

# An Introduction to Soils and Landscapes of Maryland

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# Definition of Soil

- Soil is a natural body .... which occurs at the earth's surface .... and has one or both of the following characteristics:
  - 1) is organized into **horizons** or layers that are distinguishable from the initial material as a result of **additions, losses, transfers, and transformations** of energy and matter or
  - 2) is **capable of supporting rooted plants** in the natural environment.

# Relationship of Soils and Geology

- Does Soil = Weathered Rock?
- Geology highly important,
  - but soil formation much more involved
- Hans Jenny's State Factors  $s = f(C, O, P, R, T)$
- Soil is a function of

- Climate
- Organisms

**Broadly Regional**

- Parent Material – (Geology)
- Relief (topography)
- Time

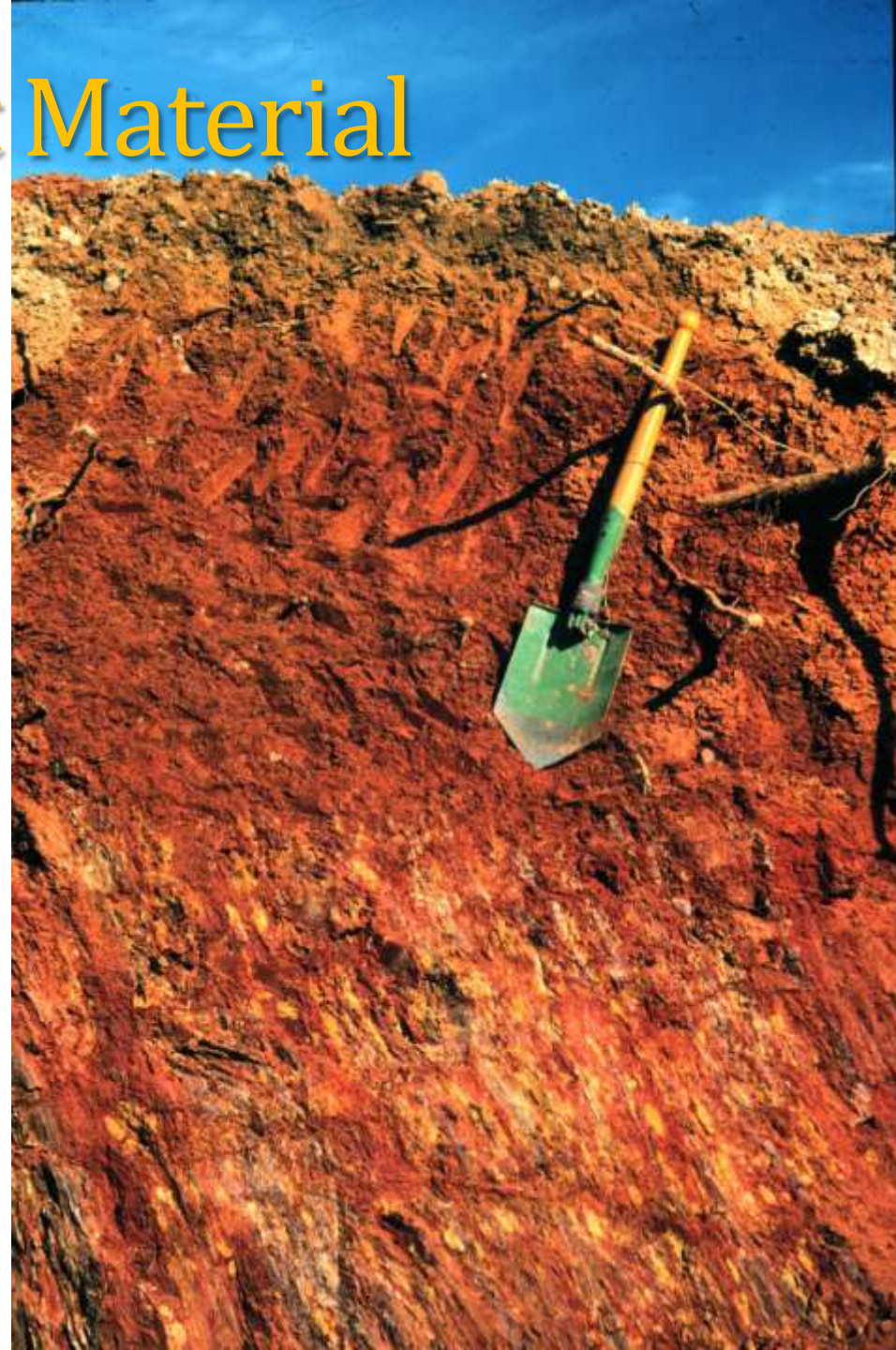
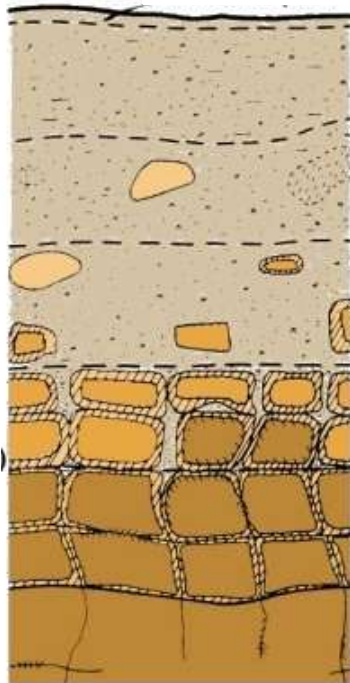
**Important Locally**

# Types of Parent Material

- Residual - soils formed from hard rock
  - Igneous
  - Sedimentary
  - Metamorphic
- Unconsolidated / Transported
  - by gravity
  - by water
  - by wind
  - by glaciers

# Residual Parent Material

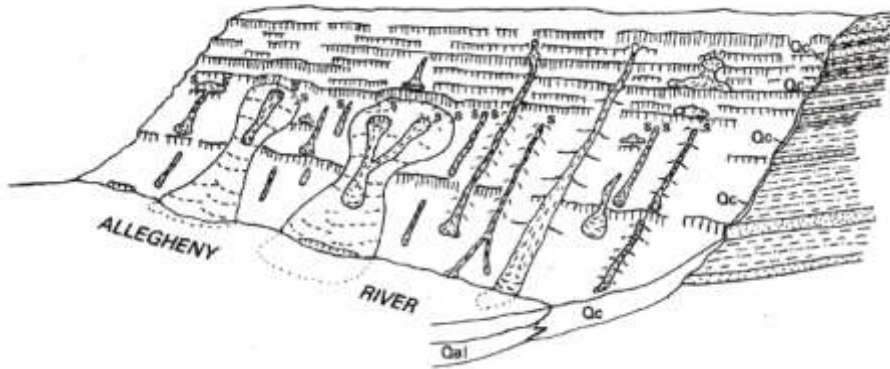
- Formed from hard rock
  - Igneous
  - Sedimentary
  - Metamorphic





# Unconsolidated / Transported Parent Material

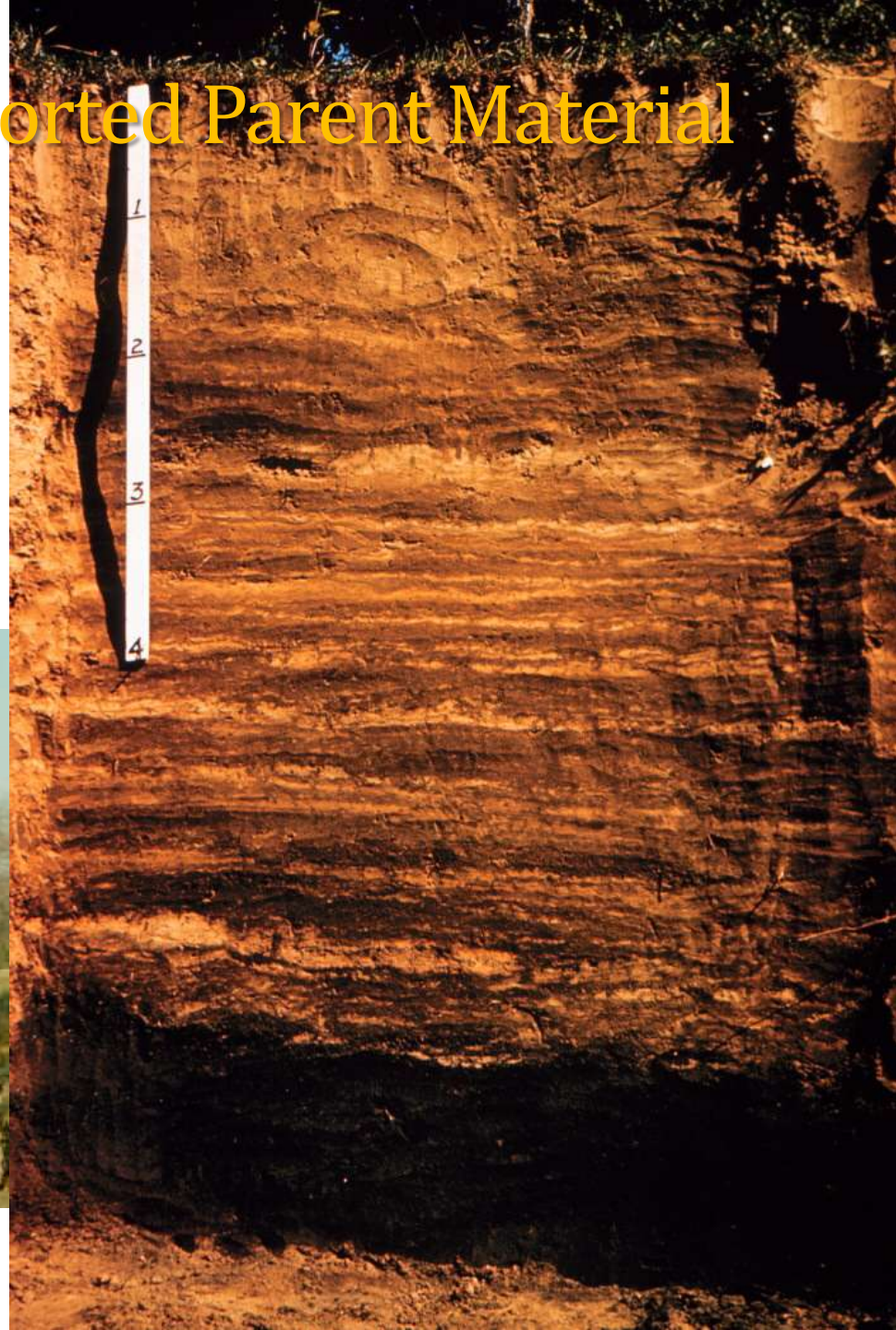
- By Gravity
  - colluvium - lithologically similar to residuum





# Unconsolidated / Transported Parent Material

- By Water
  - alluvium





# Unconsolidated / Transported Parent Material

- By Water
  - alluvium
  - fluvio-deltaic coastal plain sediments
  - marine sediments

