

# Diagnostic Horizons

Special horizons used in classification to differentiate a soil.

1. A layer of soil parallel to soil surface different in soil characteristics.

- Diagnostic horizons are of two types.
- Diagnostic epipedons
- Diagnostic endopedons

- a. EPIPEDON surface
- b. diagnostic horizon
- c. Epi means above
- d. A, E, *sometimes* upper part of B

## 2. Endopedon

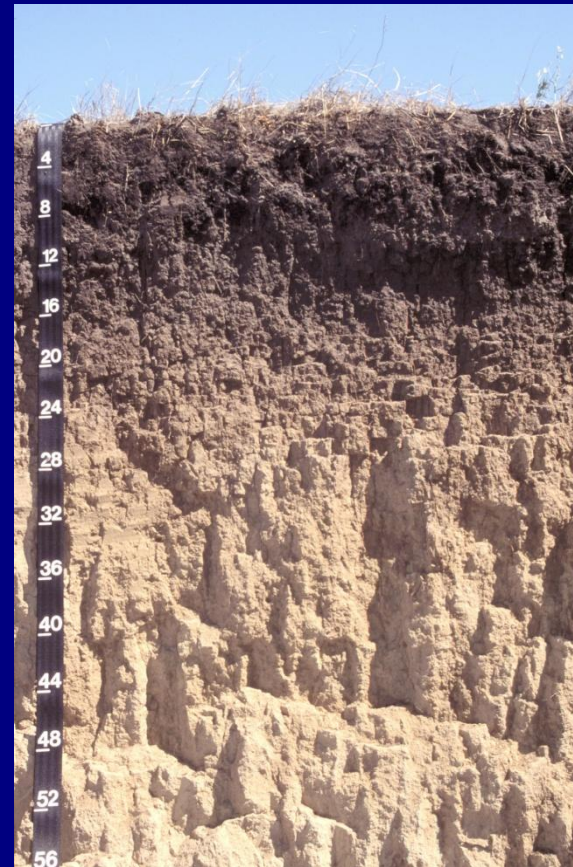
Subsurface diagnostic horizons  
always B

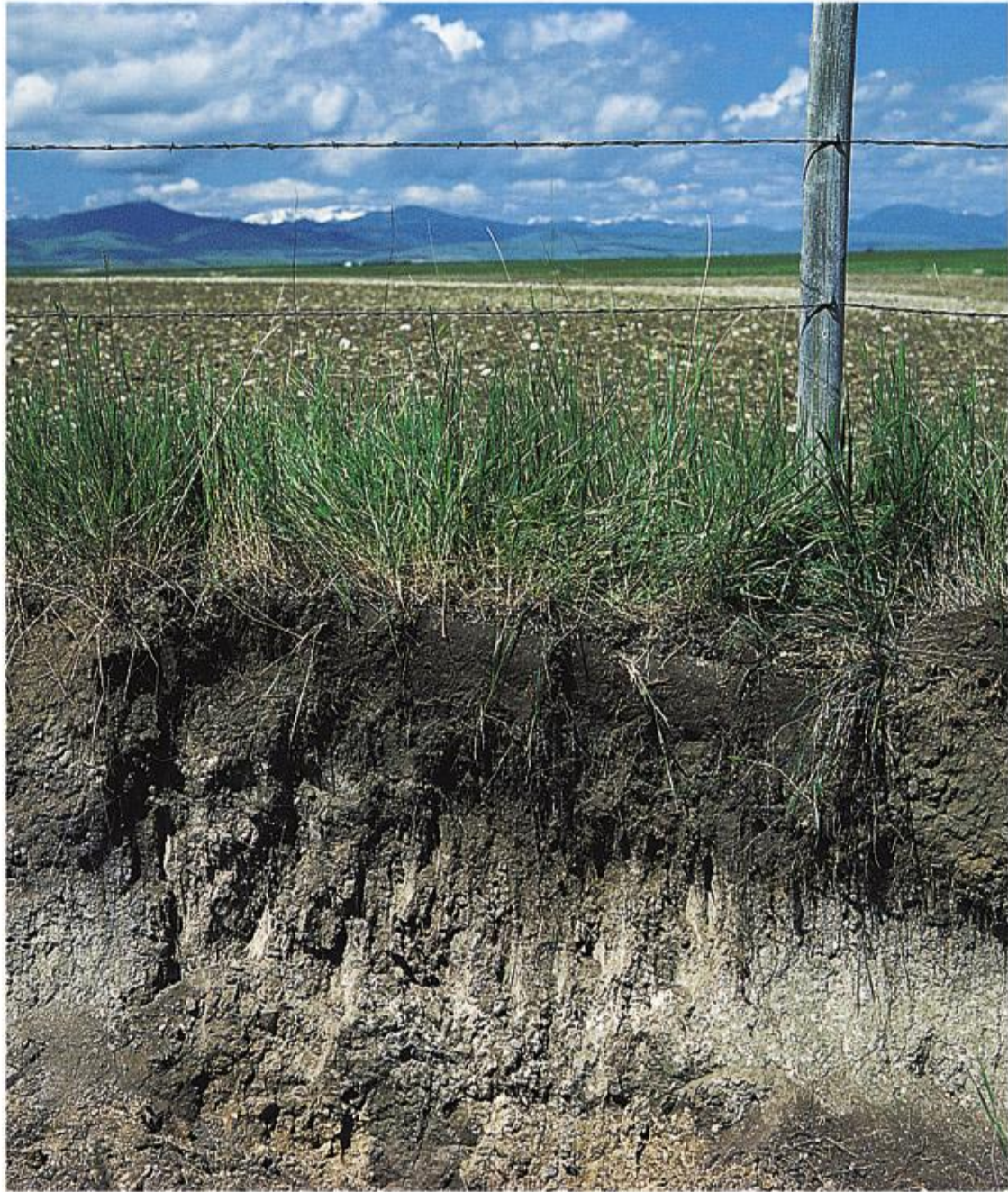
## The Epipedons:

5 common and 2 anthropogenic

# 1. Mollic epipedon

- Soft
- Thick (>18 cm)
- Dark
  - Chroma < 3.5
- > 1% OM
- Grasslands
- Strong structure
- Greater than 50% Base Saturation





## 2. Umbric epipedon



Photo 11.—An umbric epipedon in an Umbrept from Spain.

