



Meriwether Lewis

Courtesy of Independence National Historical Park



Location Map

Despite near-freezing temperatures on the morning of April 27, 1805, Meriwether Lewis completed his celestial observations at the mouth of the Yellowstone River. The Lewis and Clark Expedition then continued up the Missouri. Dangerous headwinds forced the canoes ashore about noon. At 4 pm the expedition continued upstream again, making camp just inside present-day Montana.

On April 28, Clark walked along the river bluffs:

*... the hills & Bluffs Shew the Stratus of Coal, and burnt appearances in many places, in and about them I could find no appearance of Pumice Stone ... the Bluffs in this part as also below Shew different Stratus of Coal or carbonated wood, and Coloured earth, such as dark brown, yellow a lightish brown, & dark red &c.*



Photo by Ginette Abdo, MBMG

The coal is lignite in the Tongue River Member of the Fort Union Formation. The “burnt appearances” likely refer to areas of clinker (local residents also call it scoria); clinker forms when a burning coalbed “bakes” adjacent shale and claystone.

Lewis and Clark called any light-weight, frothy-looking rock with numerous pores or holes “pumice stone.” Like clinker, it is produced when coalbeds burn and is not of volcanic origin as the captains thought.



Photo by Ginette Abdo, MBMG



The “Coloured earths” were outcrops of siltstone, mudstone and soft sandstone in the Fort Union Formation.

Photo by Ginette Abdo, MBMG

# Lewis and Clark in Montana

## Entering Montana

*Bob Bergantine and Ginette Abdo*



*... the country through which we passed today is open as usual and very broken on both sides near the river hills, the bottoms are level fertile and partially covered with timber.*

Photo by Ginette Abdo, MBMG

Later on the 28th, Lewis noted:

*... the salts still increase in quantity; the banks of the river and sandbars are incrustated with it in many places and appear perfectly white as if covered with snow or frost. —*

The captains had observed salt areas as far downstream as the Kansas River and had described “salines” (usually salt springs) in Missouri, Kansas and Nebraska. The quantity and extent of salt noted today far exceeded anything seen earlier.



This salt is not sodium chloride (common table salt) — but a variable combination of sodium, magnesium and calcium plus sulfate and bicarbonate. Ground water that passes through rocks and sediments dissolves some of the salts they contain. When that water returns to the surface (usually on a river shore or cliff face) and evaporates, salt crystals and crusts develop.



Photos by Ginette Abdo, MBMG

On April 29, Lewis opted to walk on shore:

*... there is more appearance of coal today than we have yet seen, the stratas are 6 feet thick in some instances; the earth has been burnt in many places, and always appears in stratas on the same level with the stratas of coal.*

The photograph on the right shows coal on the same level with clinker. The coal (to the left), which ends abruptly about photo center, is the unburned portion of the coalbed.



**In this section the coal has been burned and is no longer visible.**

Photo courtesy of Ed Helfren, BLM State Office, Wyoming



MBMG



William Clark

Courtesy of Independence National Historical Park

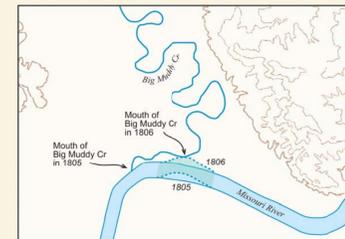
### The Fort Union Formation

The coal-bearing Fort Union Formation underlies large areas of Montana, North Dakota and Wyoming.

About 65-55 million years ago, rivers flowing east from the rising mountains deposited alternating sequences of sand, silt and clay; these sediments ultimately consolidated into soft rock. The coalbeds originated in swamps along the rivers as decaying vegetation accumulated and slowly turned to peat.



### An Ever-Changing River . . .



Lewis, April 29, 1805:

*we came too this evening in the mouth of a little river, which falls in on the Stard. side. . . This stream . . . Capt. C. named Marthas river . . .*

On Lewis’s return down the Missouri River, August 7, 1806 he wrote:

*... we passed the entrance of Marthy's River which has changed its entrance since we passed it last year, falling in at present about a quarter of a mile lower down.*

Marthas River is Big Muddy Creek. The creek likely had found a new entrance to the Missouri during the spring of 1806. Meander development by both streams allowed high water to cut a passage between them a quarter of a mile downstream from the creek’s former mouth.

Rivers are dynamic systems — constantly shifting their course through erosion and deposition. The light blue pattern depicts the course of the Missouri River as Lewis and Clark mapped it. The dark blue pattern shows the Missouri’s modern course.

The river’s many course changes since 1805-1806 have destroyed most of the expedition’s campsites.

