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Montana Geology '02

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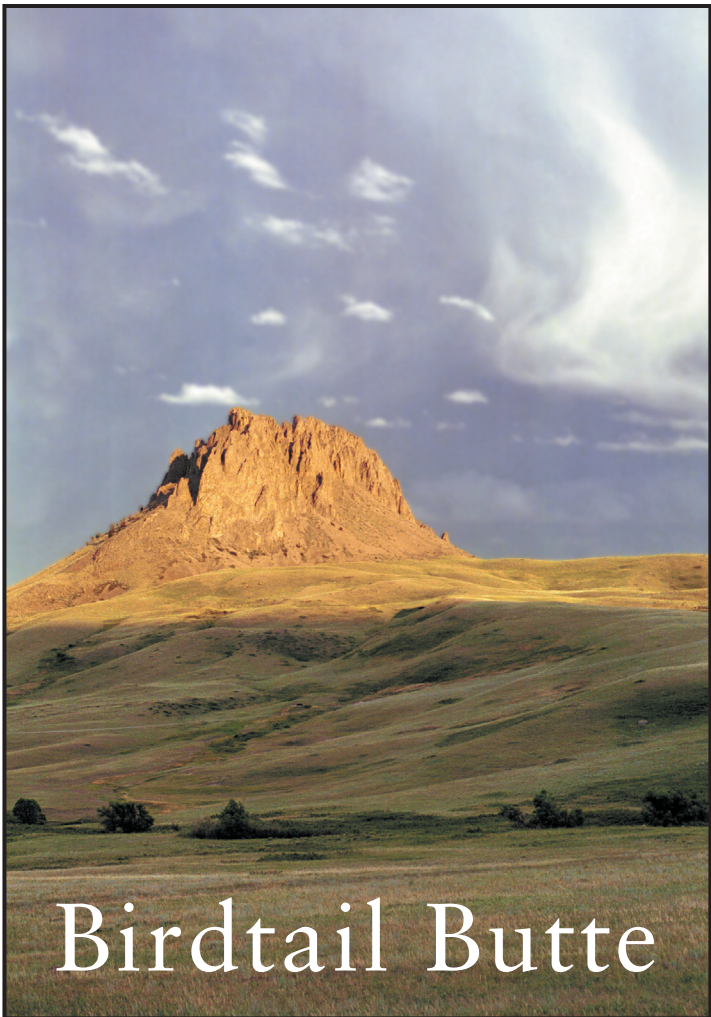
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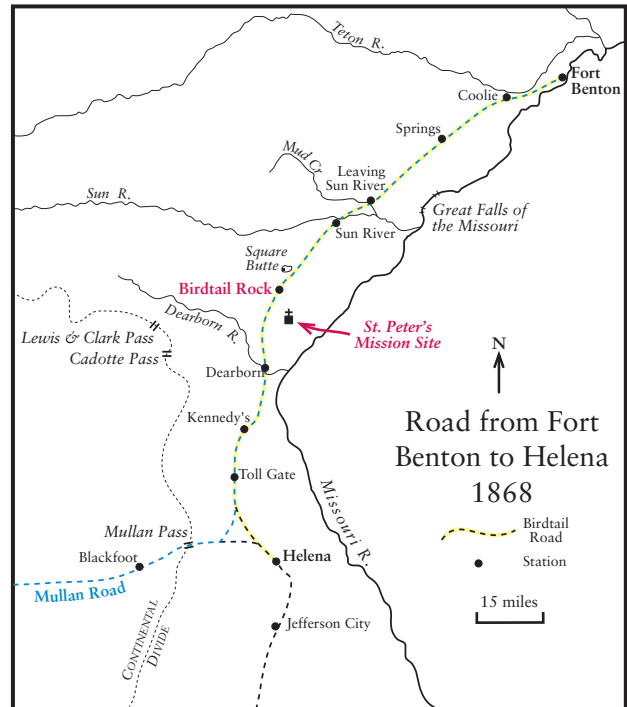
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Birdtail Butte, a natural landmark southwest of Great Falls, rises about a thousand feet from its base and is capped by rock spires that resemble the feathers of a bird’s tail. Early fur traders called the small mountain Birdtail Rock, or Eagletail Mountain, but the names probably originated with the Blackfeet or Salish Indians. The numerous cultural features, including trails, roads, and settlements, named after the butte emphasize its prominence as a local landmark.



