

Coining Scientific Discoveries

Middle School



OBJECTIVES

Students will be able to explain the objectives of the Lewis and Clark Expedition and the relationship of those objectives to the designs of the Westward Journey Nickel Series™. The students will use primary documents and the Internet to conduct independent research about some of the scientific artifacts that Lewis and Clark examined on their Expedition. Students will prepare presentations of their materials and incorporate their new knowledge into an original coin design to give their classmates a better understanding of the role that scientific exploration played in Lewis and Clark's journey.



CLASS TIME

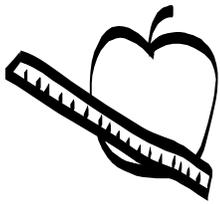
Four or five 45- to 60-minute sessions



NATIONAL STANDARDS

This lesson plan reflects some of the national standards of learning as defined by the National Council for the Social Studies (NCSS), the National Council for Teachers of English (NCTE), the National Research Council, and the International Society for Technology in Education (ISTE). These standards are listed below:

- Social Studies: Time, Continuity, and Change
- Social Studies: People, Places, and Environments
- Social Studies: Science, Technology, and Society
- Language Arts: Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.
- Language Arts: Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.
- Language Arts: Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.
- Science: Science as inquiry
- Science: Life science
- Technology: Technology Operations and Concepts
- Technology: Technology Research Tools

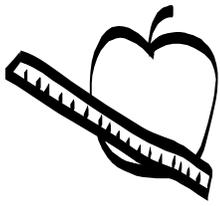


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MATERIALS

- 1 overhead projector
- 1 overhead transparency of each of the following:
 - Pre-2004 Monticello nickel obverse from the Resource Guide
 - “Mission Objectives” graphic organizer
 - “Shira’s Moose Example” sheet
 - “Shira’s Moose Drawing” sheet
- Copies of each of the following:
 - “Introduction” or “Lewis and Clark Expedition Overview” from the Resource Guide
 - “New Nickel Fact Sheet”
 - “Flora Discoveries” sheet
 - “Fauna Discoveries” sheet
 - “Specimen Journal” sheet
 - “Specimen Drawing” sheet
 - “My Nature Nickel” sheet
- Copies of President Jefferson’s initial letter to Meriwether Lewis, available at such Web sites as:
 - www.monticello.org/jefferson/lewisandclark/instructions.html
 - www.lewisandclark200.gov/edu/tjletter.cfm
 - www.clarkswcd.org/Education/LewisClark/LWLetter.htm
- Highlighters or pencils
- Overhead transparency markers
- Peace Medal Nickels
- Keelboat Nickels
- A reserved computer lab with Internet access
- Web sites that include information about the flora and fauna explored during the Lewis and Clark Expedition, such as:
 - www.fs.fed.us/r1/clearwater/LewisClark/lewis_clark_plants/lcindex.htm
 - www.life.umd.edu/emeritus/reveal/pbio/LnC/LnCpublic.html
 - www.nationalgeographic.com/lewisandclark/resources_discoveries.html
 - www.nationalgeographic.com/lewisandclark/record_species_135_11_6.html
 - web4.si.edu/lewisandclark/index.html?loc=/lewisandclark/home.html
 - www.clarkswcd.org/Education/LewisClark/Mammals.htm



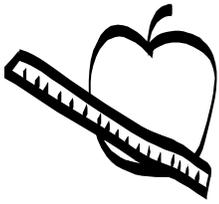
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- Copies of age-appropriate texts that provide information about the flora and fauna explored during the Lewis and Clark Expedition, such as:
 - *Plants on the Trail with Lewis and Clark* by Dorothy Hinshaw Patent
 - *Plants of the Lewis and Clark Expedition* by H. Wayne Phillips
 - *Animals on the Trail with Lewis and Clark* by Dorothy Hinshaw Patent
 - *Lewis and Clark’s Mountain Wilds: A Site Guide to the Plants and Animals They Encountered in the Bitterroots* by Sharon A Ritter
 - *Herbarium of the Lewis & Clark Expedition* by Gary E. Moulton
- Colored pencils
- 1 three-ring binder



