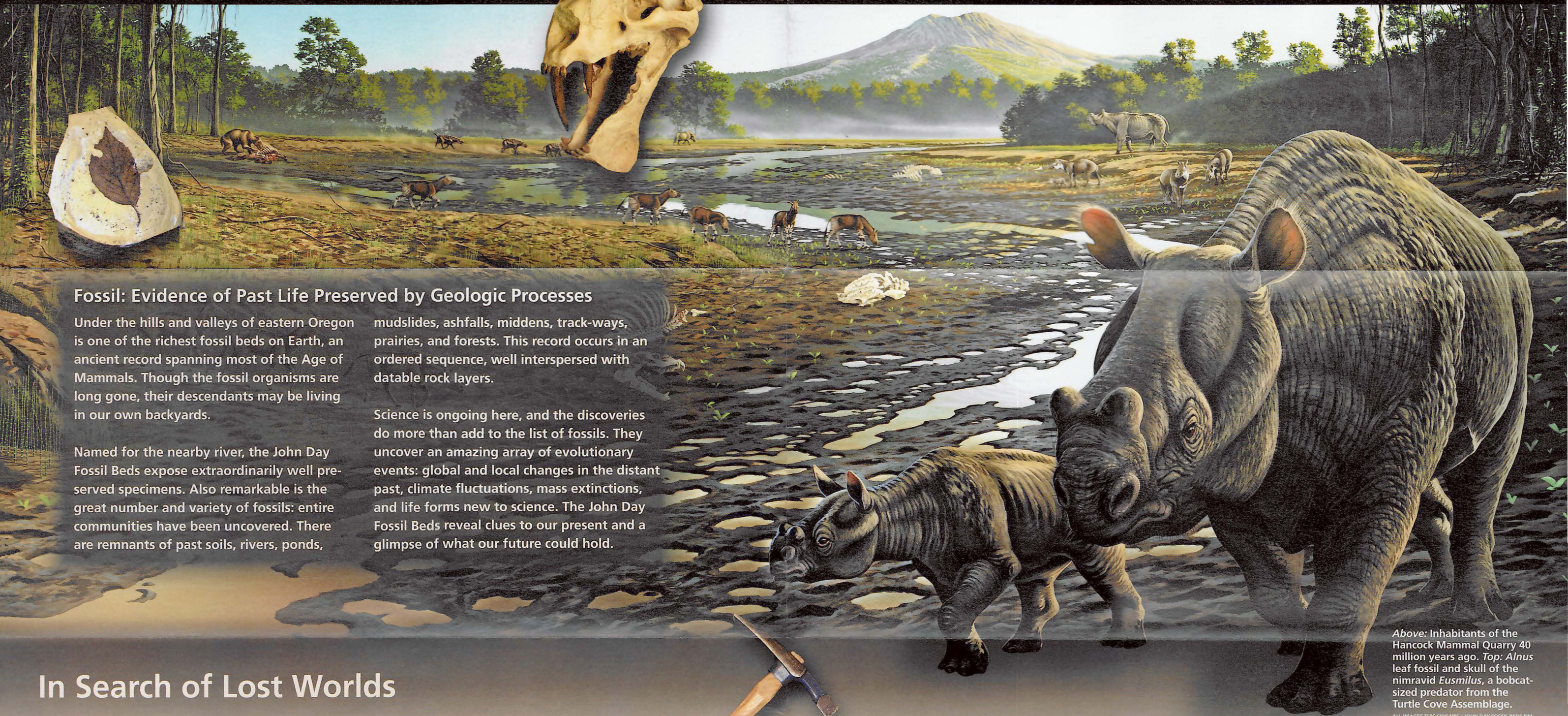


John Day Fossil Beds

John Day Fossil Beds
National Monument
Oregon

National Park Service
U.S. Department of the Interior



Fossil: Evidence of Past Life Preserved by Geologic Processes

Under the hills and valleys of eastern Oregon is one of the richest fossil beds on Earth, an ancient record spanning most of the Age of Mammals. Though the fossil organisms are long gone, their descendants may be living in our own backyards.

