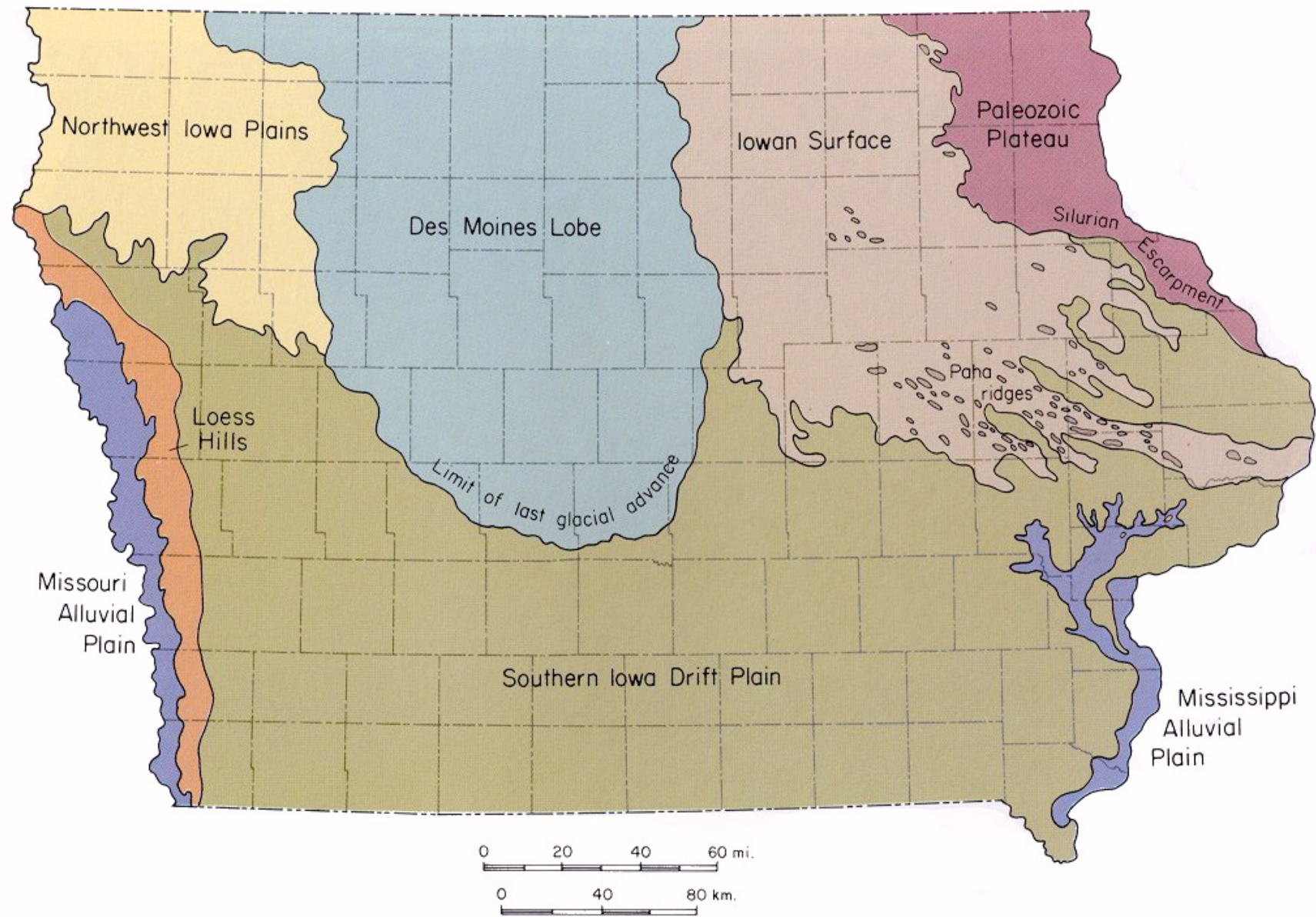
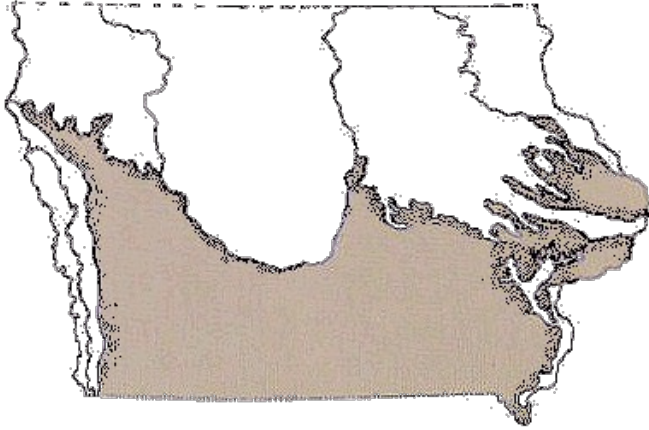




Landform Regions of Iowa

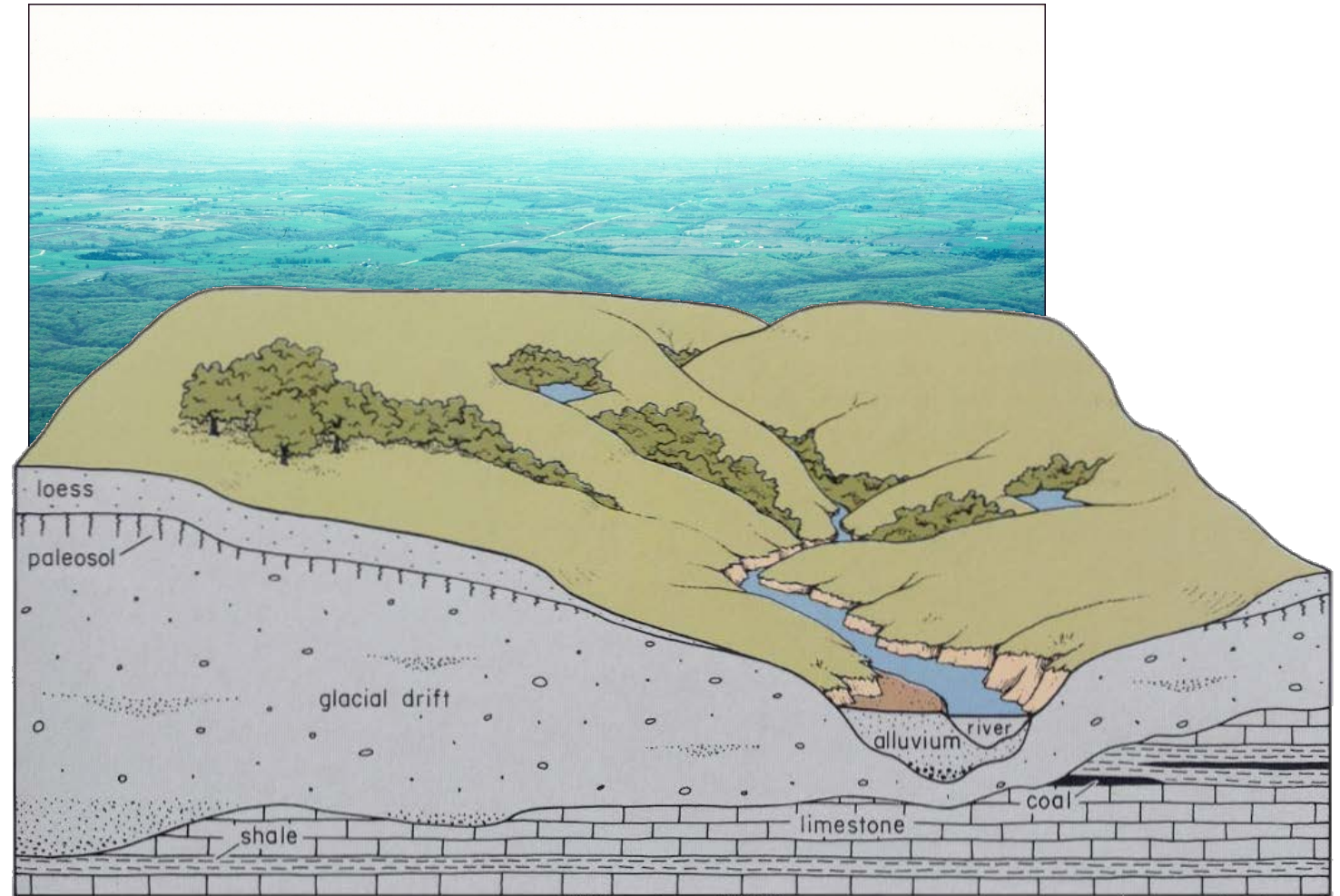


Southern Iowa Drift Plain



Terrain Characteristics

- * moderate loess cover
- * weathered glacial drifts with paleosols
- * integrated drainage network
- * bedrock exposed in deeper valleys



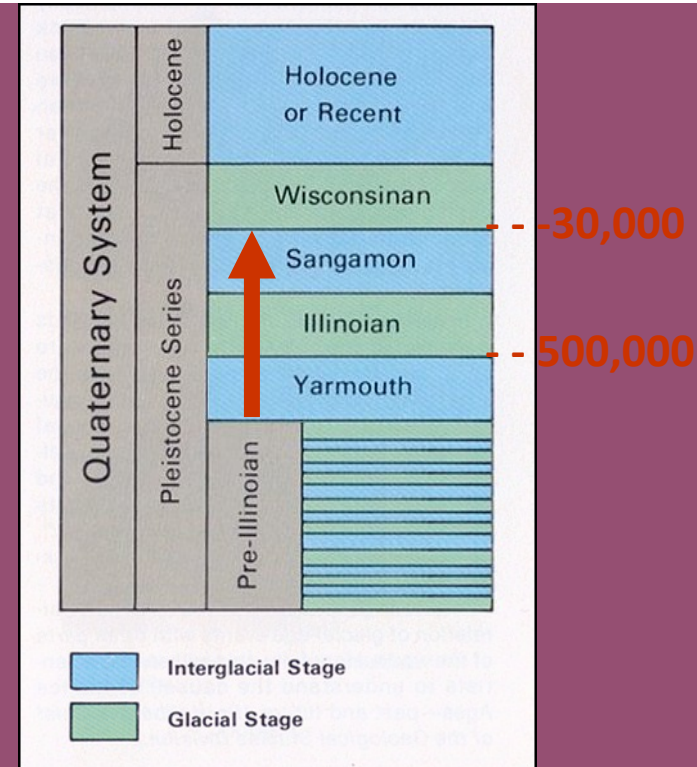
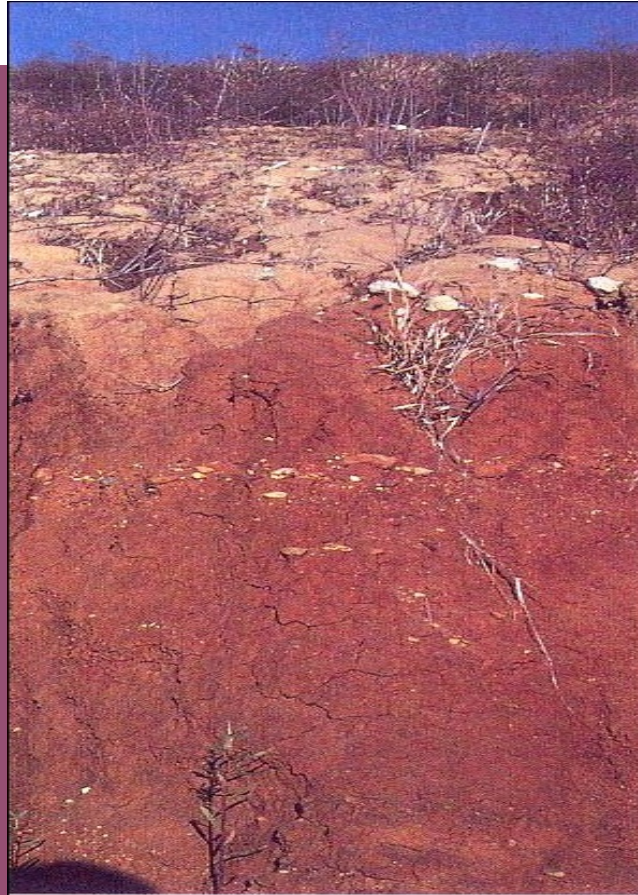
*** moderate loess cover**



loess-capped hills, Iowa County

photo by Gary Hightshoe

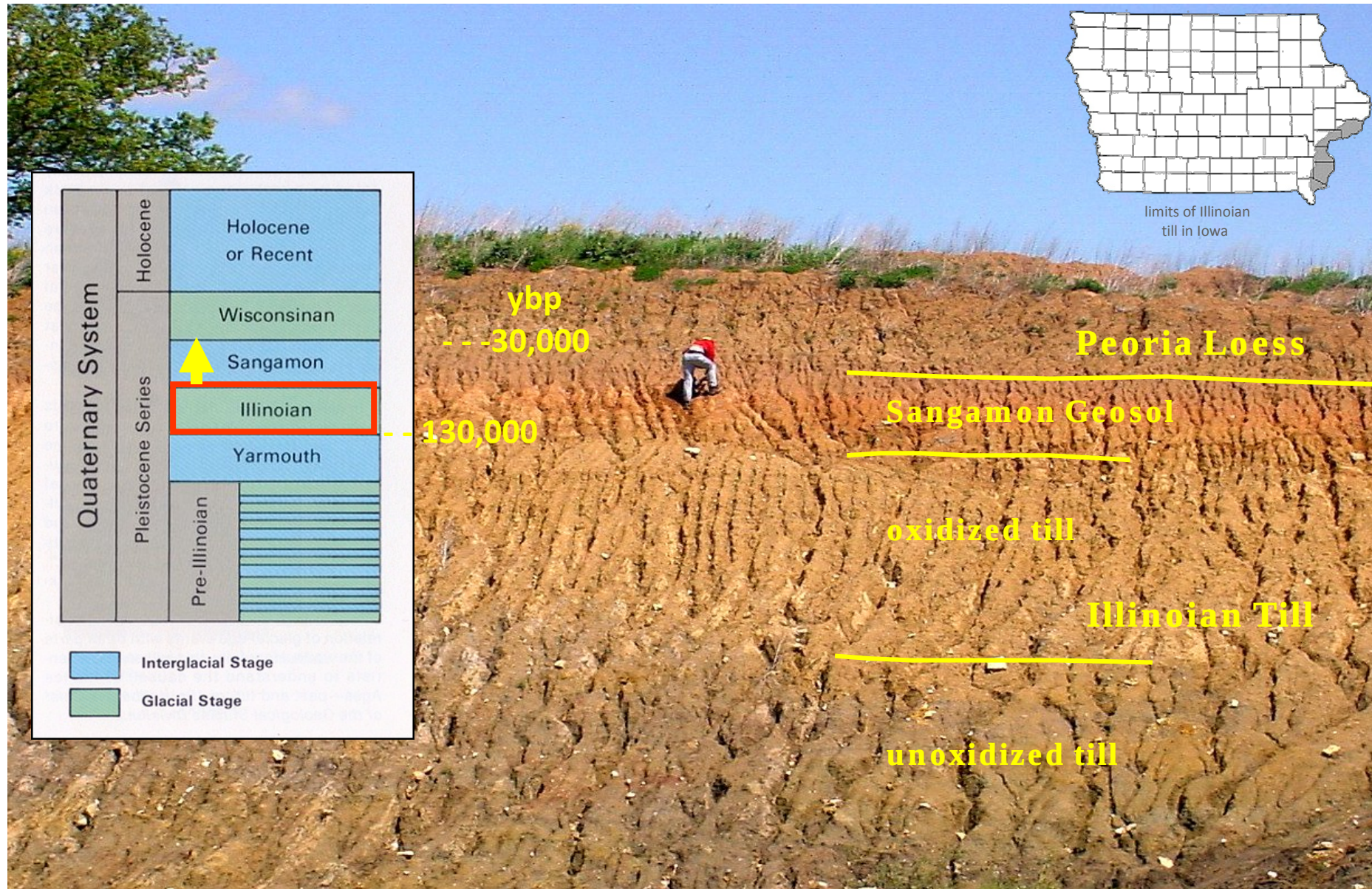
* weathered glacial drift with palaeosols