PREPARATIONS

- Make one overhead transparency of each of the following:
 - Pre-2004 Monticello nickel obverse from the Resource Guide.
 - “Mission Objectives” graphic organizer.
 - “Shira’s Moose Example” sheet.
 - “Shira’s Moose Drawing” sheet.
- Gather some Peace Medal Nickels (1 per small group).
- Gather some Keelboat Nickels (1 per small group).
- Make copies of each of the following:
 - “Introduction” or “Lewis and Clark Expedition Overview” from the Resource Guide (1 copy).
 - President Jefferson’s initial letter to Meriwether Lewis (1 per student).
 - “New Nickel Fact Sheet” (1 per student).
 - “Flora Discoveries” sheet (1 copy).
 - “Fauna Discoveries” sheet (1 copy).
 - “Specimen Journal” sheet (2 per student).
 - “Specimen Drawing” sheet (2 per student).
 - “My Nature Nickel” sheet (1 per student).
- Arrange to use the school computer lab during your class period on two consecutive days.
- Bookmark appropriate Internet sites.
- Locate appropriate texts that provide information about the flora and fauna explored during the Lewis and Clark Expedition (see examples under “Materials”).



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GROUPINGS

- Whole group
- Small groups
- Independent work



TERMS AND CONCEPTS

| | | | |
|------------------|-----------------------|--------------------|--------------------|
| Obverse (heads) | Primary Documentation | Reverse (tails) | Journal |
| Lewis and Clark | Flora | Corps of Discovery | Fauna |
| Thomas Jefferson | Specimen | Keelboat | Scientific drawing |
| Peace Medal | Northwest Passage | Mission | American Indians |
| Objective | Exploration | | |



BACKGROUND KNOWLEDGE

The students should have a basic knowledge of:

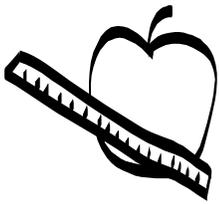
- The Lewis and Clark Expedition
- Circulating coins and the Westward Journey Nickel Series
- Journal writing
- Basic research skills
- Internet navigation
- Basic presentation skills



STEPS

Session 1

1. Display the overhead transparency of the pre-2004 Monticello nickel obverse. Ask the students to examine the image and tell you what they know about it. The students should be able to identify it as the obverse (front) of a United States nickel and that the individual on this coin is President Thomas Jefferson.
2. Ask the students if they have heard of or have seen any recent changes to this familiar coin. Students may note that the reverse (back) of this coin has recently changed. Guide the students to understand that the new coin reverse designs incorporate images that relate to the Lewis and Clark Expedition. Ask the students why they think the government would have decided to change the design of this coin and why the this journey is an appropriate theme on the nickel. Students may realize that 2004 marked the bicentennial of the official start to the Expedition.