Named for the nearby river, the John Day Fossil Beds expose extraordinarily well preserved specimens. Also remarkable is the great number and variety of fossils: entire communities have been uncovered. There are remnants of past soils, rivers, ponds,

mudslides, ashfalls, middens, track-ways, prairies, and forests. This record occurs in an ordered sequence, well interspersed with datable rock layers.

Science is ongoing here, and the discoveries do more than add to the list of fossils. They uncover an amazing array of evolutionary events: global and local changes in the distant past, climate fluctuations, mass extinctions, and life forms new to science. The John Day Fossil Beds reveal clues to our present and a glimpse of what our future could hold.

Above: Inhabitants of the Hancock Mammal Quarry 40 million years ago. Top: *Alnus* leaf fossil and skull of the nimravid *Eusmilus*, a bobcat-sized predator from the Turtle Cove Assemblage.

ALL IMAGES THIS SIDE NPS / JOHN DAY Fossil Beds NMA

In Search of Lost Worlds



Eastern Oregon was first recognized as an important paleontological region in the 1860s, thanks to the young frontier minister, Thomas Condon (left). Paleontology, the study of ancient life, was still a new science at the time. Condon's discoveries spurred scientific interest. By the late 1800s, scientists from Yale, Princeton, and the Smithsonian

Institution had acquired tons of fossil specimens from the area, which they classified and presented to the scientific community.

This early work set the stage for field paleontologists like John C. Merriam of the University of California, who in 1899 began placing the John Day fossils into their geological, chronological,

and paleoecological context. His work helped preserve these fossil resources. John Day Fossil Beds National Monument was established in 1975.

Exploration and study continue today (right and far right). Each year adds hundreds of specimens to institutional collections. Most are mere fragments—a few



teeth, for instance—but each is accompanied by a wealth of field data: geographical location, stratigraphic position, and other facts about its recovery. This information, as well as that gained as the fossils are prepared and studied in the lab, becomes part of the global paleontological record.

The John Day Fossil Beds are dispersed across 20,000 square miles of eastern Oregon. The beds have yielded such a wealth of information that scientists can assemble and reconstruct ancient ecosystems. Eight of these "assemblages" are re-created in the museum gallery of the Thomas Condon Paleontology Center. They are summarized below.



Deep Time in the John Day Fossil Beds

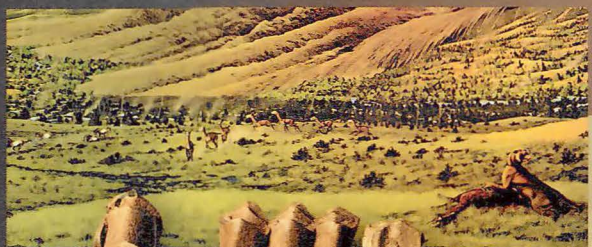
RATTLESNAKE ASSEMBLAGE

Scientists have found more fossils here of grazing animals than browsers. These animals lived in a relatively cool, semi-arid climate dominated by grasslands (illustration at right). Forests grew around lakes and rivers and at the higher elevations.

Many of these fossilized animals are very familiar to North America today:

horses, bears, deer, dogs, pigs, and true cats, for example. Others, like elephants, rhinos, camels, and ground sloths, seem out of place, though they flourished in the Rattlesnake's prairie environment.

The fossil at right is the lower jaw of a young camel.



Millions of years ago

approx. 5 mya

7 mya
RATTLESNAKE FORMATIONS

MASCALL FORMATION

15 mya

16 mya
PICTURE GORGE BASALT

MASCALL ASSEMBLAGE

Sufficient rainfall and fertile soil fostered the growth of lush, nutritious grasses and mixed hardwood forests much like those found today from Illinois to Ohio. This savanna-like landscape had broad floodplains with scattered lakes.