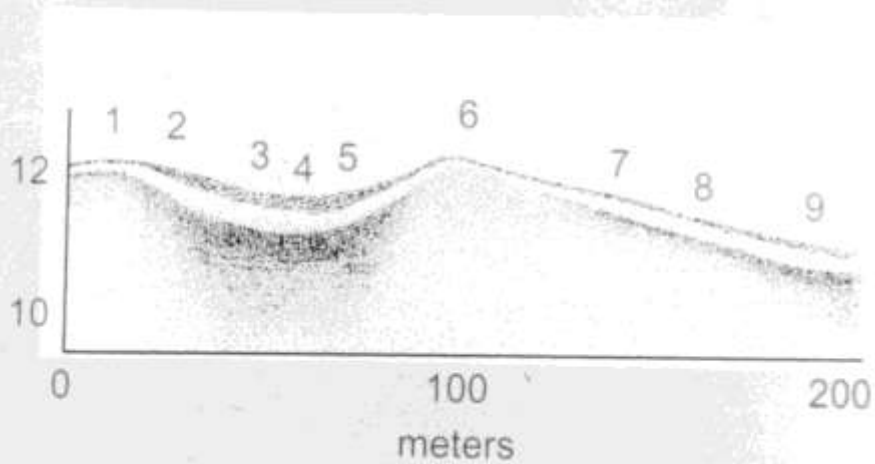




# Unconsolidated / Transported Parent Material

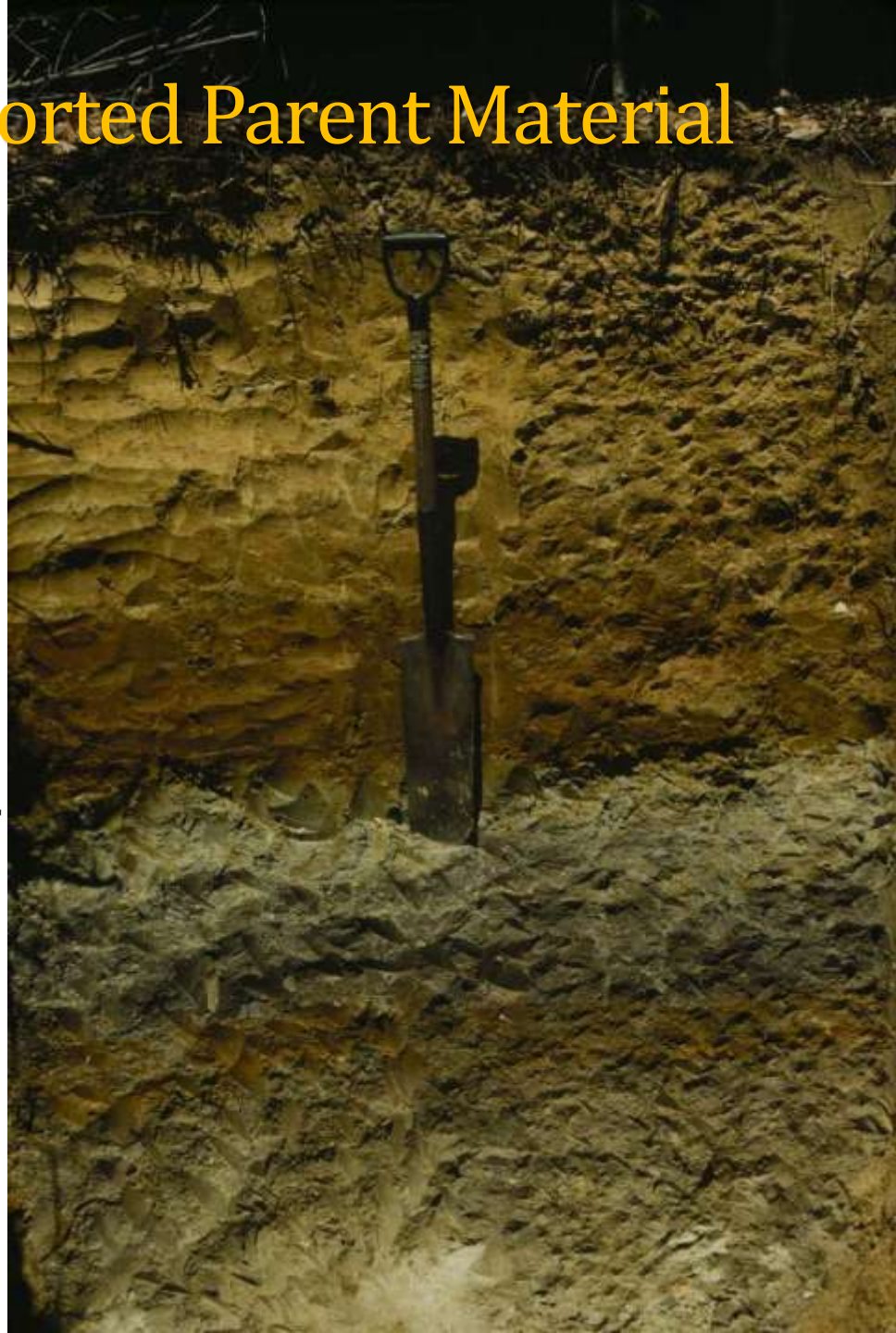
- By Wind
  - eolian sands - dunes

Site 1



# Unconsolidated / Transported Parent Material

- By Wind
  - eolian sands - dunes
  - eolian silts - loess



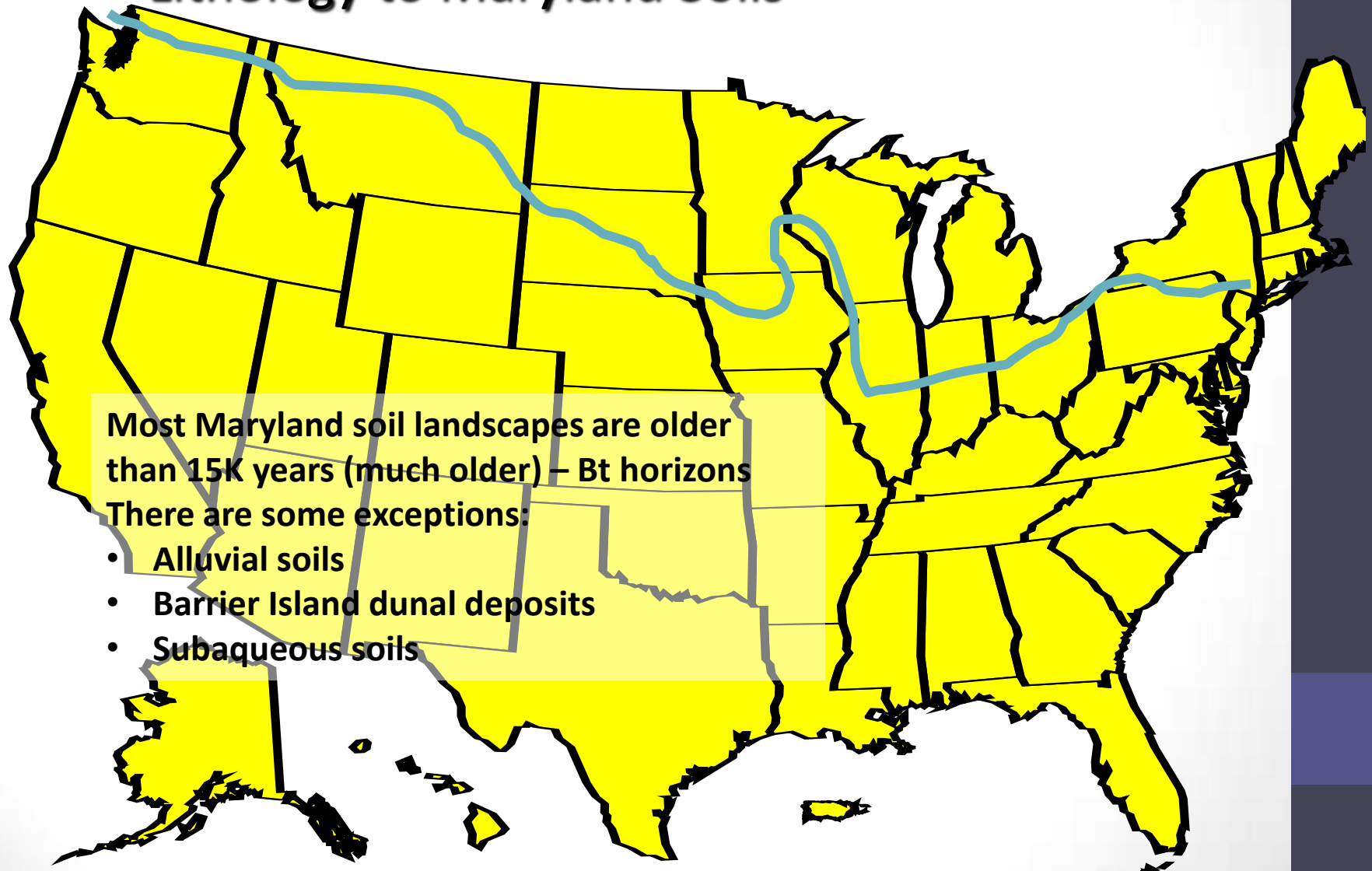
# Unconsolidated / Transported Parent Material

- By Glaciers - not within MD
  - till
  - outwash



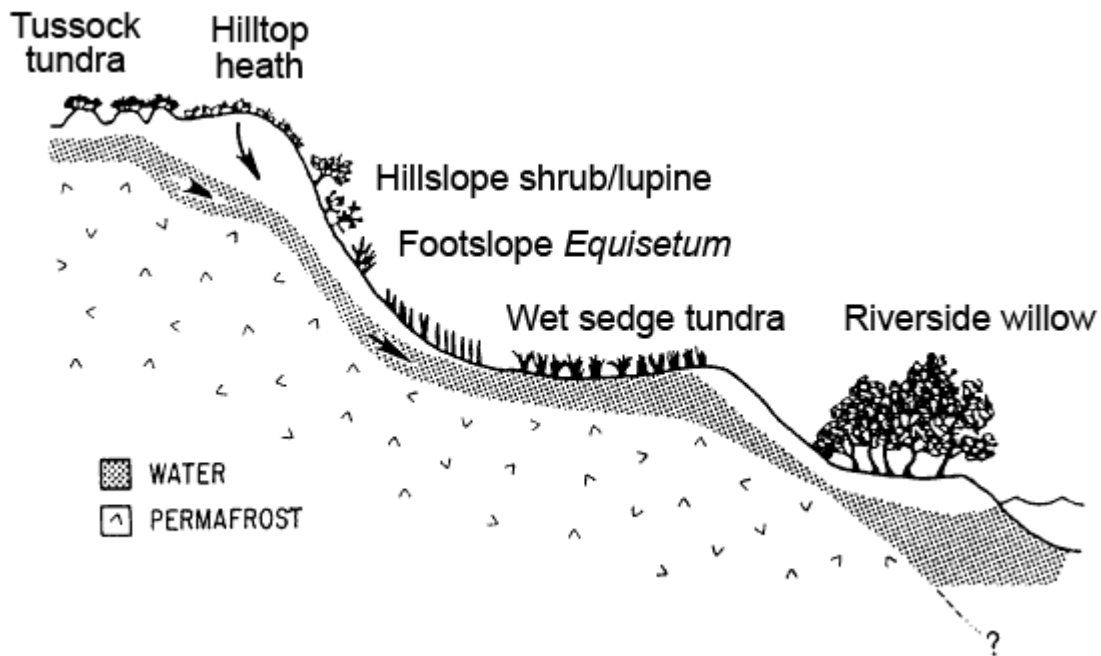
# Extent of Glaciation in the US

Enhances The Importance of Parent Material  
Lithology to Maryland Soils

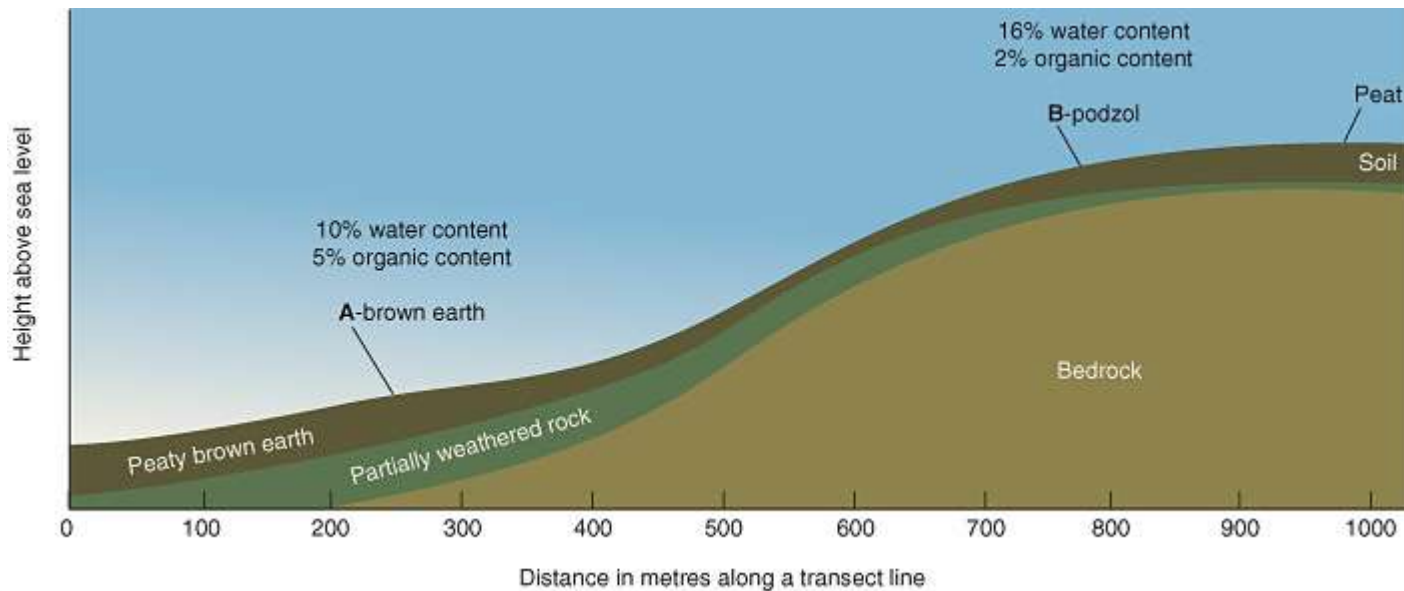


# Topography

- **Toposequence**
  - Adjacent soils that show differing profile characteristics reflecting the influence of local topography



