



Stratigraphic Units at Ft. Niobrara National Wildlife Refuge

Mrs. Flynn's Earth Science Class
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Rosebud Formation

- ❧ Part of the Arikaree Group
- ❧ Deposited 28-23 million years ago (mya)
- ❧ This was during the Oligocene Epoch (in the Tertiary Period of the Cenozoic Era).
- ❧ A pinkish-tan siltstone.
- ❧ It was deposited by a river with low energy currents on a wide, flat floodplain.
- ❧ The climate at this time was mild and temperate.
- ❧ Few fossils have been found in this formation.



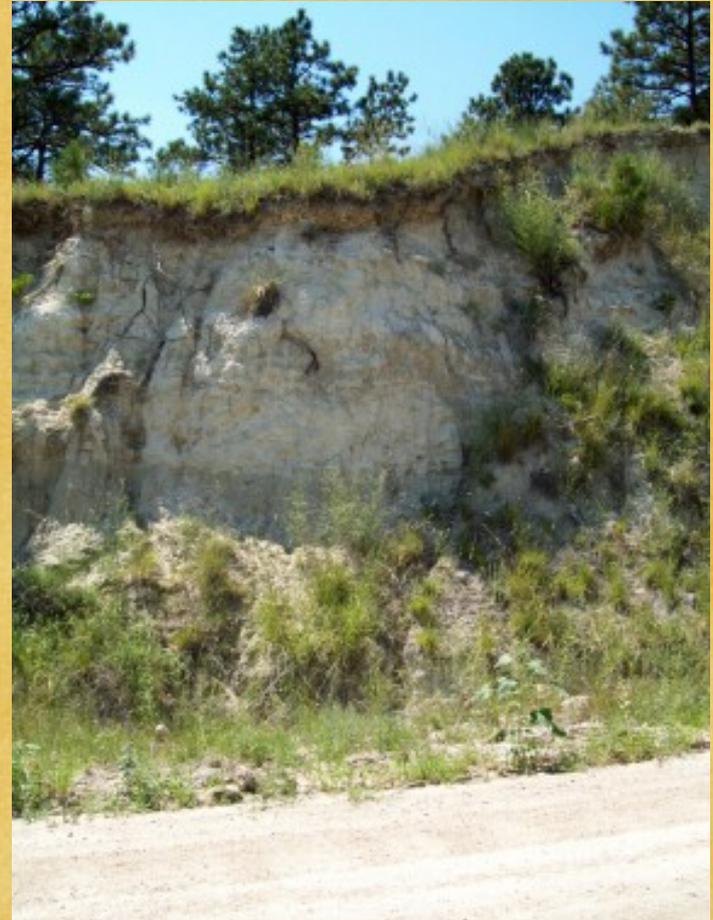
Disconformity

There is a disconformity - a type of unconformity that records a time when the rock was exposed and eroded - between the Rosebud and Valentine formations.



Valentine Formation

- ❧ Part of the Ogallala Group
- ❧ Deposited 14-12 mya
- ❧ This was in the middle of the Miocene Epoch (also in the Tertiary Period of the Cenozoic Era).
- ❧ An easily-crumbled sandy unit.
- ❧ Consists mostly of unconsolidated fine to medium sand and semiconsolidated sandstone.
- ❧ Does show some cross-bedding.
- ❧ The lower half contains concretions.



Valentine Formation (continued)

- It was deposited by a river, with alternating intervals of high-energy currents and low-energy currents.
- The climate was milder and moister than today's. It was frost-free.
- Many fossils have been found, including: mastadons, rhinos, horses, camels, grasses, and subtropical trees.
- Hardwood forests grew on the low, broad floodplains and an open, grassy woodland or savanna grew on the slightly higher areas.





Cap Rock Member of the Ash Hollow Formation



- ❧ Part of the Ogallala Group
- ❧ Deposited 12-9 mya
- ❧ This was later in the Miocene Epoch (also in the Tertiary Period of the Cenozoic Era).
- ❧ It is a well-hardened, porous sandstone.

Cap Rock Member of the Ash Hollow Fmn. (continued)

- ❧ It was deposited by a river.
- ❧ Some layers within this formation are wind-blown volcanic ash.
- ❧ The climate may have been more arid than during the time of the Valentine Fmn.
- ❧ Fossils found include: large tortoises, rhinos, horses, camels.
- ❧ There were more grasses and fewer trees than when the Valentine formed.



Niobrara River alluvium terrace

- ❧ Formed 20,000 years ago.
- ❧ This was late in the Pleistocene Epoch (in the Quaternary Period of the Cenozoic Era).
- ❧ It contains pebble to boulder-sized rock clasts (rock fragments).



Niobrara River alluvium terrace (continued)

- ⌘ This terrace was formed by the ancestral Niobrara River. The ancestral Niobrara R. valley during this time was 2-3 times wider, but only half as deep as the modern river's trench.
- ⌘ This was the height of the last glaciation. No glaciers here, but a cooler climate.
- ⌘ Fossils include: bison, mammoth, horse, camel, and wolf.



<http://www.visitusa.com/nebraska/images/niobrarariverpic.jpg>

Sand Hills

- ❧ Formed 15,000 years ago.
- ❧ This was in the Late Pleistocene and Early Holocene.
- ❧ These are medium to fine grained sand dunes, held in place by vegetation.



Sand Hills (continued)

- ❧ These were deposited by the wind.
- ❧ The climate was similar to the present day climate.
- ❧ Fossils found include: bison and bighorn sheep.