The grass and forest environment was home to swift, long-legged, hoofed animals like

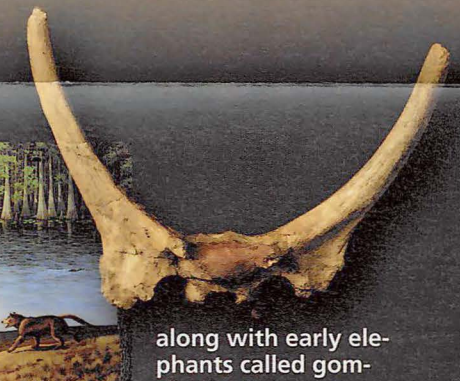


horses and camels (above) that resemble their modern relatives. Above right are the horns of the deer-like

Dromomeryx borealis. The Mascall environment also attracted newcomers: true cats crossed over from Asia,

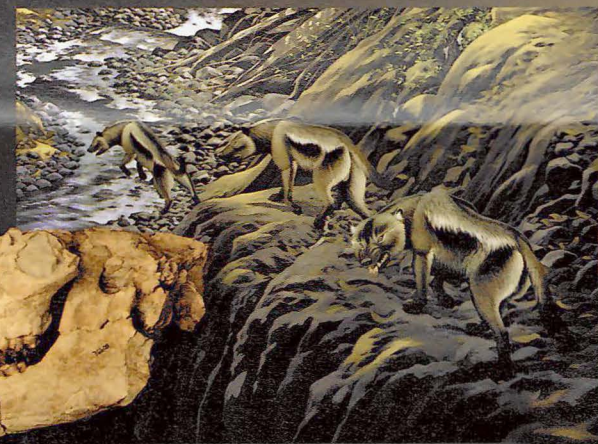
along with early elephants called gomphotheres.

As forests receded and competitors changed, some groups like oreodonts headed toward extinction.



HAYSTACK VALLEY ASSEMBLAGE

Similar to the Mascall, this timespan featured cottonwood trees, alders, shrubs, and shallow rivers. These trees and leafy plants fed rhinos and calicotheres—large,



clawed creatures related to horses, tapirs, and rhinos. They were joined by evolving grazers like camels (skull at left) and horses, both more suited to the newly developing grasslands.

Ursavus, a bear-dog the size of a wolf (illustration at left), was a common predator. Bear-dogs are extinct today.

20 mya

24 mya

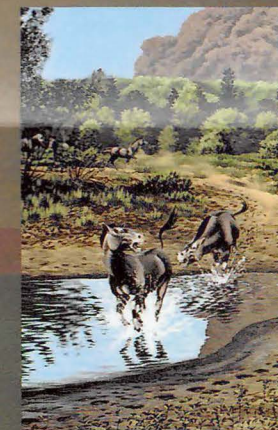
29 mya

JOHN DAY FORMATIONS

KIMBERLY ASSEMBLAGE

Geologic evidence suggests that large amounts of soft, ashy soils laid down during the Kimberly time allowed tiny burrowing animals to be fossilized. The number and variety of burrowing rodent fossils (skull at lower right) is significant.

The habitat was forest and field, with elm, birch, oak, maple, fir, spruce, pine, and smaller plants



and shrubs. Grasses may have just started to appear in the region. A very diverse population of oreodonts (skull above) browsed the forests and fields along with three-toed horses and rhinos.



TURTLE COVE ASSEMBLAGE



During the Turtle Cove time, the climate continued to cool and dry. Hardwood forests similar to those growing in the eastern United States today were inundated with ash and pumice from abundant volcanic eruptions. The habitat was primarily woodland. Three-toed horses, mouse-

deer, beavers, and oreodonts (foot bones and illustration at left) browsed on the many leafy plants.

Prey were hunted by bear-dogs, nimravids—saber-toothed, catlike animals of varied sizes—and entelodonts, creatures that looked like warthogs and were as tall as bison.