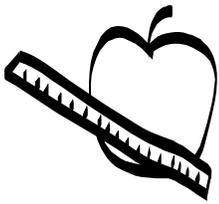


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3. Ask leading questions to assess the students' pre-activity knowledge of Lewis and Clark and the Corps of Discovery. Using either the "Introduction" or the "Lewis and Clark Expedition Overview" from the Resource Guide, review basic information about the Expedition. Do not distribute copies of these—they contain information that the students will research later in this lesson.
4. Return to the transparency of the pre-2004 Monticello nickel obverse. Ask the students to explain the connection between President Jefferson and the Lewis and Clark Expedition. Students should explain that President Jefferson purchased the land that he was sending Lewis and Clark to explore.
5. Distribute a copy of President Jefferson's initial letter to Meriwether Lewis to each student. Direct the students to read this letter independently and highlight or underline any information about Thomas Jefferson's objectives for this mission.
6. Display the transparency of the "Mission Objectives" graphic organizer. Guide students to categorize the mission objectives for the expedition as stated by Jefferson. Guide students toward developing three primary areas in which to categorize these objectives for the Corps: Water and Land Exploration, American Indians, and Scientific Discoveries.
7. Divide the students into small groups of three or four. Distribute a Peace Medal Nickel and a Keelboat Nickel to each group. Also distribute a "New Nickel Fact Sheet" to each student.
8. Ask each group to carefully read about and examine the reverse of both nickels. Direct the students to discuss to which mission objective each coin most closely relates (the Peace Medal Nickel relates to the goal of developing positive relations with American Indian tribes as the design is derived from the original Jefferson Peace Medal that Lewis and Clark gave as a gift to tribal leaders they met along the trail). Students should be able to defend these statements with the information from the reading.
9. Regroup and ask the students to share with the class what they discussed in their small groups. Add this information to the "Mission Objectives" graphic organizer.
10. Collect all nickels from the small groups.

Sessions 2 and 3

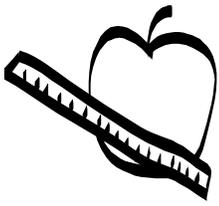
1. Revisit the previous day's discussion by asking students to redefine the mission objectives for the Lewis and Clark Expedition. Display a partially-covered copy of the overhead transparency of the "Mission Objectives" graphic organizer. As students list these objectives, reveal them on the overhead transparency.
2. Ask students to take out their "New Nickel Fact Sheets" and reexamine the newest nickels produced by the United States Mint. Ask students to recall which coin they felt most closely aligned with which mission objective. Students will likely note that the Peace Medal Nickel is most closely related to the mission of developing positive relations with



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American Indian tribes along the trail, and the Keelboat Nickel is most closely related to Lewis and Clark's mission of seeking out a direct passage to the Pacific Ocean via the Missouri River. The students should notice that neither the Peace Medal Nickel nor the Keelboat Nickel specifically refers to the scientific studies of Lewis and Clark.

3. Place a star next to the scientific exploration objective and explain that you will be focusing on some of Lewis and Clark's scientific discoveries today.
4. On the board, write a list of the flora and fauna specified on the "Flora Discoveries" and "Fauna Discoveries" sheets. Explain that these are just a few of the many plants and animals discovered, but they are some that are featured more prominently in the journals.
5. Explain that each student will need to select a specific plant and animal from this list that they will research in the computer lab and in the classroom. Explain that students will be responsible for locating and recording the following information (list these requirements in a location that is visible to all students throughout the research period):
 - The name of the plant or animal discovery
 - The discovery's scientific name
 - A description of the plant or animal
 - An image of the plant or animal
 - The date(s) and location(s) where Lewis and Clark noted this discovery in their journal
 - A significant journal quote in which a Corps member referred to this discovery
 - The relevance of this plant or animal to the American Indians and/or the Corps of Discovery members
 - The organism's current status (extinct or thriving) and purpose in society
6. Distribute two copies of the "Specimen Journal" and "Specimen Drawing" sheets to each student. Students will record their information and will also make a scientific drawing of each of their specimens on these pages. The teacher may need to explain the difference between an illustration and a scientific drawing at this point.
7. Model an exemplary presentation for the students using the overhead transparency of the "Shira's Moose Example" sheet. Explain that, once they have completed their research and journal writing, the students will each be asked to make a presentation of their findings to the class.
8. Escort the class to the computer lab. Explain that the students will conduct appropriate Internet research to find the information they need. Explain that there are also additional resources in their classroom to assist their research.
9. Allow the students to use the remainder of the class period and the following period to conduct their research, work on their journal entries, and develop their independent presentations.