Birdtail Butte at sunset (photo by Susan Vuke).



Map modified with permission from “Wells Fargo Stagecoaching in Montana Territory,” *Montana The Magazine of Western History*, Montana Historical Society Press, 1979.

but close together at the cliff’s edge, to form a great V. All of the area was grassy range where the buffalo congregated in great numbers. The outer ends of the V were near small streams where the buffalo came to drink. When the Native Americans needed meat and the herds were available, the hunters would carefully work the buffalo into the wide end of the V and start a stampede, funneling the buffalo to the precipice, where great numbers went over the cliff. Many not killed by the fall were killed by the hunters waiting below.

The buffalo jump probably was used by successive groups of Northwest Plains Indians, including the Shoshone, Salish, and Blackfeet. The word, *pishkun*, a synonym in this area for buffalo jump, was originally used by the Blackfeet Indians, who arrived in the middle-to-late 1700s. Closely spaced tipi rings (circles of rocks that anchored the tipis) cover about 20 acres of the flat ground in a natural cove below the buffalo jump. They indicate there was a habitual Native American campground below Birdtail Butte and Buffalo Falls.

St. Peter’s or Birdtail Mission

St. Peter’s Mission, also called Birdtail Mission, is the third oldest mission in Montana and was the main white settlement near Birdtail Rock along the Birdtail Road. It was founded by Jesuit priests in 1866, after three failed attempts to establish the mission at other localities. Although the mission started with a working farm, a reservoir, a chapel, three large three-story buildings, and a cluster of log cabins, it was only in operation sporadically at first.



Ruins of boys’ school at St. Peter’s mission site (photo by Susan Vuke).

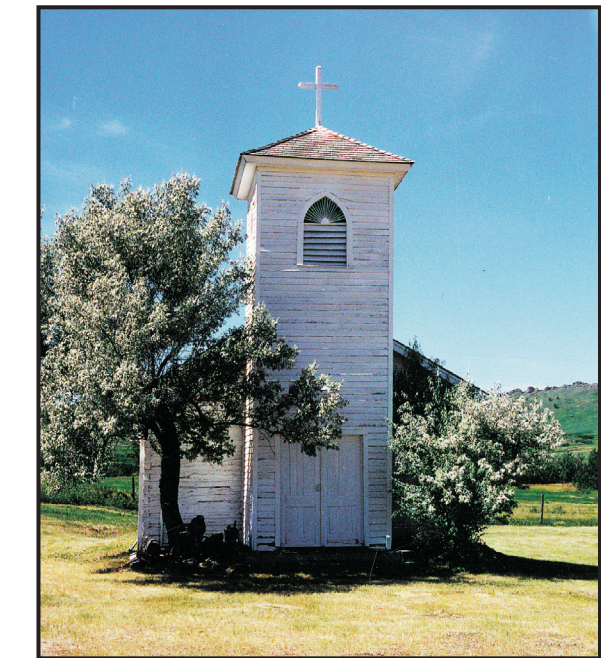
joined the Jesuit priests and opened a school for Indian girls at the mission. Mother Amadeus, who had just established the convent and school at St. Labre’s Mission near the Tongue River Reservation (a school still in operation on the Northern Cheyenne Reservation), came to St. Peter’s to establish another convent and school. Soon local white settlers also sent their children to the school. The school’s simple wooden church, completed by 1875, still stands. The mission became the motherhouse of the Ursulines of the West.

