

Descriptions of Common Sedimentary Environments

River systems:

- **Alluvial Fan:** a pile of sediment at the base of mountains shaped like a fan. When a stream comes out of the mountains onto the flat plain, it drops its sediment load. The sediment ranges from fine to very coarse angular sediment, including boulders. Alluvial fans are often built by flash floods.
- **River Channel:** where the river flows. The channel moves sideways over time. Typical sediments include sand, gravel and cobbles. Particles are typically rounded and sorted. The sediment shows signs of current, such as ripple marks.
- **Flood Plain:** where the river overflows periodically. When the river overflows, its velocity decreases rapidly. This means that the coarsest sediment (usually sand) is deposited next to the river, and the finer sediment (silt and clay) is deposited in thin layers farther from the river.
- **Delta:** where a stream enters a standing body of water (ocean, bay or lake). As the velocity of the river drops, it dumps its sediment. Over time, the deposits build further and further into the standing body of water. Deltas are complex environments with channels of coarser sediment, floodplain areas of finer sediment, and swamps with very fine sediment and organic deposits (coal)

Lake: fresh or alkaline water. Lakes tend to be quiet water environments (except very large lakes like the Great Lakes, which have shorelines much like ocean beaches). Alkaline lakes that seasonally dry up leave evaporite deposits. Most lakes leave clay and silt deposits.

Beach, barrier bar: near-shore or shoreline deposits. Beaches are active water environments, and so tend to have coarser sediment (sand, gravel and cobbles). Barrier bars form offshore and parallel to beaches.

Lagoon: quiet water environment behind a barrier such as a coral reef or a barrier island. Lagoons leave very fine sediment and thin layers behind.

Shallow Marine: Offshore from the beach environment to the edge of the continental shelf, to water depth of about 600 feet in modern world, but typically much less in the past. These environments vary from higher energy nearshore (and sandy sediment) to quieter water offshore (and clays). If the water is warm and shallow, and there is little incoming sediment (for example, no major rivers nearby), these environments produce carbonate rocks – limestone, largely made by living things.

Deep Marine: off the continental shelf down to the abyssal plain. This environment is typified by turbidity currents at the continental slope, which leave characteristic sets of sandstones and shales called turbidites; and very deep water shales.

	Alluvial Fan	River Channel	Floodplain	Delta	Lake	Beach, Barrier Bar	Lagoon	Shallow Marine	Deep Marine
Breccia	X								
Conglomerate	X	X				X			
Qtz sandstone						X		X	
Arkose	X	X		X					
Graywacke		X		X				X	X
Shale			X	X	X		X	X	X
Limestone						X	X	X	
Evaporites					X		X		
Coal				X					
Laminar Beds			X		X		X	X	X
Cross Beds	X	X		X		X		X	X
Ripple Marks		X		X		X		X	X
Mudcracks			X		X		X		
Graded Beds									X
Vert Footprints			X			X			
Land Plants		X	X	X					
Brackish Fossils							X		
Marine Fossils				X			X	X	X
Freshwater Fossils					X				
Red	X	X	X						
Black				X			X		X
Gray, Brown, Tan	X	X	X	X	X	X	X	X	X
White, Pastel					X	X			

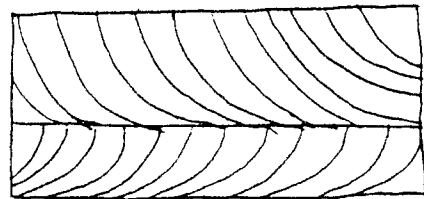
Sedimentary Rocks and Sedimentary Structures

This lab will primarily be a review of sedimentary rocks. You will, however, learn to give sedimentary rocks more complete names based upon composition and texture. The second part of the lab will introduce you to sedimentary structures.

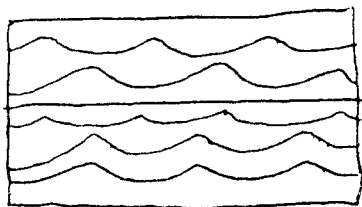
A sedimentary structure is a structure formed in a sedimentary rock before lithification. Thus a sedimentary structure may be formed during deposition or in a pile of soft sediment after deposition. Do not confuse these with geologic structures such as anticlines or synclines which are formed after lithification. Some sedimentary structures are illustrated below:



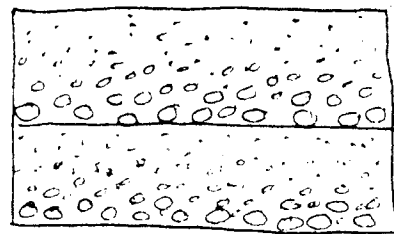
laminar bedding



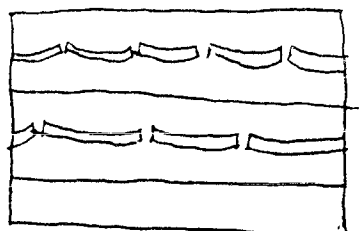
Cross-bedding



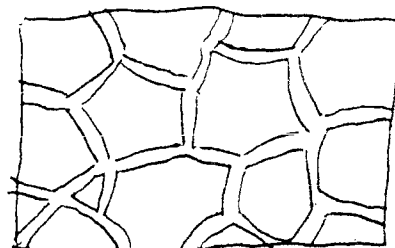
ripple marks



graded bedding



mudcracks - side



mudcracks - top.