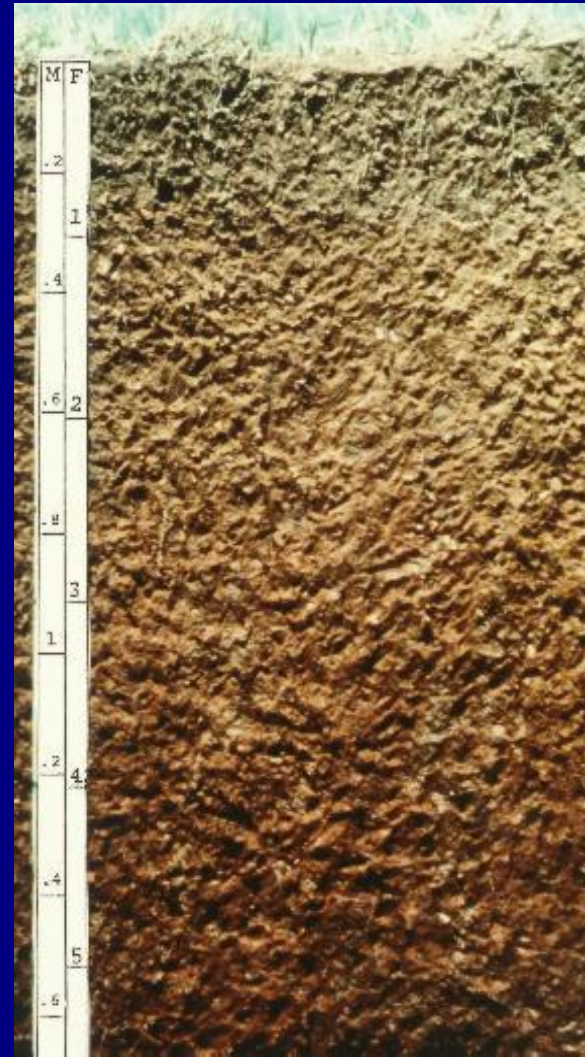
- Similar to mollic
- Means shade
- <50% base saturation

less Ca, Mg

(higher rainfall or  
parent material)

# 3.0chric epipedon

- No rocky structure and no fine stratification.
- Paler
  - chroma > 3.5
  - value > 3.5
- Low OM
- Hard, massive when dry



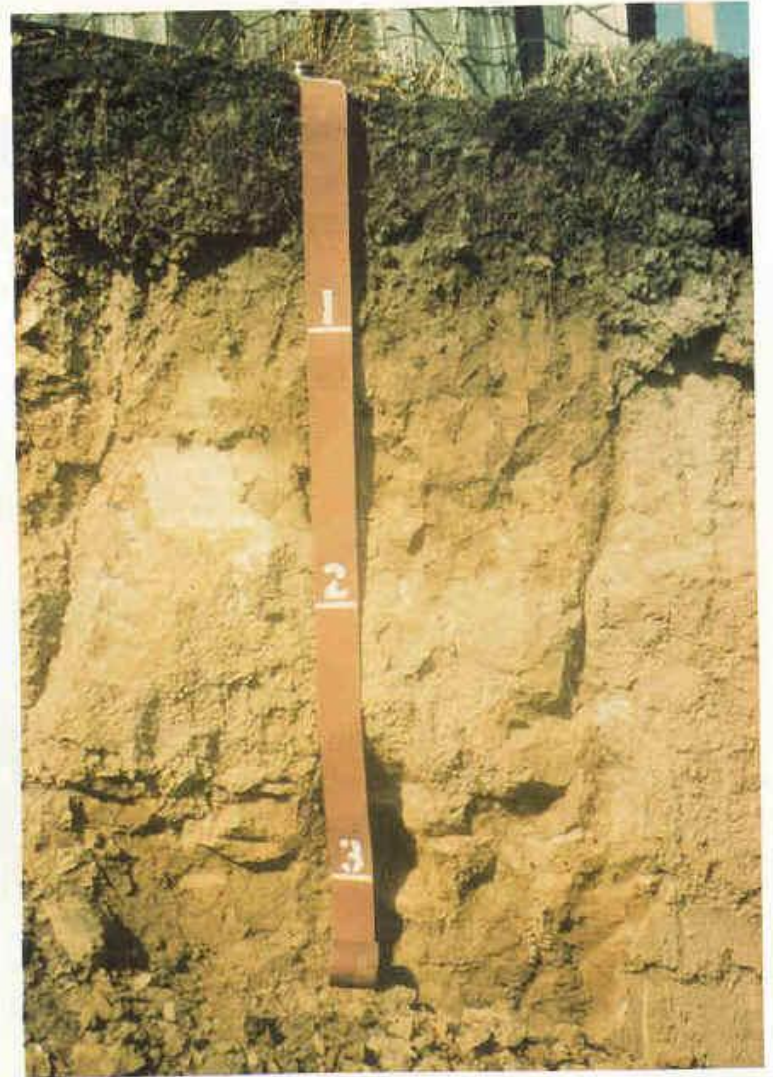
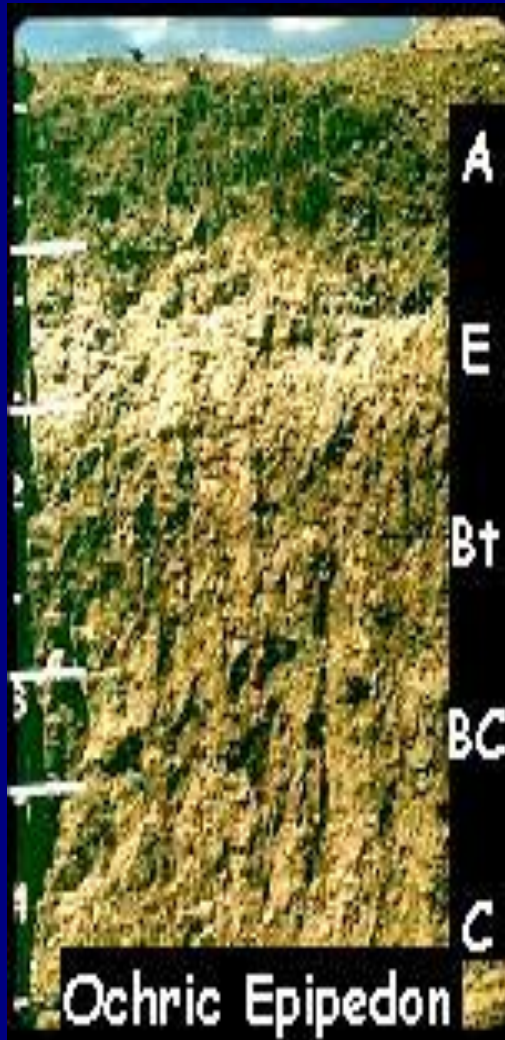