AK



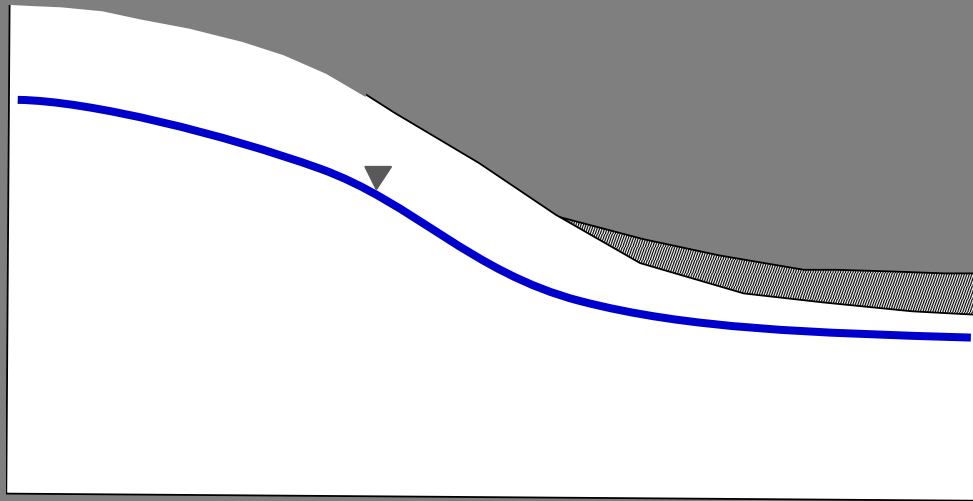
UK



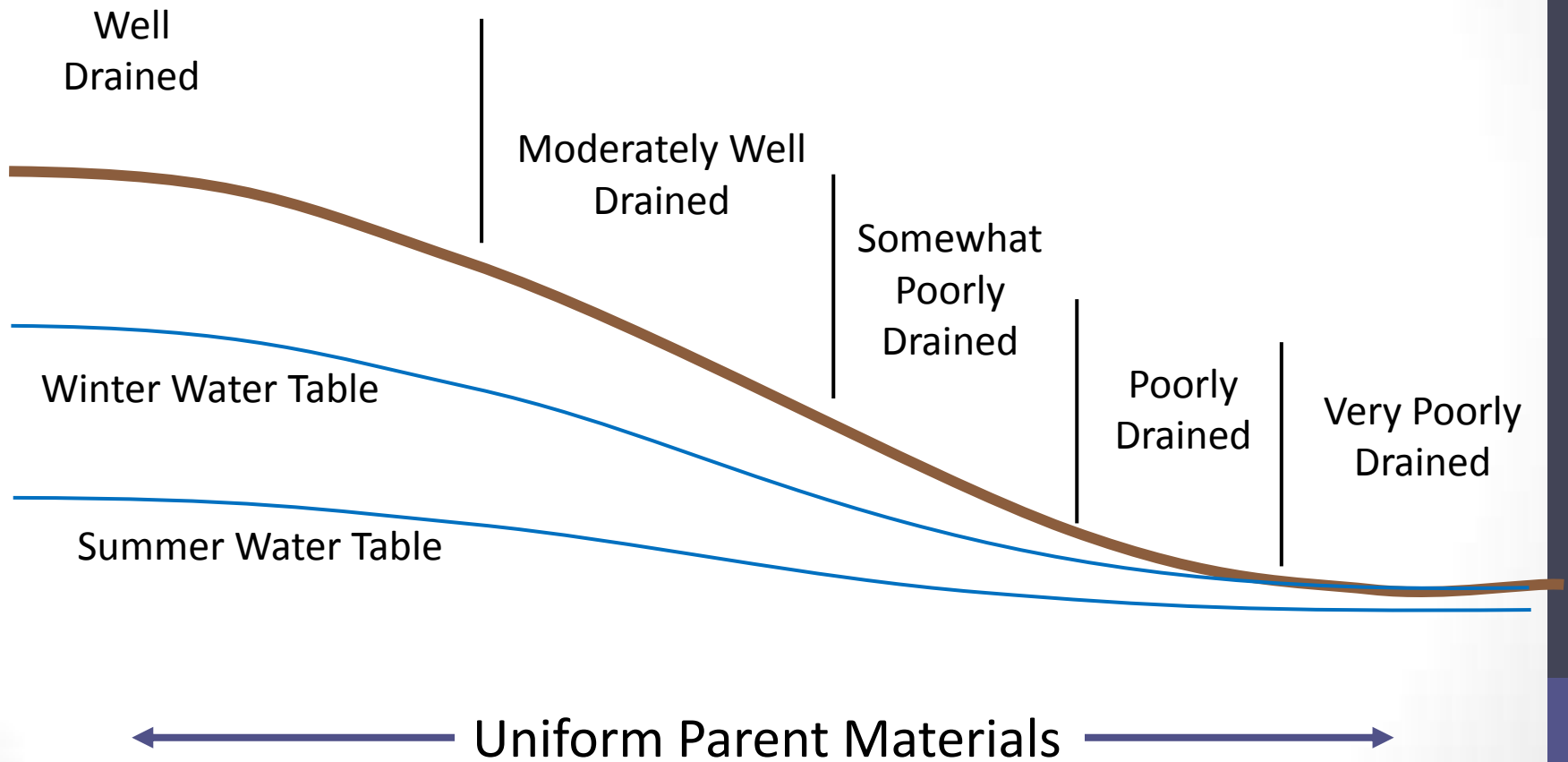
# Relief / Topography

Effects on hydrological processes

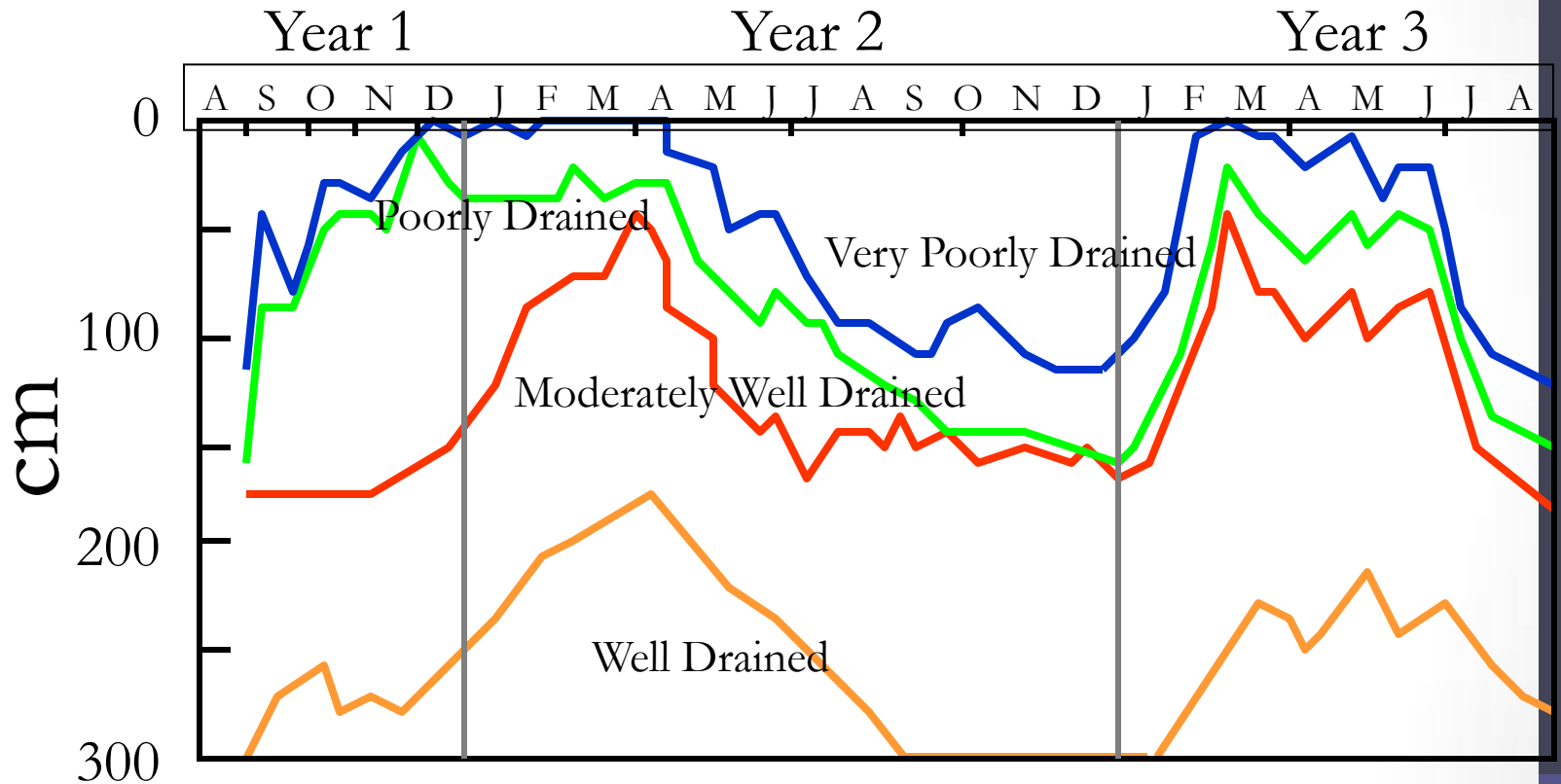
Erosion and sedimentation



# The Catena Concept



# Water Table Dynamics in the Sassafras Catena



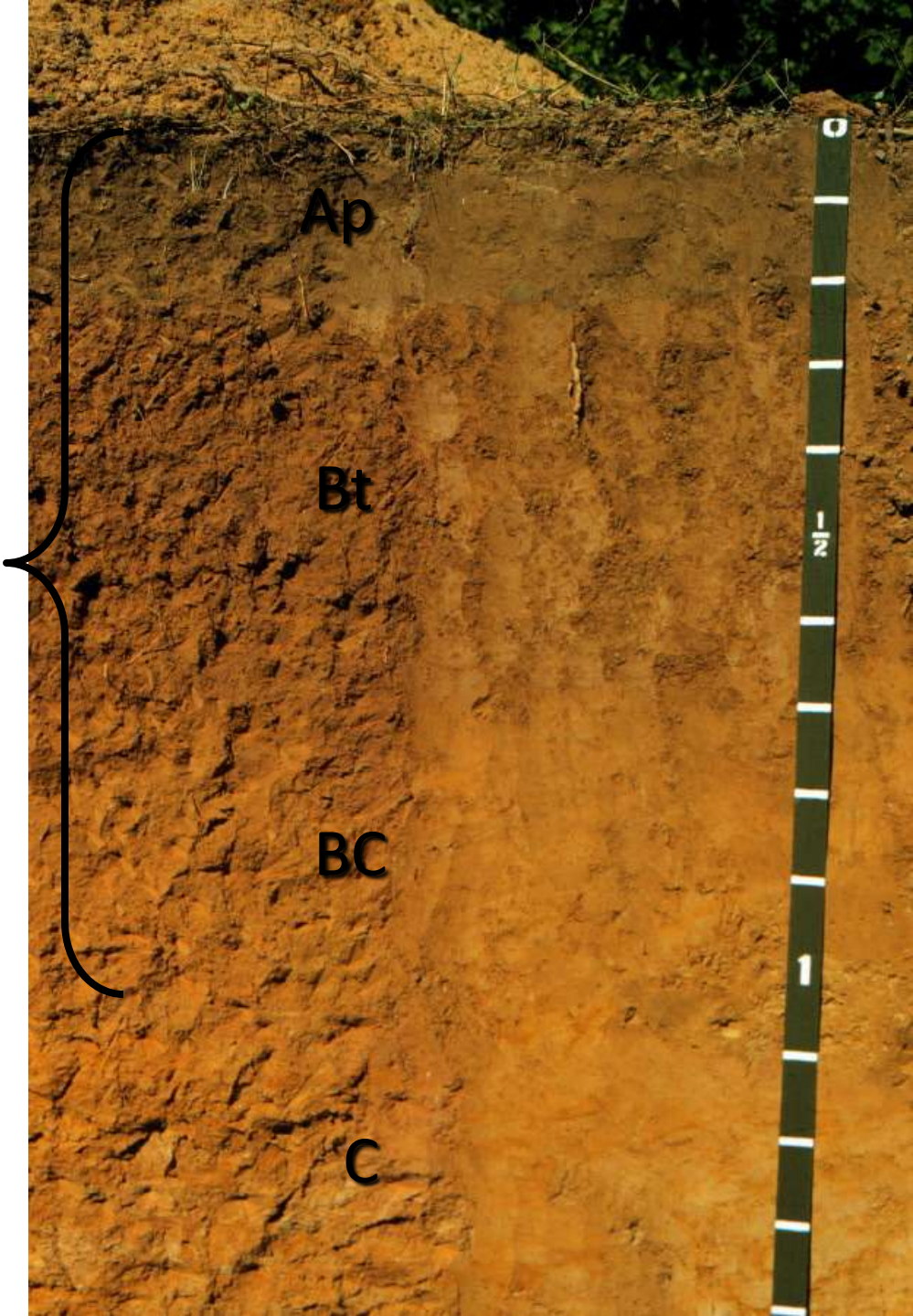


Drainage Sequence

# Sassafras

Well Drained

NO gray Depletions  
(of chroma 2)  
within 100 cm

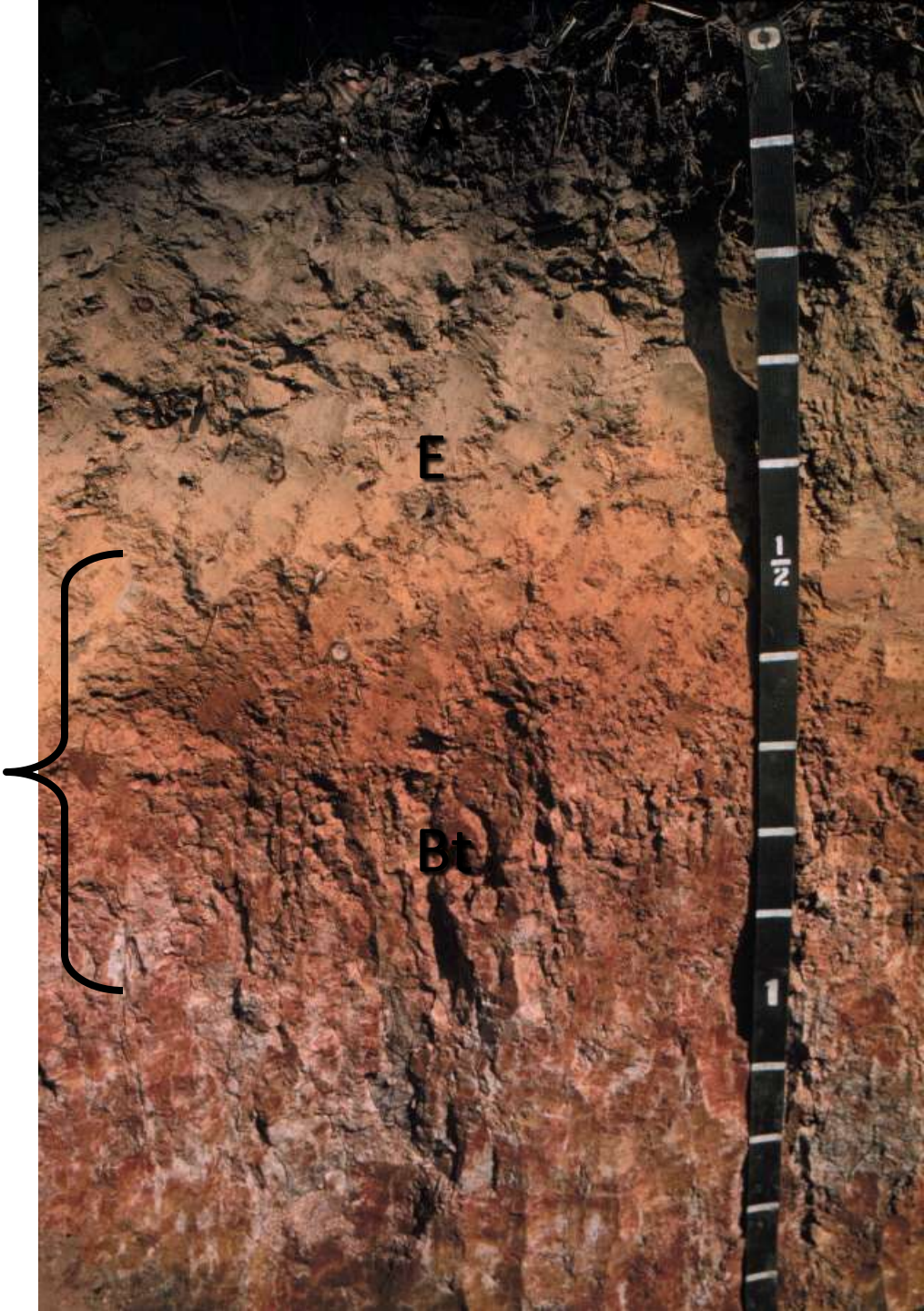




# Keypoint

Mod. Well Drained

Gray Depletions  
(of chroma 2)  
within 50-100 cm

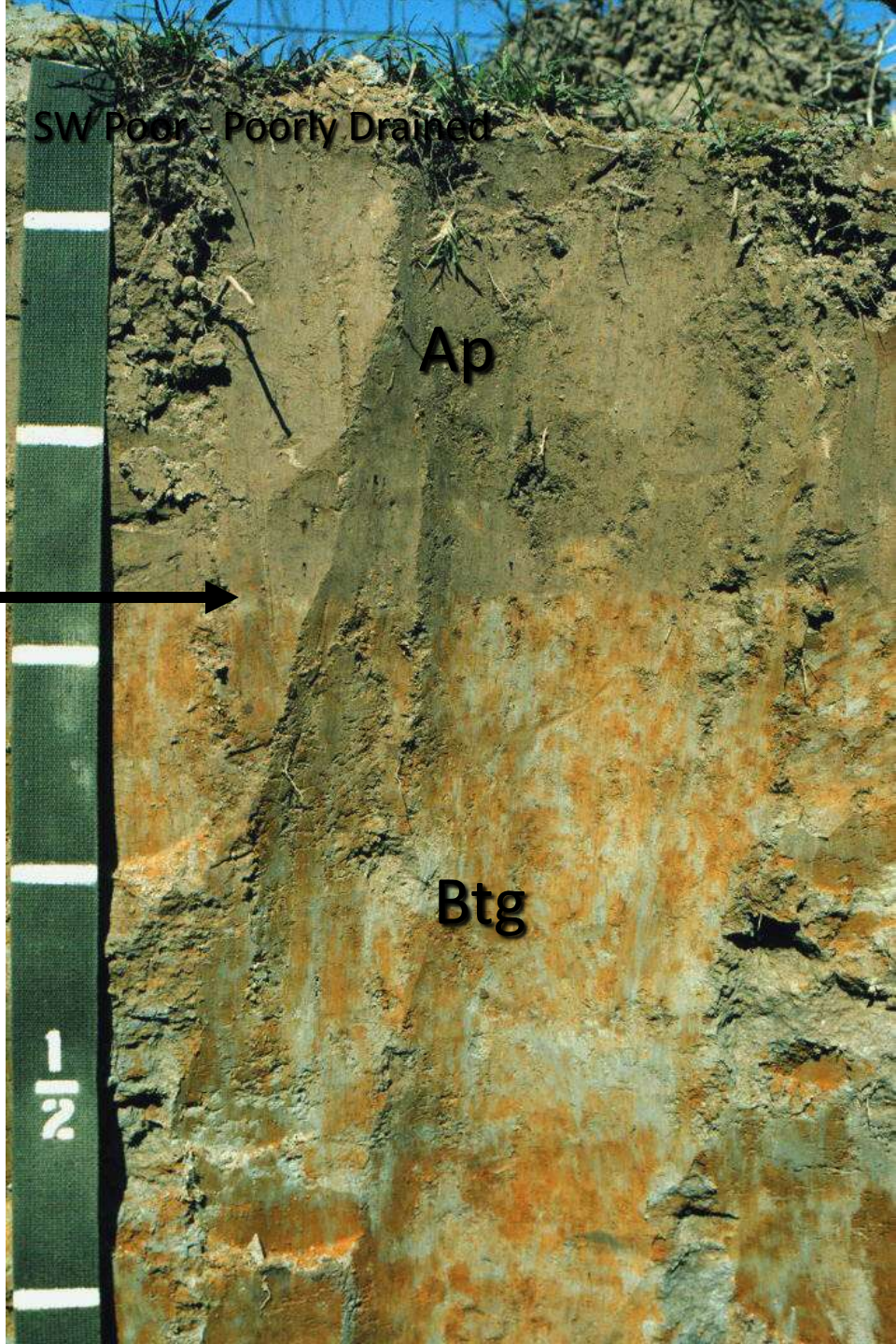




Drainage Sequence

Somewhat Poorly Drained  
to poorly drained

Depletions of  
chroma 2  
within 25 cm  
or at base of Ap



SW Poor - Poorly Drained

Ap

Btg

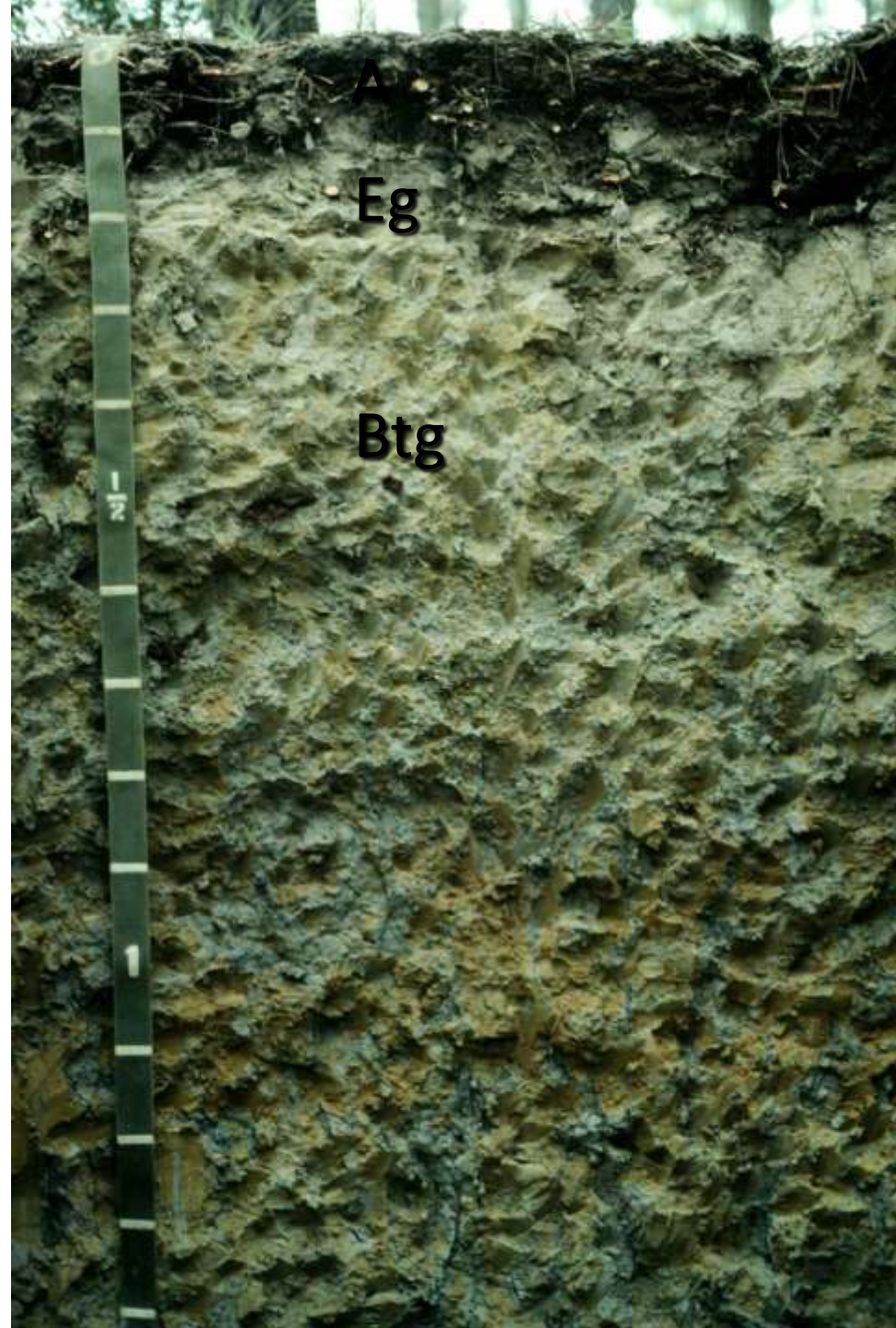
1  
1/2



# Elkton

Poorly Drained

Dominance of gray colored depletions (of chroma 2) throughout the soil (gray matrix colors)