Yarmouth-Sangamon Paleosol “gumbo till”, Pottawattamie County

photo by Tim Kemmis

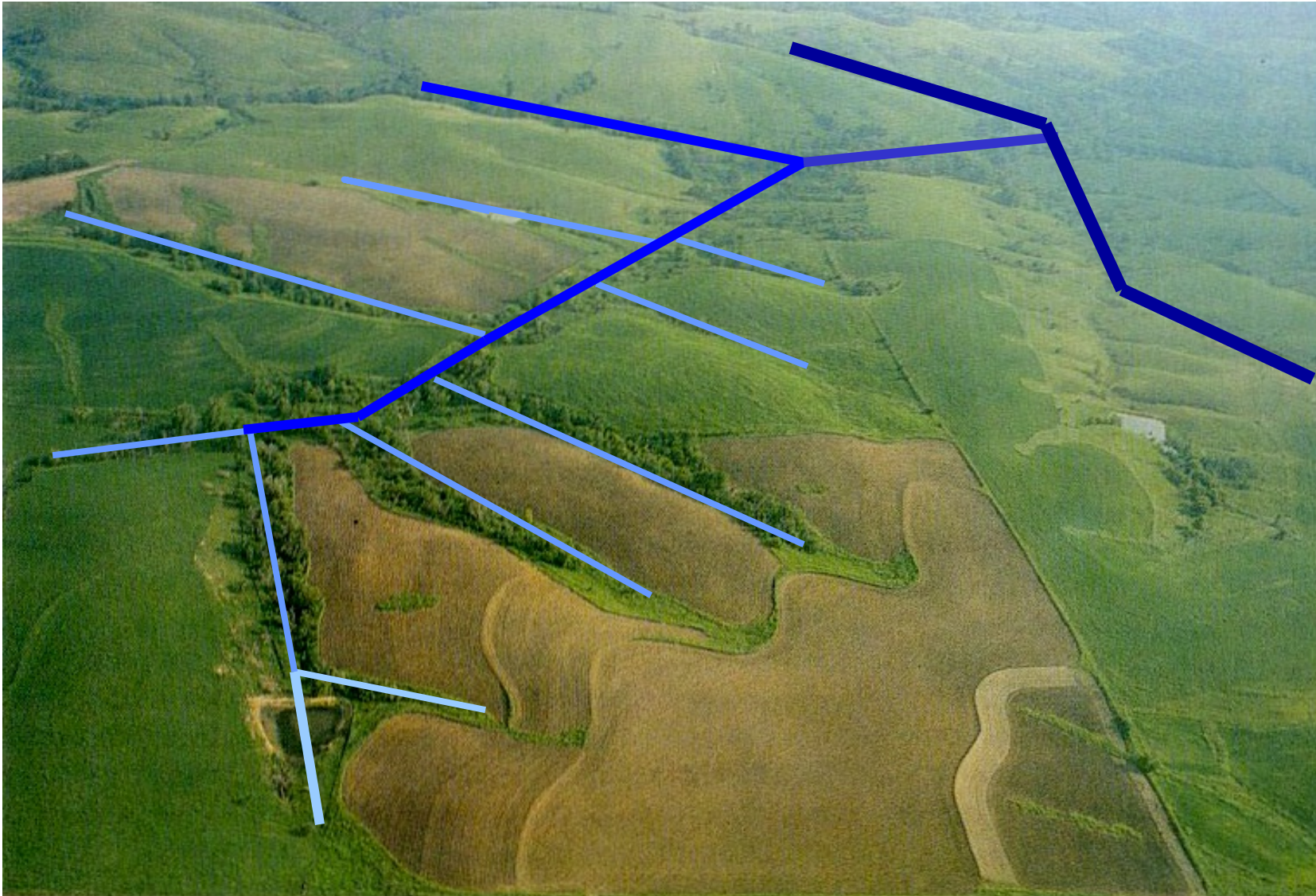
* weathered glacial drift with palaeosols



Sangamon Geosol at Nelson Quarry – Des Moines County

photo by Ray Anderson

*** integrated drainage network**



Integrated drainage, Monona County

*photo from Land-Use Analysis Laboratory
Iowa State University*

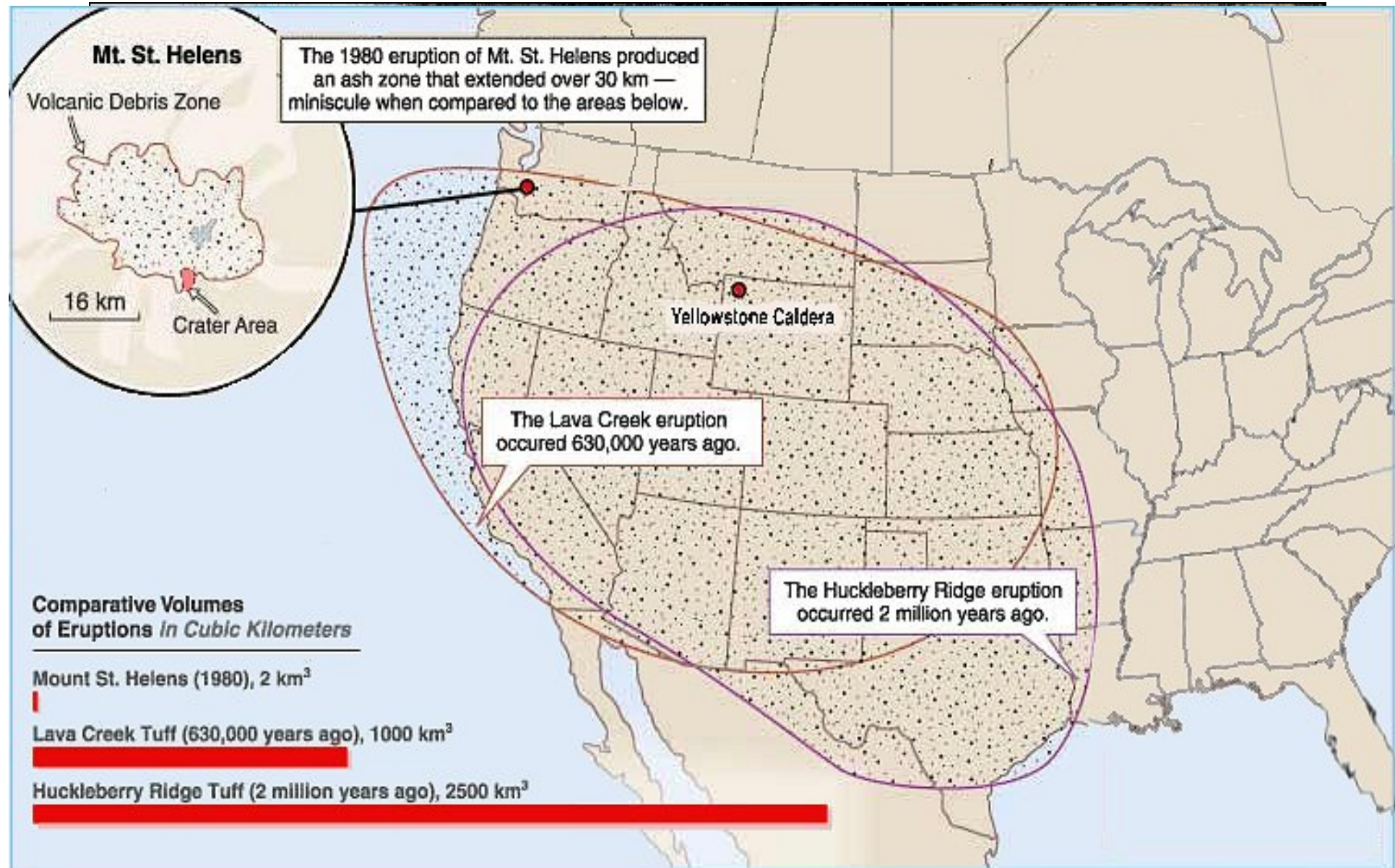
*** bedrock exposed in deeper valleys**



Silurian rocks exposed along the Cedar River, Palisades-Kepler State Park, Linn County

photo by Ray Anderson

* volcanic ash beds



Iowan Surface



Terrain Characteristics

- * gently rolling terrain
- * thin, discontinuous loess or loam over glacial drift
- * bedrock near surface
- * local karst conditions
- * scattered glacial boulders
- * integrated drainage network
- * isolated elongate hills (paha)



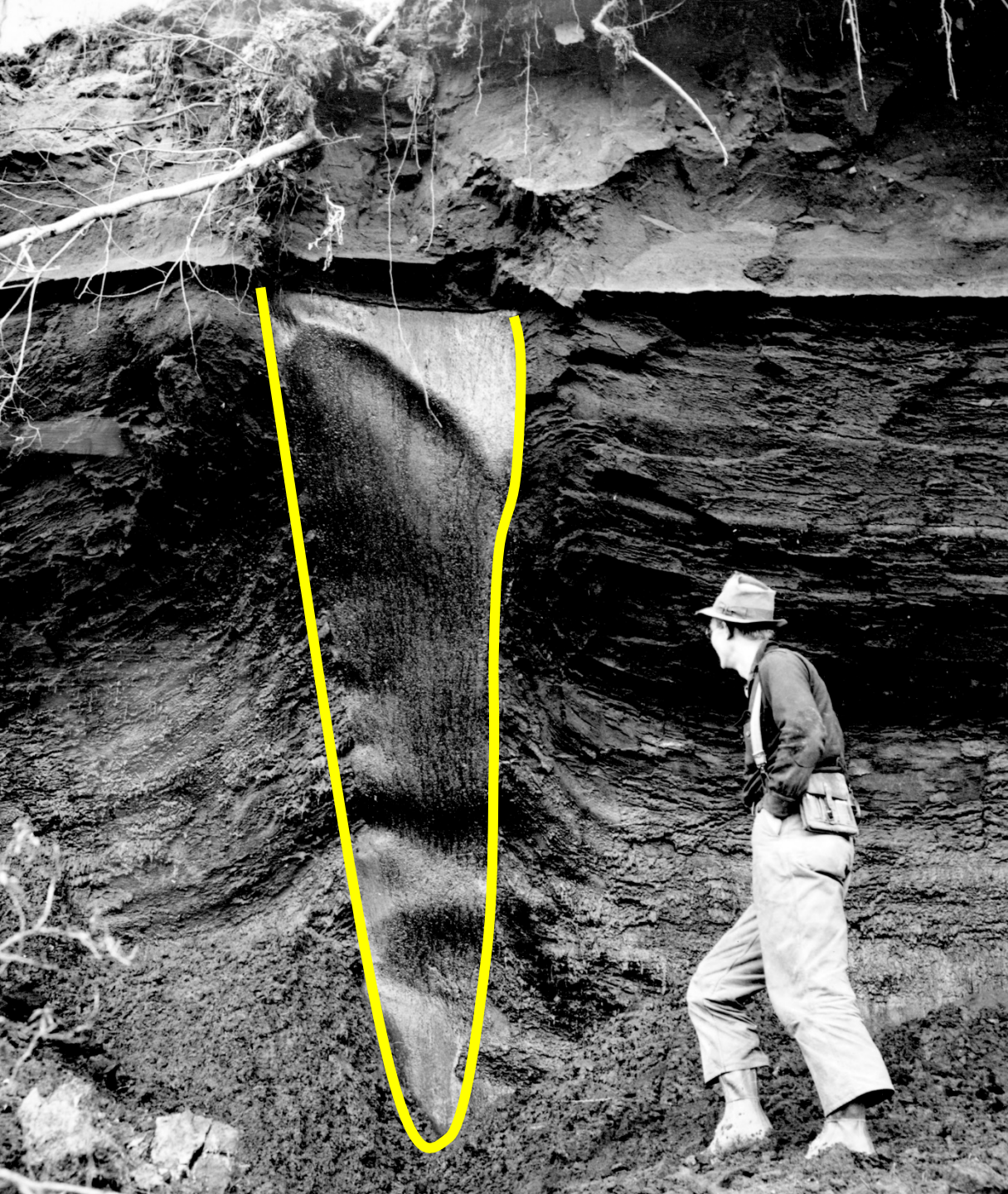
View looking west across North Liberty Lobe of Iowan Surface, North Liberty in Johnson Co