In 1897, economic considerations caused the Jesuit priests to leave St. Peter’s, but the Ursuline sisters continued to operate the two schools. In 1908, some of the Jesuit buildings burned, including the boys’ school that then closed. In 1918, the girls’ school at the mission also burned down; now only a large wooden building called the Opera House remained at the mission. It had served as a dormitory and auditorium but was unsuitable for a school, so the mission closed permanently. Remains of the Opera House can still be seen. The Birdtail Post Office also closed in 1918 after two years in operation, and the community known as Birdtail began to dissolve.

Throughout the mission’s 52-year history, Birdtail Rock was the landmark most associated with St. Peter’s. In 1974, Sister Genevieve McBride of the Ursuline Academy in Great Falls wrote a book about the founding and development of St. Peter’s Mission. The name of the book was *The Birdtail*.



The buffalo jump probably was used by successive groups of Northwest Plains Indians, including the Shoshone, Salish, and Blackfeet (photo © John Lambing).



Wooden church at St. Peter’s mission site (photo by Susan Vuke).

Geology

Birdtail Butte lies within a cluster of similar buttes that border the north end of the Big Belt Mountains. Crown, Shaw, Square, and Cascade Buttes form an outer arc of larger buttes in the cluster and are easily seen from Interstate 15 southwest of Great Falls. Several of the buttes are depicted in the paintings of Montana artist, Charlie Russell.

Birdtail Butte is part of an inner arc of smaller buttes south of the outer arc. The smaller buttes are not as conspicuous as the larger buttes because they are closer to the Big Belt Mountains. Nonetheless, they are impressive when viewed from the gravel roads in the area, or from Highway 200 southwest of Simms. A thick layer of resistant, dark rock caps the buttes in the cluster and generally thickens toward the center of each butte. Ridges of similar dark rock also form fairly straight, natural rock walls that may extend for many miles across the countryside. The rock-wall features are called *dikes* and the black lens-shaped caprock of the buttes, *laccoliths*.

The dikes and laccoliths are associated with a great pile of volcanic rocks, the Adel Mountain volcanics, at the north end of the Big Belt Mountains. Interstate 15 passes through these rocks in the Missouri River canyon between Craig and Cascade.



1 Laccolith and dike injected beneath the surface as magma.



2 Erosion has now stripped off the overlying sedimentary rocks, leaving the remains of the laccolith and dike exposed at the surface.

Modified from Alt, D.A., 1984, *Profiles of Montana Geology: A Layman’s Guide to the Treasure State*, Montana Bureau of Mines and Geology.

Radiometric dates suggest that the volcanism and intrusion of dikes and laccoliths occurred during a span of one to three million years during the Cretaceous Period, probably more than 10 million years before the dinosaur extinction.

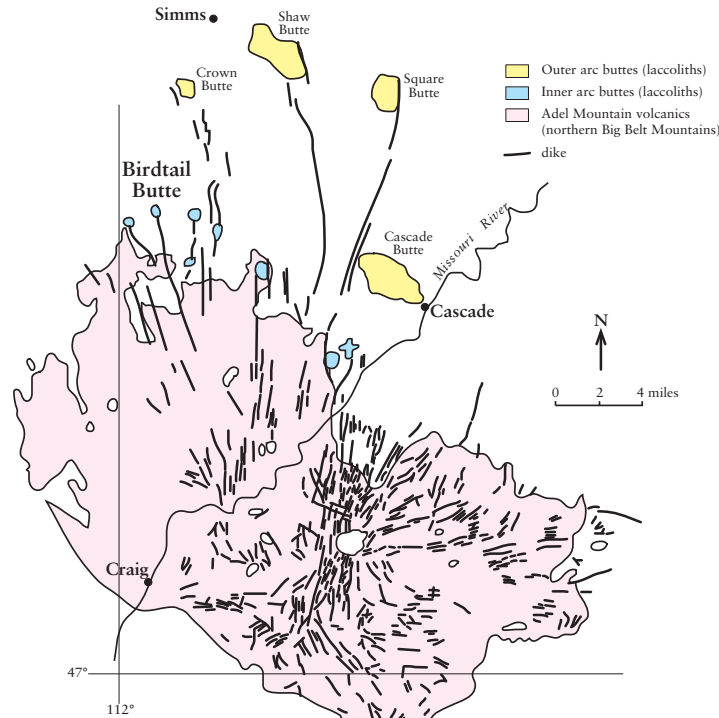
Shonkinite—the dominant rock of the dikes, laccoliths, and Adel Mountain volcanics—is an unusual kind of rock that Montanans can call their own because central Montana is one of the few places in the world where much of the rock is found. Shonkinite was named for the small community of Shonkin, located north of the Highwood Mountains. *Shonkin* is an American Indian name for the Highwood Mountains, where the rock type was discovered and described more than one hundred years ago. Shonkinite is a dark-gray rock that contains abundant feldspar, shiny black crystals of augite, and various other minerals—some of which are uncommon. Shonkinite was the building stone used for St. Peter’s Mission, and it forms the bird’s tail on Birdtail Butte.