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Session 4 (and 5 if necessary)

1. Allow each student to present one of his or her journal entries to the class in order to give the students a more complete understanding of the magnitude of the discoveries that were made during the Expedition.
2. In a three-ring binder, compile the students' work into a class "Journal of Rediscovery!" and place this journal on display for the students to refer to throughout their study of Lewis and Clark.
3. As a class, discuss the reasons that these discoveries would be important to American society. Why would people have wanted to know about these Northwestern plants and animals, particularly before they moved to this new area of the United States?
4. Display the "Mission Objectives" graphic organizer and remind the students that they noted that there is no nickel design yet that represents the scientific findings of Lewis and Clark. Reiterate that the Peace Medal Nickel represents the American Indian objective, and that the Keelboat Nickel represents the land and water objective.
5. Distribute a "My Nature Nickel" page to each student and explain that, based on their research, they will now design their own new nickel reverse that exemplifies this third mission of the Corps of Discovery: the scientific exploration of organisms.
6. Allow some of the students to share their nickel designs with the class, and add them all to the class journal. As a class, discuss how these coin designs express this third mission objective.



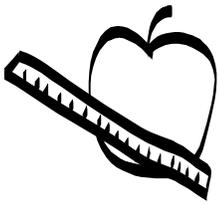
ASSESSMENT

- Develop a rubric for the students' presentations, journal entries, and coin designs. This rubric should be shared with the students before they develop their presentations.
- Take anecdotal notes about the students' group work, discussions, and research.



ENRICHMENTS/EXTENSIONS

- Students can explore where some of Lewis and Clark's discoveries are now located throughout the United States. What type of soil and land are in that area? Why would this type of land, soil, and climate be most conducive to this organism's health?
- Once students have compiled their "Journals of Rediscovery," they may want to study, write journal entries, and gather and press plants from their area in the style of Lewis and Clark.
- Students can visit local taxidermy shops to examine animal artifacts from their area and write journal entries in the style of Lewis and Clark.



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- Create an online class collection of artifacts that is entitled “Virtual Rediscovery Museum.”
- Using a wall map of the United States, allow the students to pinpoint the location of their flora and fauna discoveries. Allow the students to mark this point with some data relating to that discovery (its name, date of discovery, its picture, etc.)



DIFFERENTIATED LEARNING OPTIONS

- Students can work in pairs or small groups to complete their exploration of primary source documents and their flora and fauna research.
- Allow students to type or draw rather than write their journal entries.



Mission Objectives

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

**RELATIONSHIP
BETWEEN DESIGN
AND OBJECTIVE**

**RELATIONSHIP
BETWEEN DESIGN
AND OBJECTIVE**

**RELATIONSHIP
BETWEEN DESIGN
AND OBJECTIVE**

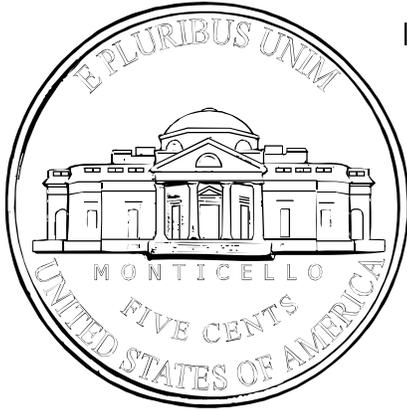
NICKEL DESIGN

NICKEL DESIGN

NICKEL DESIGN



New Nickel Fact Sheet



In commemoration of the Louisiana Purchase, and the Lewis and Clark Expedition, the President enacted Public Law 108-15 to modify the Jefferson five-cent coin (nickel) in 2003, 2004, and 2005 to reflect images evocative of Lewis and Clark's historic expedition into the Louisiana Territory. A depiction of Monticello will return to the nickel in 2006. The obverse will continue to bear the likeness of President Thomas Jefferson.