*** Formation of the Iowan Surface 16,500 – 21,000 ybp**



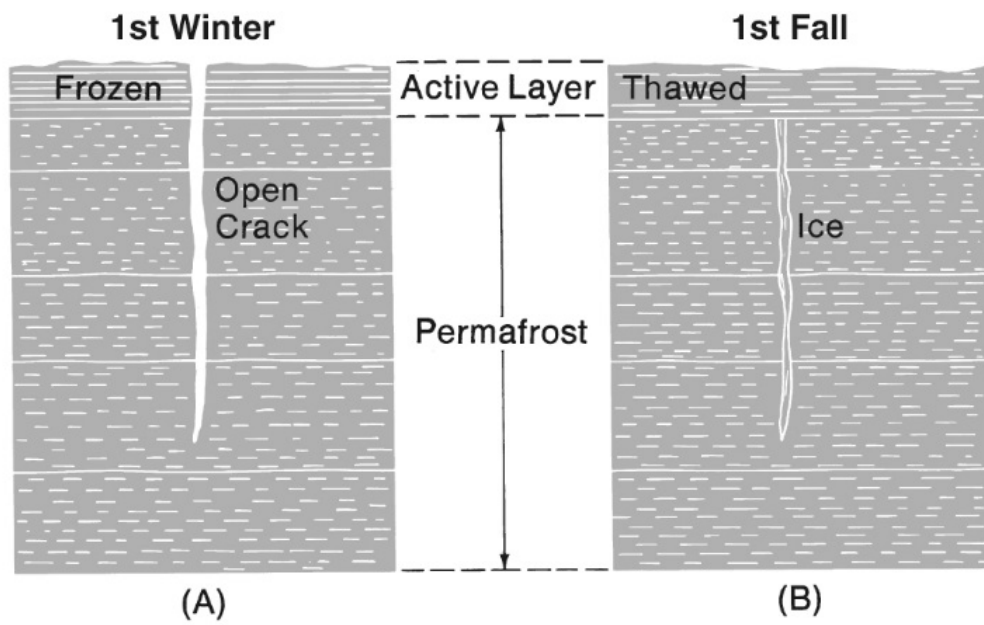
Solifluction Lobes Richardson Mts., Canada August 1980

photo by Dr. Sharon Johnson

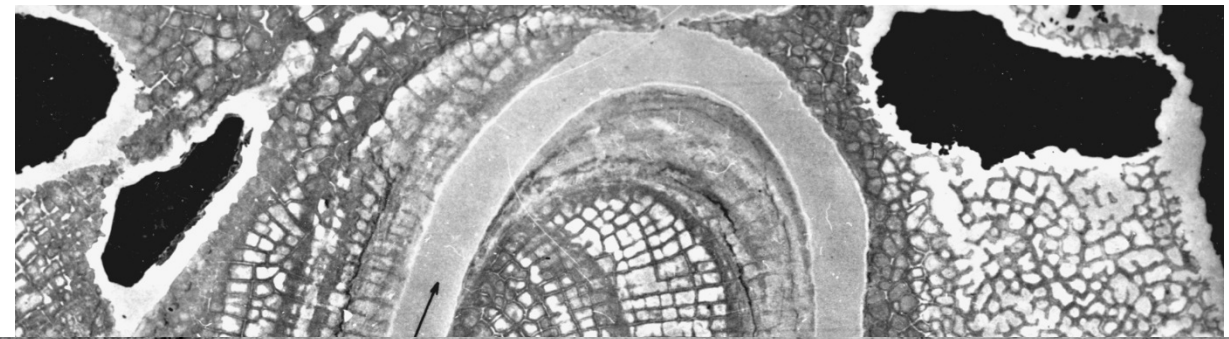
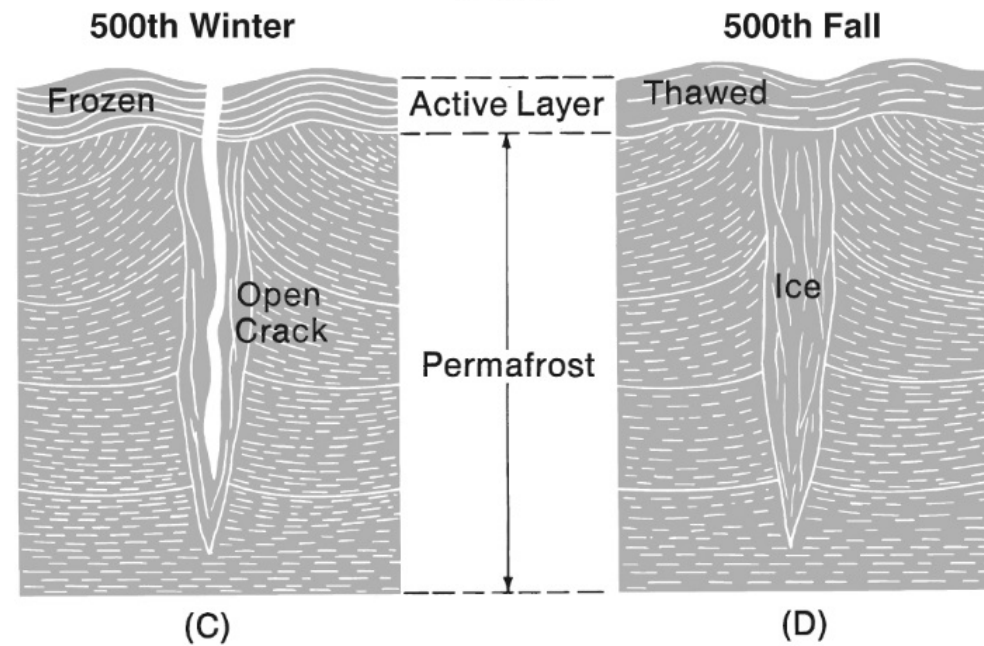


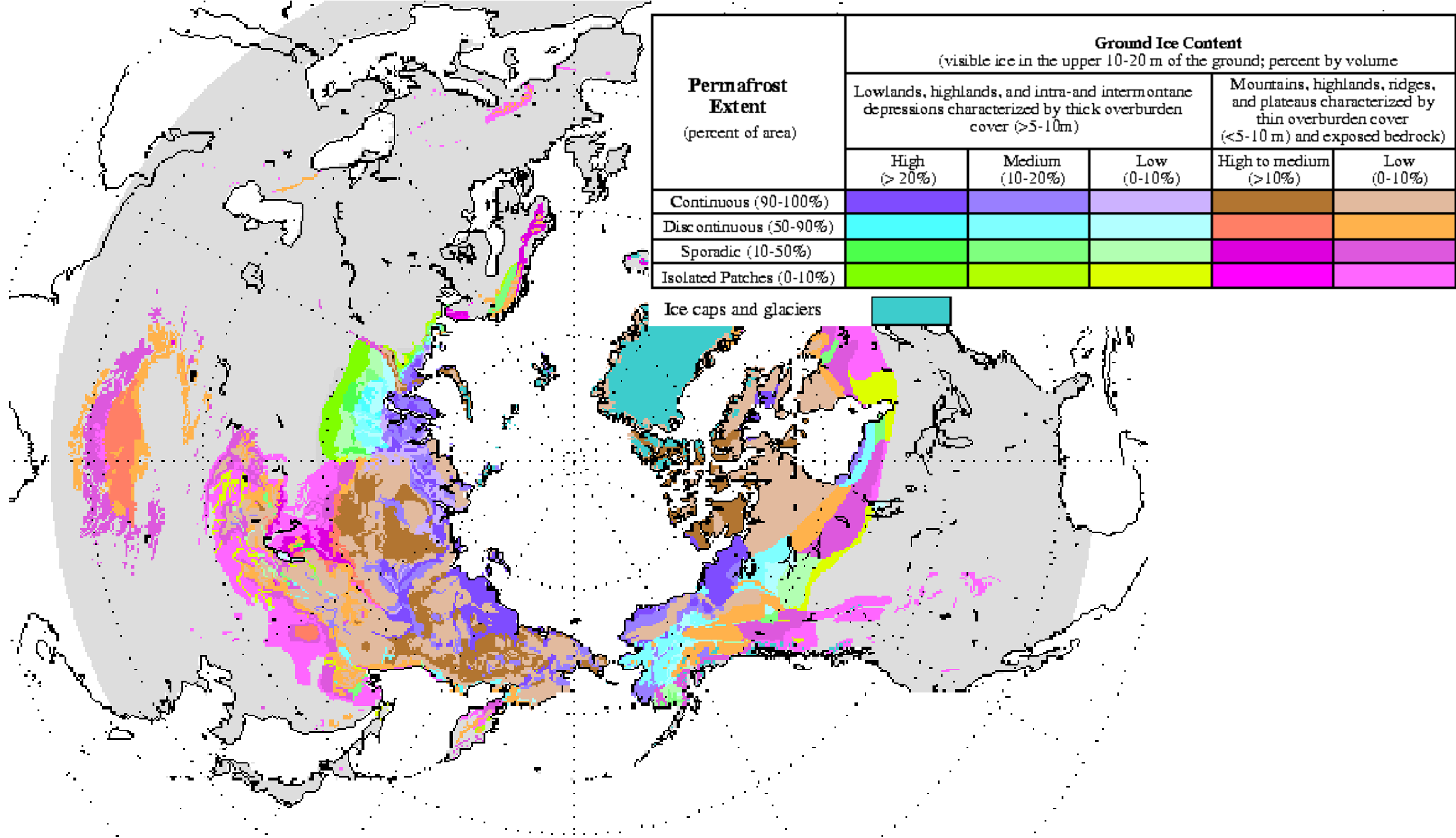
Permafrost

Or **cryotic soil** is at or below the freezing point of water 0°C (32°F) for two or more years. Most permafrost is located in high [latitudes](#) (i.e. land close to the North and South poles), but **alpine permafrost** may exist at high [altitudes](#) in much lower latitudes



