We know teachers never lack for innovative ideas and that you'll find fabulous ways to use this website for your curriculum. Nevertheless, some of the Smithsonian Institution's educators couldn't help but come up with a few ideas. We hope you find these ideas useful as ways to get students immersed in U.S. history, geography, social studies, and the natural world at the beginning of the 19th as well as the 21st century.

Grades 3-5
I.a. The Collector and the Collected
Lewis and Clark collected many examples of the species they observed. Have your students look at examples from the Botany collection, such as the bigleaf maple (*Acer macrophyllum*). Let them study and compare the two collection sheets with the two photos of living bigleaf maple. From this study, see if the students can identify the parts of the plant that needed to be gathered. Lastly, assign pairs of students a single plant species to collect and preserve, much as a herbarium would. Their notes should indicate as much information on where it was found as possible, and the date. Students may want to record other types of plants at the location, or any factors that would affect the growth and vitality of the plant, such as the availability of sunlight, or nearby geographic or manmade features, like streams, roads, and buildings.

I.b. A Method for Seeing
Encourage your students to see themselves as nature detectives by keeping a journal of observations on one or two animals, quietly spying on their subject. They should focus on something manageable, such as a family of birds or a squirrel they can see from their window at home. Students should draw a picture in their journals, and record time of day, weather, and temperature, and then try to describe behavior in complete sentences. Giving them specific things to observe will improve their field notes: feeding behavior, response to other birds, response to a threat, kind of food preferred, and preferred footing, such as ground or tree, and limb or trunk. Does the animal prefer to be in a group or be alone? Where does the animal go when reacting to a threat? What kind of food does the animal seem to like? What kinds of things make the animal change behaviors (loud noise, big truck, another animal, etc.)? Developing a table or chart to organize categories of behavior can make recording them much more effective.

Grades 6-8
II.a. A Reason for Seeing
A lost journal of L&C has been discovered! The journal was found in box of old books being sold at a garage sale in South Dakota. It is bound in the same red Moroccan leather and tied with an old string. The small book tells us that Lewis took a week-long journey ...your students need to write the lost journal entries about this trip. Have students make a list of the kind of information included in the journals—natural observations, meeting of native groups, hunting animals for food, listing species, etc. Students can try to capture the curiosity of seeing an animal for the very first time by making a detailed description of a plant or animal. Can they discover plants and animals in the neighborhood that they never noticed before? Can find a new sighting each day for a few days? Keep in mind the best pure descriptions do not contain explanations.
II.b. Form, Function, and Adaptation
Having students answer a specific question using this website is a good way to encourage analysis, collaboration, and problem solving. Your students can create their own understanding and construct a project to demonstrate that understanding. The Smithsonian Institution’s Lewis and Clark as Naturalists website has lots of images of animals appearing in their natural settings. Students can use these field shots to create a PowerPoint presentation or a simple website that answers a question such as “What are some of the adaptations Lewis and Clark saw that help animals survive the winter?” Students should work in pairs or small groups to help them solve the problem together. To save a picture for use in another medium, students simply right click on their mouse and select Copy. They then right click and Paste the image into a word processing program, a presentation program or a web design program.

II.c. What’s Hot and What’s Not
Can your students work out several reasons why Lewis and Clark needed a good system of recording information? Have your students look at the image(s) of a plant (such as Acer macrophyllum Pursh, Arctostaphylos uva-ursi (L.) Spreng., or Malus fusca (Raf.) Schneid.) and identify the parts of the plant that needed to be gathered and the kinds of information that had to be recorded. Read the journal entry describing the plant. Lastly, assign pairs of students a single plant species to collect and preserve. Their notes should indicate where it was found, date, and habitat. Have students explore the role each structure serves for the plant. Explore the systems and structures plants have. (roots for water and mineral absorption, stems for transportation, leaves for transforming light into energy, seeds for propagation...)

II.d. Wording
All students will notice that the grammar, punctuation and spelling in the journals is not correct according to today’s standards and they typically enjoy correcting the mistakes of adults. Copy and paste some long journal entries into a word processing document, have students rewrite excerpts correctly.

Grades 9-12
III.a. Mapping Biodiversity and Biogeography
Lewis and Clark traveled thousands of miles during which time they would see a species for a long time and then gradually not see it anymore. This can tell your students important information about a species’ distribution and habitat requirements. In this exercise, students create a single map showing the trail of the Corps of Discovery. The map should include major geographic features such as rivers and mountains, the major ecoregions the expedition passed through, and the distribution of five different species.

