Crazy Mountains

Montana Geology '01

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Montana Tech of The University of Montana
1300 W. Park Street, Butte, MT 59701-8997
406/496-4180 Fax: 406/496-4451

Montana Bureau of Mines and Geology

Billings Office
1300 North 27th Street, Billings, MT 59101
406/657-2629 Fax: 406/657-2633

Crazy Mountains

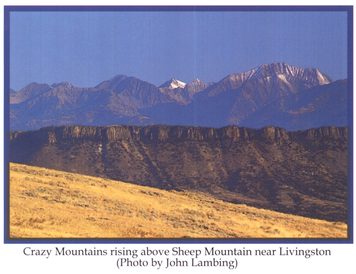
Introduction
The Crazy Mountains are a prominent, isolated mountain range located in south-central Montana north of the town of Livingston. The sharp ridges and peaks of the Crazy Mountains rise more than 6,000 feet from the Montana Plains to an elevation of 11,209 feet at Crazy Peak, the highest point.

The Crazy Mountains at dawn (Photo by John Lambing)

Origin of the Name
Stories abound concerning the origin of the name of the Crazy Mountains. Native Americans called them the Mad Mountains because of the extremely steep slopes, rugged beauty, and haunting winds that blow through the canyons. Other names—attributed to the Crow Indians—are Awahawapiia (Bird Home Mountains), Mean or Rugged Mountains, and Blue Bird Mountains. The Crow called the highest peak, Ahwahhawa Peak, meaning mad mountain. It was given that name because all of the signs used to forecast weather failed in this region, making it impossible to predict fair or stormy weather.

The most widely accepted story is that a woman went mad on the prairie, probably because of an attack in which her family was killed. It is unclear whether the woman was Indian or Anglo. The woman took refuge in the mountains, so the name, Crazy Woman Mountains, was given to these mountains. Native Americans believed that crazy people must be left alone. This legend was given new life in the movie, *Jeremiah Johnson*.

Another story about the name comes from the geologic nature of the mountains. The igneous intrusions that form the core of the range are relatively young and present a distinctive physical appearance as compared to other mountain ranges west and south of the Crazy Mountains. Hence, the name, Crazy, signifying that they are anomalous or disconnected from the rest of the mountains in the region.



Crazy Mountains rising above Sheep Mountain near Livingston (Photo by John Lambing)

The last story is attributed to the locoweed that is believed in early days to have been confined to the foothills of the Crazy Mountains. The Crows noticed that if their horses were left to graze in that area for any length of time, the horses would become loco or crazy. Therefore, they called this range the Crazy Horse Mountains.

Chief Plenty Coups
Chief Plenty Coups of the Crow Tribe used the high peaks in the Crazy Mountains for a vision quest. It was here that he cut off the end of his index finger of his left hand in hopes that helper spirits would smell his blood and come to his aid. During this vision quest, he was directed to settle at his home site near Pryor, Montana. He also was shown the cattle herds that would soon come to the prairies of Montana. At the end of the vision, he was shown the chickadee as his medicine because a voice told him, "He [the chickadee] is least in strength but strongest of mind among his kind. He is willing to work for wisdom." Chief Plenty Coups was told to develop his body but not to neglect his mind because it is the mind that leads a man to power, not strength of body (Linderman 1962).

Formation (Why they are there)
The Crazy Mountains are mountains because they are composed of an island of igneous rock that is more resistant to erosion than the surrounding soft sedimentary beds. Approximately 60 million years ago, rivers flowing off the rising Rocky Mountains carried large quantities of sand, silt, and mud that were deposited across central and eastern Montana to form sedimentary beds of the Fort Union Formation. Then, about 49 million years ago—a geologic instant after the deposition of the sand, silt, and mud that compose the Fort Union Formation—molten rock or magma forced its way into these beds to form a large blob, which slowly cooled to form a rock resembling granite. This body of igneous rock, known to geologists as the Big Timber stock, forms the core of the Crazy Mountains and is exposed for approximately eight miles in the north-south direction and five miles, east west. Although resembling granite, the Big Timber stock is composed mainly of the igneous rock types, diorite and gabbro, that differ from granite in being darker in color and containing more iron and magnesium. The igneous rocks of the Crazy Mountains are part of the Central Montana Alkalic Province, so named because the igneous rocks that are exposed in these and other mountain ranges in central Montana are characterized by relatively high contents of sodium and potassium. Hot magma that formed the Big Timber stock baked or metamorphosed the surrounding sedimentary rocks making them harder and thus more resistant to erosion. Because of excellent exposures of diverse igneous rocks in the Crazy Mountains, many geologists have studied these rocks in detail. One of the southernmost prominent peaks is named for a prominent geologist, J.P. Iddings, who together with J.H. Weed published a description of the geology of this area in 1894.

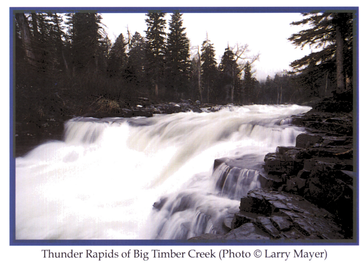
The Crazy Mountains photographed from the east with tan beds of the Fort Union Formation exposed in the low hills in the foreground (Photo by John Lambing)

Sills and Dikes
When magma forced its way into the sedimentary beds of the Fort Union Formation to form the Big Timber stock, it also oozed out from the stock between beds to form near-horizontal layers, or sills, of hard igneous rock that extended for miles from the stock. Sheep Mountain, although hardly a mountain compared to the Crazy Mountains, is a prominent landmark north of the Yellowstone River east of Livingston. This feature is formed by a sill that extends for three miles and protects softer underlying sandstone beds from erosion to form a mesa gently inclined to the northwest. A similar sill is exposed along Brackett Creek west of the Crazy Mountains. This sill, which is about 90 feet thick along Brackett Creek, can be traced along ridges for six miles. After the magma cooled and solidified to form the sills, many near-vertical fractures formed, cutting sedimentary beds as well as the igneous sills. More magma rapidly flowed along these fractures to solidify and form dikes.