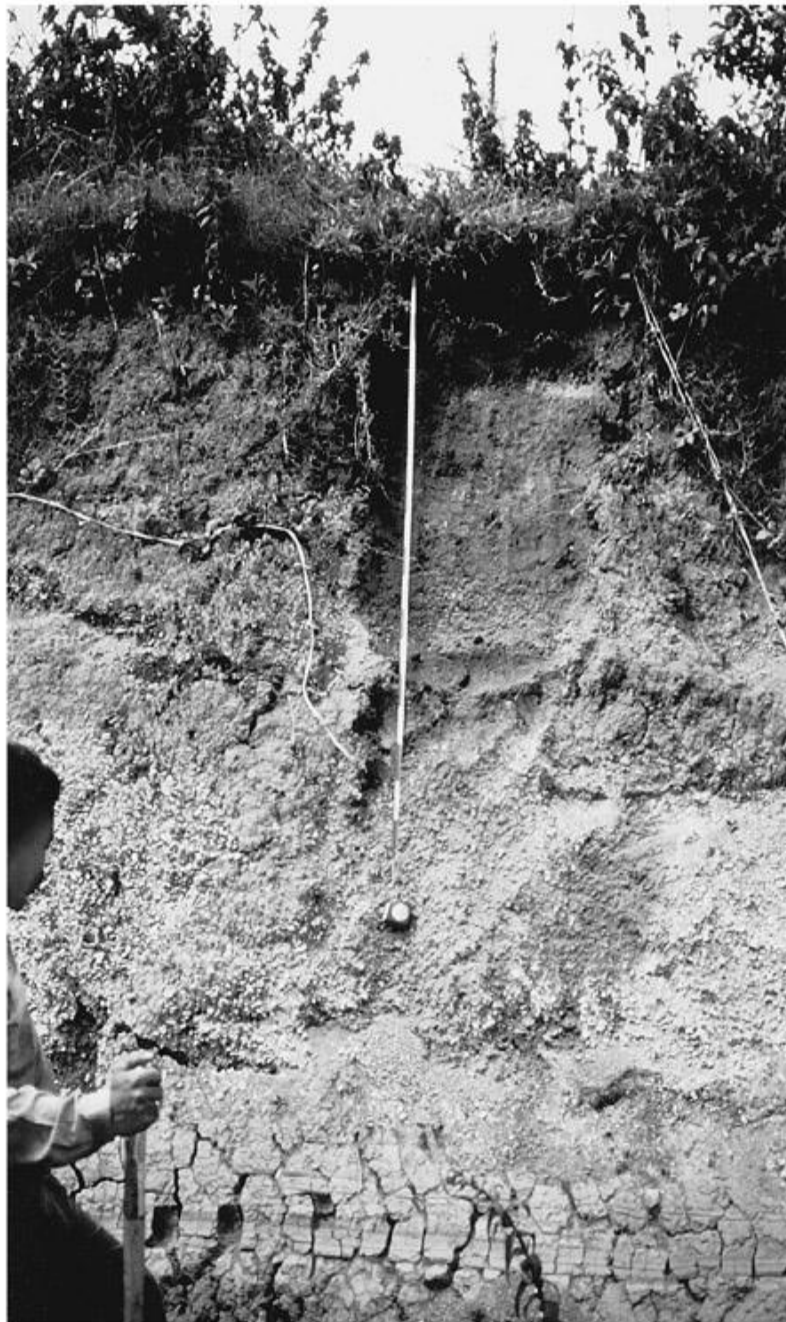
Photo 9.—A soil with an ochric epipedon about 15 cm thick. The dark colored ochric epipedon is too thin to be a mollic or umbric epipedon.



# 4. Melanic epipedon

- Black
  - Chroma  $\leq 2$
- High OM
- Volcanic ash
- > 30 cm thick
- High P retention
- Light in density
- High carbon content