2004 SPRING DESIGN: PEACE MEDAL NICKEL

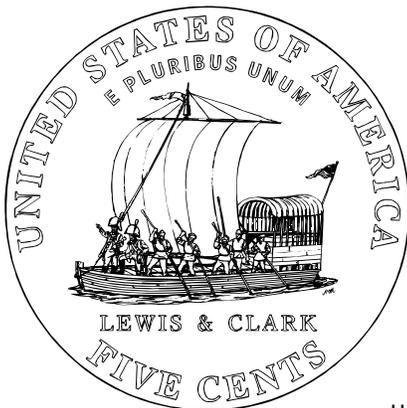
The first of two new reverses on the 2004-dated nickel resembles the reverse of the original Indian Peace Medal. The medal bore the likeness of America's third president on one side, and symbols of peace and friendship on the other. To most Native Americans, these medals remain prized symbols of peace and friendship.

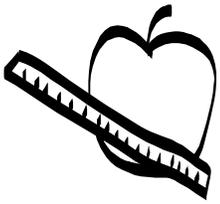
The design, engraved by United States Mint sculptor/engraver Norman E. Nemeth, features two hands clasped in friendship—one with the cuff of a military uniform, symbolizing the American government, and the other with a silver wrist band adorned with beads and a stylized American eagle, representing the Native American community.



2004 FALL DESIGN: KEELBOAT NICKEL

In late 2004, the 2004-dated nickel will feature an angled side view of the keelboat in full sail—the boat that transported members of the expedition and their supplies through the rivers of the Louisiana Territory on the first leg of their search for a northwestern passage to the Pacific Ocean. Built to the specifications of Captain Lewis, the 55-foot keelboat could be sailed, rowed, poled like a raft, or towed from the riverbank. The design, by United States Mint sculptor/engraver Al Maletsky, shows Captains Lewis and Clark in full uniform in the bow of the keelboat.





Fauna Discoveries

Black-tailed prairie dog

When members of the Lewis and Clark Expedition first saw a prairie dog village, they were fascinated with the animals. They were intent on capturing several specimens of these “barking squirrels.” You can imagine the humorous sight of grown men chasing these quick little rodents across the plain for an entire day. After digging out burrows and carrying buckets of water to flood them out, they finally captured only one live specimen. It was sent back to Thomas Jefferson on the keelboat.

Bison

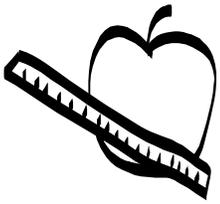
This mighty animal once numbered in the tens of millions, forming one of the largest mammal populations on the earth. Bison were very valuable to the American Indian—not only for food and hides, but for their horns, hooves, and teeth, which were used in important ceremonies. Today, after returning from the brink of extinction, the bison population in North America is estimated at over 200,000. Lewis and Clark marveled at the magnificence of this animal and depended on it for food and hides. They received some beautiful buffalo-hide paintings, one of which may be at the Peabody Museum at Harvard University.

Grizzly bear

Meriwether Lewis wrote in his journal on May 5, 1805, that the grizzly bear was a “most tremendous looking animal, and extremely hard to kill.” The bear they saw that day weighed about 600 pounds and was the largest bear they had ever seen. William Clark and another expedition member fired 10 shots at a grizzly bear before they were able to kill it. Clark described the grizzly as “very large and a terrible looking animal.”

Elk

Members of the Expedition killed and ate their first elk west of the Rocky Mountains on December 2, 1805, at the mouth of the Columbia River. They killed 375 elk during the whole journey, but about a third (130) were bagged near Fort Clatsop. Fort Clatsop’s location was chosen partly because some Clatsop Indians had advised the captains that there were more elk on the south side of the river than on the north. These animals not only supplied meat but their hides were used to replace worn-out clothing and moccasins. Elk roamed throughout the continental United States before the end of the 18th century. Today, elk are found throughout the Rocky Mountains but in only a few eastern states.



Flora Discoveries

Purple Coneflower

The roots from this plant (Latin name "echinacea") were sent back from Fort Mandan, North Dakota, in 1805. The explorers learned much about this plant from the American Indians, and Clark wrote in his journal about its use as a cure for snake bite and "the cure of mad dogs." Lewis noted in his journal that it was "an excellent poultice for swellings or soar throat." Today you can find echinacea in your local drugstore as an ingredient in tea, herbal remedies, and even in shampoos and lotions.