0 2
meters







Frost Sorting

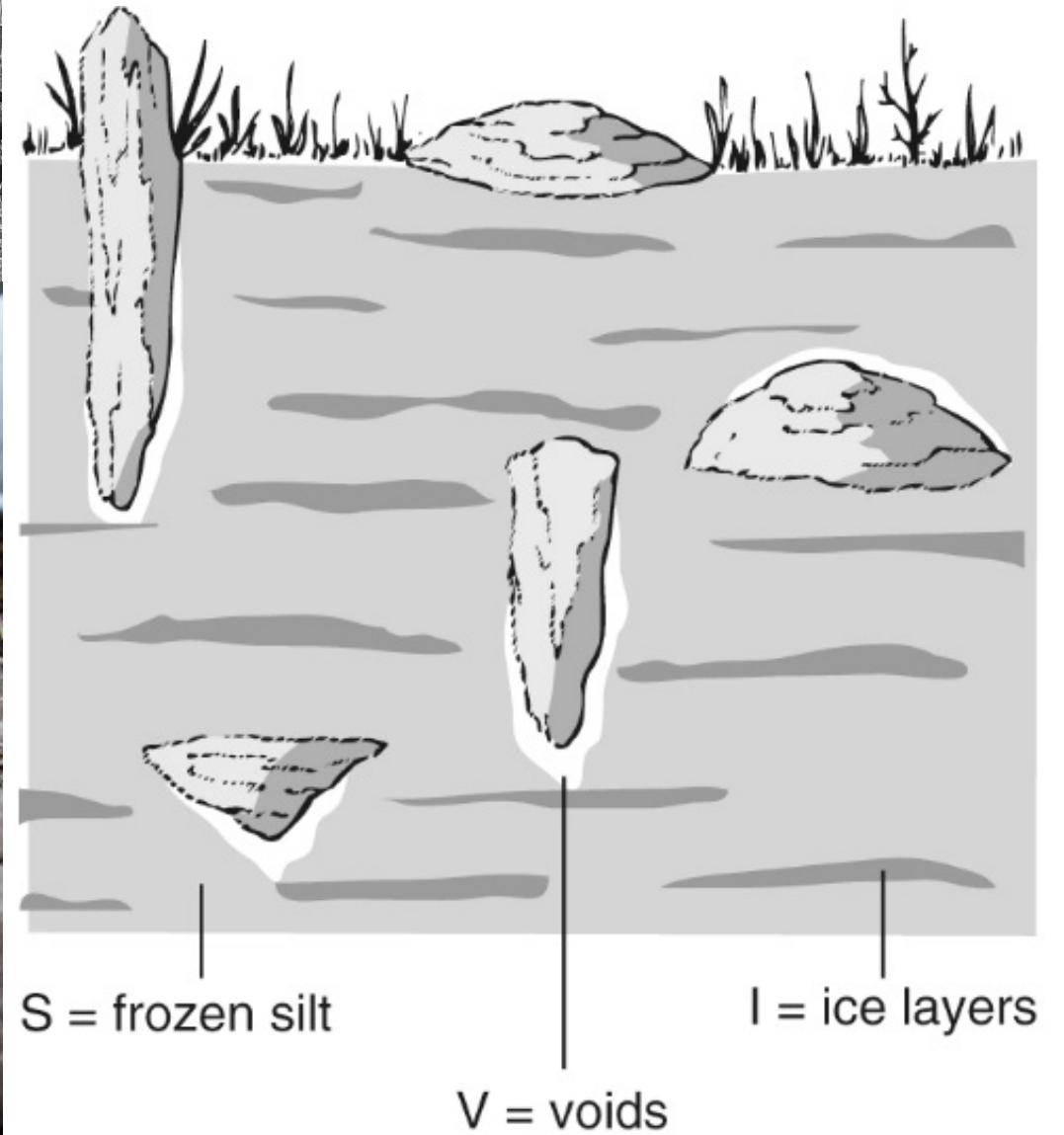


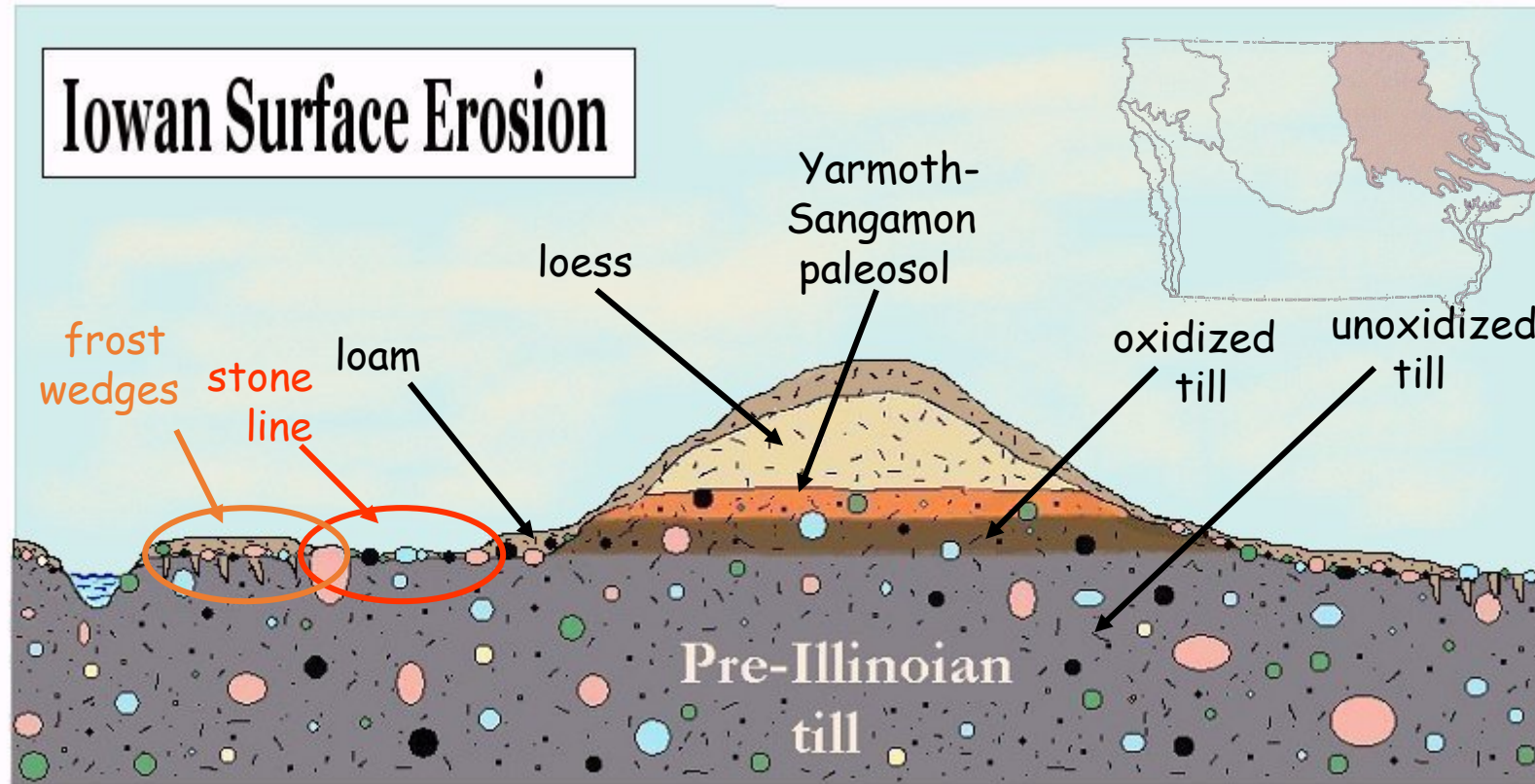


Table 11.4 Landforms That Indicate Ground Conditions in Arctic and Near-Arctic Regions

Feature and Description	Associated Ground Conditions
<i>Polygonal ground (ice wedges)</i> —Usually indicates the presence of a network of ice wedges—vertical wedge-shaped ice masses form by the accumulation of snow, hoarfrost, and meltwater in ground cracks that form due to contraction during the winter. Wedge networks are also common in wet tundra where no surface expression occurs. (Subject to extreme differential settlement when the surface is disturbed.)	Typically indicates relatively fine-grained unconsolidated segments with a permafrost table near the ground surface; also known for coarser sediments and gravels where wedge ice is less extensive.
<i>Stone nets, garlands, and stripes</i> —Frost heaving in granular soils produces netlike concentrations of the coarser rocks that are present. If the area is gently sloped, the net is distorted into garlands by downslope movement. If the slope is steep, the coarse rocks lie in stripes that point downhill.	Indicates strong frost action in moderate, well-drained granule sediments that vary from silty fine gravel to boulders. Surficial material is commonly susceptible to flowage.
<i>Solifluction sheets and lobes</i> —Sheets or lobe-shaped masses of unconsolidated sediment that range from less than a foot to hundreds of feet in width and may cover entire valley walls; found on slopes that vary from steep to less than 3°.	Indicates an unstable mantle or poorly drained, often saturated sediment that is moving downslope largely by seasonal frost heaving. On steeper slopes they often indicate bedrock near the surface, and on gentle slopes, a shallow permafrost table.
<i>Thaw lakes and thaw pits</i> —Surface depressions form when local melting of permafrost decreases the volume of ice-rich sediments. Water accumulates in the depressions and may accelerate melting of the permafrost. Often forms impassible bogs.	Usually indicates poorly drained, fine-grained unconsolidated sediments (fine sand to clay) with the permafrost table near the surface.
<i>Beaded drainage</i> —Short, often straight minor streams that join pools or small lakes. Streams follow the tops of melted ice wedges, and pools develop where melting of the permafrost has been more extensive.	Indicates a permafrost area with silt-rich sediments or peat overlying buried ice wedges.
<i>Pingos</i> —Small, ice-cored circular or elliptical hills that occur in tundra and forested parts of the continuous and discontinuous permafrost areas. They often lie at the juncture of south and southeast-facing slopes and valley floors and in former lakebeds.	Indicates silty sediments derived from the slope or valley, also groundwater with some hydraulic head that is confined between the seasonal frost and permafrost table or is flowing in a thawed zone within the permafrost. Those in former lakebeds indicate saturated fine-grained sediments.

(Ferrians et al. 1969)

* Formation of the Iowan Surface 16,500 – 21,000 ybp







- gently
- rolling terrain

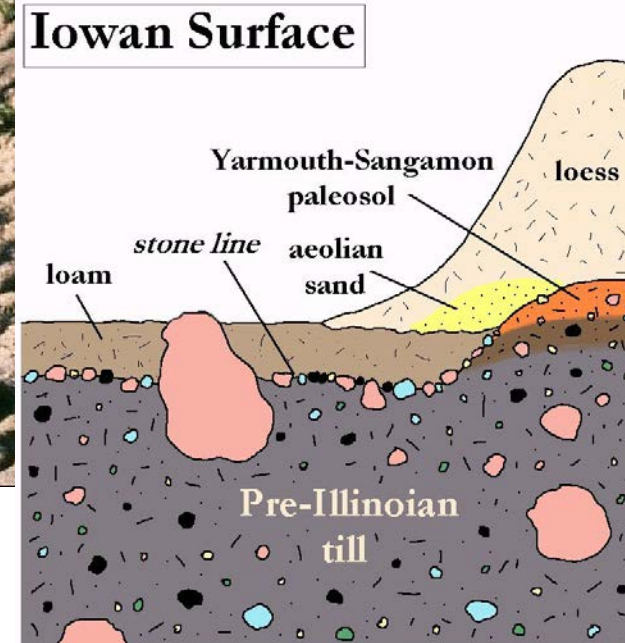
Iowan Surface, Linn County
photo by Ray Anderson