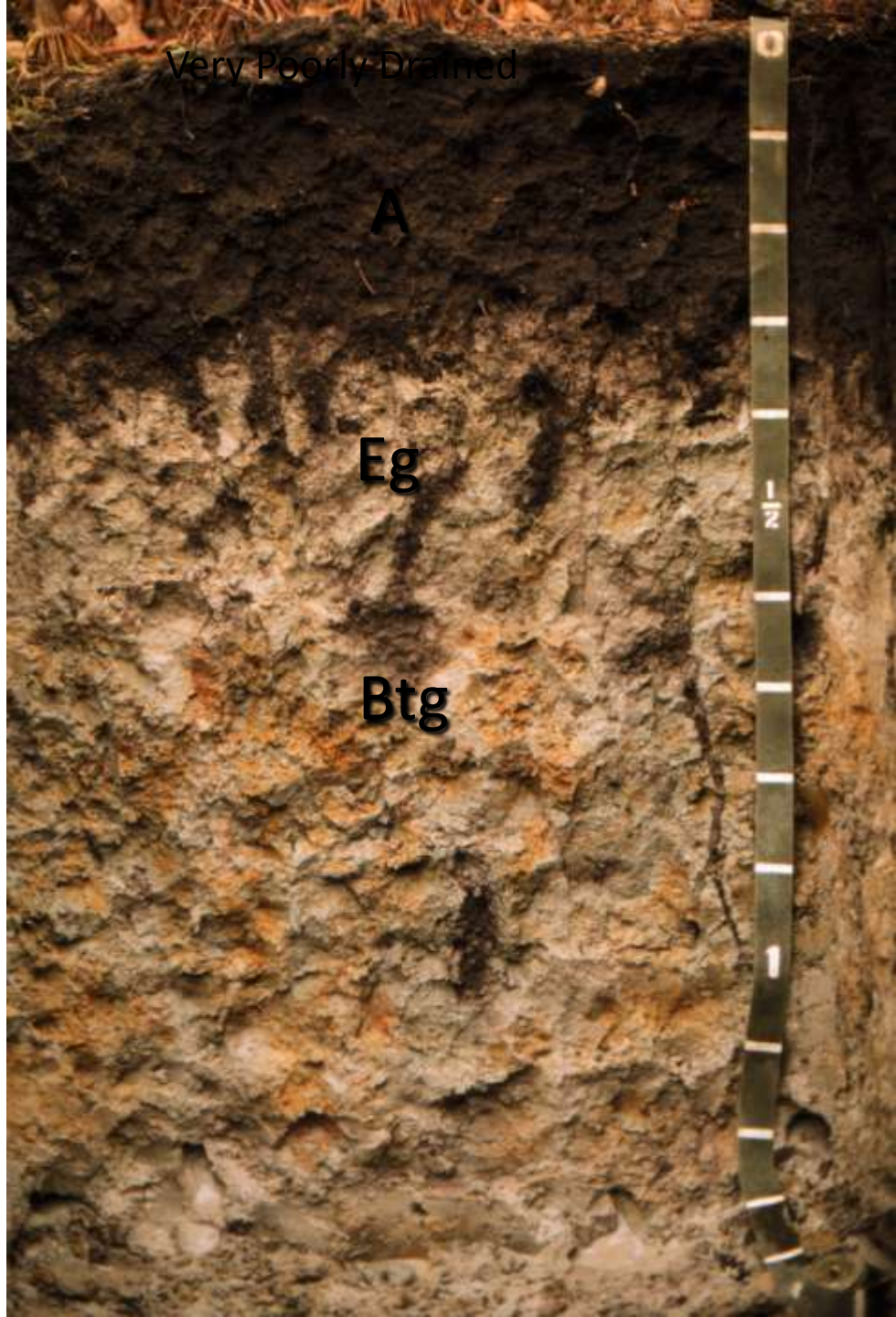


Drainage Sequence

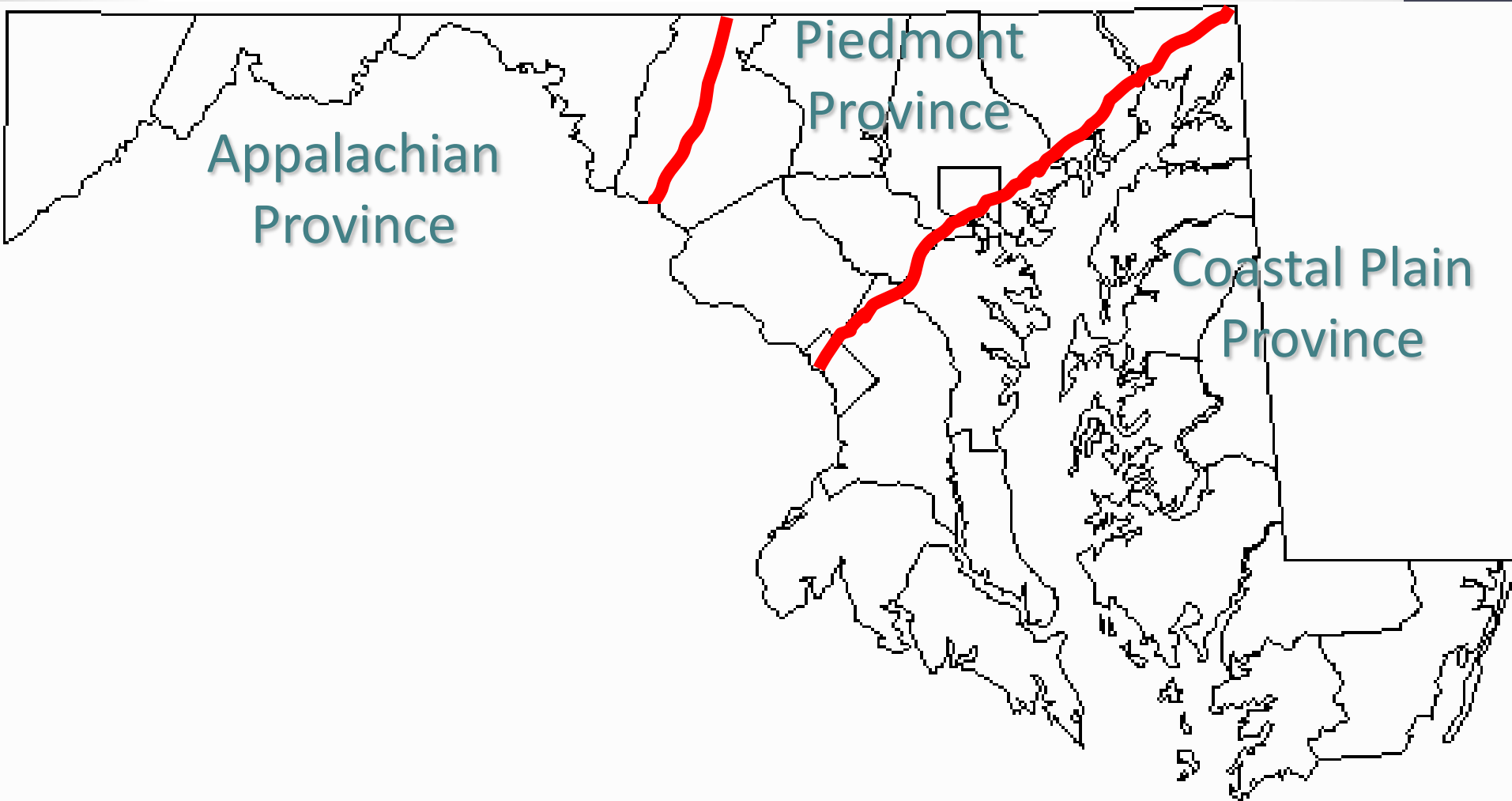
# Kentuck

Very Poorly Drained

Dominance of gray depletions with chroma 2  
right to the base of the A horizon  
AND Dark thick A horizon



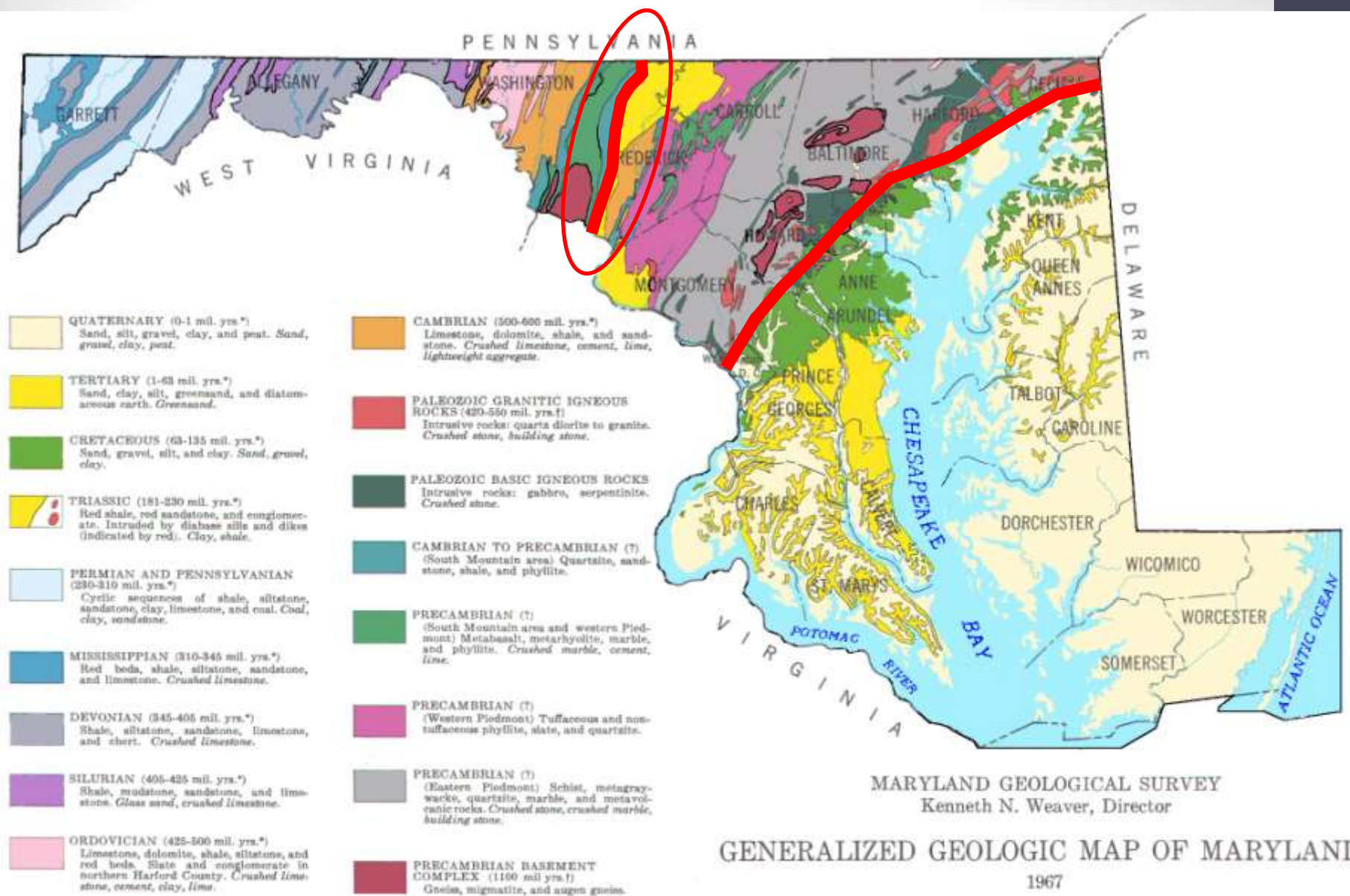




Appalachian  
Province

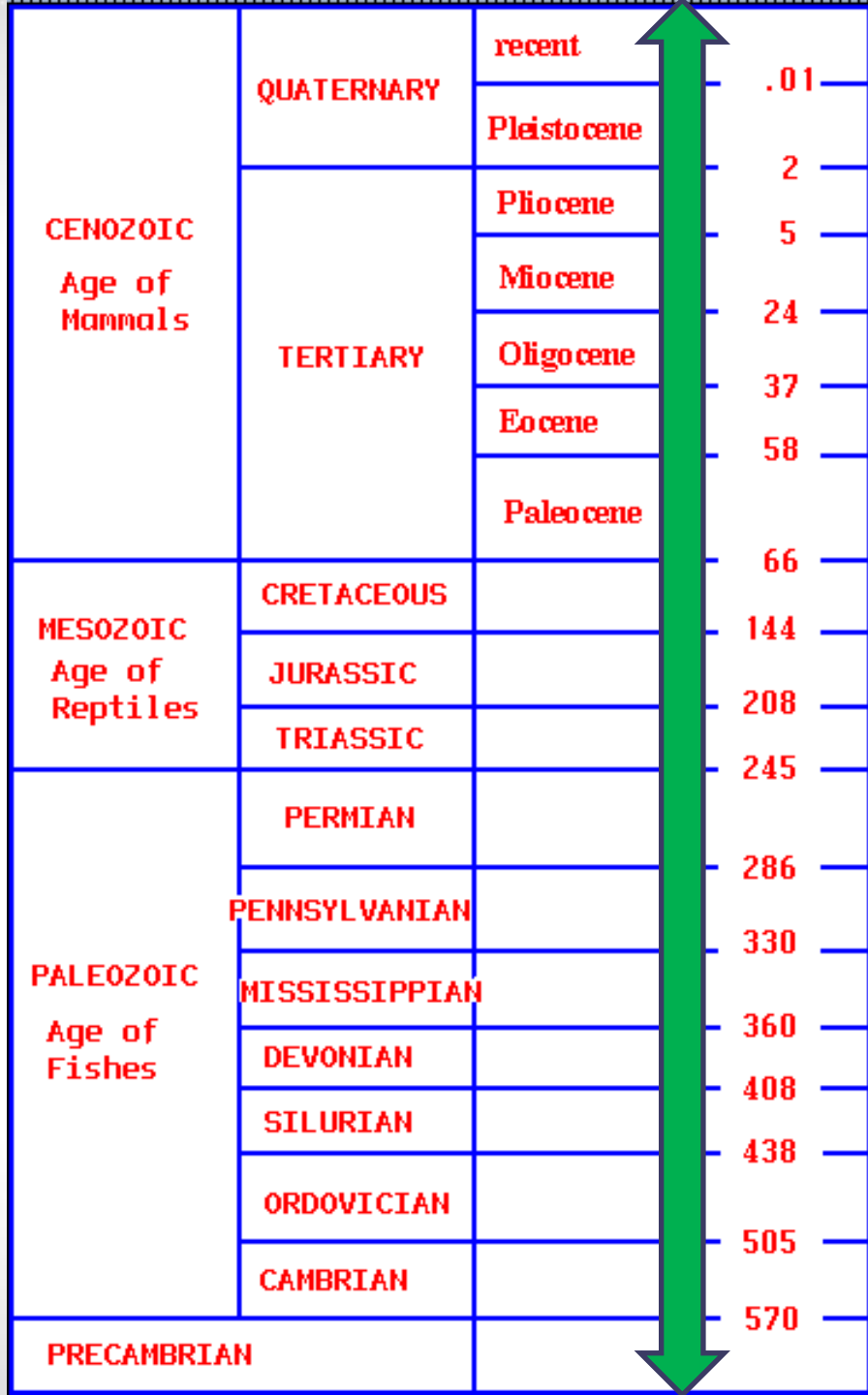
Piedmont  
Province

Coastal Plain  
Province



## Wide Variety of Geological Parent Materials



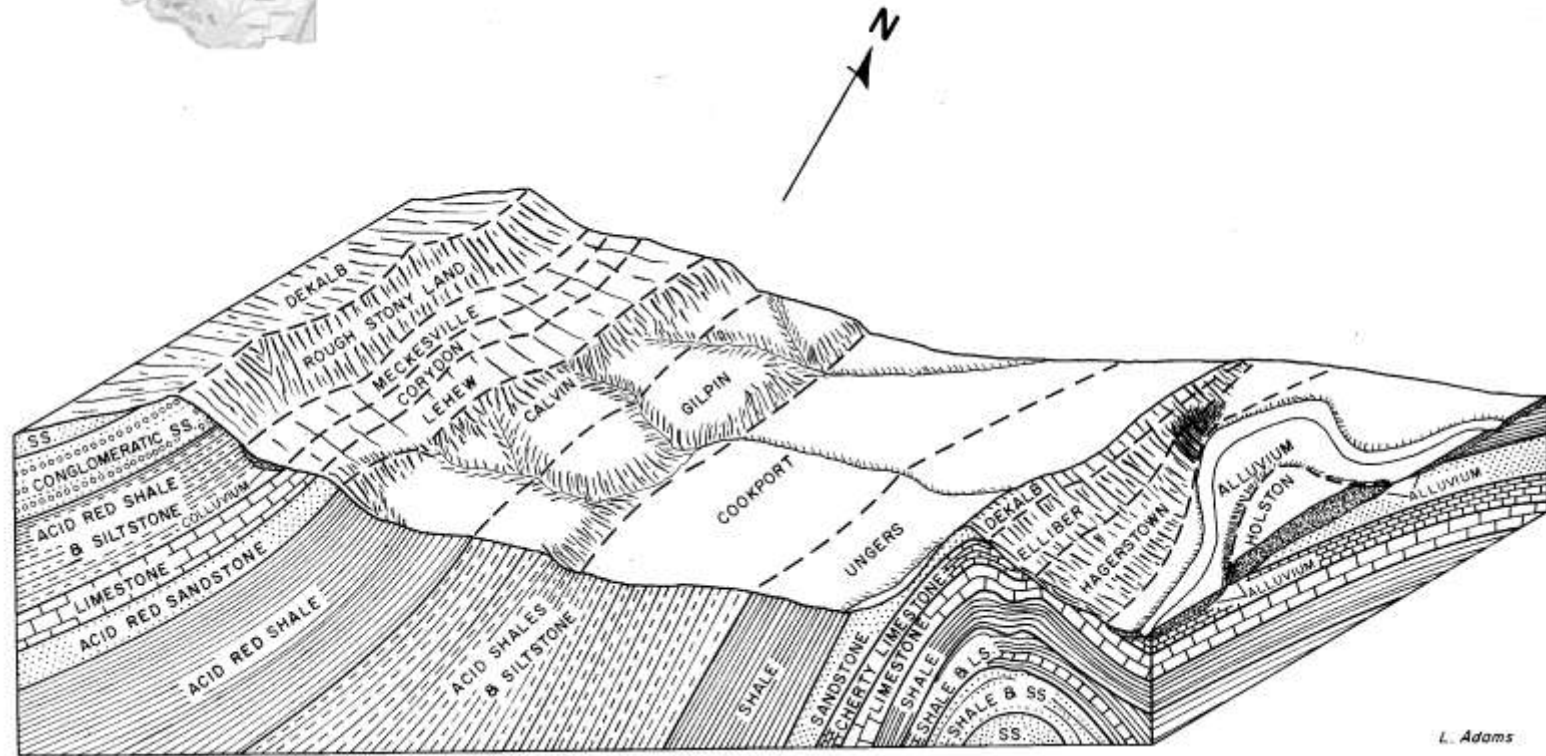


But the age of soils is generally much less than the age of the parent rocks

# Major Physiographic Regions

- Ridge and Valley and Alleghany Plateau
- Limestone Valley
- Blue Ridge and Middletown Valley
- Triassic Redbeds of Western Piedmont
- Crystalline (Igneous and Metamorphic) Rocks of the Piedmont
- Inner Coastal Plain
- Outer Coastal Plain
- Barrier Island/Coastal Lagoon
  
- ONLY A FRACTION!