Using a textbook or animal encyclopedia, have students read about the food and habitat preferences of the Stellar’s Jay, Clark’s Nutcracker, Magpie, Ground Squirrels, and the Condor. For mammals, we shamelessly recommend using the Smithsonian North American Mammals web site (http://www.mnh.si.edu/mna)

Using a spreadsheet program, have students record every instance when Lewis and Clark observed these species. The data should be recorded in two columns titled “Species Name” and “Location.” Students then need to create a map where the species was found. If the map function is not in your program, you can give your students a worksheet map of the US that shows major geographic features, letting them add the trail. Colored pencils work well. Different species can be represented by different colors and shapes, e.g., solid circles, triangles, squares, etc. These should appear as points along the trail.

Finally, have the students find maps showing United States ecoregions--the North American Mammals web site’s Map Search feature offers ecoregion and river overlays;
the National Geographic Society also offers ecoregion maps
(http://www.nationalgeographic.com/wildworld/terrestrial.html). The students should
select those regions traversed by the trail and then mark the distribution of the various
species onto this map to understand the preferred environments for the various species.

III.a.i  Extension to Mapping Biodiversity and Biogeography
Compare a single species' historic distribution with its present day one. We say “historic”
rather than “at the time of Lewis and Clark,” as reasonably accurate records are scarce to
nonexistent from two centuries ago. Keep in mind that not all species' distributions have
contracted, the coyote being one example. Use contemporary maps showing North
American (and beyond) animal distribution, such as those found in the field guide,
Mammals of North America, by Roland W. Kays and Don E. Wilson, Princeton University
Press, 2002 or the North American Mammals web site mentioned above. A few
suggested species are elk, brown bear, wolf, coyote, puma, condor, and the various grouses.

III.b.   Homologs, Analogs, and Natural Variation
At the time of the Corps of Discovery, Darwin’s big book on the evolution of species was
more than a half-century into the future. Lewis and Clark understood species in an entirely
different way than people have since Darwin. To these men, species were fixed, unchanging
entities. Variations within species were often regarded as imperfections resulting from the
contingencies of growth, development, and the environment. Animals that looked alike
were not imagined to share a common ancestor.

Yet they often remark that a new animal reminds them of a familiar animal and it is
common to explain something new in terms of something old. Have your students read
some of the journal accounts of species, such as pronghorn, brown bear, bighorn sheep,
mountain goat, Clark’s grebe, etc., and observe how they struggle with categorization.

III.c.   Form, Function, and Adaptation
Select Quicktime VR images of skulls from different families of bird (e.g., Birds of prey,
Waterfowl, Gallinaceous, Passerine and Woodpeckers). Students should be able to make
observations about proportion and shape of bill and relate the shape distinctions to diet
and functional differences. Hypothesize function from form. What makes each of these
families unique?

III.d.   Diet and Dento-Facial Adaptations
Using the Quicktime VR images, compare the Fox/Coyote/Wolf. These species can be
found in the same ecosystem and yet each is adapted to a unique niche. Students should
look specifically at size of skull, length of teeth, shape of snout, etc. Can your students infer
from these observations any hypotheses about feeding habits?

Authored by Susan Metcalfe and Robert Costello

On the next two pages, see a chart correlating lesson plans with standards of
learning and skills.
### National Science Education Standards

This table cross-references Life Science Standards (C) developed by the National Academies, approved by the Governing Board of the National Research Council, and published in 1995. They have since served as a guide for science standards throughout the states, in both the public and private sectors.

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<td>Science: Knows that good scientific explanations are based on evidence and scientific knowledge</td>
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<td>Science: Knows ways in which organisms interact and depend on one another through food chains and food webs in an ecosystem</td>
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<td>Language Arts: Uses descriptive language that clarifies and enhances ideas</td>
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### Mapping Biodiversity

**Science:** Knows how the interrelationships and interdependencies among organisms generate stable ecosystems that fluctuate around a state of rough equilibrium

**Geography:** Understands how relationships between soil, climate, and plant and animal life affect the distribution of ecosystems

**Geography:** Transforms primary data into maps, graphs, and charts

**Language Arts:** Understands the advantages and disadvantages of using maps from different sources and different points of view

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### Extension to Mapping Biodiversity

**Science:** Knows ecosystems in terms of their biodiversity and productivity

**Science:** Knows the effects of both physical and human changes in ecosystems

**Language Arts:** Understands the advantages and disadvantages of using maps from different sources and different points of view

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### Homologous and Analogous Forms

**Science:** Knows how organisms are classified into hierarchy of groups and subgroups based on similarities that reflect their evolutionary relationships

**Science:** Uses text features and elements to support inferences and generalizations about information

**Language Arts:** Uses reading skills and strategies to understand a variety of informational texts

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### Form, Function, and Adaptation

**Science:** Knows how organisms are classified into hierarchy of groups and subgroups based on similarities that reflect their evolutionary relationships

**Science:** Understands biological evolution and diversity

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### Diet and Dento-Facial Adaptations

**Science:** Knows how organisms are classified into hierarchy of groups and subgroups based on similarities that reflect their evolutionary relationships

**Language Arts:** Uses reading skills and strategies to understand a variety of informational texts