Acknowledgements

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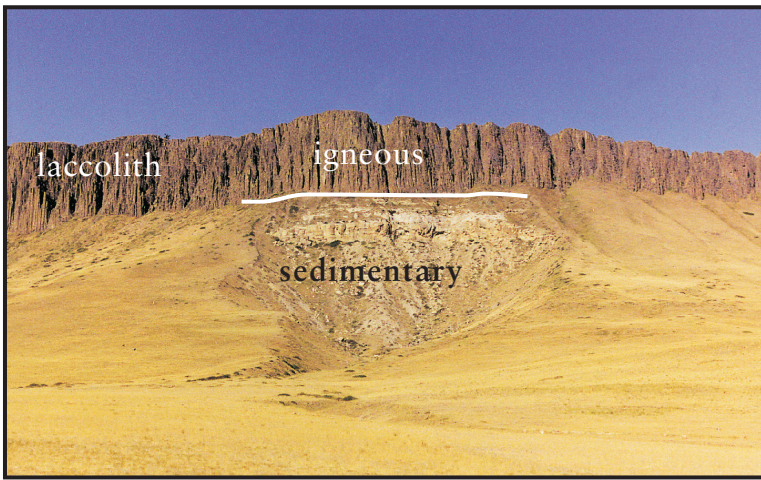
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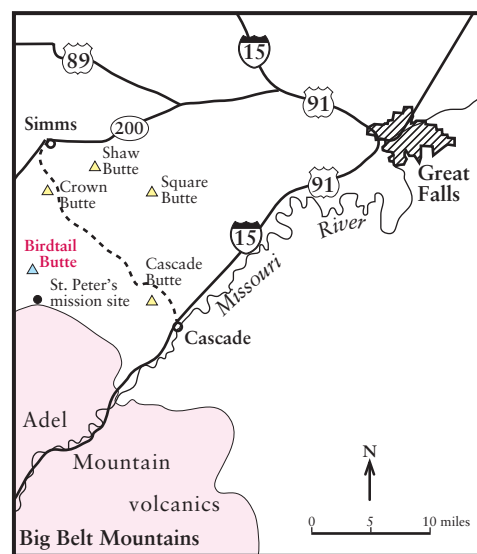
Birdtail Butte lies within a cluster of similar buttes that border the north end of the Big Belt Mountains.

Modified with permission from Hyndman and Alt, “Radial Dikes, Laccoliths, and Gelatin Models,” *Journal of Geology*, 1987, vol. 95, p. 763–774] © by The University of Chicago. All rights reserved.



Landslide deposits cover the contact between the igneous and sedimentary rock on Birdtail Butte, but the contact is apparent here on Crown Butte and on some of the other larger buttes. (photo by Susan Vuke).

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Modified from Alt, D.A., 1984, *Profiles of Montana Geology: A Layman’s Guide to the Treasure State*, Montana Bureau of Mines and Geology.



Credits

Front photo: Birdtail Butte near Simms, Montana (photo © by John Lambing).
Text photos were taken by John Lambing, Helena, and Susan Vuke, MBMG.
Text was written by Susan Vuke, MBMG.

Montana Bureau of Mines and Geology

Montana Tech of The University of Montana

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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
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- 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°x2° 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