# Ridge and Valley and Allegheny Plateau

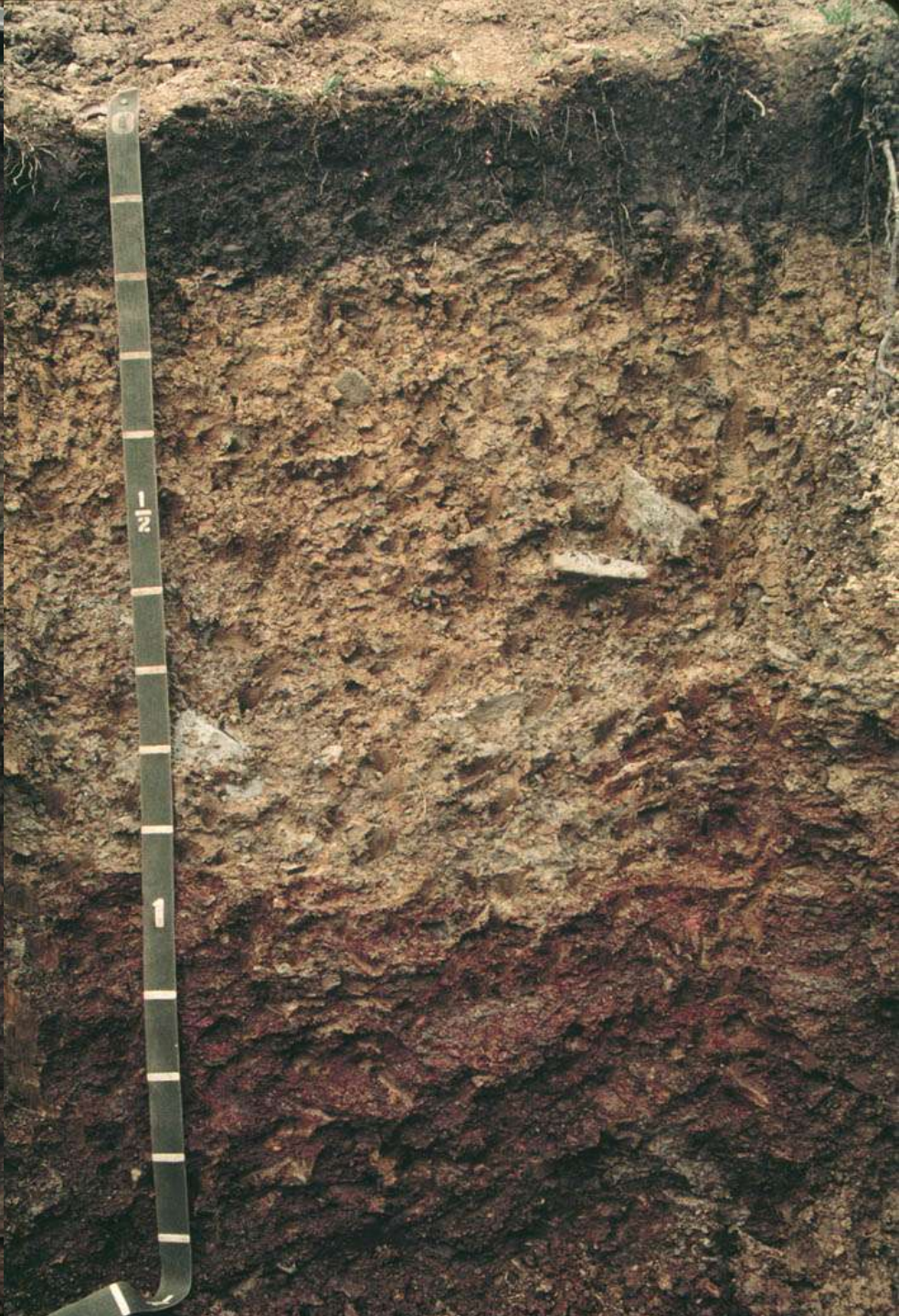


L. Adams



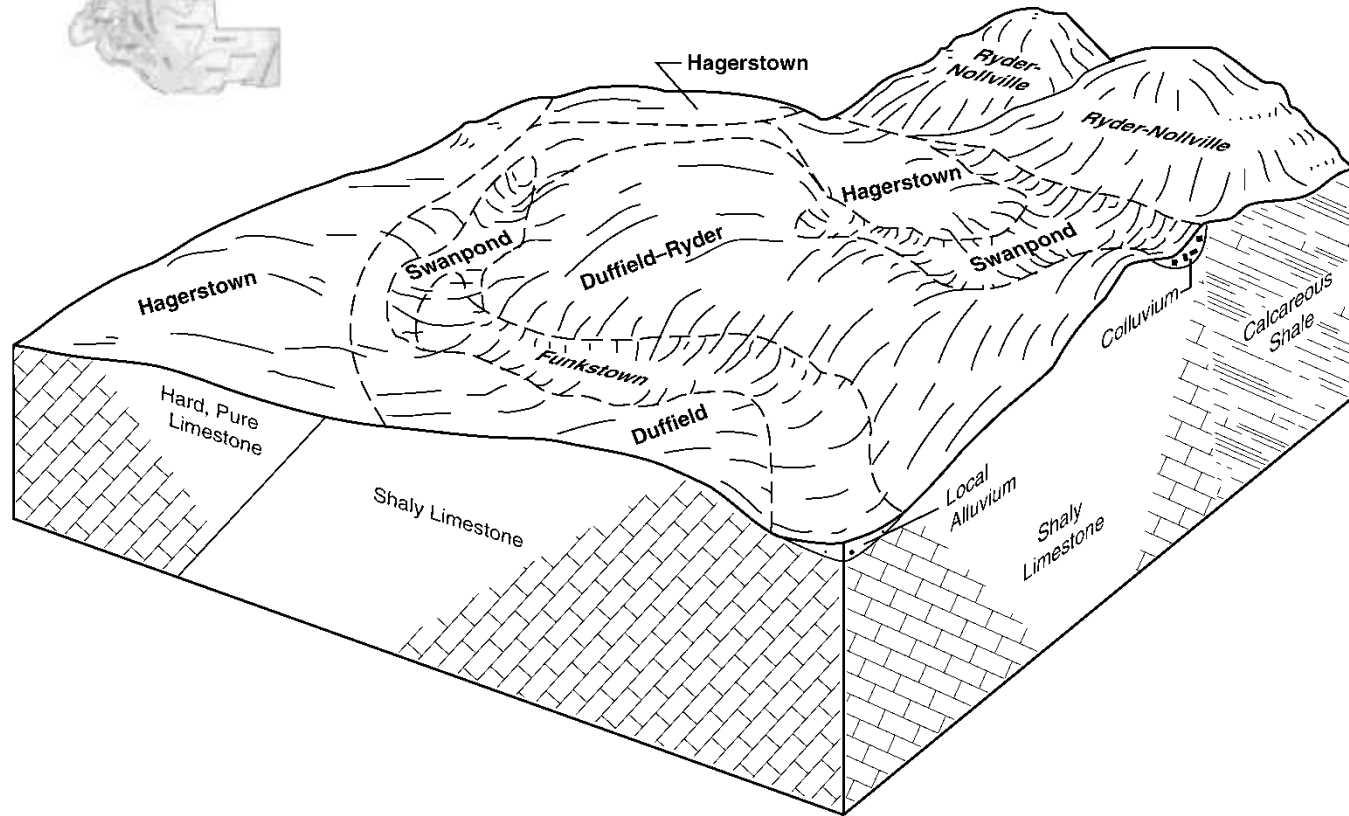
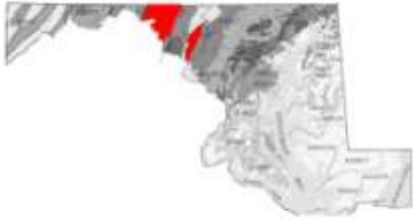