33 mya

40 mya

CLARNO FORMATIONS

BRIDGE CREEK FLORA



The Bridge Creek Flora shows evidence of one of Earth's cooling trends. As the region gradually became cooler and drier, it had forests, lakes, and swamps and resembled the balmy parts of the southeastern United States. Many trees in this ancient forest are related to modern alders, elms, maples, and oaks. The deciduous conifer *Metasequoia*, or dawn redwood (fossil at left),

was widespread. *Metasequoia* is Oregon's state fossil.

The Bridge Creek Flora has fossils of leaves, fish, amphibians, birds, and insects preserved like pressed flowers in a book. Mammal fossils, save for the occasional bat, are rare in these ashy lakebed sediments.



HANCOCK MAMMAL QUARRY

Look at the illustration at the top of the page: There is a warm, humid forest, where most of the plants are vaguely familiar. A scalding volcanic mudflow (lahar) has recently torn through the jungle-like foliage. Dozens of beasts gather in the newly opened area, the mud littered with plant and animal remains.

Mammals include *Haplohippus*, a small four-toed horse; huge rhino-like animals called brontotheres (lower right in top illustration and skull at right); and *Protapirus*, an early tapir.

A variety of animal remains was preserved at this site, probably a former bend in a stream with high sedimentation.



CLARNO NUT BEDS

This was a wet, lush, semitropical forest with many vines and creepers—similar to Panama's jungles today.

Over 300 plant species have been found here—175 species of fruits and nuts alone, including chestnuts, walnuts, bananas, and moonseeds (left). Early magnolias and palms were common. These plant fossils are

more than just leaf impressions, evidenced by one of the most diverse collections of petrified wood found anywhere.

Browsing mammals, several of great size, were brontotheres and amynodonts. Strong-jawed hyaenodonts were scavengers. The large catlike *Patriofelis* (right) was a major predator.

44 mya



approx. 55 mya

Sheep Rock, Clarno, and Painted Hills



Sheep Rock peak is an icon for the national monument and for North American paleontology.
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Things You Should Know

John Day Fossil Beds National Monument encompasses 14,000 acres in three separate units. Driving routes between units pass by stunning scenery, colorful geological features, and abundant wildlife.

The best place to start your visit and to see fossils is the Thomas Condon Paleontology Center, the park visitor center. It is open daily year-round; in winter it is closed on federal holidays. Ask park staff about accessibility features.

Trails and picnic facilities are open year-round during daylight hours. From spring into fall, drinking water is available at all

picnic areas. All park roads and parking areas allow bus and trailer access. There is no camping in the park. Camping, lodging, food, gas, and other services are available in nearby parks and towns.

This is one of over 390 parks in the National Park System. Visit www.nps.gov to learn more.