Melanic  
Epipedon

Pumice layer

Weathered  
layers of  
volcanic  
ash and  
pumice

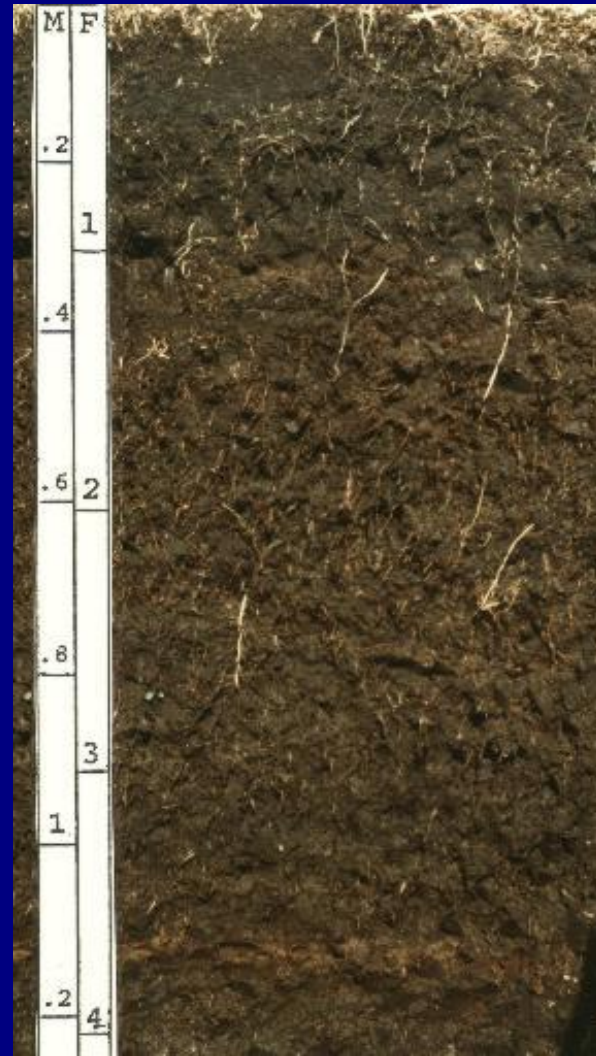
Buried  
A horizon

Oldest  
layers of  
volcanic  
pumice

Underlying  
layer of  
expanding  
clay

# 5. Histic epipedon

- Organic materials
  - >30% OM if >60% clay; >20% if no clay
- 20 – 60 cm thick
- Peat or muck
- In poorly drained areas
  - saturated for at least 1 month
  - 12 to 18 percent organic carbon.



High base saturation

Mollic

Low base saturation

Umbric

Low base saturation  
thin, light

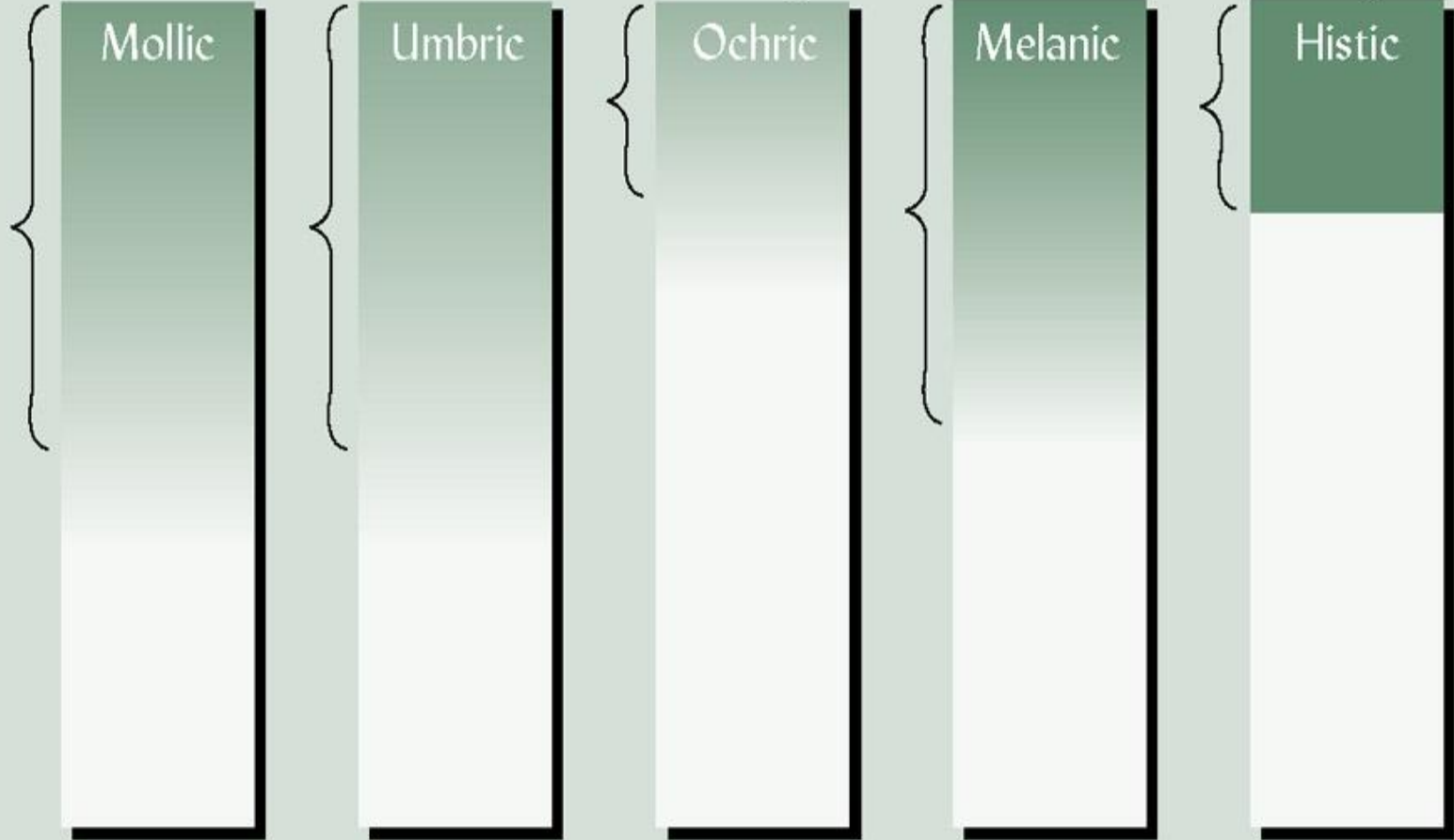
Ochric

Volcanic materials

Melanic

Peat bog

Histic



## 2 Anthropogenic Epipedons:

# 1. Plaggen epipedon

- >50 cm thick
- Produced by manuring for long periods of time; sod used for animal bedding
- artifacts

## 2. Anthropogenic

- Human-made mollic horizon through addition of OM with artificially high phosphate content
- Formed under long term cultivation and fertilization
- *Terra Preta* (black earth) of Amazonia

# Subsurface diagnostic hori zons



Accumulation of clay (2)

Accumulation of Salt (3)

Accumulation of Humus (1)

Loss of Materials (2)

Hardpans (2)

Other (1)

# Accumulation of clay:

- Argillic
- Natric

# Argillic horizon on

- Accumulation of silicate clays as “clay skins” (argillans)
- Illuvial horizon
- Least 15cm thick