# Limestone Valley



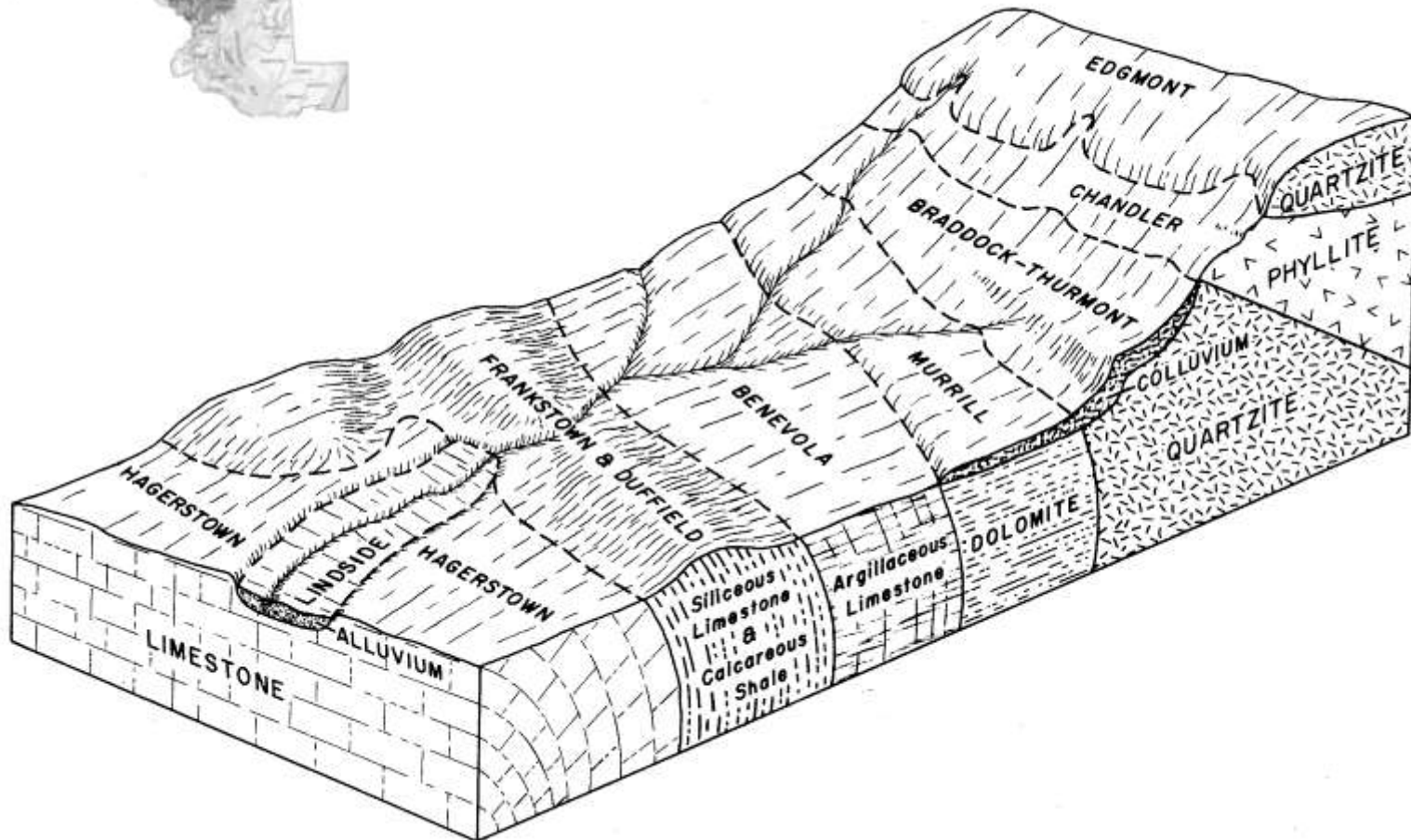


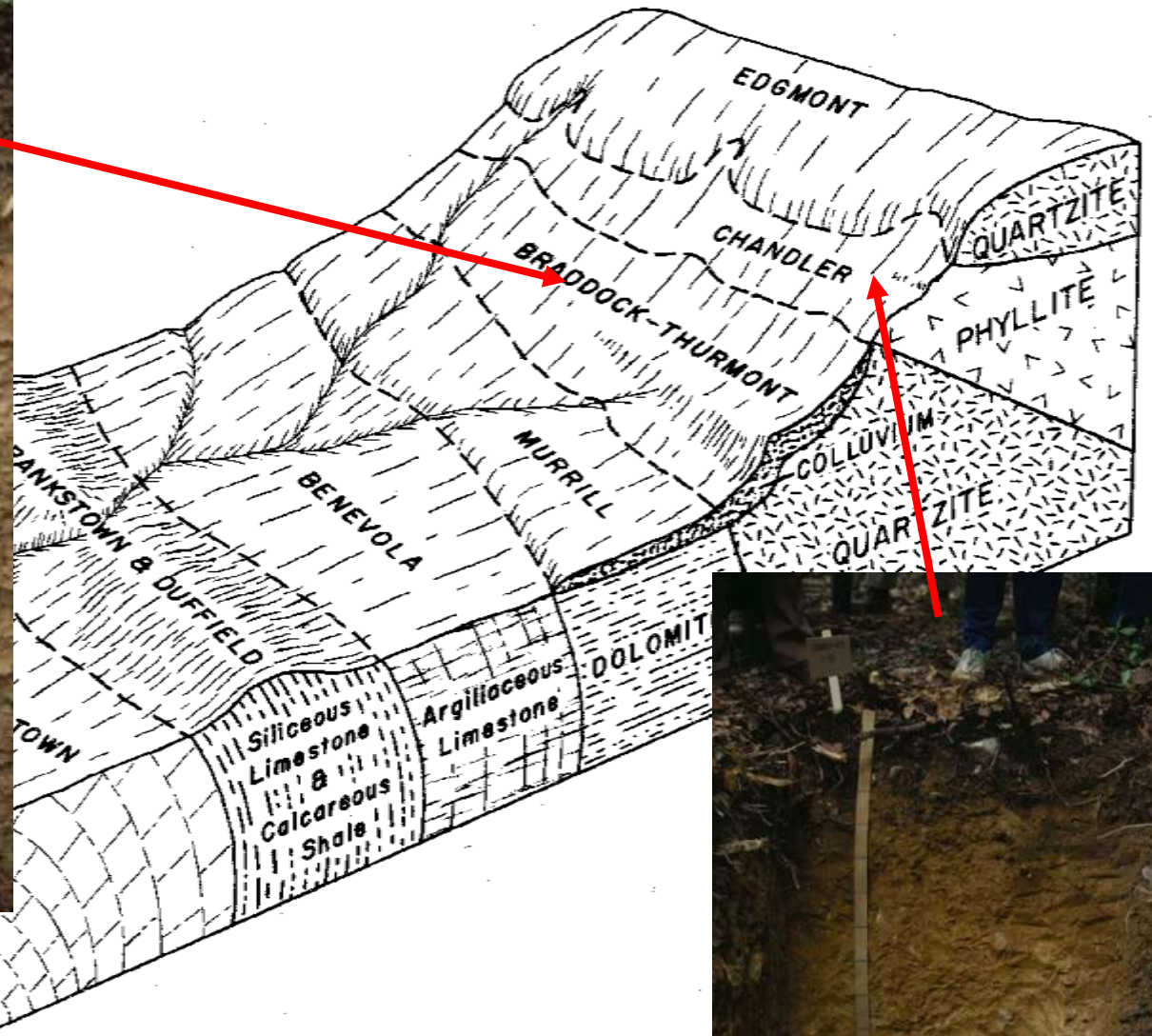




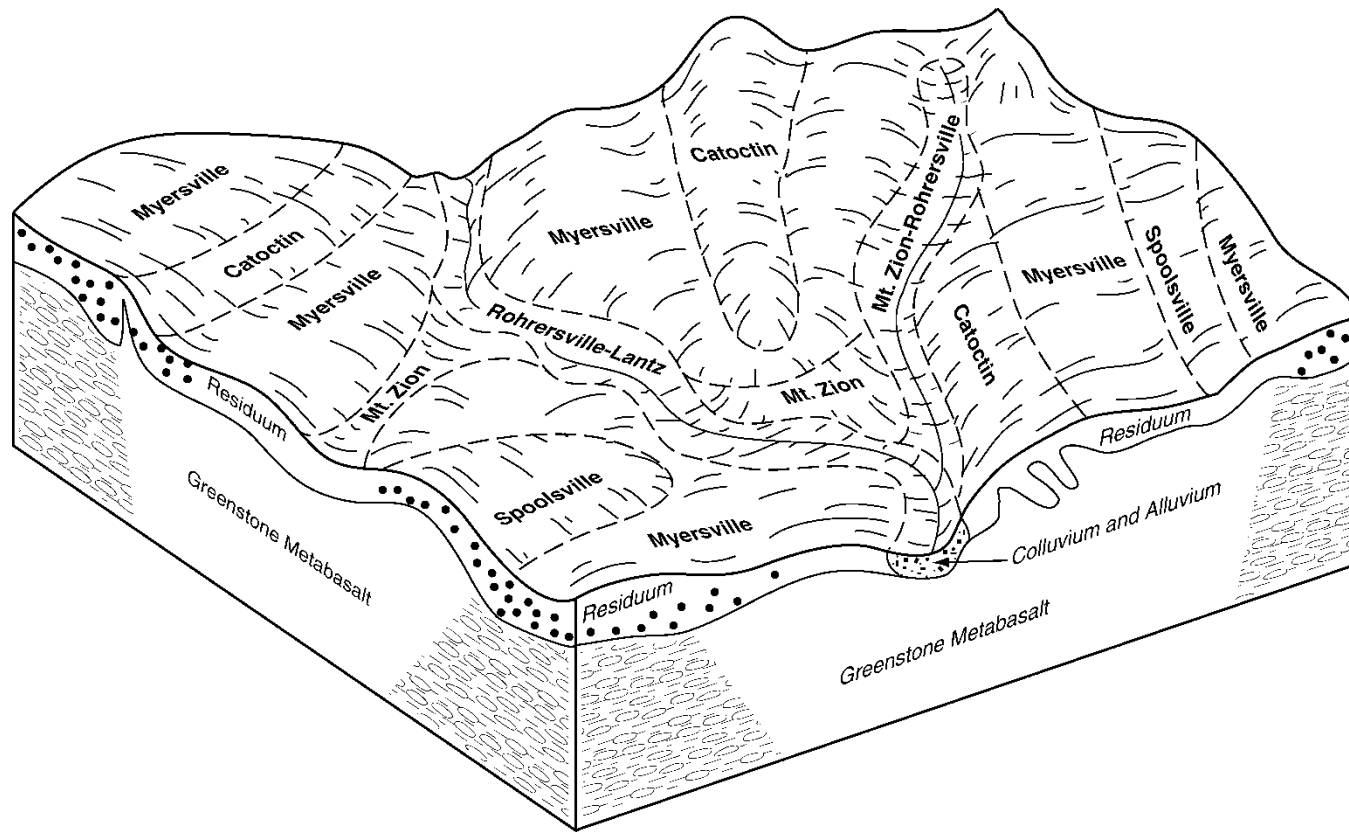


# Blue Ridge and Middletown Valley





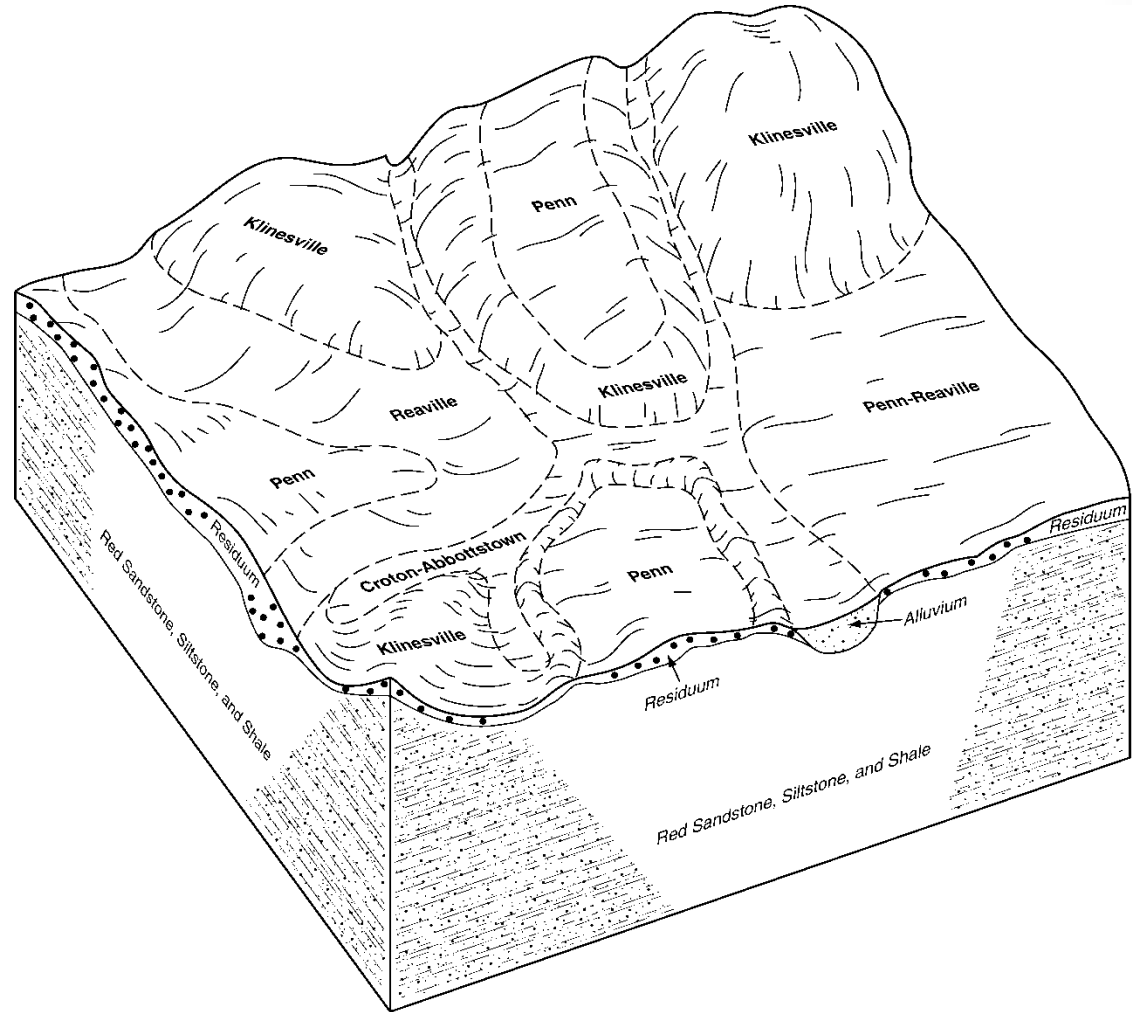
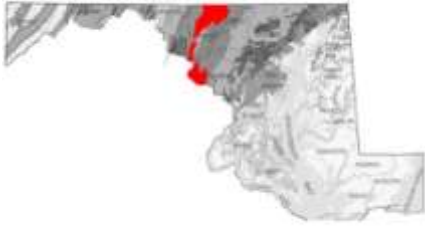
# Blue Ridge and Middletown Valley





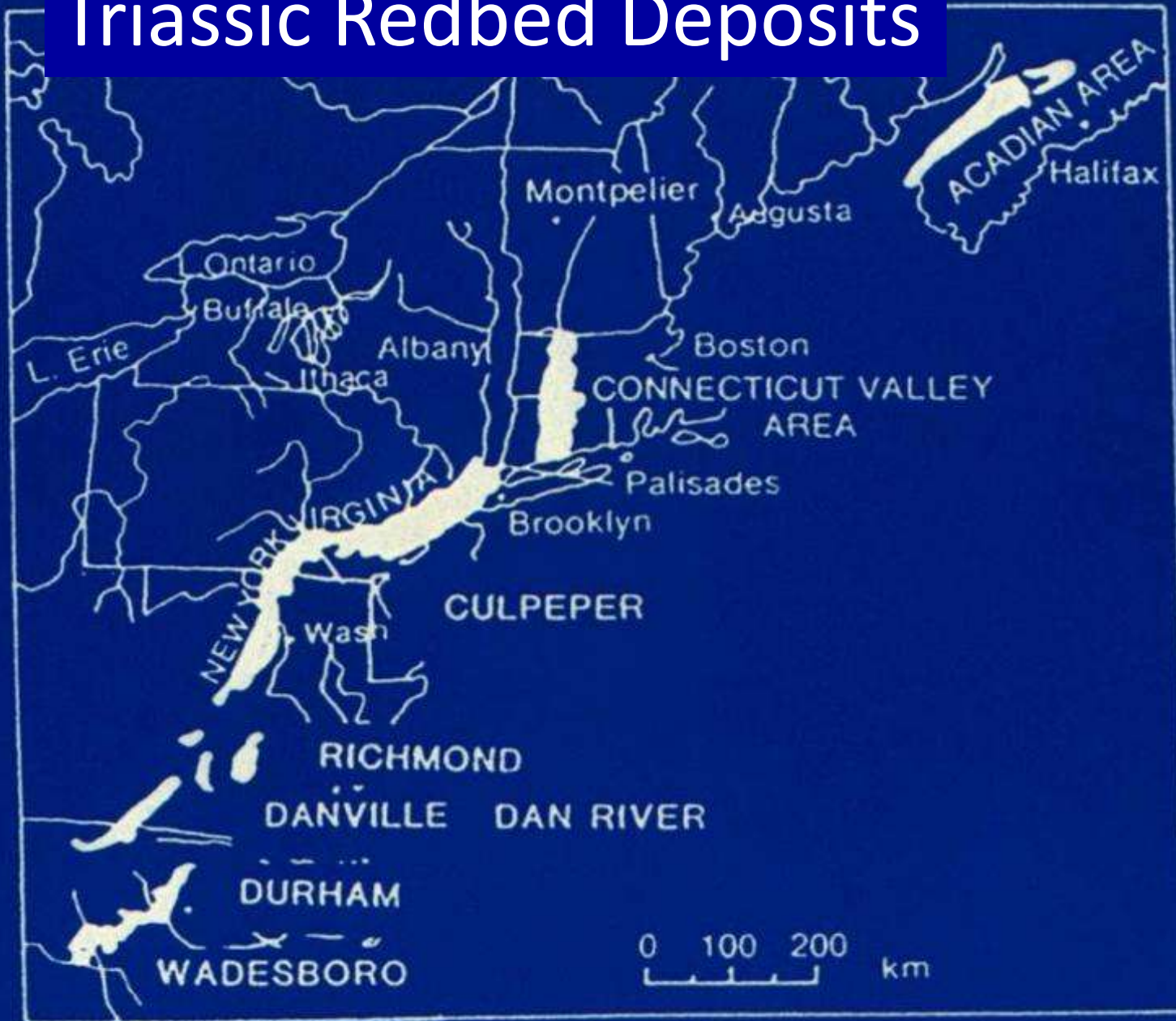


# Triassic Redbeds of the Western Piedmont





# Triassic Redbed Deposits



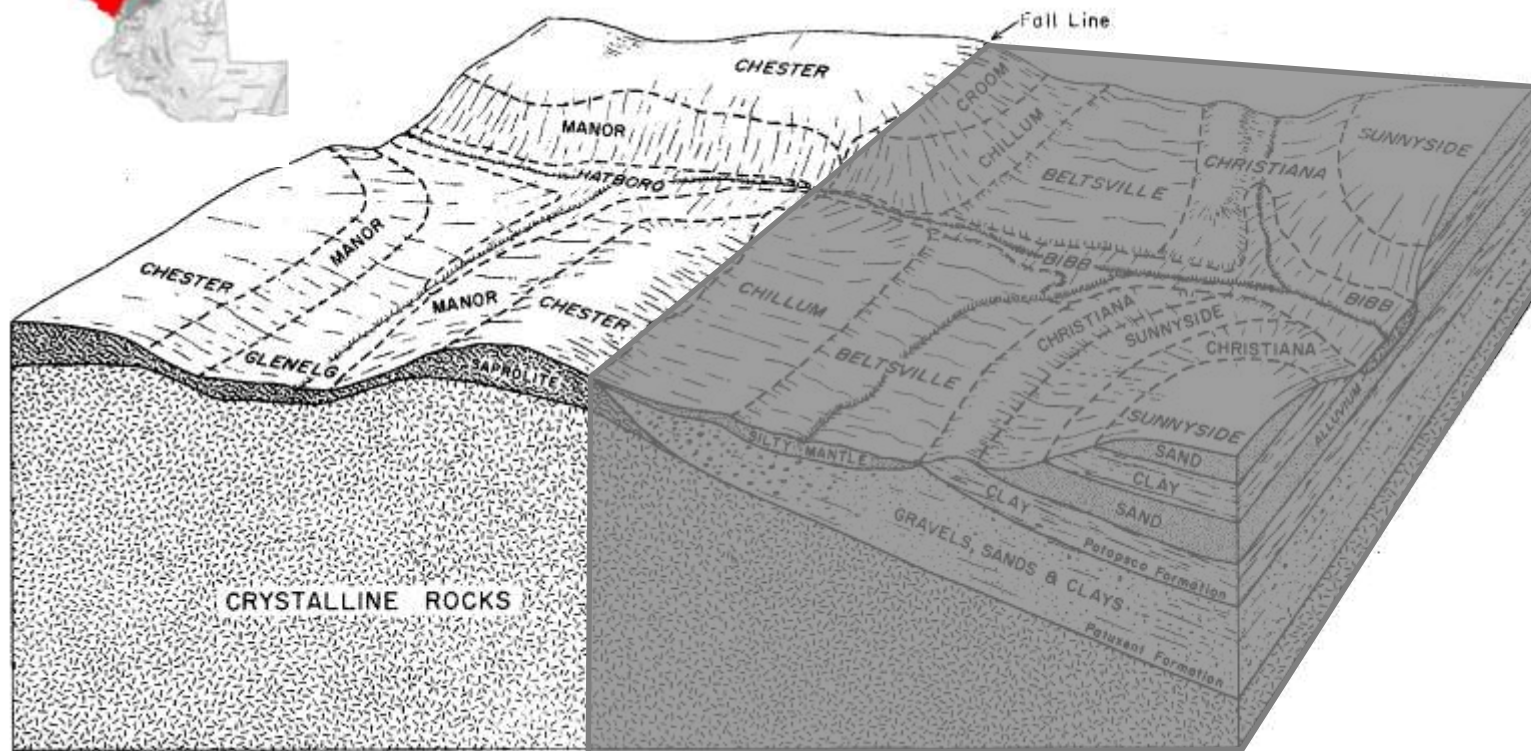
-from Levin (1978)