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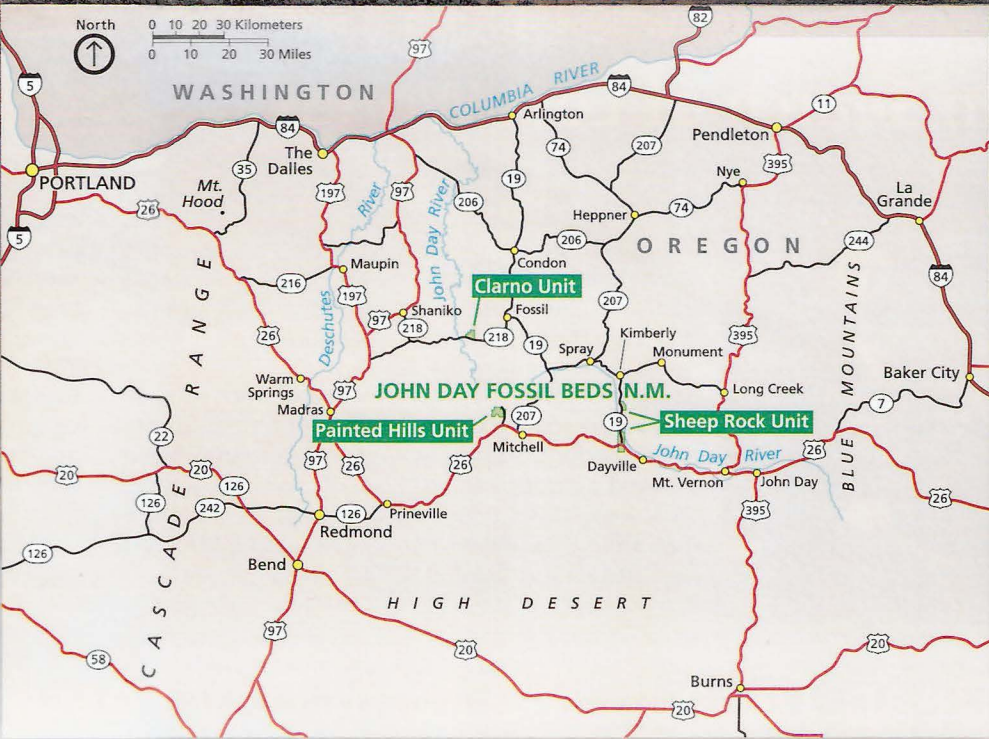
Protect the Park—and Yourself

Fossil collecting is strictly prohibited in the park unless you are working with a research institution that has been granted a permit. All fossils, rocks, artifacts, plants, animals, and other natural and cultural features in the park are protected by federal law. Do not collect, dig, or disturb them in any way.

When hiking, please stay on trails and wear appropriate footwear and sun guard. Carry plenty of water. • Watch out for rattlesnakes, ticks, scorpions, black widow spiders, and puncture vine. Don't put your hands or feet where you cannot clearly see what's there.

Fishing is allowed. A valid fishing license is required. • For firearms regulations, contact the park staff or visit the park website. • There is private property within the park boundary. Please respect posted warnings.

Pets must be kept under physical control and are not allowed off-road or off-trail. They are allowed on park trails, overlooks, and visitor center and ranch grounds. • Service animals are welcome to come indoors.



Sheep Rock Unit



Blue Basin badlands

Sheep Rock Unit is at the intersection of state route 19 and U.S. 26. The trails and overlook listed below offer interpretive exhibits and restrooms.

Foree Area A picnic site and two short trails, one accessible, offer views of sculpted green claystone capped by lava flows.

Cathedral Rock This large block of 29-million-year-old strata turns the John Day River course backward nearly 180 degrees.

Blue Basin The Island In Time Trail, an easy one-mile walk, leads you into colorful badlands, banded layers deposited 29 million years ago. The 3-mile **Overlook Trail** climbs high to the rim of the basin and rewards you with valley vistas. *Off-trail hiking in Blue Basin is strictly prohibited.*

Goose Rock These cliffs are river-borne material that settled on the ocean bottom 100 million years ago.

Picture Gorge These imposing lava layers are part of the **Picture Gorge Basalt**, a subgroup of the Columbia River flood basalt group spread over the Pacific Northwest.

Mascall Formation Overlook The view from this point takes in the upper John Day Valley, Strawberry Mountain Range, Picture Gorge, and the Mascall and Rattlesnake formations.

Clarno Unit



Clarno Unit is 18 miles west of Fossil, Ore., off state highway 218. There is a picnic area and restrooms. This unit also has two significant fossil sites not yet open to the public: **Clarno Nut Beds** and **Hancock Mammal Quarry** (see other side of brochure).



The Palisades

Trails Two trails with interpretive displays let you explore the towering **Palisades**. These craggy cliffs looming up to 150 feet over the valley were formed when a succession of ash-laden mudflows (lahars) swept through a forested landscape. A jumble of fossils are embedded in the rocks. The layers in The Palisades were formed about 45 million years ago.