# Natric horizon



Layer of accumulated  
clay and sodium

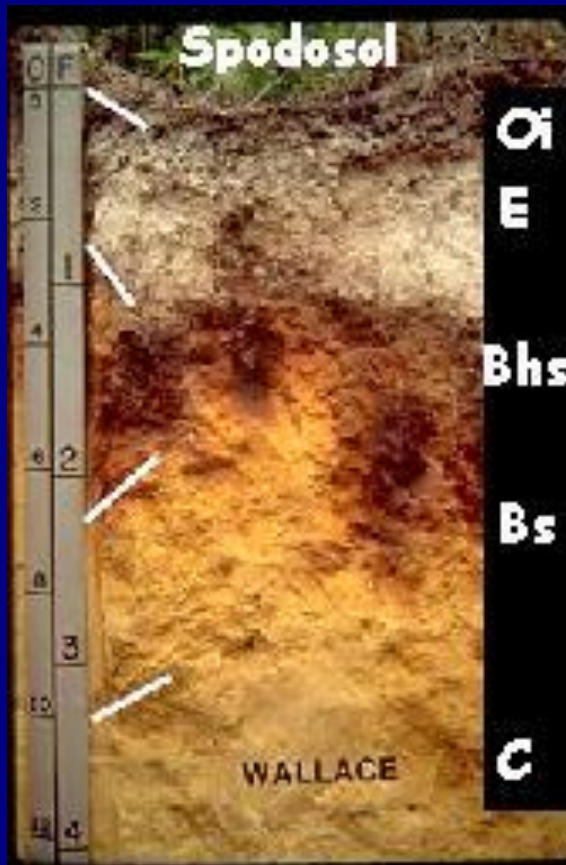
hard and impermeable

Columnar or prismatic  
structure

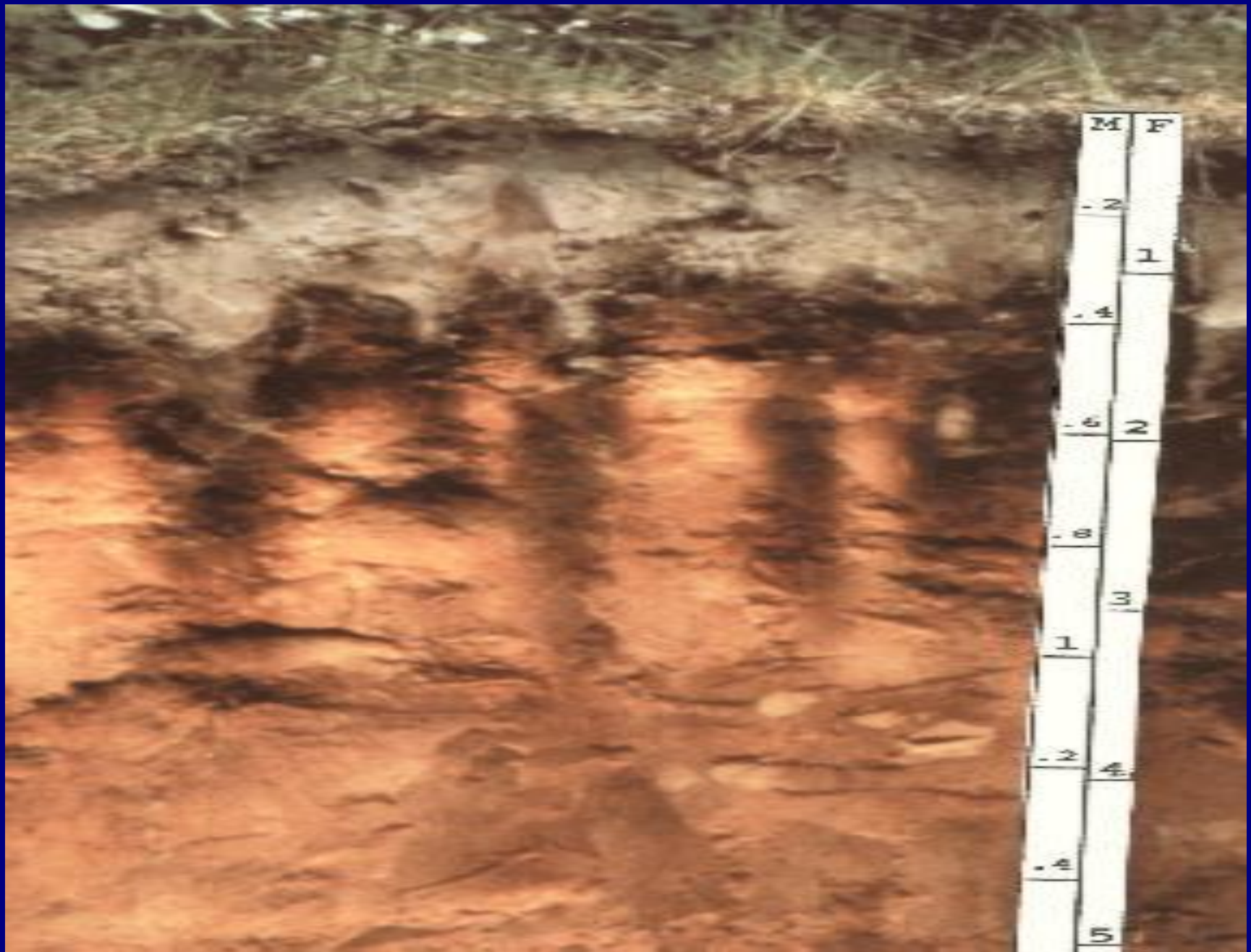
# Accumulation of humus:

- Spodic

# Spodic horizon



- Illuvial accumulation of aluminum and organic carbon
- acidic
- Fe complexes
- Large surface area
- High water holding capacity