# Crystalline (Igneous and Metamorphic) Rocks of the Piedmont

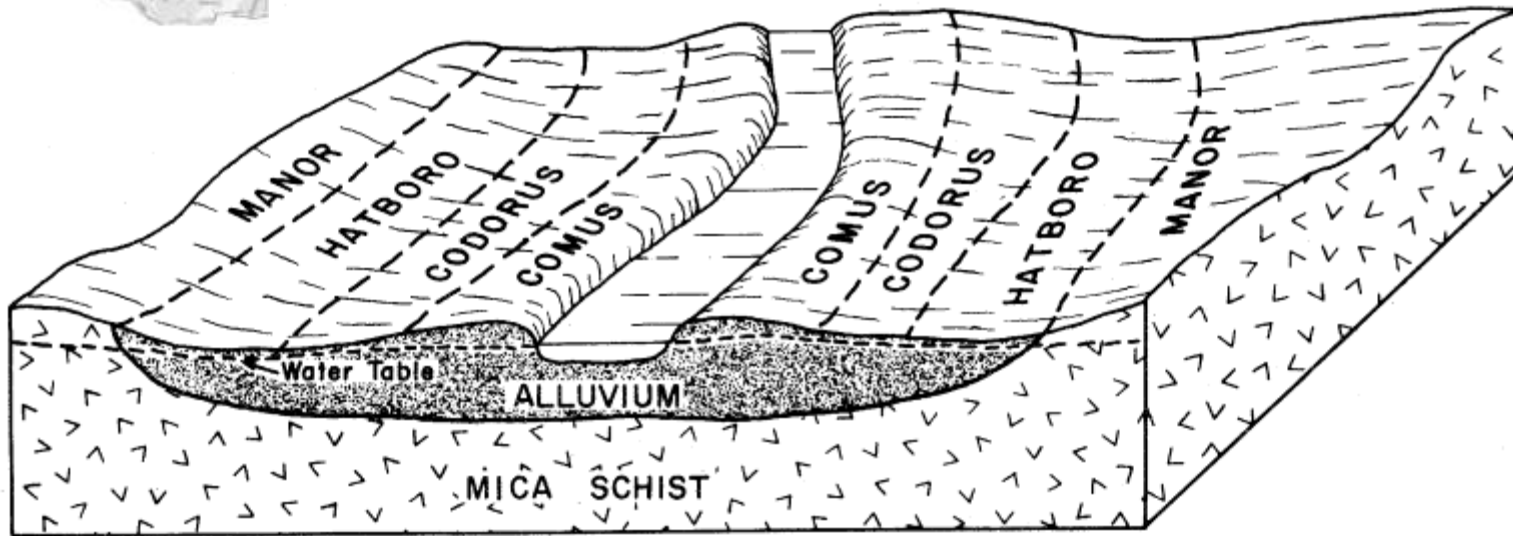






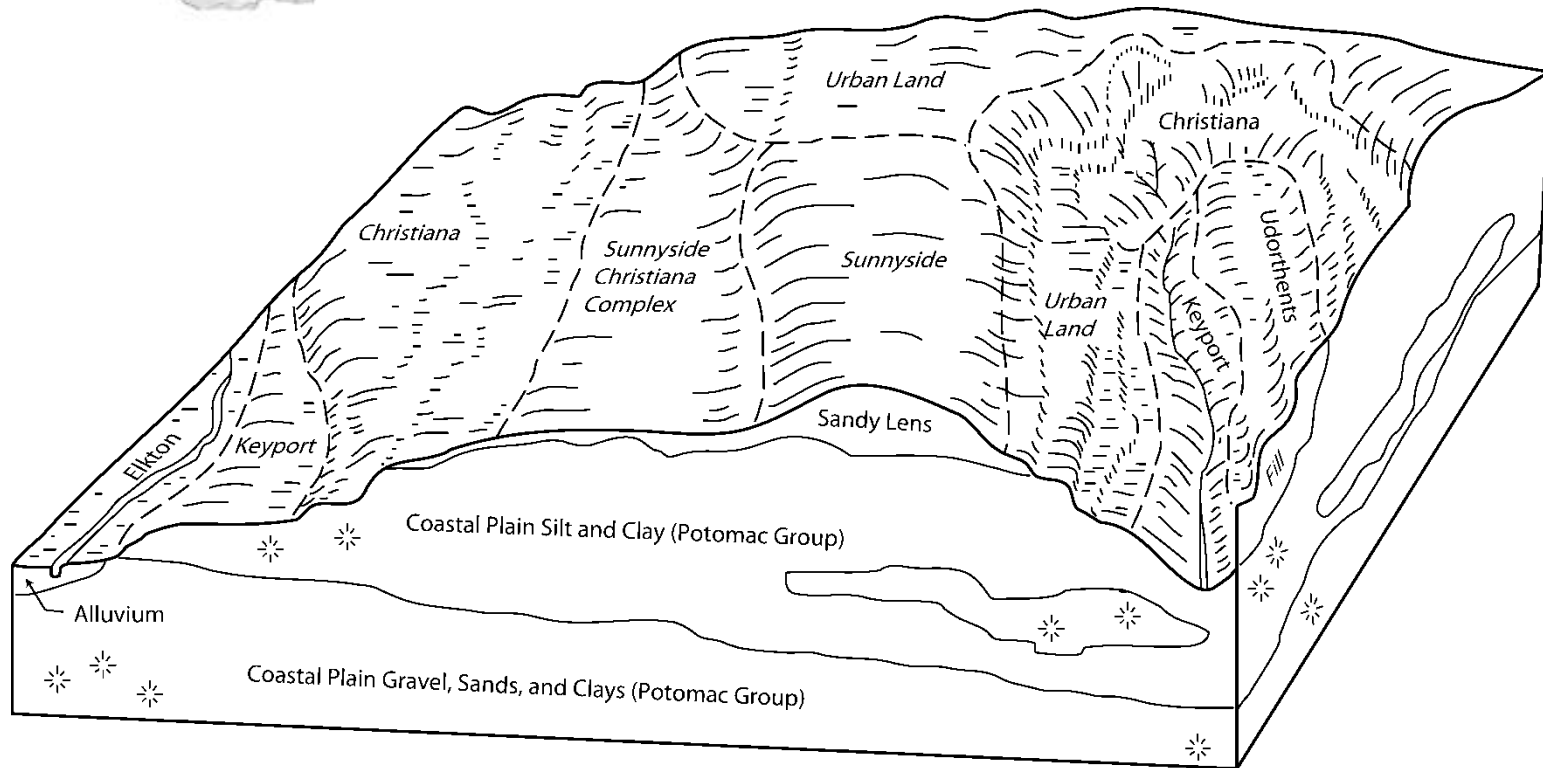
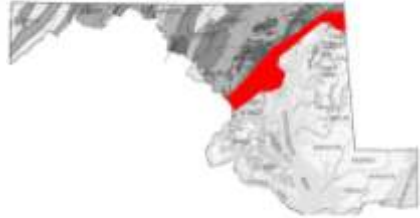


# Crystalline (Igneous and Metamorphic) Rocks of the Piedmont





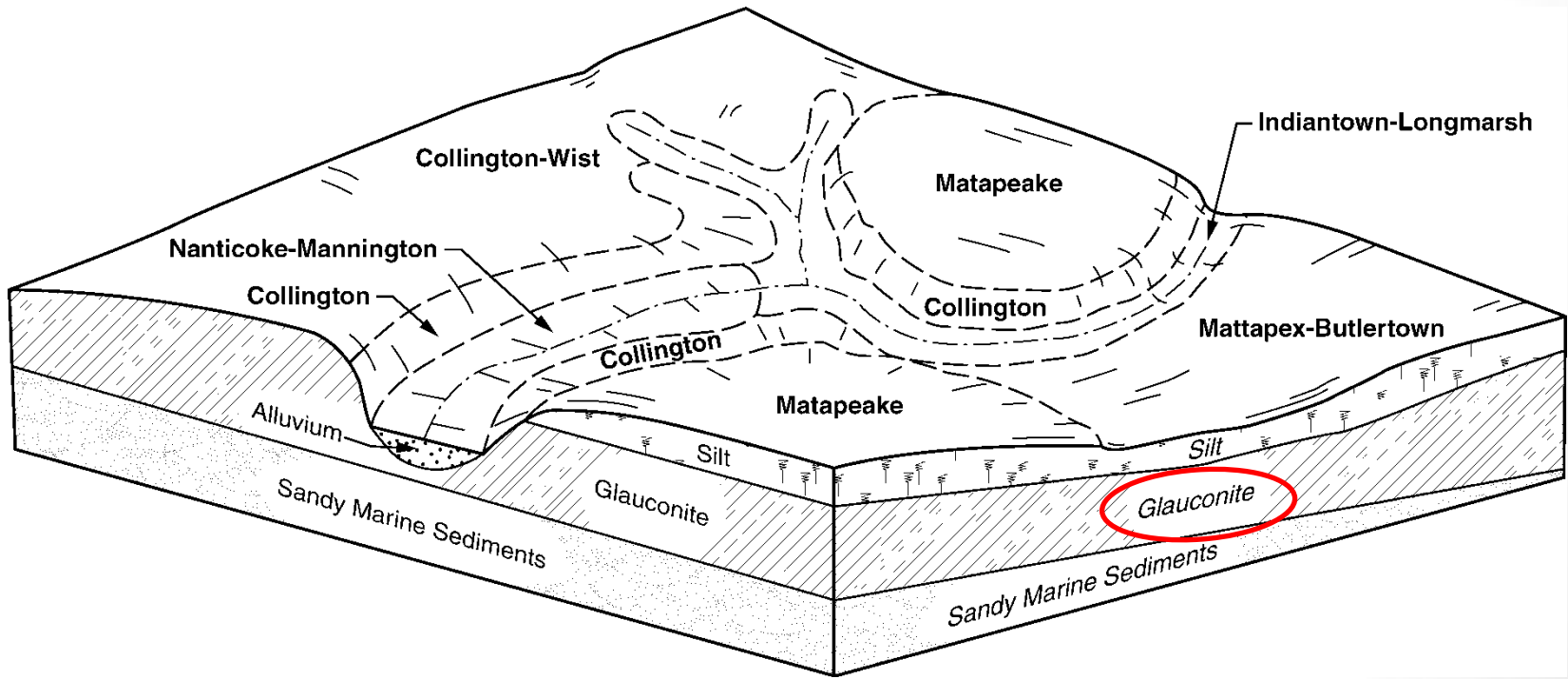
# Inner Coastal Plain



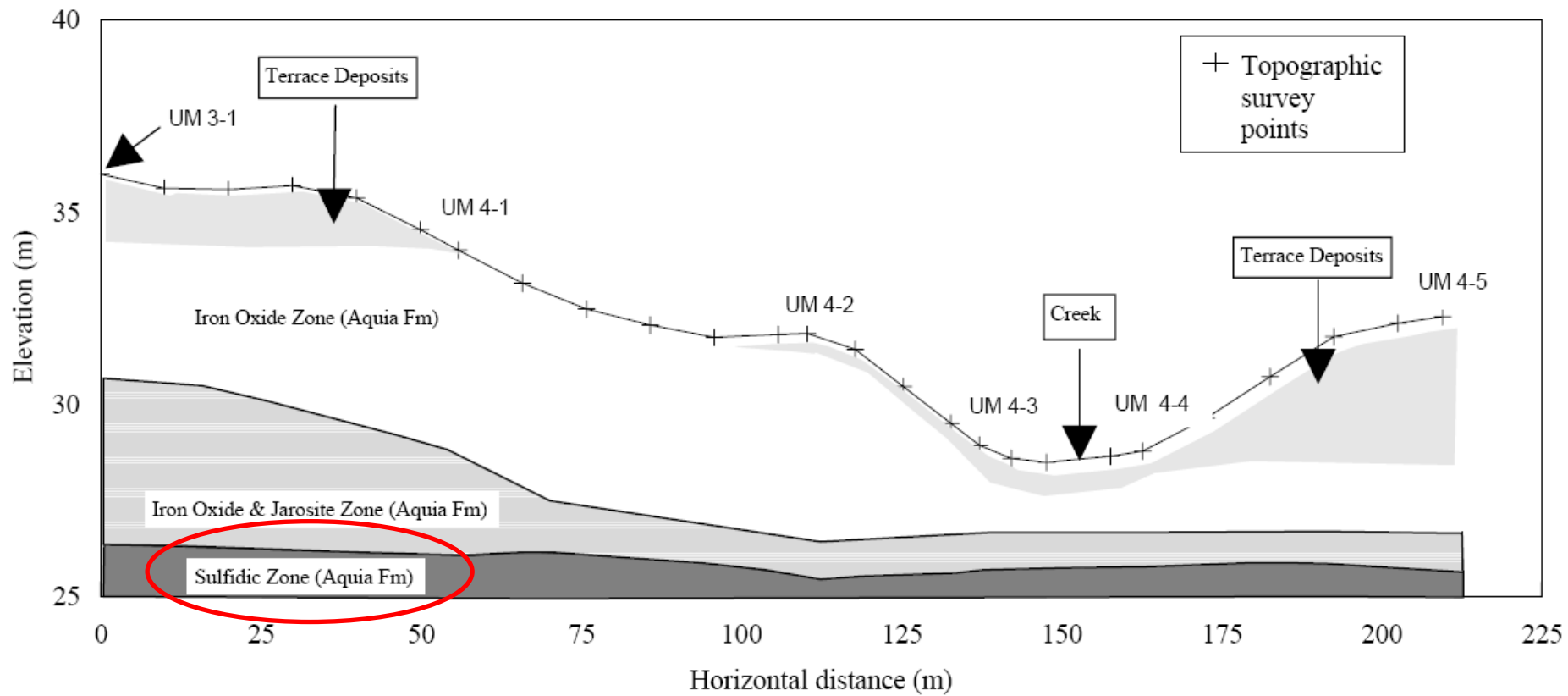


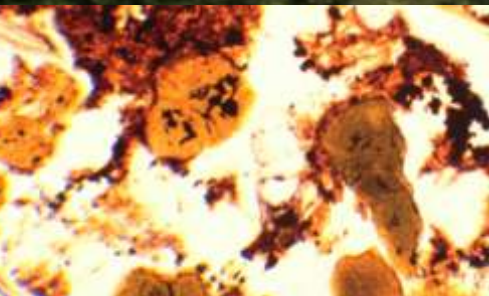
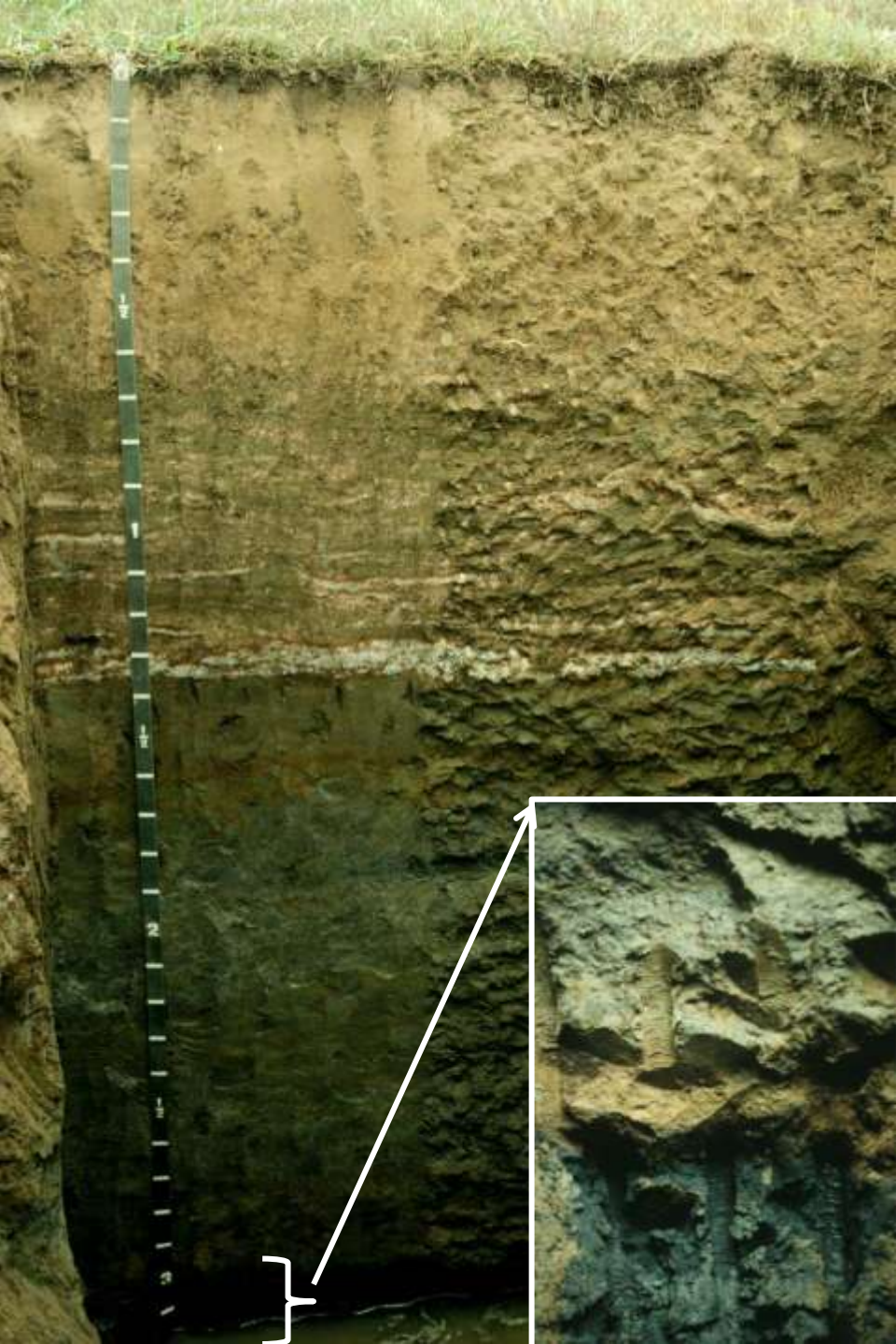