Blue Camas

On June 12, 1806, Meriwether Lewis made an entry in his journal about the Blue Camas stating that "The quawmash is now in bloom and from the color of its bloom at a short distance it resembles lakes of fine clear water." The bulbs of the common camas was a staple food for many Northwestern American Indians who, after gathering the bulbs, would boil or roast them in pits. When the Nez Perce Indians offered the explorers salmon and camas root, the explorers were so hungry that they gorged themselves. Many of them, including Meriwether Lewis, were sick for days with gastrointestinal distress because their systems were not used to this plant. You can be sure that they were cautious about eating it for the rest of their journey!

Prickly Pear Cactus

This plant was a constant irritation for the Expedition. Near Great Falls, Montana, they first collected it on May 20, 1805. In his journals, Lewis wrote that this plant "forms one of the beauties as well as the greatest pests of the plains." The prickly pear cactus grew all along the Plains, but it was particularly bothersome when the explorers had to carry their boats up the hillside around the Great Falls. The hills were filled with hard, dried muddy ruts, this cactus, and rattlesnakes. On one evening, Lewis wrote that Captain Clark "extracted 17 of these bryers from his feet." The painful needles of the cactus infected the members' feet, protected by only moccasins. It took the Expedition members 11 days to carry their boats and supplies only 10 miles.

Indian Paintbrush

As the Expedition moved westward, it found large patches of flowers that were 12 to 18 inches tall in many vivid colors: red-orange, white, magenta, purple, deep red, pale orange, and yellow. There are over 200 different species of Indian Paintbrush in western North America. Many American Indians legends say that Indians used this plant to apply paint to their faces. Actually, many tribes used the plant as medicine and even ate the plant in raw form.

NAME _____

DATE _____



Specimen Journal

A large, yellow, torn-edge rectangular area containing 20 horizontal lines for writing, serving as the main journal space.

NAME _____

DATE _____



Specimen Drawing

NAME OF PLANT OR ANIMAL _____



Shira's Moose Example

Shira's Moose (*Alces alces shirasi*) was discovered by the Lewis and Clark Corps of Discovery on May 10, 1805. The explorers spotted this small subspecies by the Milk River in Montana. These animals have a hump on their shoulders and are heavy for their size: up to seven feet tall at the shoulder and ten feet in length.

Their bulky bodies are dark brown in color and their heads are very large and oblong. They have long square noses, and ears that can rotate. Their excellent hearing and sense of smell make up for their poor eyesight.

The Shira's Moose, also known as the Wyoming Moose, features a short tail and the males have a long, floppy dewlap that hangs below their throat. The males grow enormous antlers each summer and shed them during the winter.

These moose are able to navigate through very deep snow because of their long legs and are protected from the cold by a thick, insulating coat of hollow hairs that hold in their body warmth. Being herbivores (plant-eaters), they consume large quantities of leaves, twigs, bark, buds, and aquatic plants. Because they migrate seasonally to find fresh vegetation, Shira's Moose is found in swamps and marshy areas in the summer and in spruce forests and aspen and willow thickets in the winter. They are also native to Canada.

These animals can stay under water for up to 40 seconds when looking for aquatic foods, can run up to 36 MPH for short distances, and can swim at 6 MPH for up to two hours. They have three main predators: bears, wolves, and man. Today, the total North American population of Shira's Moose is between 800,000 and 1.2 million, with hunters taking about 90,000 of these animals annually.