*** thin, discontinuous loess or loam over glacial drift**



Iowan Surface soil profile in south Cedar Falls

photo by Jim Walters



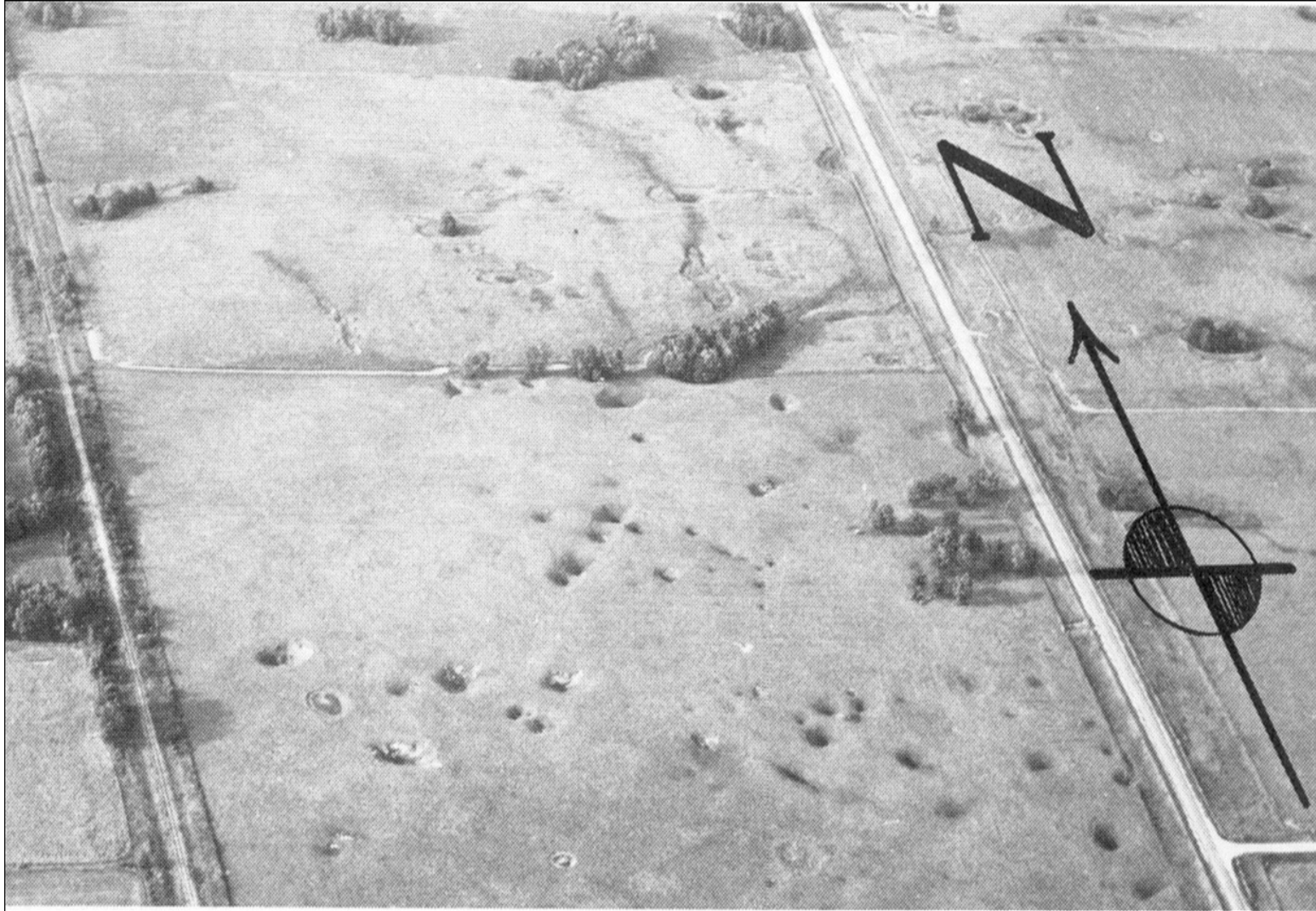
*** bedrock near surface**



Natural bridge at Maquoketa Caves State Park, Jackson County

photo by Ray Anderson

*** local karst conditions**



Sink holes in pasture, Floyd County

photo by Stan Grant

*** scattered glacial boulders**

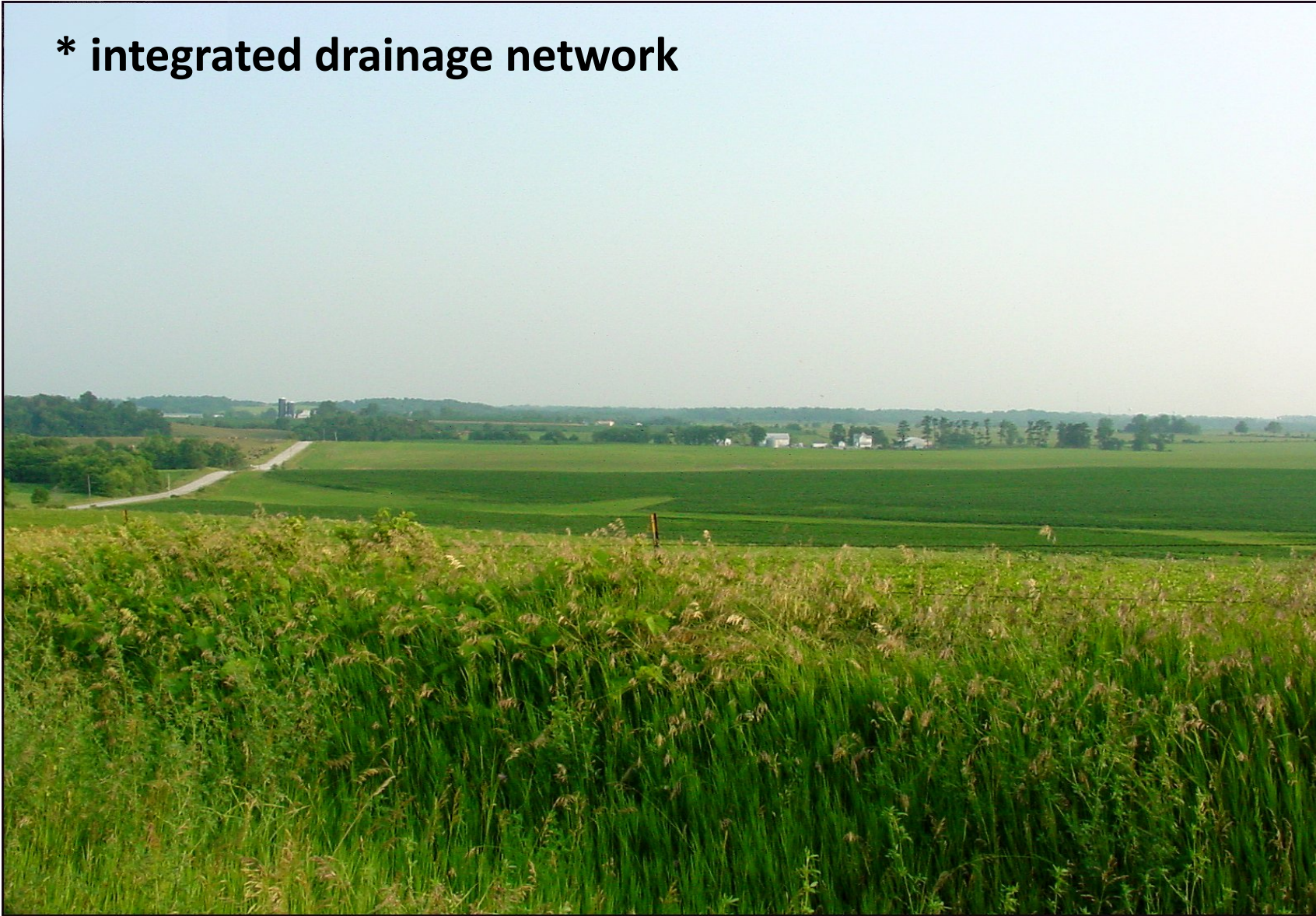


Eratics along fence row, Iowan Surface

photo by George Hallberg



*** integrated drainage network**



Edge of North Liberty Lobe, Iowan Surface, Johnson County

photo by Ray Anderson

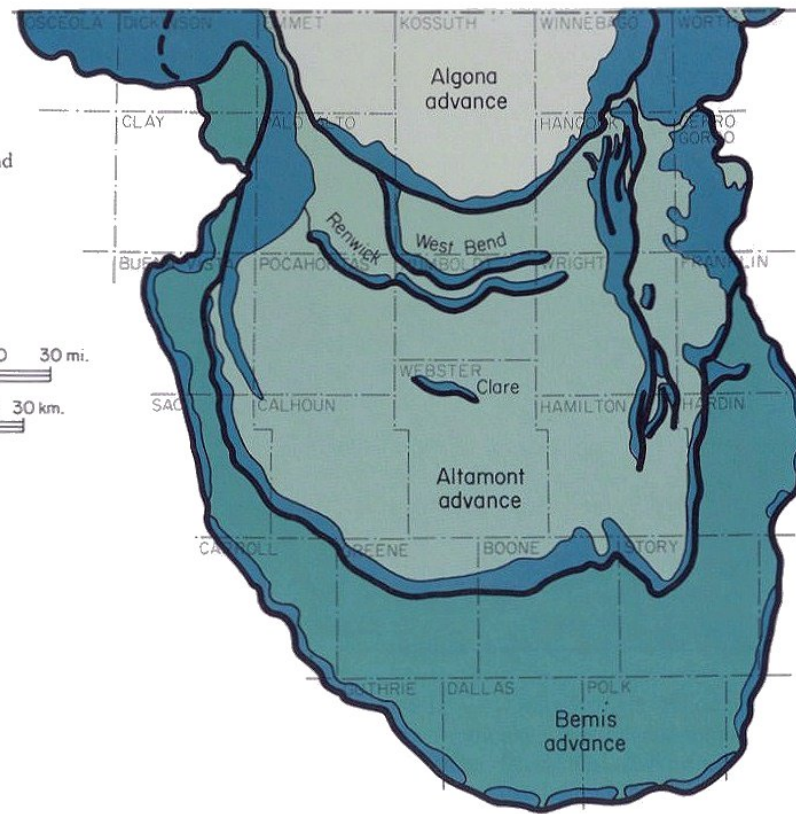
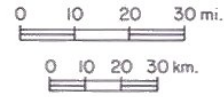
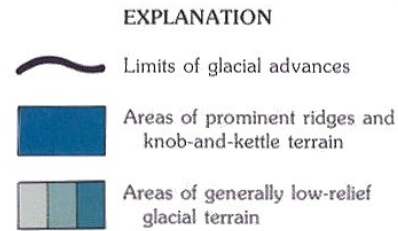
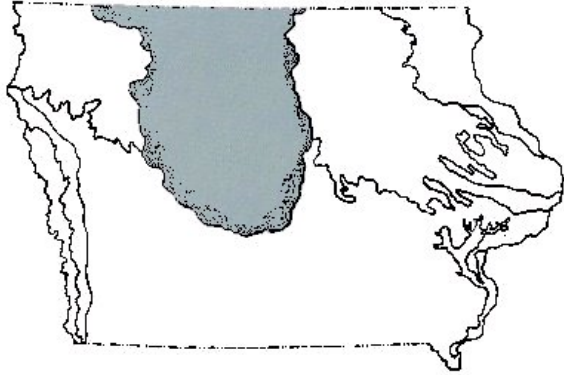
*** isolated elongate hills (paha)**



Paha in southeast Linn County

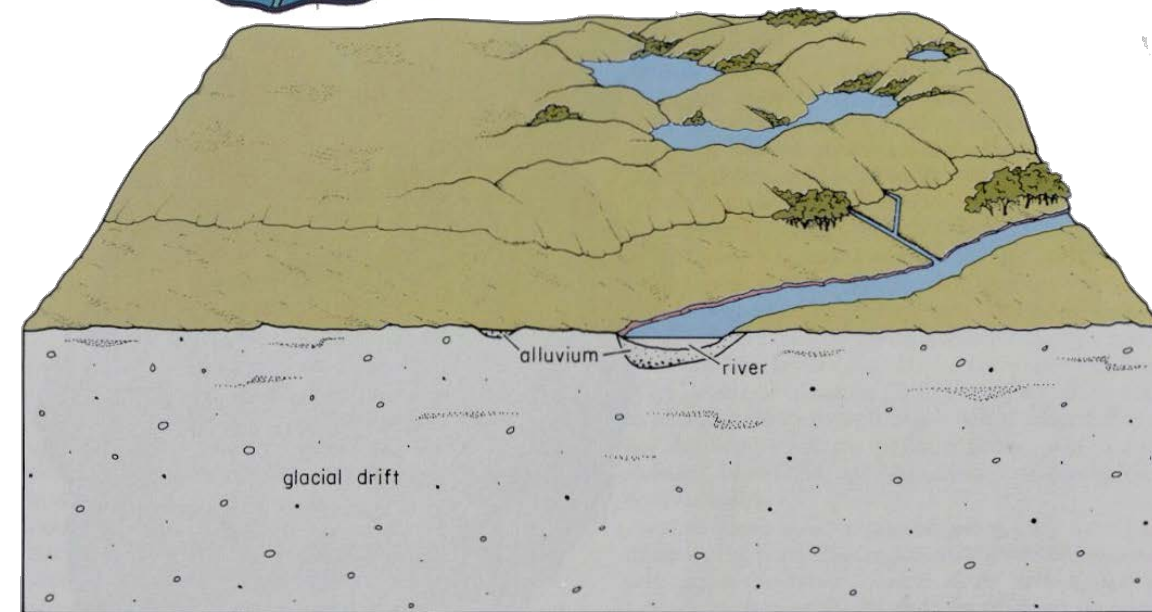
photo by Tim Kemmis

Des Moines Lobe



Terrain Characteristics

- * fresh glacial till
- * no loess cover
- * bands of knob and kettle terrain
- * areas of level terrain
- * poor surface drainage
- * natural lakes, wetlands



*** fresh glacial till**

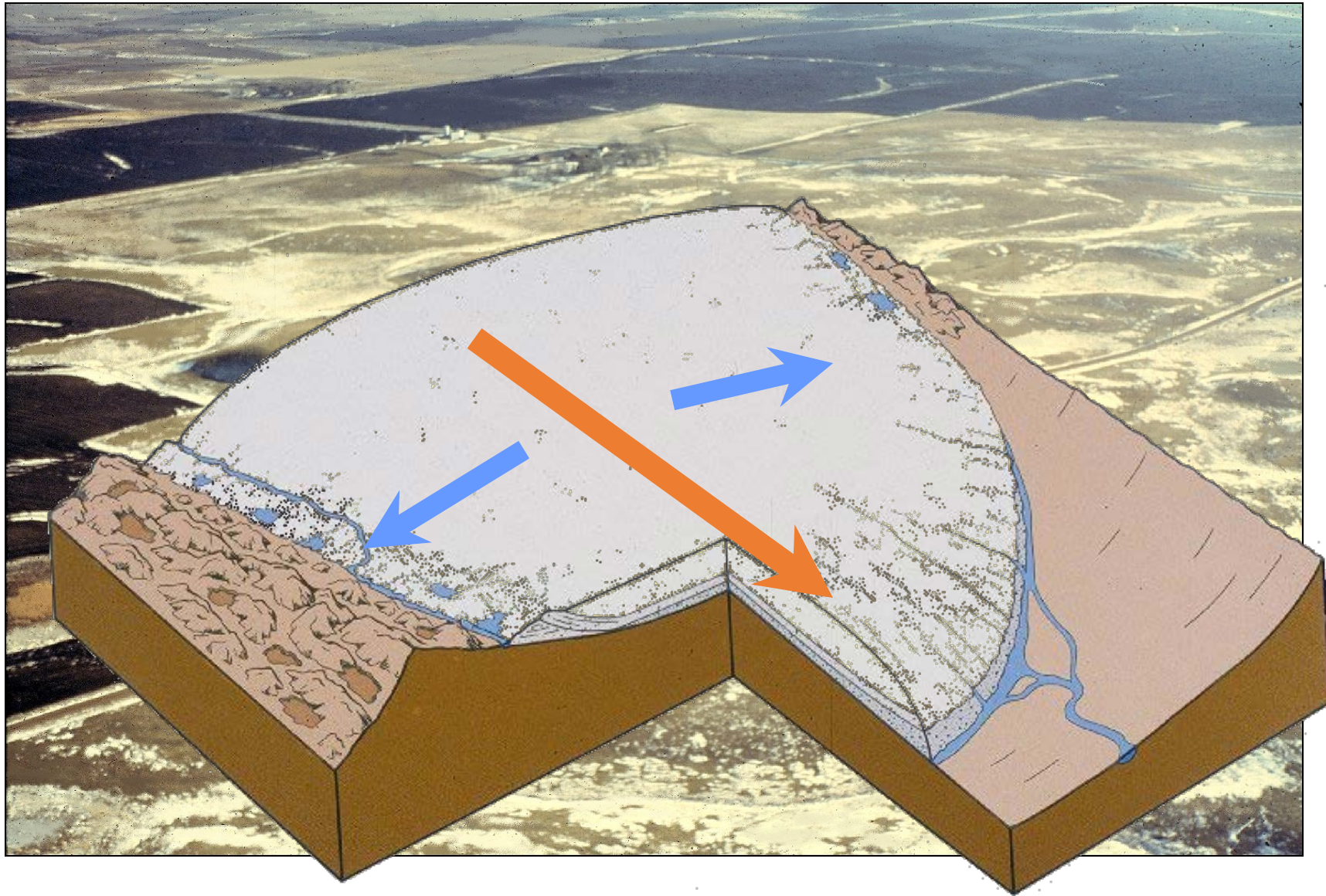


exposures of Des Moines Lobe till
Kemmis



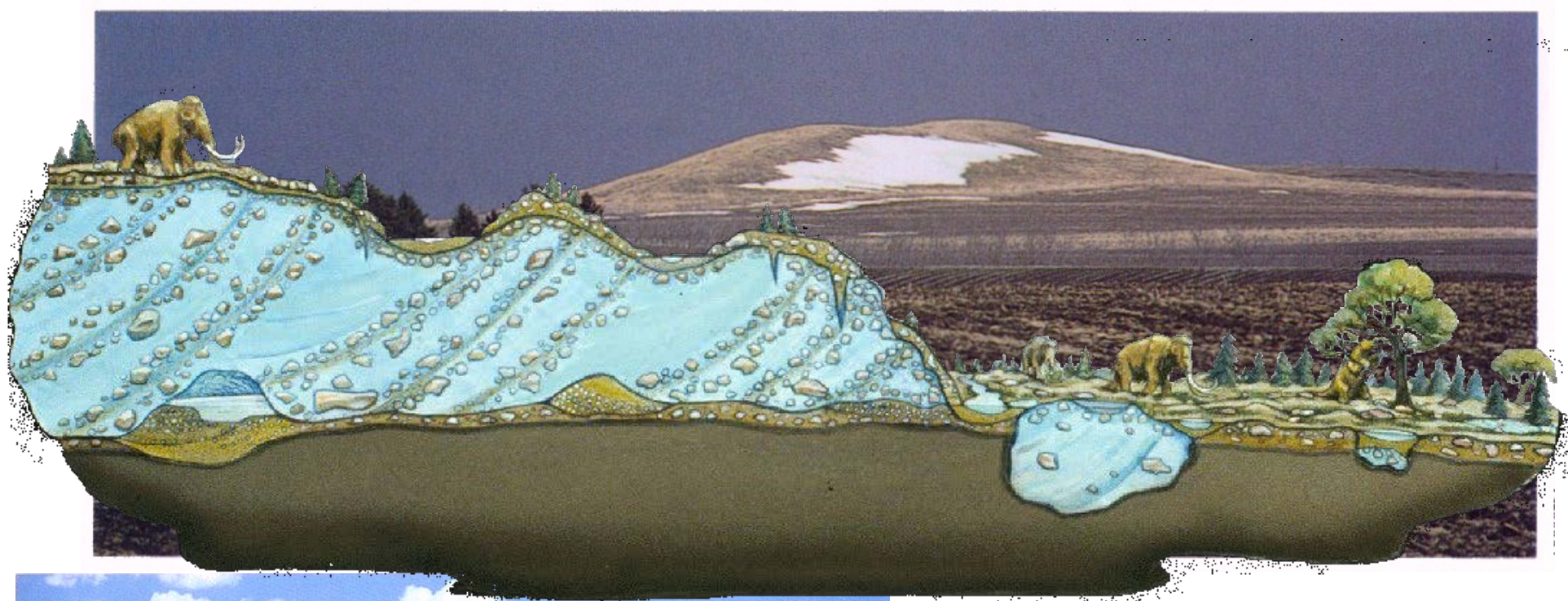
photos by Tim

*** Bands of knob and kettle terrain**



Dickinson County near Superior
photo

IGS



Ocheyeden Mound a large
Kame in Osceola Co.



Freda Haffner Kettlehole
State Preserve
a large kettle in Dickinson Co.