# Inner Coastal Plain







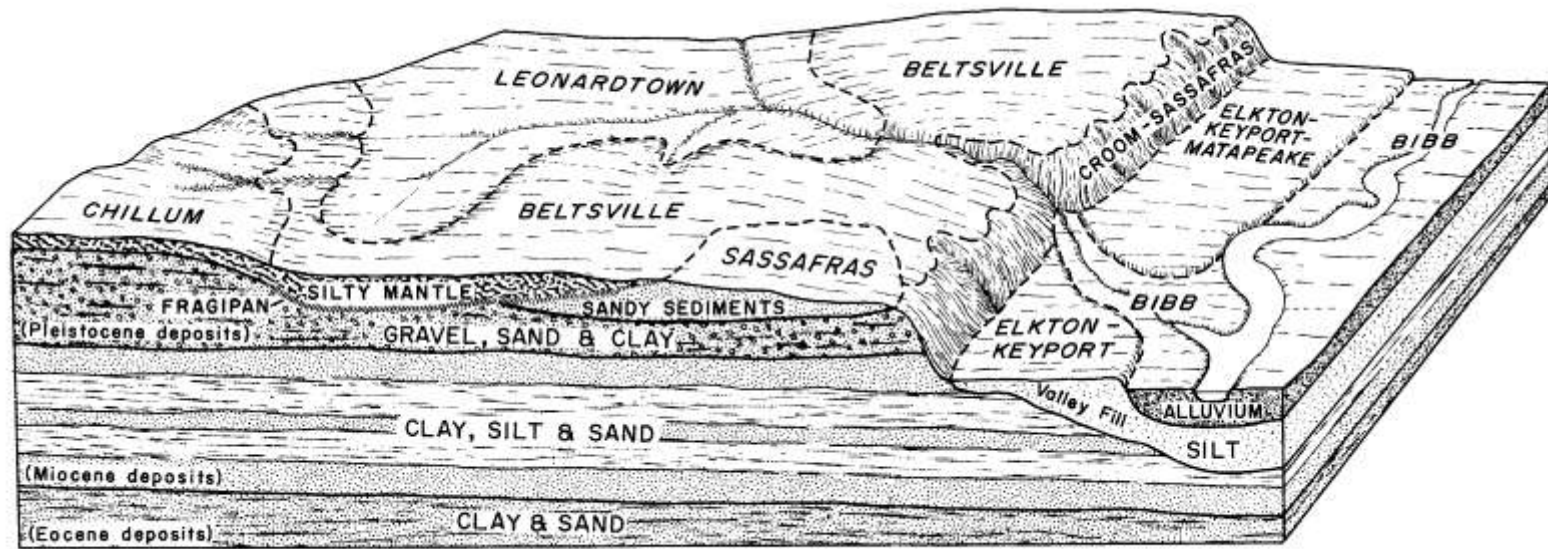








# Inner Coastal Plain – Southern Maryland





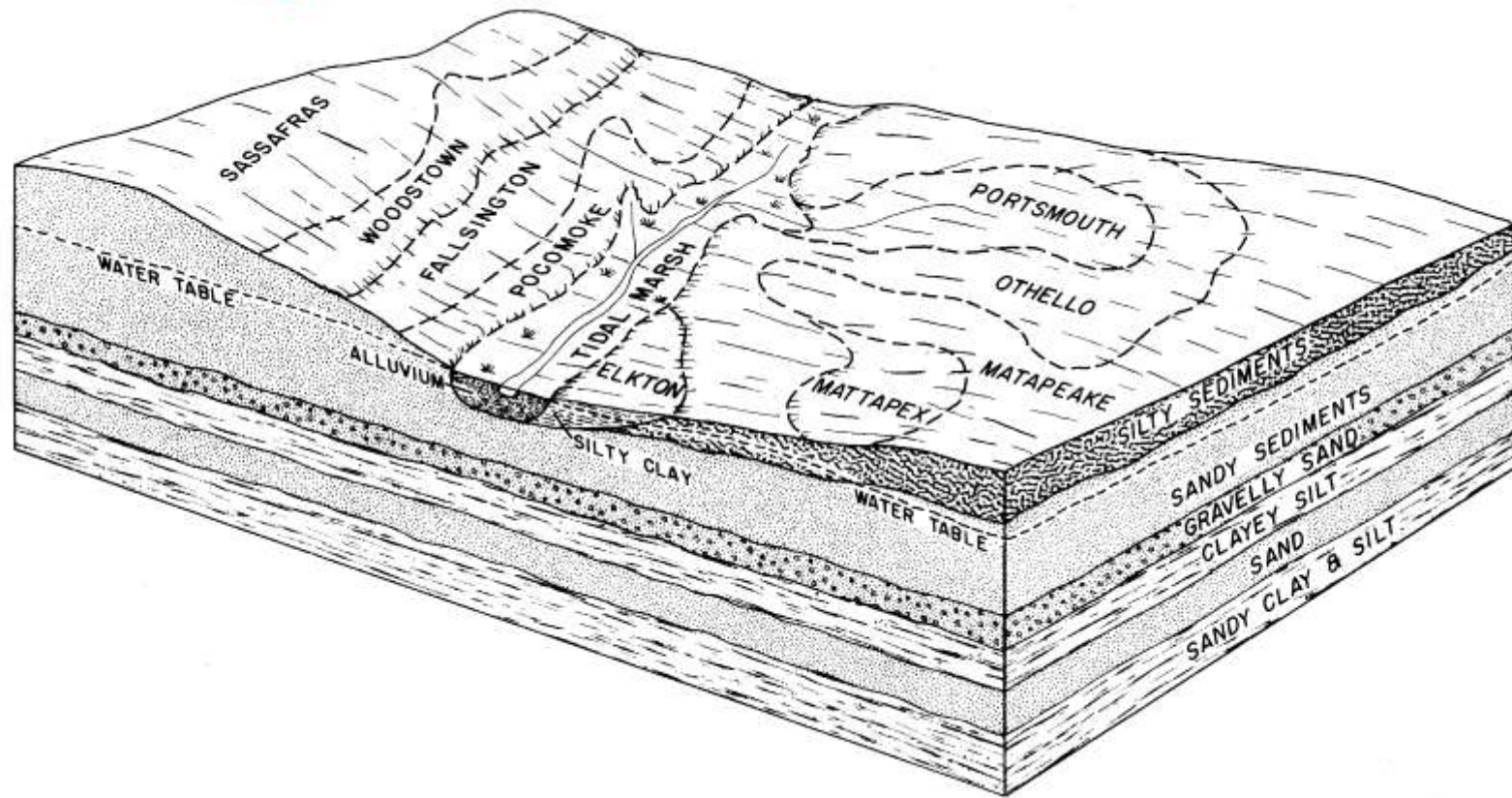




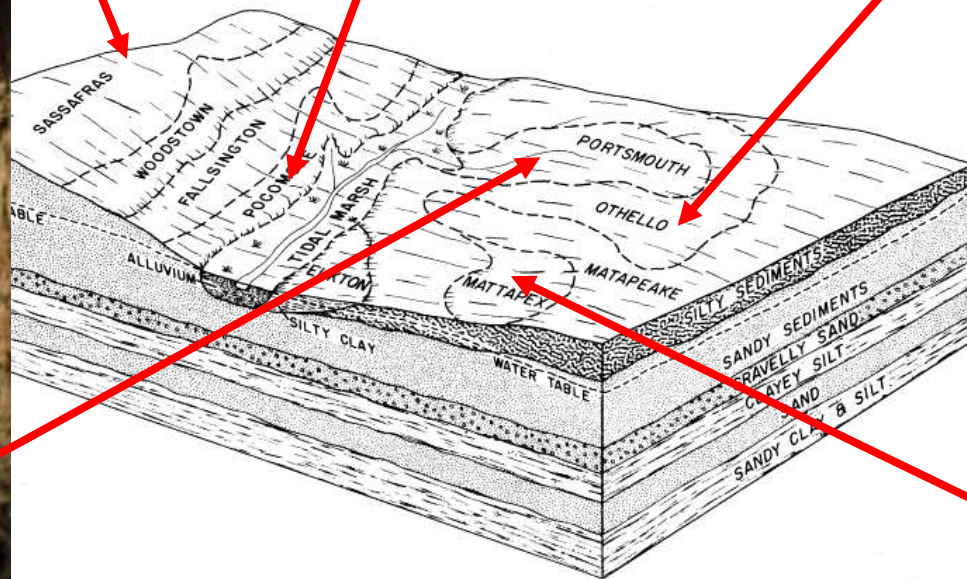




# Outer Coastal Plain

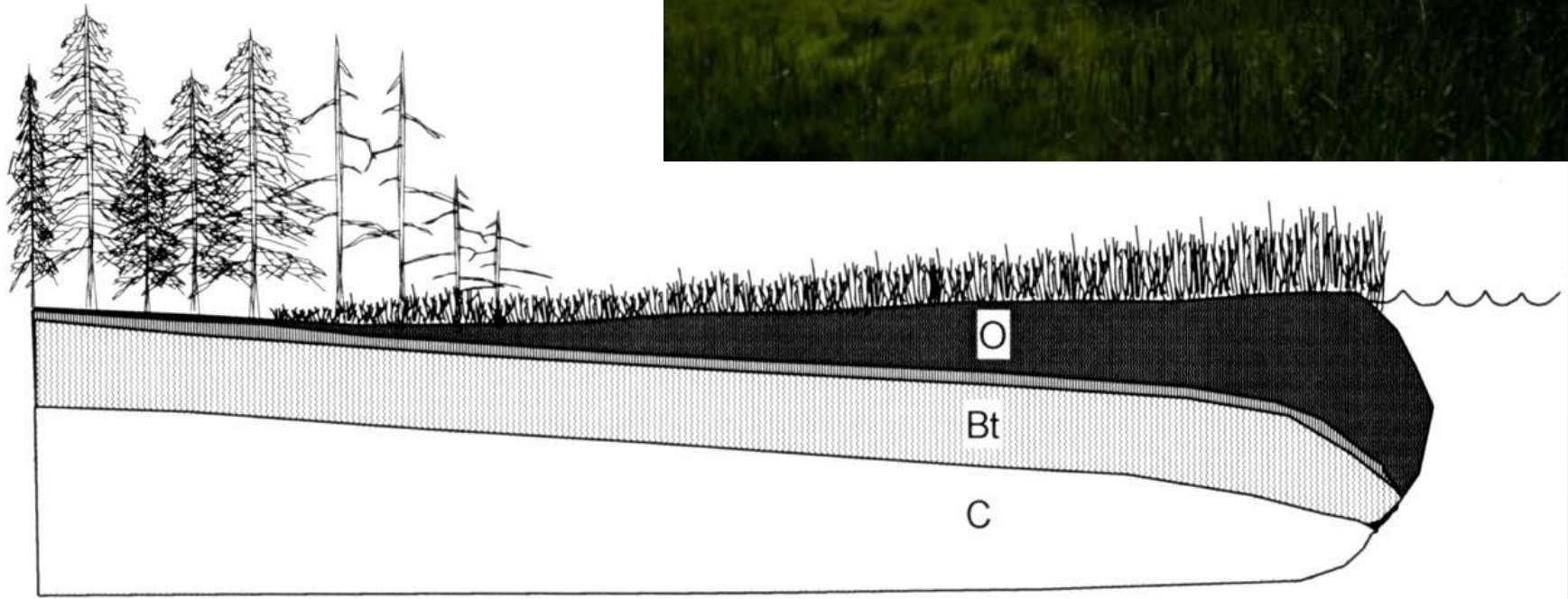








# Outer Coastal Plain



Submerged Upland Marsh



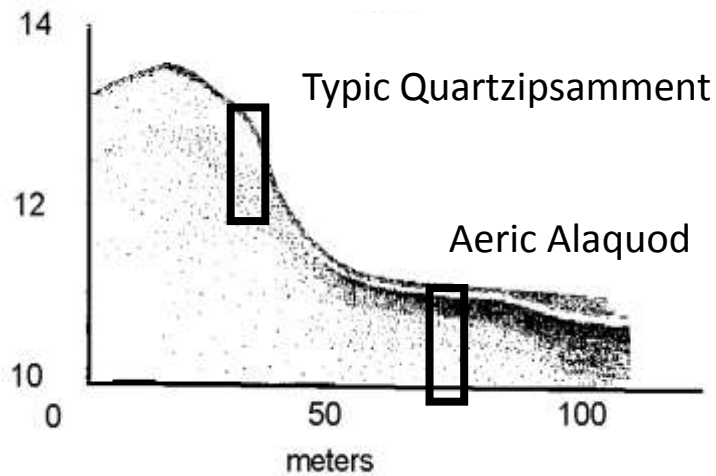




# Outer Coastal Plain



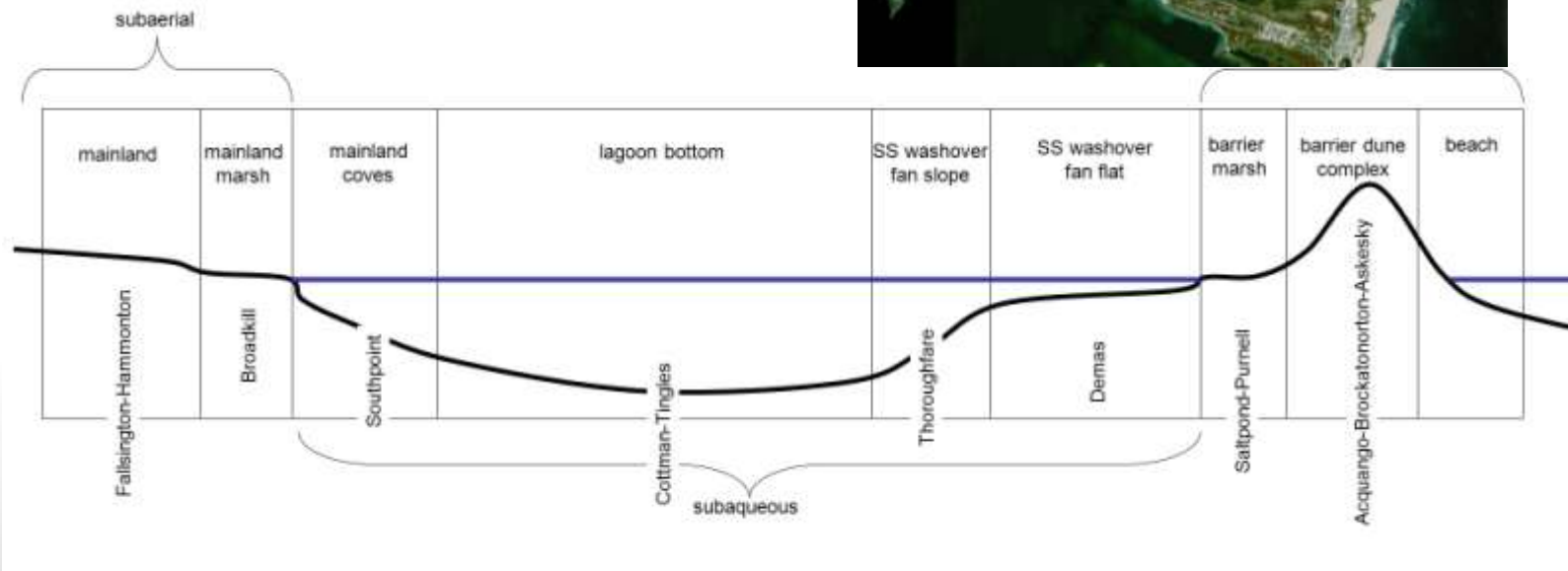
## Late Pleistocene Dunes







# Barrier Island/Coastal Lagoon



# Barrier Island/Coastal Lagoon



(sandy)  
Sulfic Psammowassent

Fine Silty  
Typic Sulfiwassent

Sandy over Loamy  
Haplic Sulfiwassent



# Barrier Island/Coastal Lagoon



*Thorofare*  
*Middlemoor*

*Purnell*

*Acquango*  
*Brockatonorton*  
*Askecksy*

Coastal Lagoon  
(Subaqueous Soils)

Tidal Marsh

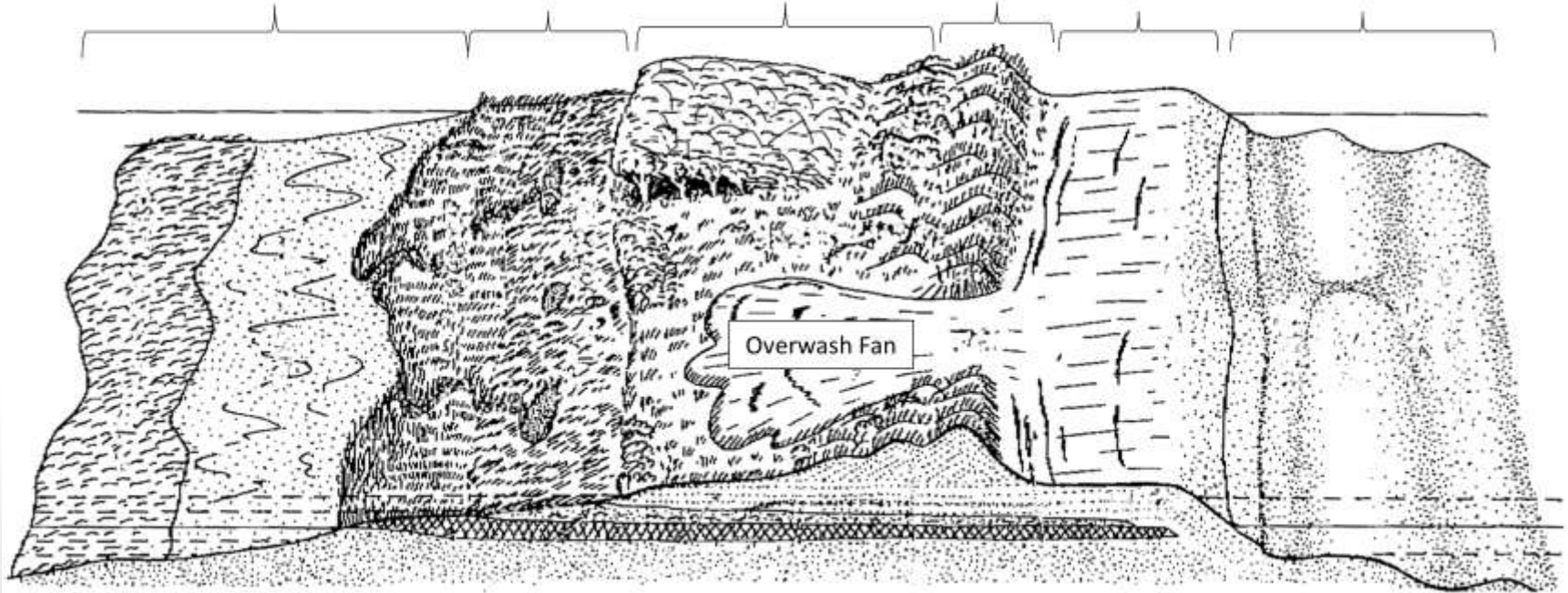
Barrier Core

Fore Dunes

Beach

Ocean

Overwash Fan



# Mid-Atlantic Barrier Island Systems

Late Holocene



Some landscapes very young (decades)



# Maryland Statsgo Map