M	F
- 2	
	1
. 4	
- 6	2
- 8	
	3
1	
- 2	4
. 4	
	5



# Loss of materials:

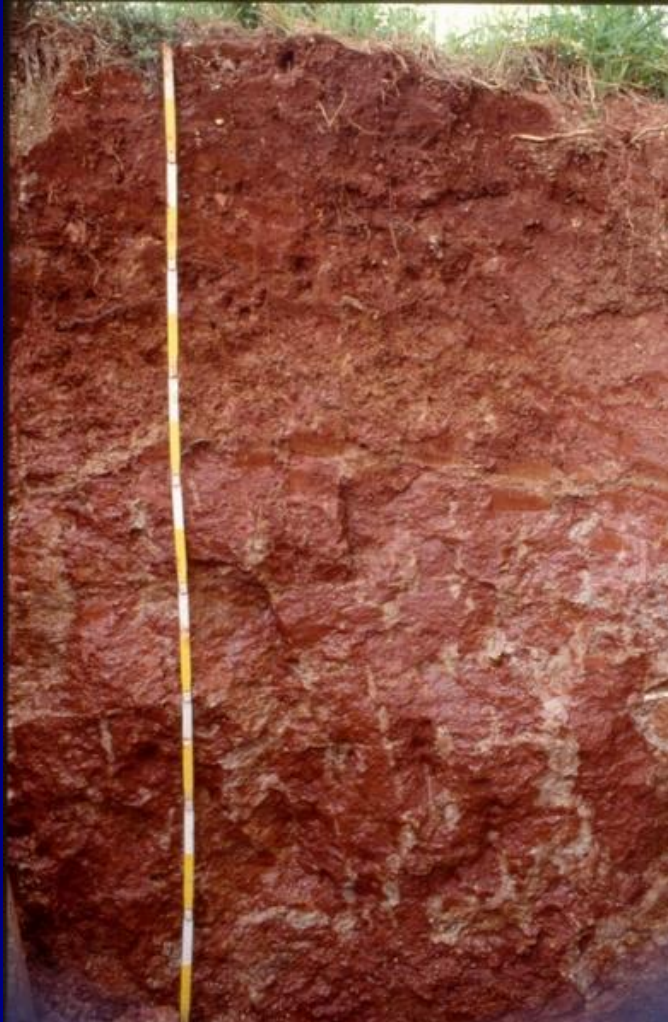
- Albic
- Glossic
- Oxi



# Albic horizon

- Clay and free iron oxides have been removed
- light in color

# Glossic



- Degraded argillic or natric horizon, from which clay and iron oxides are removed

# Other: Oxic horizon

- tropical climates
- highly weathered layer of only Fe and Al oxides and 1:1 clay minerals
- low pH
- low fertility

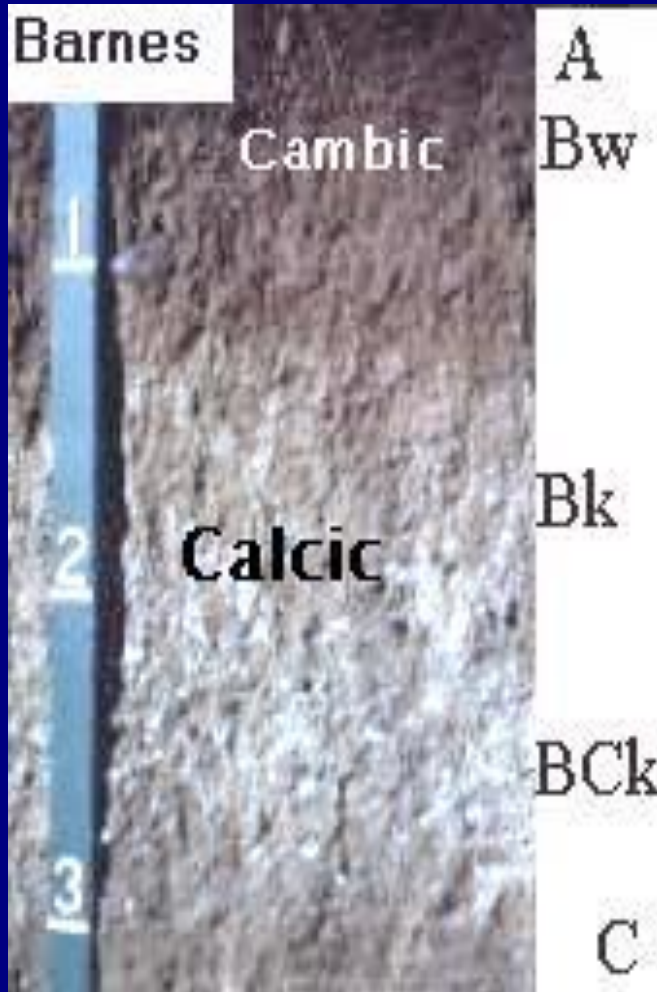
# Sombric

- Formed in well drain mineral soil
- Contained illuvial humus
- Base saturation is less than 50

# Accumulation of salts: Developed through accum ulation of solublized mater ial

- Calcic
- Salic
- Gypsic
- Sulphuric

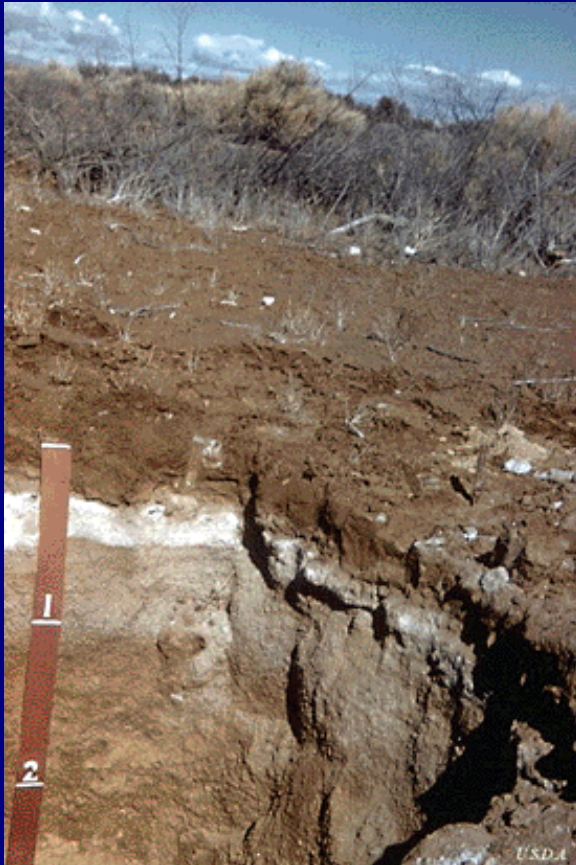
# Calcic horizon



carbonates

High carbonates and bicarbonates.