*** upland sand and gravel deposits**



Upland Sand and Gravel Deposit, Emmet County
by Tim Kemmis

*** areas of level terrain**



Rice Lake, Winnebago County
Hightshoe

photo by Gary

*** linked depression systems**



Doolittle Prairie, Story County

photo by Gary Hightshoe

*** poorly developed drainage**



Spring Run State Wildlife Management Area, Dickinson County
Douglas C. Harr

photo by

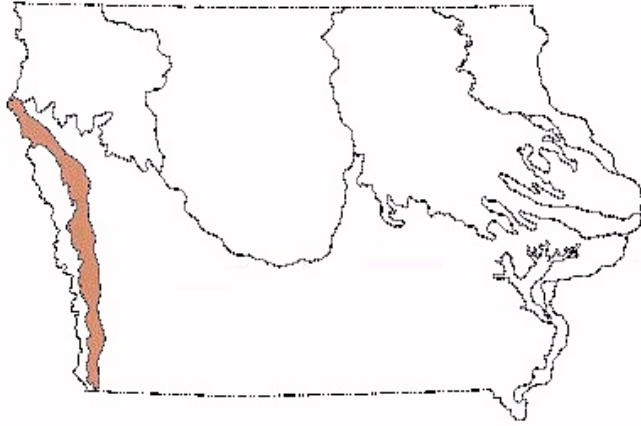
*** natural lakes and wetlands**



Arnolds Park, Lake Okoboji, Dickinson County
Kemmis

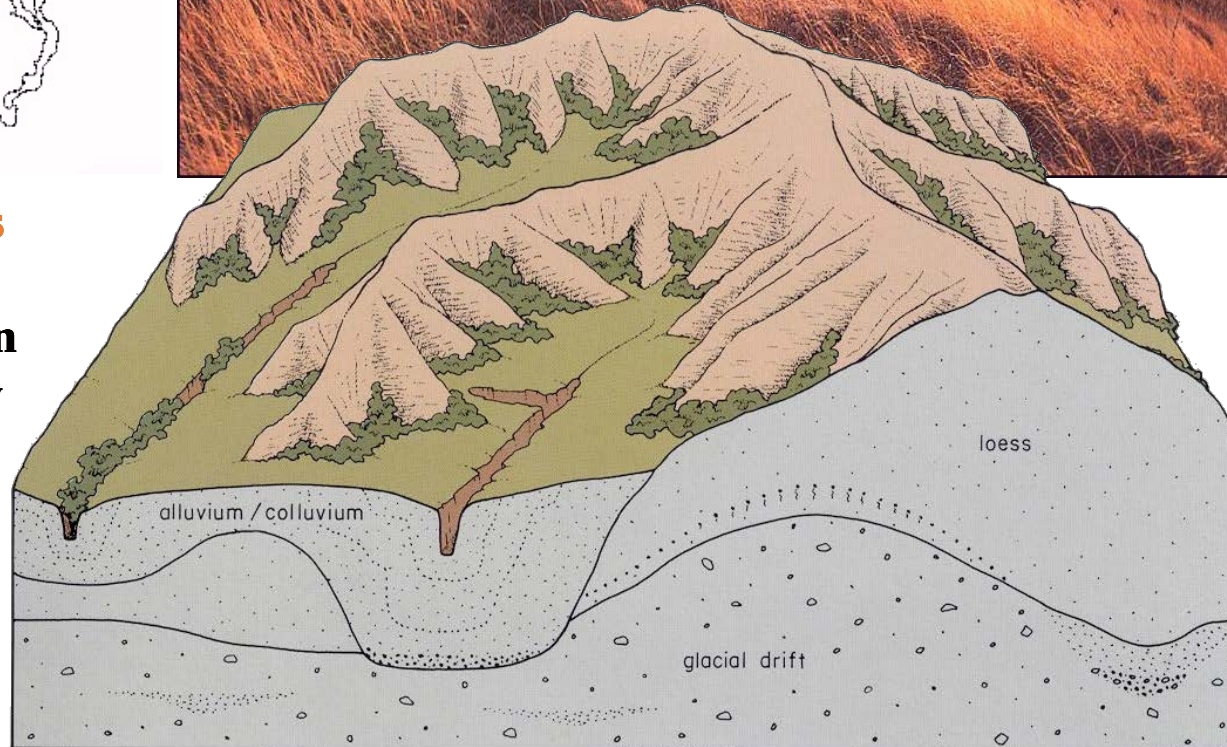
photo by Timothy J.

Loess Hills

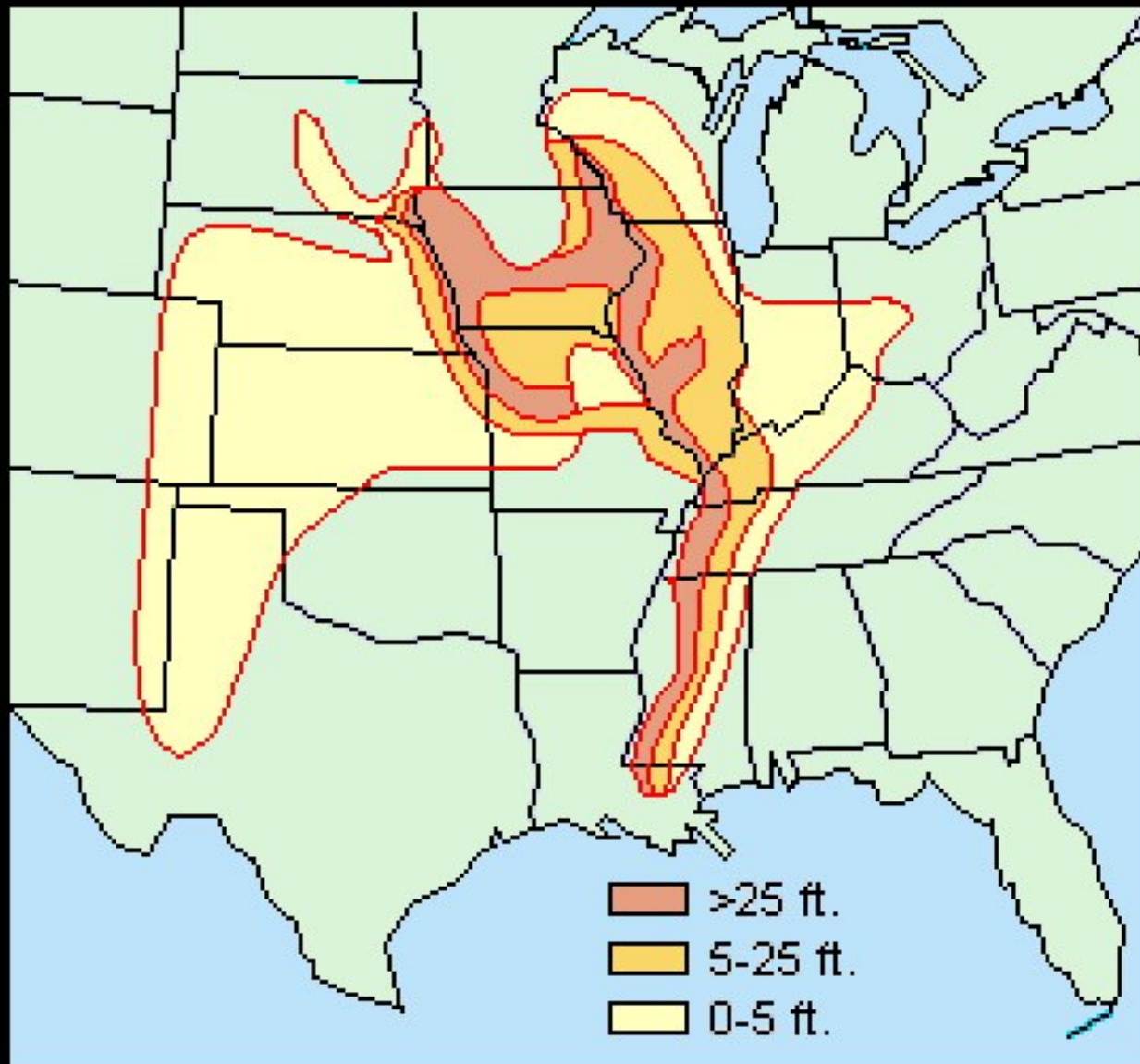


Terrain Characteristics

- * thick loess cover
- * sharply ridged terrain
- * high drainage density
- * rapid surface runoff
- * gully development
- * vertical road cuts



What is Loess????

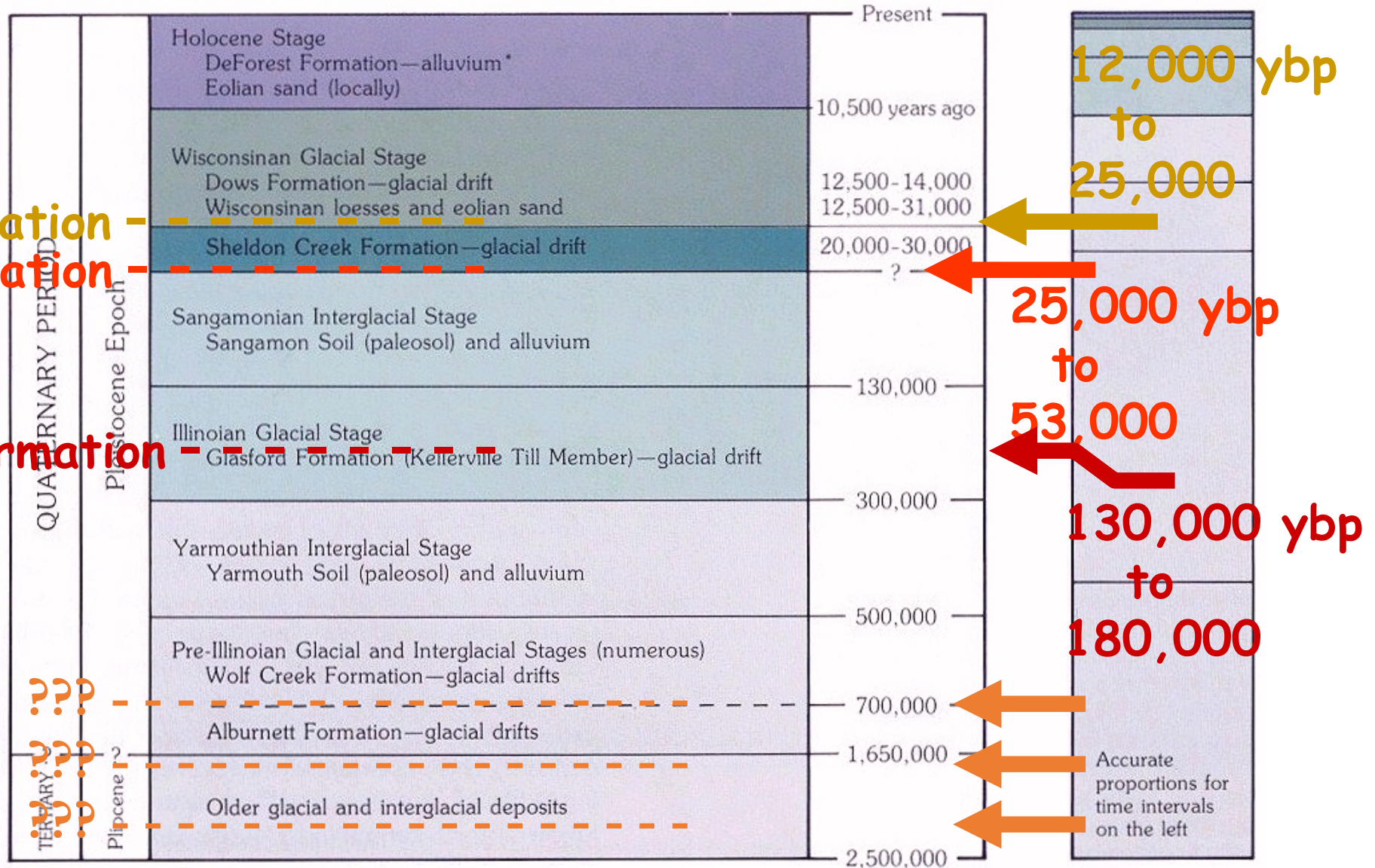


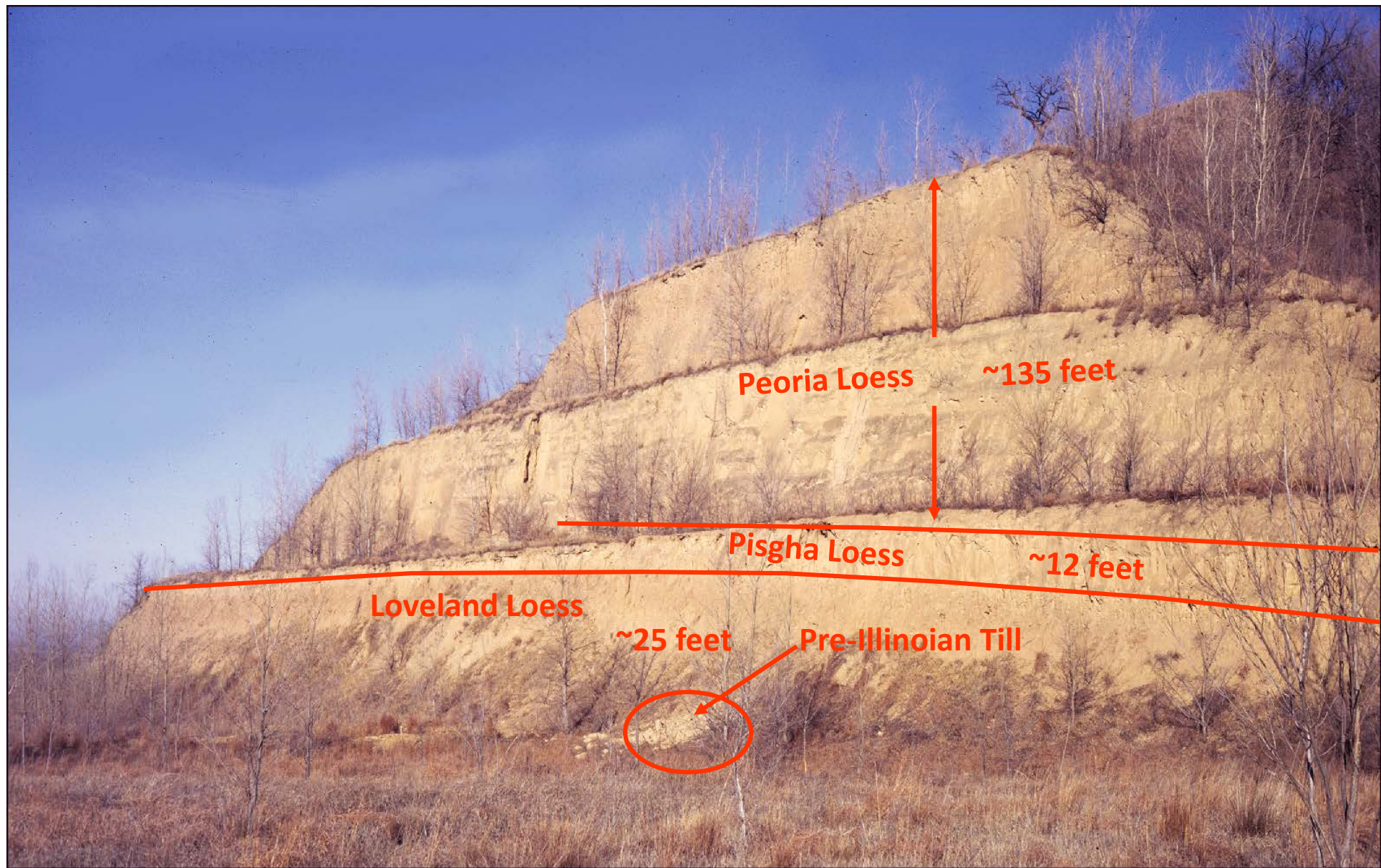
Loess thickness in the
Midcontinent U.S.