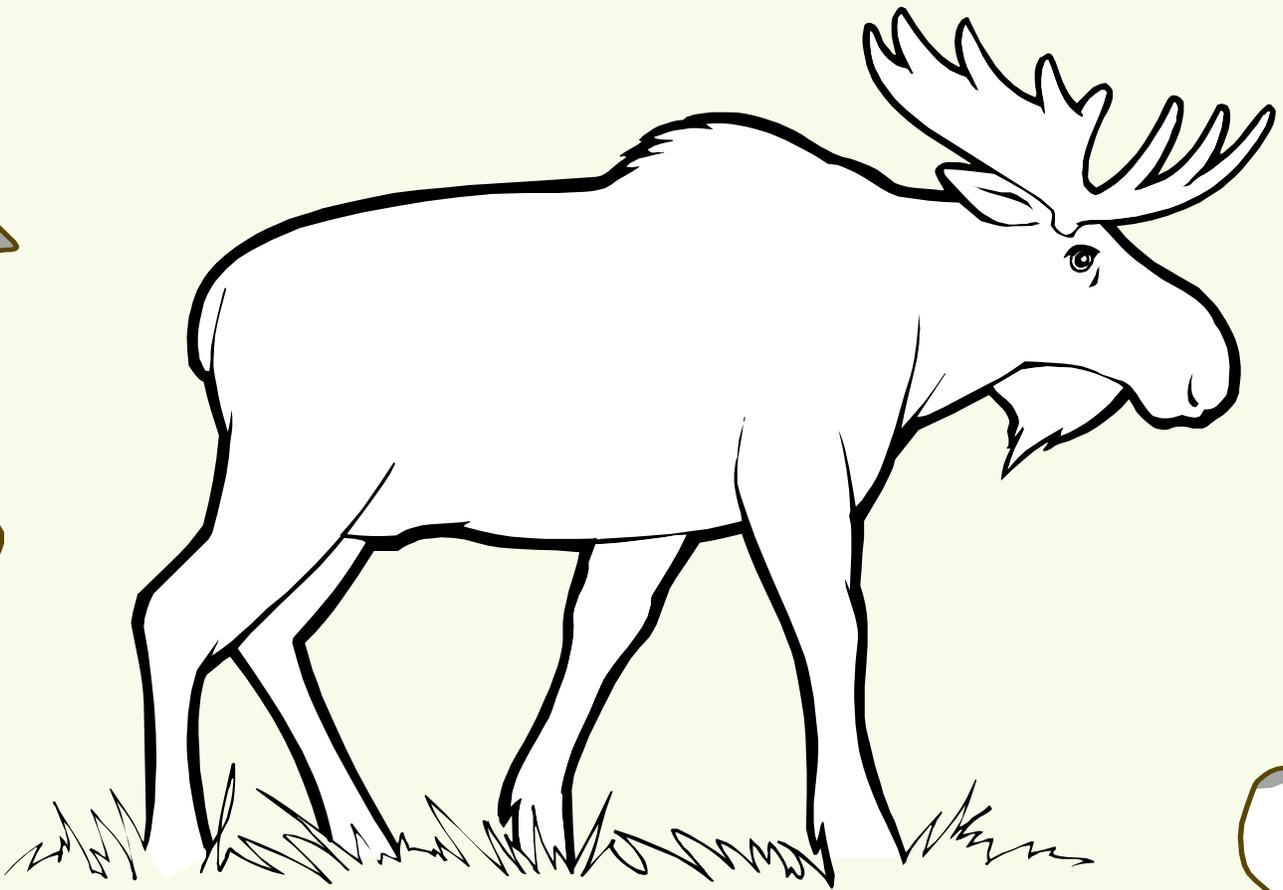
REFERENCES IN JOURNALS

Capt. Lewis, June 2, 1806—The Indians inform us that there are a plenty of Moos to the S.E. of them on the East branch [Salmon River] of Lewis's [Snake] river which they call Tommanamah R. *On Landers Fork, Montana*

Capt. Lewis, July 7, 1806—Halted to dine at a large beaver dam the hunters killed 3 deer and a fawn. deer are remarkably pleny and in good order. Reubin Fields wounded a moos deer this morning near our camp. my dog much worried [Ed.—alarmed by the moose].



Shira's Moose Drawing



NAME OF PLANT OR ANIMAL: *Shira's Moose (Alces alces shirasi)*



My Nature Nickel

