



Geology of the Niobrara River Valley¹

The geographic landscape of the present Niobrara River valley is closely tied to the Sandhills of Nebraska. Geologists estimate that the entire depositional process began some 98 million years ago when marine seas once covered the area. The seas were followed by alluvial stream deposits, and finally eolian (windborne deposits) and volcanic periods. Evidence favors the formation of the Sand Hills during multiple episodes occurring the last 10,000 years, with the most active period forming the largest dunes some 5-8,000 years ago, their source being unconsolidated alluvial sands. The Ancient Niobrara River was likely half as deep and two to three times wider than today's.

Formation

Sediment Types

Typical Fossils

Environment

Ash Hollow

Sandstone, gray calcareous, interbedded with less consolidated sand and volcanic ash lentils; overlain by thinner bedded calcareous sandstone; younger deep cuts filled with unconsolidated sand.

Tortoises, grass seeds, & large grazing mammals (horses, camels, rhinos, ruminants)

Forests only in river valleys; savannas occupy interfluves. Warm & dry.

Valentine

Sand, pale olive, friable, cross-stratified; sandstone pale olive, argillaceous; volcanic ash, light gray; sand and gravel, cross-stratified.

Fish, alligators, turtles, fossil wood & grass seeds common. Diverse microfauna includes frogs, toads, salamanders, snakes, lizards, amphisbaenids, shrews, moles, hedgehogs, plesiosoricids, rodents, rabbits and pikas. Larger mammals include mastodons, tapirs rhinos, horses, chalicotheres, peccaries, oreodonts, camels, ruminants & carnivores.

Large permanent streams & well-watered floodplains supporting forests. Savannah woodlands on interfluves. Frost-free.

Rosebud

Siltstone & silty-sandstone, pinkish gray to brown, minor olive colors; massive to stratified; tuffaceous; includes local channels filled with reworked siltstone and sandy siltstone gravels, with silts filling pore spaces between grains, pale pink & some light olive colors, massive to grossly cross-stratified.

Fossils rare, some oreodont, rodent & insectivore jaws.

Perhaps a floodplain in a seasonally arid environment.

Pierre Shale

Shale, black, gray & brown, thinly laminated; chalk shaley, light gray, laminated; bentonite clays (volcanic ash).

Nannofossils, foraminifera, bivalves, ammonoid cephalopods, sharks, bony fish, marine reptiles.

Shallow marine.

¹ *Geologic Framework of the Niobrara Drainage Basin & Adjacent Areas in S.D. Generally East of the 100th meridian West Longitude and West of the Missouri River.* – Robert F. Diffendal, Jr., and M.R. Voorhies, UNL. Research Symposium Environmental and Natural Resources of the Niobrara River Basin 1993.