Ages of loess deposition in Iowa

Peoria Formation -
Pisgah Formation -

Loveland Formation -

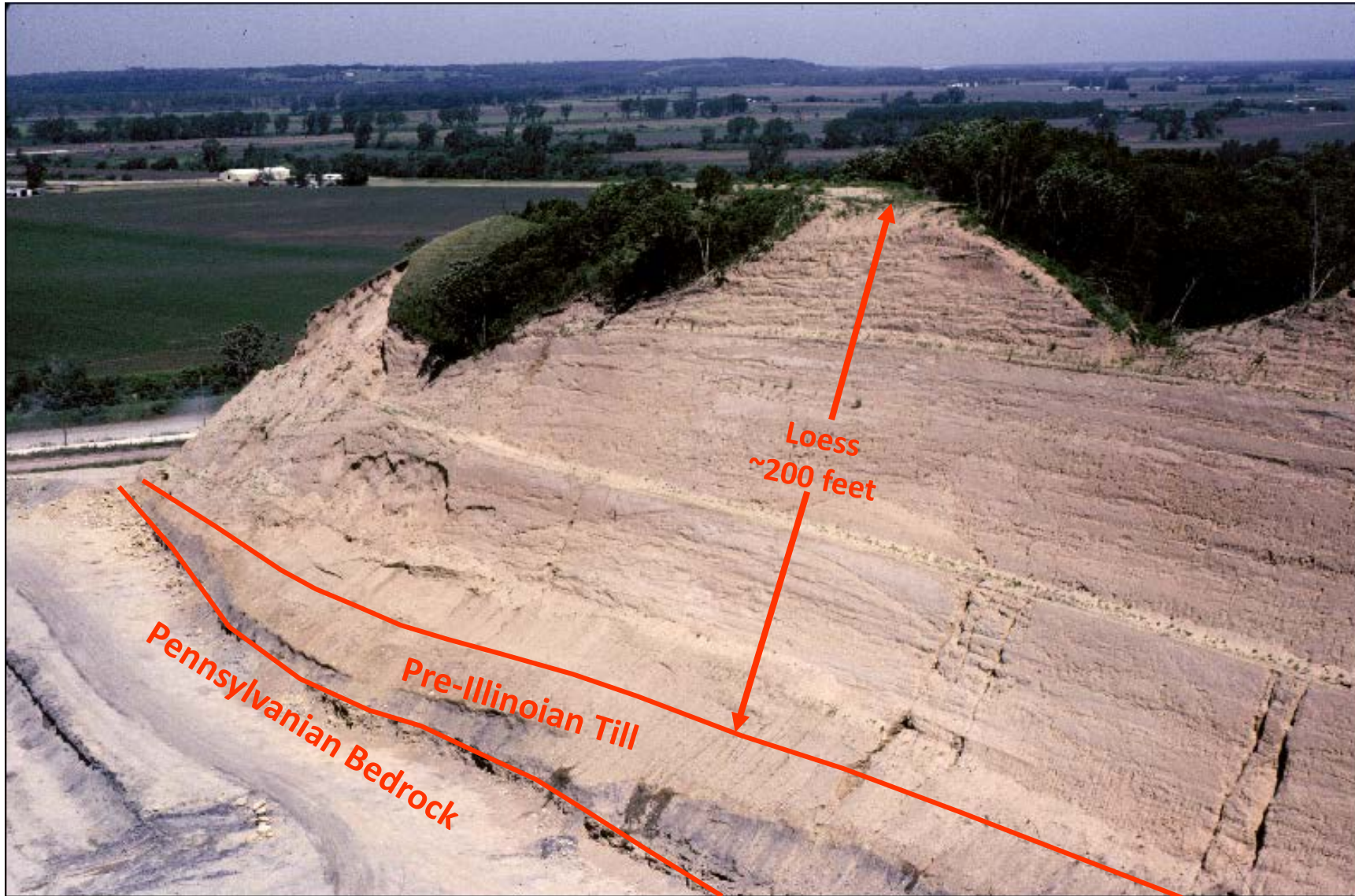




Type Section of Loveland Loess, Pottawattamie County, 1971
Jean Prior

Photo by

*** thick loess cover**



Crescent Quarry, Pottawattamie County

photo by Ray Anderson

*** sharply ridged terrain**



Sharp ridge crests, Plymouth County

photo by Gary Hightshoe

* “cat steps”



Stone State Park, Woodbury County

photo by Jean C. Prior

*** high drainage density**



Drainage development in thick loess, Monona County

photo by Gary Hightshoe

*** rapid surface runoff**

*** gully development**



Gully development in loess near Treynor, Pottawattamie County

photo by Tim Kemmis

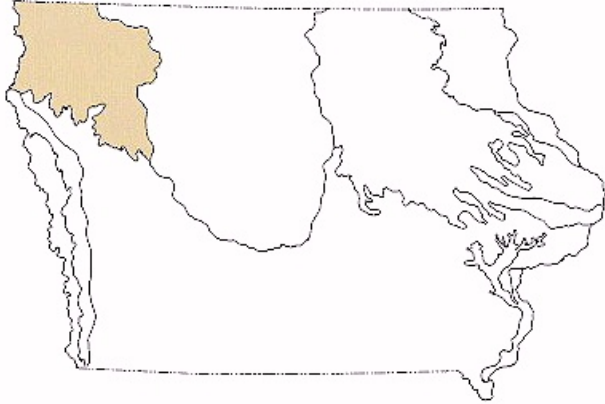
*** vertical road cuts**



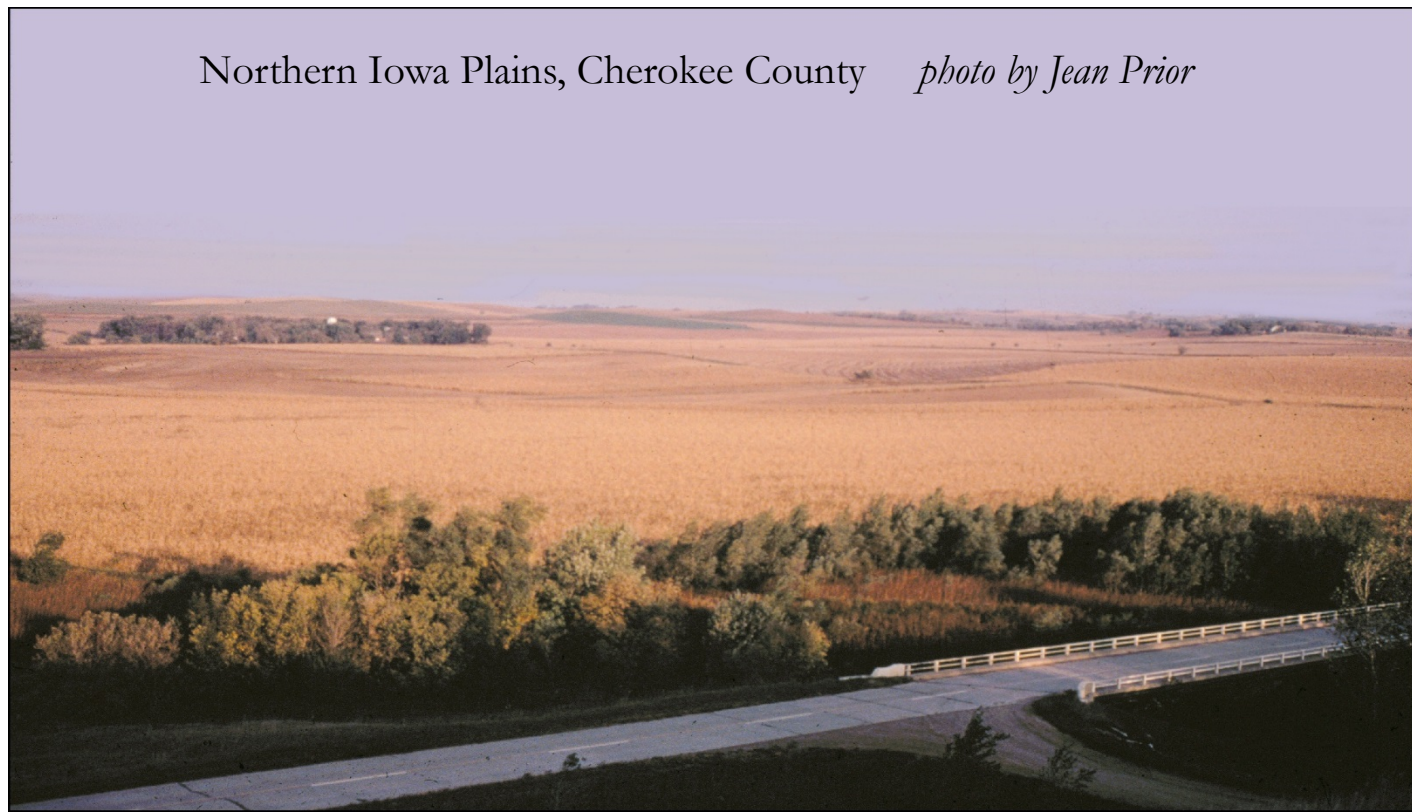
Vertical loess cut, Durr Hill, Monona County
Jean Prior

photo by

Northwest Iowa Plains

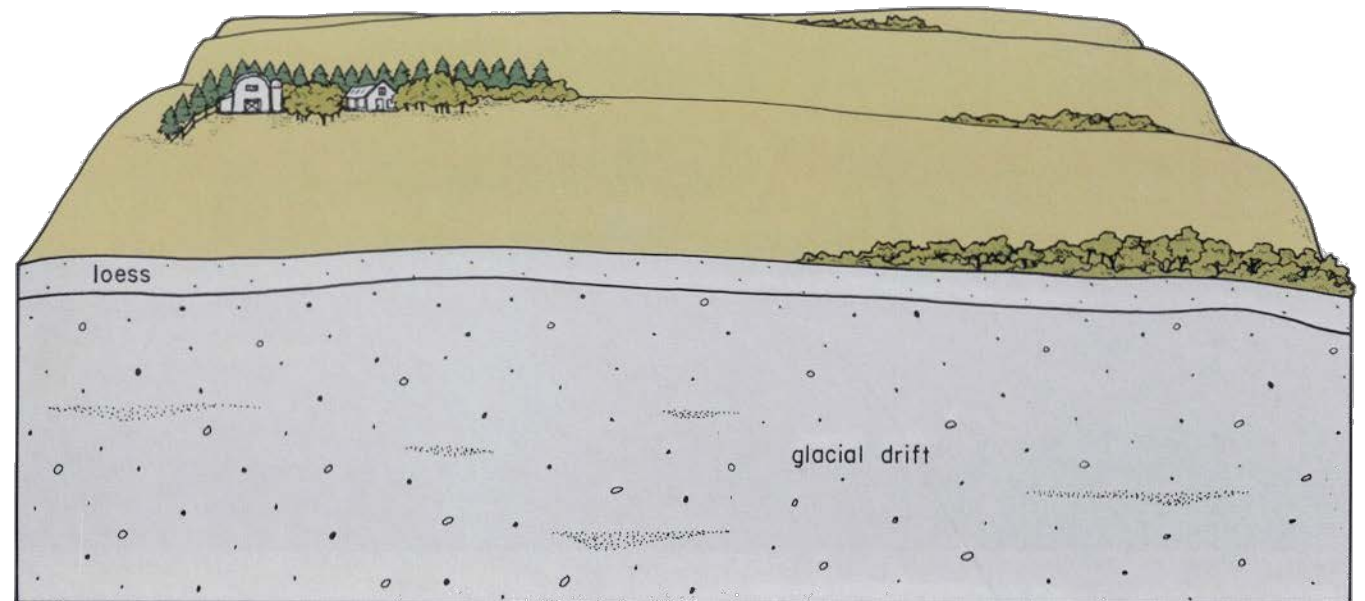


Northern Iowa Plains, Cherokee County *photo by Jean Prior*



Terrain Characteristics

- * moderate to thick loess over glacial till
- * gently rolling terrain
- * integrated drainage network