# Salic horizon



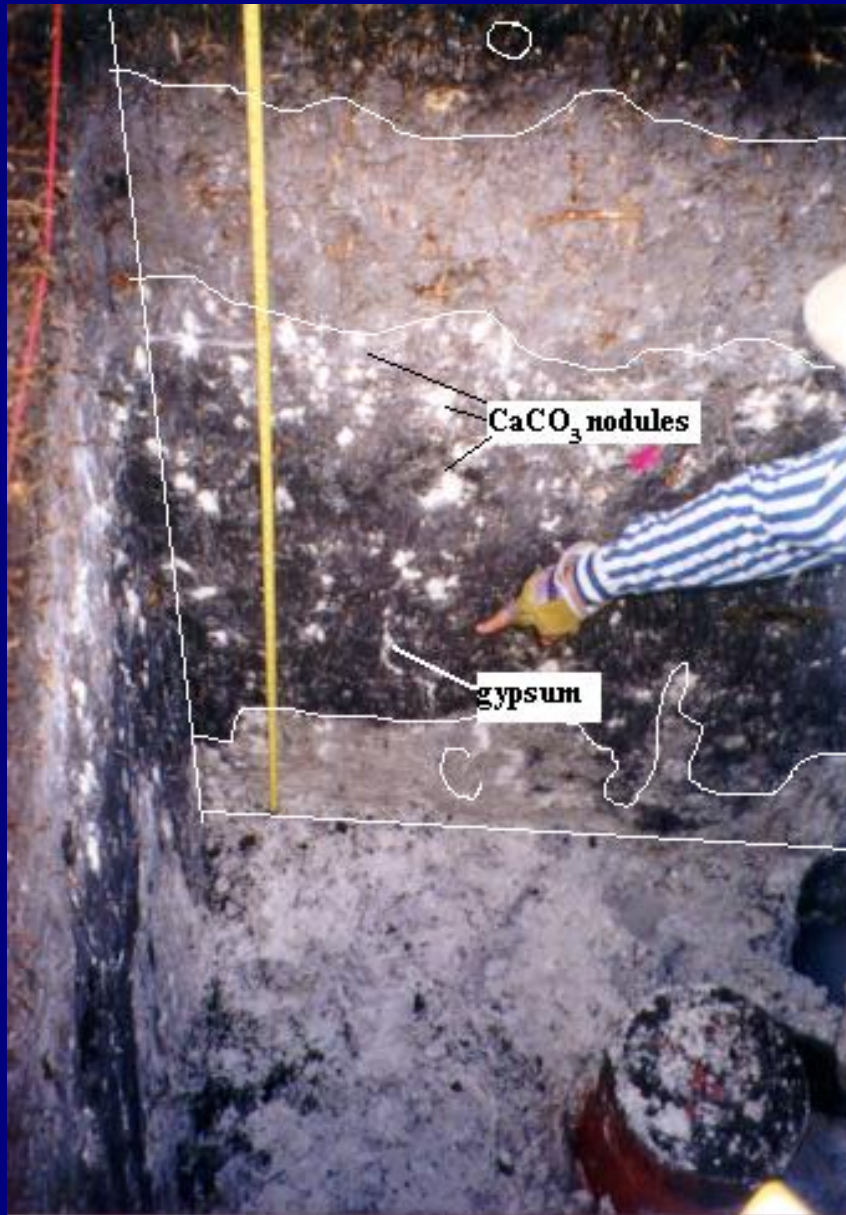
- Soluble salts
  - more soluble than gypsum
- “salty” horizon



# Salinization

- Forms salic horizons
- high evapotranspiration rates cause salts dissolved in soil water to migrate upwards

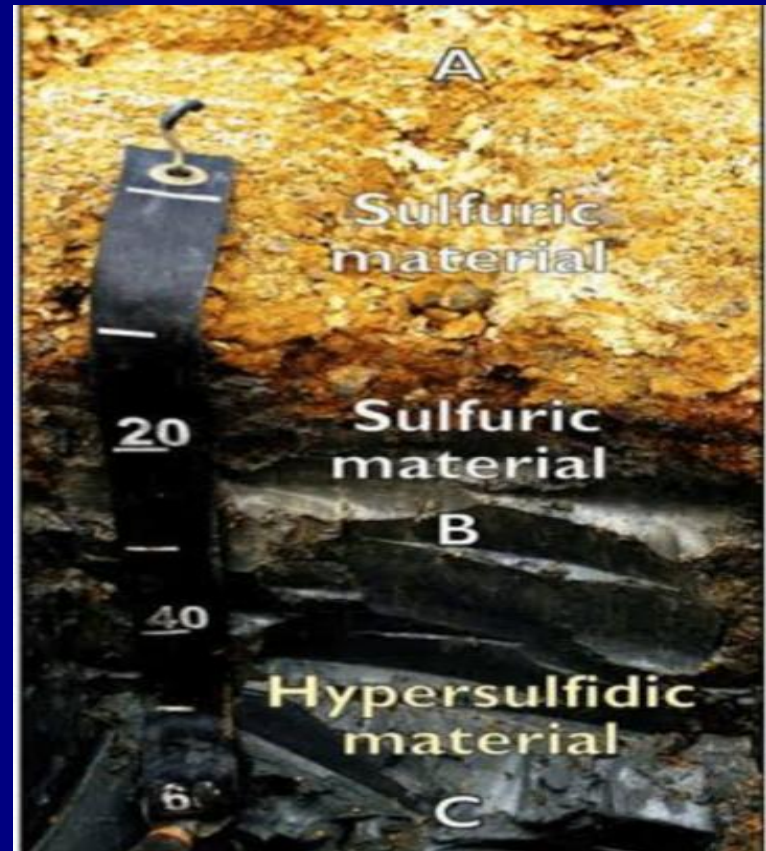
# Gypsic horizon



- Gypsum (calcium sulfate)
- gypsum has precipitated out of solution

# Sulphuric horizon

- Rich in sulphide
- High in surface  
0.m
- Ph less than 3.5
- Toxic to many plants.



