Summary of Nashville Environment 470 million years ago – 370 MYA

Environment = very shallow ocean with waves, currents, storms, shoals, exposed to air

Summary:

Waves and currents	Shoals, cross-bedding, ripples
Waves and currents	Broken fossils
Profuse life living on bottom	Corals, many fossils
Hurricanes	Distinctive cross-bedding
Exposed to air (above sea level)	Mudcracks – (evidence of drying)

3. When were Nashville's limestones deposited?

470- 370 Million Years Ago

3. When were Nashville's limestones deposited?

470- 370 Million Years Ago

Timeline: 1 inch = 20 million years Earth formed 4.55 billion years ago

Length of timeline = 18 feet, 9 inches

Nashville limestones deposited in 5 inch swath, youngest of which is 18.5 inches from now end of timeline