Rock Descriptions

- A. Red breccia and conglomerate with coarse cross-bedding.
- B. Brown and red laminated shales with mudcracks and dinosaur footprints.
- C. Red arkosic sandstone and conglomerate with crossbeds and ripple marks.
- D. Gray and tan sandstones and shales with laminar beds, ripple marks and marine fossils.
- E. White and tan cross-bedded sandstone.
- F. Black and gray shales with interbedded evaporites.
- G. Brown cross-bedded sandstones and shales with plant fossils.
- H. Red cross-bedded arkosic sandstone.

A

B

B

B

B

A

B

B

C

C

A

A

C

B

C

A

B

B

B

B

G

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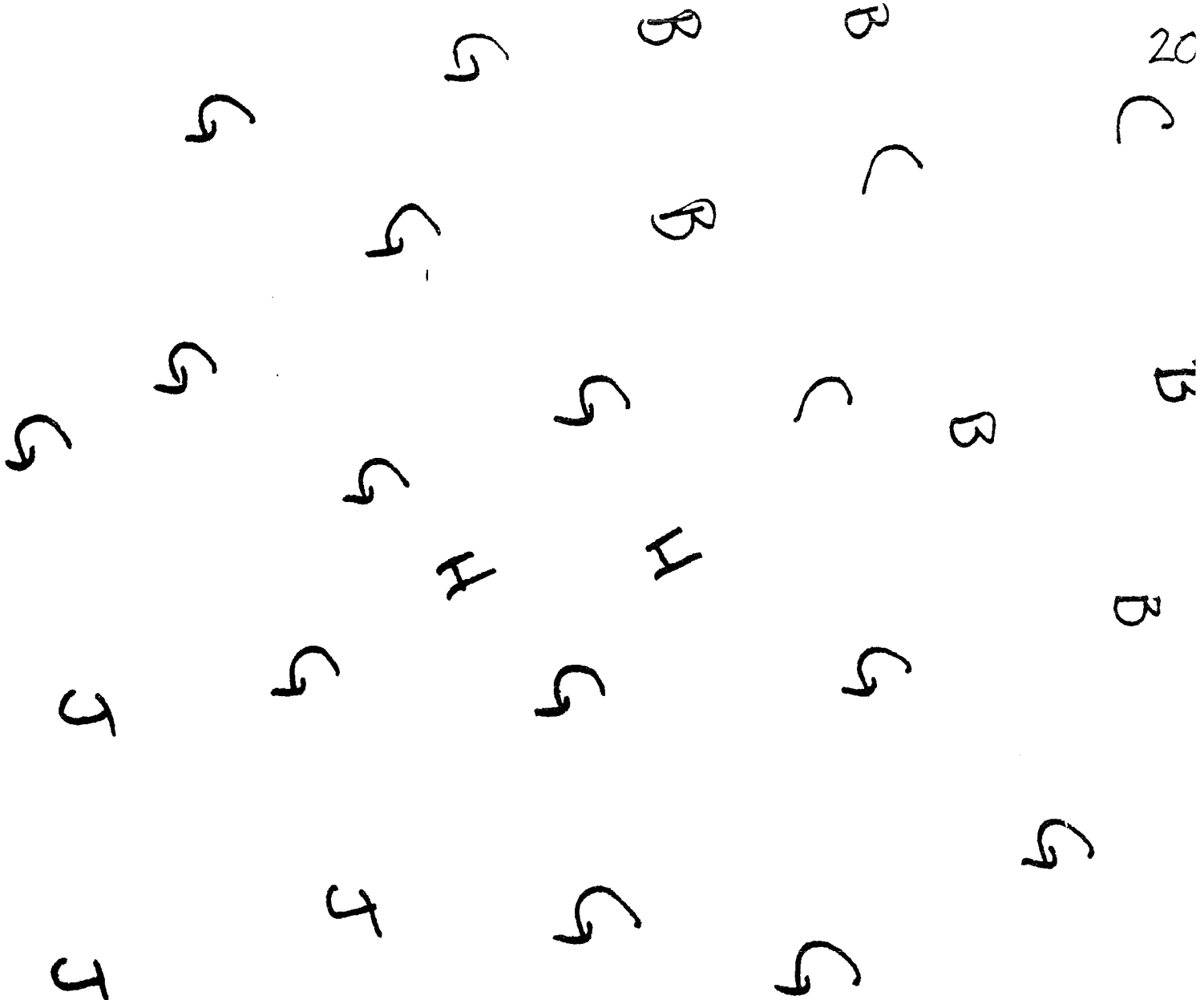
F

G

F

D

G



J: Brown and white shale with laminar beds and interbedded evaporites