# Hardpans/hard horizons

- Duripan
- fragipan
- Petrocalcic
- Petrogypsic
- Placic

# Duripan

- Hardpan cemented by silica
- Carbonates may be present
- Do not slake during prolonged soaking in water or Hcl
- root penetration is impeded



# fragipan

- Mineraally-cemented hardpan
- High bulkcarbon density
- hard when dry; brittle when wet
- no roots
- Show cracks



# Petrocalcic

- Cemented by carbonates
- Non permeable
- Dry fragments don not slake in water
- 2.5cm in thickness

# Petrogypsic

- Cemented by gypsum
- Dry fragments do not slake in water
- Restricts root penetration
- **Placic**
- Cemented by iron manganese
- Humid regions
- Water infiltration
- Restrict root penetration



# Other diagnostic features

- Silken sides
- Planthite
- Permafrost
- Lithic contact
- Durinodes

## Silken sides

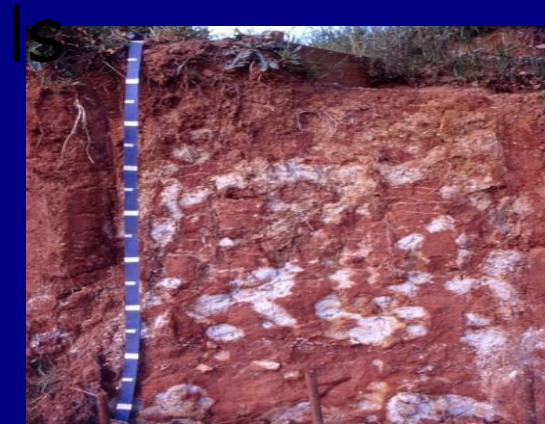
is a smoothly polished surface caused by frictional movement between rocks along the two sides of a rock



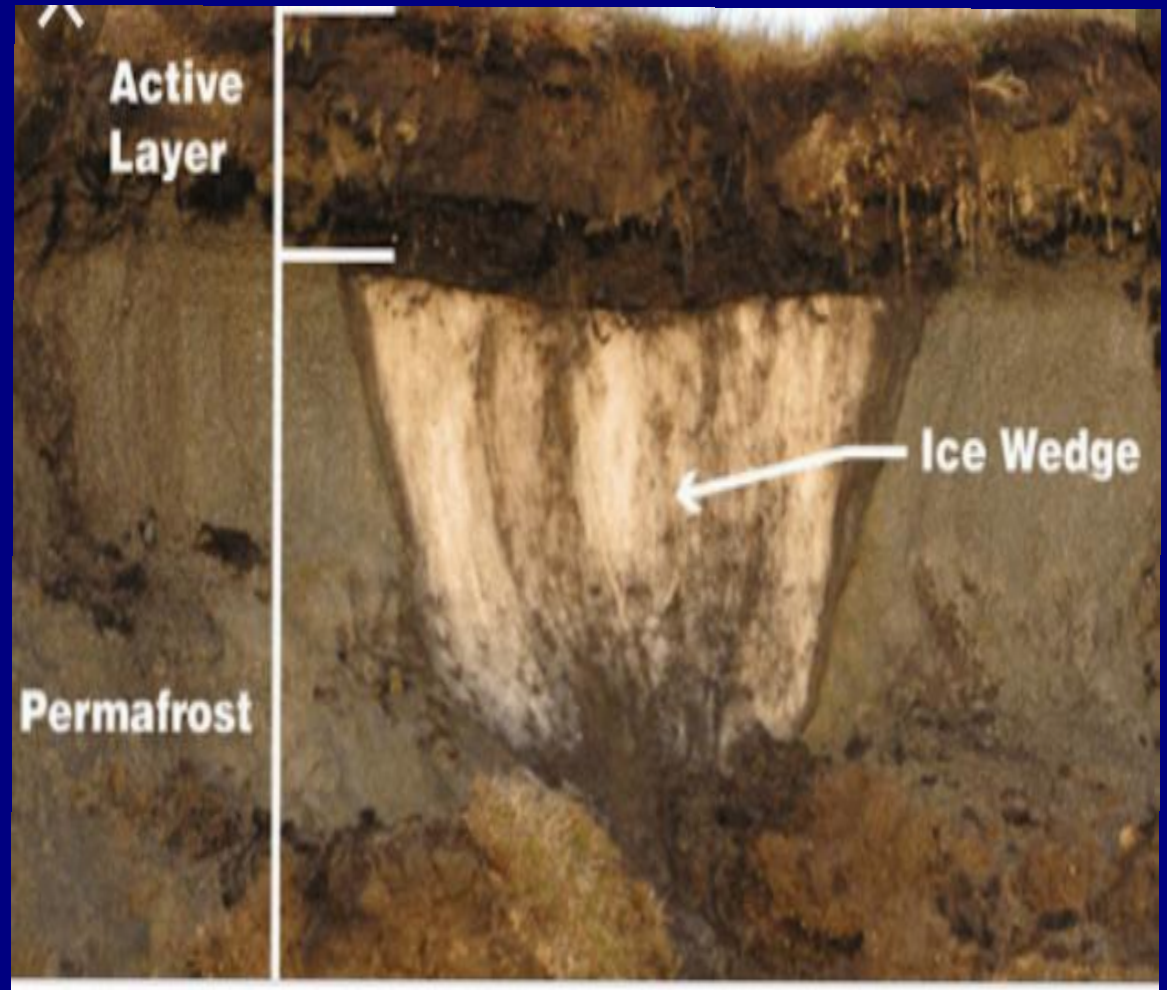
## Plinthite

redoximorphic feature in highly weathered soil

is an iron-rich, humus-poor mixture of clay with quartz and other minerals




permafrost is ground, including rock or soil, with a temperature that remains at or below the freezing point of water  $0^{\circ}\text{C}$  for two or more years



Durinodes are “weakly cemented to indurated nodules or concretions with a diameter of 1 cm or more”

Paralithic. An adjective used in both Soil Taxonomy and WRB to denote a weathered rock contact within a profile. As opposed to a lithic, or continuous rock contact, paralithic implies the presence of breaks and fissures which allow roots to penetrate the underlying rock



A photograph showing the roots of green grass extending into dark brown soil. The roots are thin and fibrous, spreading out from the base of the grass blades. The text "Thank You" is written in a white, serif font across the middle of the image.

Thank You

Eric Smit Entertainment