Brackett Creek sill (Photo by Richard Berg)

Unlike sills that lie between beds of sedimentary rock, dikes cut across beds. Because these dikes are also slow to erode as compared to the surrounding beds, they form prominent ridges that extend for miles. Two parallel north-trending dikes, each only a little more than five feet thick, extend for four miles in the area north of Springdale. Many similar dikes extend out from the Big Timber stock.

Glaciation
As erosion removed the soft beds surrounding the Big Timber stock, it was left as an isolated mountain range jutting up from the Montana Plains. At this stage in their formation, the Crazy Mountains may have consisted of a number of somewhat subdued peaks and gentle valleys. Glaciers that formed in these mountains during the last Ice Age changed the shapes of these mountains dramatically. Slowly moving glaciers scoured out valleys, broadening them and steepening their walls, leaving knife-sharp ridges between them. Glaciers moving from the higher peaks plucked bedrock from their slopes to form bowl-shaped cirques at the heads of valleys and the sharp peaks now so prominent. Big Timber Canyon provides an excellent example of the results of glacial erosion as well as a look at the igneous rock and adjacent metamorphosed sedimentary beds exposed in steep cliffs. This canyon extends for eight miles into the core of the range from the east. Thunder Rapids, several mountain lakes, and the sharp peaks at the head of Big Timber Canyon all were formed by the erosion caused by a glacier that moved slowly down this valley.



Thunder Rapids of Big Timber Creek (Photo © Larry Mayer)

Sources of Additional Information

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location

Front Photo: Crazy Mountains near Big Timber (Photo by John Lambing)

Credits: Photos were taken by John Lambing, Helena; Larry Mayer, Billings; and Richard Berg, MBMG. Text was written by Richard Berg and David Lopez, MBMG. History of names courtesy of Bev Josephson, Curator, Crazy Mountain Museum, Big Timber.

Montana Bureau of Mines and Geology

Montana Tech of The University of Montana
1300 W. Park Street, Butte, MT 59701-8997
406/496-4180 Fax: 406/496-4451
http://mbmgsun.mtech.edu
Billings Office
MSU/Billings, Campus Box 112
1300 North 27th Street, Billings, MT 59101
406/657-2629 Fax: 406/657-2633

How to Contact Us

Abandoned and Inactive Mines 496-4159	Geologic Mapping 496-4327
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Scope and Organization

The Montana Bureau of Mines and Geology (MBMG) was established in 1919 as a public service agency and research entity for the State of Montana, *to conduct and publish investigations of Montana geology, including mineral and fuel resources, geologic mapping, and ground-water quality and quantity.*

In accordance with the enabling act, MBMG conducts research and provides information but has no regulatory functions. To carry out its duties more effectively, MBMG operates in five divisions: Research, Analytical, Information Services, Computer Services, and Administration, while the director holds the position of State Geologist.

Science and Service for Montana

- **Analytical Services**–analyzing the chemical quality of ground water and surface water; analyzing soils and biological tissue for metal content
- **Coal Hydrology**–investigating ground water in coal areas before, during, and after mining
- **Coal Resources**–evaluating effective reserves and establishing regional data bases
- **Computerized Resource Data Storage and Retrieval Systems**–compiling and storing Montana's coal, water, and mineral resources information
- **Earthquake Studies Research**–monitoring and analyzing seismic activity in Montana
- **Economic Geology**–making detailed studies of Montana's metalliferous deposits, industrial minerals, and coal and reporting on the activities of Montana's mineral industry
- **Environmental Sampling and Monitoring**–providing objective analysis of contaminated water and soils
- **Geographic Information Systems**–generating digital maps of geology, minerals, and hydrology
- **Geologic Maps**–field mapping and compilation of bedrock and surficial geology; digital publication of quadrangle maps and other maps at various scales
- **Geothermal Investigations**–mapping and measuring Montana's natural hot water resources
- **Ground-Water Resources Investigations**–evaluating the quality and the quantity of ground water in Montana
- **Hydrogeological Research**–assessing water-related environmental concerns, including saline seep and mine water drainage
- **Lectures and Public Addresses**–speaking to public groups on MBMG research, and Montana geology and hydrology
- **Mine Hydrology and Mine Waste Disposal**–investigating mine impacts on ground water and surface water
- **Mineral Museum**–displaying over 1,200 high-quality mineral specimens, group tours available
- **Montana Ground-Water Characterization**–monitoring and characterizing the state's ground-water aquifers
- **Montana State Map**–revising and updating the state geologic map and derivative maps in 1° x 2° quadrangles
- **Public Inquiry**–providing information on Montana geology and ground water
- **Publication and Map Sales**–providing documents on bureau research, USGS topographic and geologic maps, derivative maps, and access to federal aerial photos
- **Small Miners Assistance**–providing assistance to operators of small mines and prospectors
- **Statewide Ground-Water Assessment**–systematically evaluating Montana ground water and aquifers
- **Topical Studies in Regional Geology**–conducting investigations of Montana geology
- **Water Supply Evaluation**–evaluating the quality and quantity of water for municipalities and state agencies