The **Trail of the Fossils** allows you to see actual fossils embedded in rock. The **Clarno Arch Trail** is a 0.25-mile climb to a natural bridge arch in The Palisades.

Hancock Field Station Operated by the Oregon Museum of Science and Industry, this camp facility offers educational programs on geology, paleontology, and ecology. Please visit by appointment only. For additional information, visit www.oms.org.

Painted Hills Unit

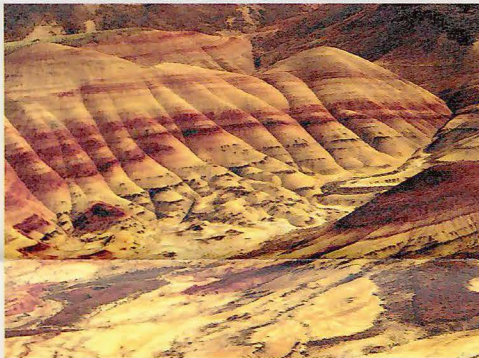


Painted Hills Unit, 10 miles west of Mitchell, Ore. off U.S. 26, has restrooms, shaded picnic tables, exhibits, and trails. Roads in the unit are dirt and gravel.

Painted Hills Overlook and Trail Best seen at sunset—take in spectacular views of color-splashed hummocks and hills, part of the lower John Day formations period. The short trail is one of the park's most picturesque.

Carroll Rim Trail A moderate climb, this 1.5-mile trail leads to an outstanding overview of the Painted Hills landscape.

Leaf Hill Trail Thousands of fossils found at this site helped give us our first glimpse of the **Bridge Creek Flora** period. Most of the 0.25-mile trail is flat. Hiking on Leaf Hill is prohibited.



Painted Hills

Painted Cove Trail This short trail winds through crimson hills, permitting a close view of the popcorn-textured claystones that distinguish the Painted Hills. Much of the trail is accessible by boardwalk.

Thomas Condon Paleontology Center

The Thomas Condon Paleontology Center is a National Park Service research facility dedicated to the study of the John Day Fossil Beds. It also serves as the park visitor center and fossil museum. It is a "green building," powered by solar panels and windmill generators. The lobby has exhibits on paleontology; picture windows let you view the working laboratory and collections room with over 45,000 specimens.

In the fossil museum gallery, you can walk through 40 million years of the Age of Mammals. Hundreds of fossil specimens are displayed, along with eight large murals depicting plants and animals of that time. Each display explains the geology then and now.

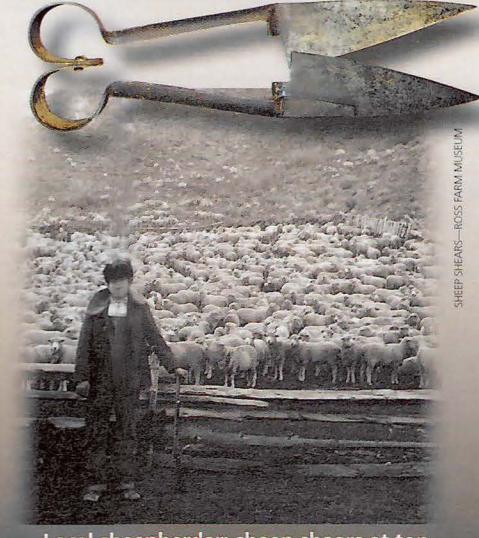


Fossil museum gallery

James Cant Ranch

The dry hills of eastern Oregon provided ideal grazing land for livestock, mainly sheep and cattle. James and Elizabeth Cant, Scottish immigrants, bought this land in the early 1900s and operated this ranch until the National Park Service purchased it in the 1970s.

The 1917 ranch house has been renovated to house the park headquarters and a museum telling the human story of the area, from the American Indians up through the sheep and cattle ranchers. You can tour the original ranch buildings and see some of the original ranching equipment.



Local sheepherder; sheep shears at top



Historic James Cant Ranch house