*** moderate to thick loess over glacial till**



Loess-capped hills in Northern Iowa Plains, O'Brien County

photo by Andy Assell

*** gently rolling terrain**



Rolling hills of the Northwest Iowa Plains

photo by Jean C. Prior

*** integrated drainage system**



Iowa's Northwest Iowa Till Plains

photo by Jean C. Prior



Sioux Quartzite at Gitchie Manitou State Preserve, Lyon County

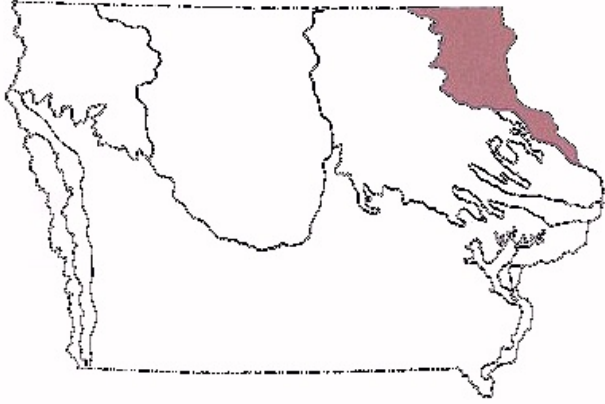
photo by Pat McAdams



Sioux Quartzite ventifacts, Lyon County

photo by Pat McAdams

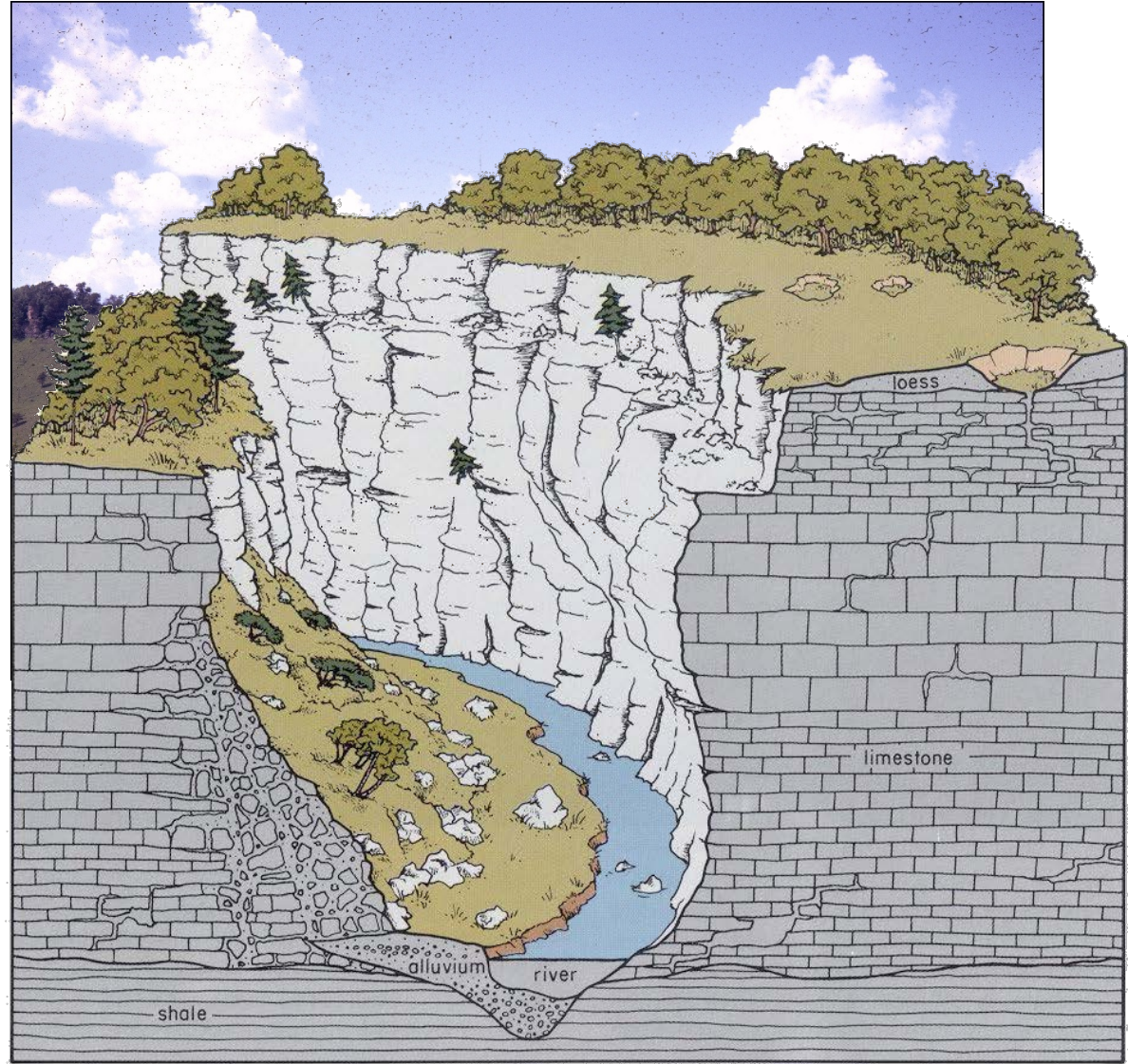
Paleozoic Plateau



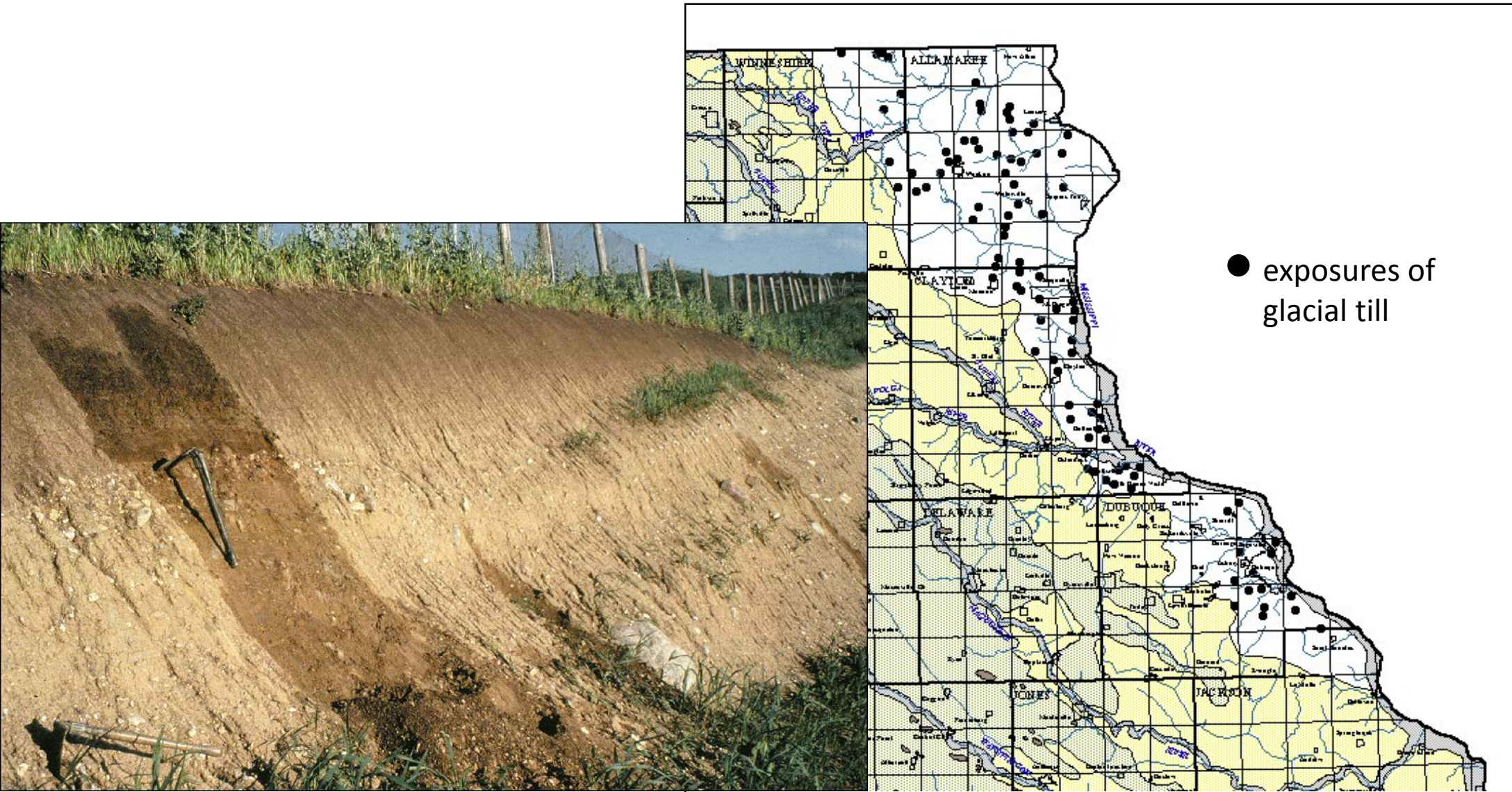
Terrain Characteristics

- * thin loess cover
- * Isolated patches of glacial drift
- * bedrock-dominated terrain
- * plateau-like uplands
- * integrated drainage network
- * deeply-entrenched valleys
- * karst topography (sinkholes, caves, springs)

Paleozoic Plateau in Allamakee County *photo by*
Jean Prior



* thin loess cover * isolated patches of glacial drift



from *Glacial Geology of Iowa*

unpublished map by Jean Prior

* bedrock-dominated terrains



Ordovician Galena Group Limestone Cliffs, Upper Iowa River, Allamakee County *photo by Ray Anderson*

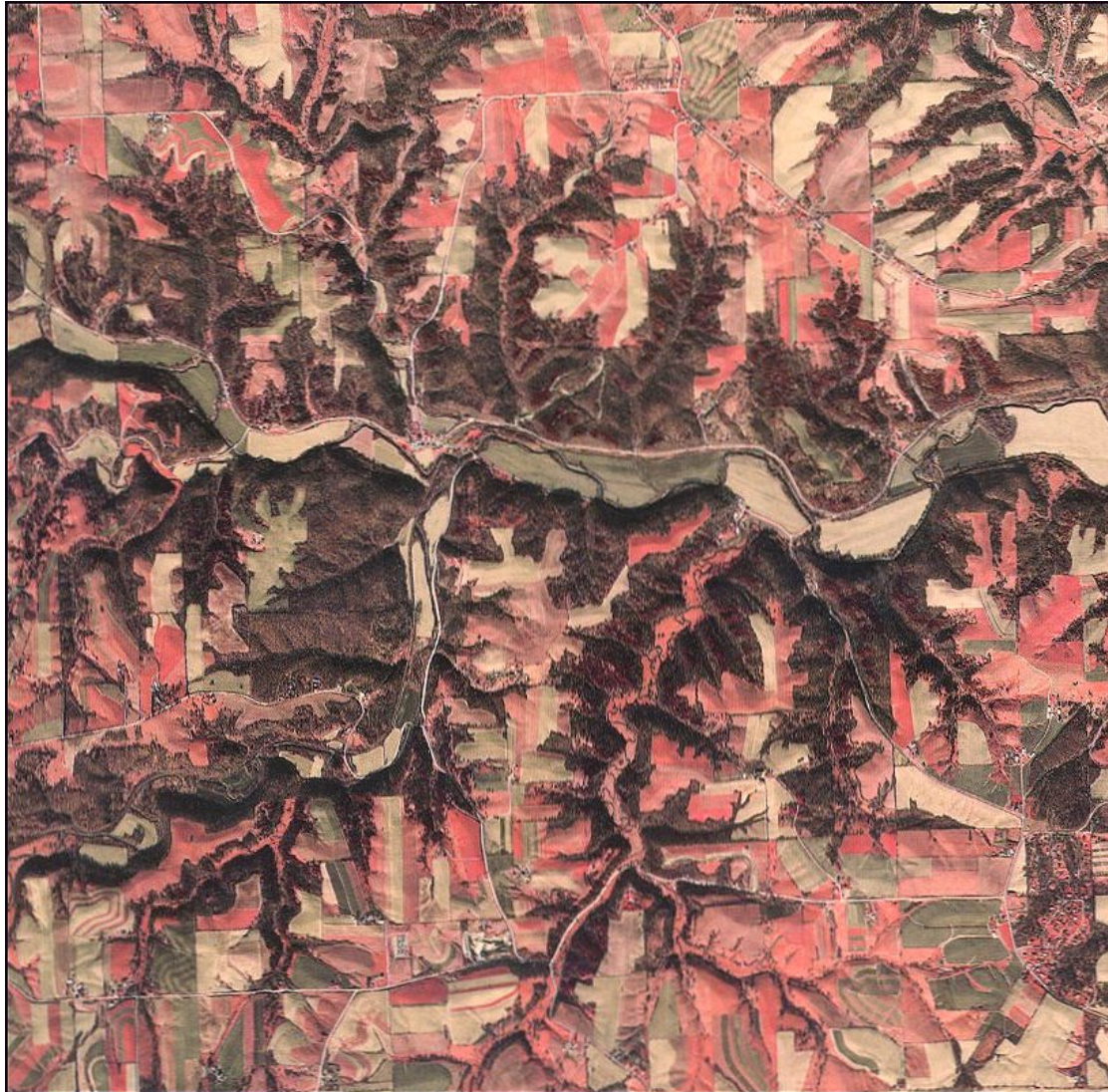
*** plateau-like uplands**



Mississippi River Valley, Allamakee County
Prior

photo by Jean

*** integrated drainage network**



Maquoketa River west of Dubuque

*** deeply-entrenched valleys**



Fall view of Mississippi River, Clayton County

photo by Gary Hightshoe

* karst topography



Sinkhole country, Clayton County

photo by Gary Hightshoe



Inside Coldwater Cave, Winnesheik County

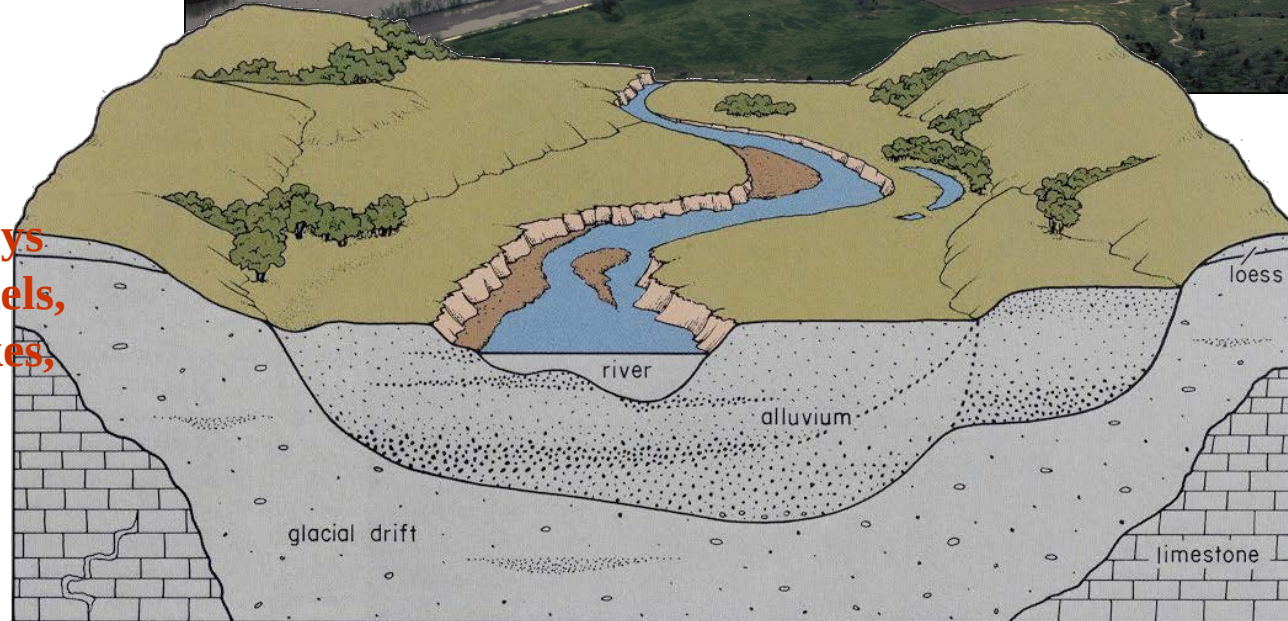
photo by Jay Hytone

Alluvial Plains



Terrain Characteristics

- * **thick alluvium**
- * **level terrain along valleys**
includes stream channels,
floodplains, oxbow lakes,
terraces, alluvial fans,
sand dunes



* Thick alluvium



Mississippi River Valley at Pikes Peak, Clayton County

photo by Ray Anderson



Shell Rock River Alluvium, Worth County

photo by Tim Kemmis

*** Meandering river, crescent-shaped point-bars**

*** Terraces**



Upper Iowa River, Allamakee County

*photo from Land Use Analysis Laboratory
Iowa State University*

* Alluvial fans



Alluvial fan of small creek at Missouri River Valley,
Monona County

photo by Gary Hightshoe