INSTRUCTIONAL OBJECTIVE: to help students understand Lewis and Clark’s historical expedition by exploring the native plants and surroundings in Idaho Botanical Garden’s Lewis and Clark Native Plant Garden.
Dear Teacher/Group Leader,

Idaho Botanical Garden is an outdoor learning environment. We want to make your visit comfortable and enjoyable, and ask that your students are dressed appropriately for the weather and have water, especially in the warm weather months.

THE MATERIALS INCLUDE:

- Background information for use during discussion with the students about Jefferson’s stated object of expedition – look for a direct water route and describe geography, soils, animals, minerals...and find new plants. Also, the teacher could discuss with the class why Jefferson was interested in new plants, such as he wanted to improve the U.S. economy by developing new sources for food, medicine, and plant landscape material.

- Background information about Lewis’ plant training, the methods he probably used to collect plants, and the kinds of information he included in his plant journal entries. The teacher can use this information during a discussion of how scientists use the same methods Lewis used when collecting plants, such as journal entries with descriptions of plants and collection location, sketches and taking plant samples. Class can practice on a plant the teacher brings to class, and with plant photographs.

- Post-visit: Using plants collected at IBG, students will mount the plants after they are pressed and dried. The teacher may assign them to research the plant for potential useful features and any Native American connection.

DURING THE TOUR AT THE GARDEN

The guide will review with class the expedition’s objectives with emphasis on the plant-related part. They will hike up path talking about the most interesting plants that a whole class can see at once. The guides will describe Native American use and the significance of certain plants during the expedition.

During the tour the children will create a plant journal entry, including a sketch, and will conduct plant collecting activities. To do this they will break into groups of 4 or so and work on designated plants. They will be given forms and writing materials to record observations and will be instructed on how to proceed. **The class will need to bring a phone book or a simple cardboard/newspaper plant press** (instructions provided with these materials) in which to place small plant samples if they will use the plants in a
follow-up activity at school. Lewis used when collecting plants, such as journal entries with
descriptions of plants and collection location, sketches and taking plant samples. Class can practice on a
plant the teacher brings to class, and with plant photographs.

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**TEACHER MATERIALS**

IBG Lewis and Clark tour materials are based upon those of the Missouri Historical Society,
www.lewisandclarkexhibit.org.

**BACKGROUND INFORMATION**

Jefferson's Instructions to Meriwether Lewis From
http://www.monticello.org/jefferson/lewisandclark/instructions.html
Bold added by Idaho Botanical Garden.

“To Meriwether Lewis, esquire, Captain of the 1st regiment of infantry of the United States of America.

“Your situation as Secretary of the President of the United States has made you acquainted with the
objects of my confidential message of Jan. 18, 1803, to the legislature. You have seen the act they passed,
which, tho’ expressed in general terms, was meant to sanction those objects, and you are appointed to
carry them into execution.

“ Instruments for ascertaining by celestial observations the geography of the country of the country thro’
which you will pass, have been already provided. Light articles for barter, & presents among the
Indians, arms for your attendants, say for from 10 to 12 men, boats, tents, & other travelling apparatus,
with ammunition, medicine, surgical instruments & provision you will have prepared with such aids as
the Secretary at War can yield in his department; & from him also you will receive authority to engage
among our troops, by voluntary agreement, the number of attendants above mentioned, over whom you,
as their commanding officer are invested with all the powers the laws give in such a case.

“As your movements while within the limits of the U.S. will be better directed by occasional
communications, adapted to circumstances as they arise, they will not be noticed here. What follows will respect your proceedings after your departure from the U.S.

“Your mission has been communicated to the Ministers here from France, Spain, & Great Britain, and through them to their governments: and such assurances given them as to it’s objects as we trust will satisfy them. The country of Louisiana having been ceded by Spain to France, the passport you have from the Minister of France, the representative of the present sovereign of the country, will be a protection with all its subjects: and that from the Minister of England will entitle you to the friendly aid of any traders of that allegiance with whom may happen to meet.

“The object of your mission is to explore the Missouri river, & such principal stream of it, as, by it’s course & communication with the water of the Pacific ocean may offer the most direct & practicable water communication across this continent, for the purposes of commerce.

“Beginning at the mouth of the Missouri, you will take observations of latitude and longitude at all remarkable points on the river, & especially at the mouths of rivers, at rapids, at islands & other places & objects distinguished by such natural marks & characters of a durable kind, as that they may with certainty be recognized hereafter. The courses of the river between these points of observation may be supplied by the compass, the log-line & by time, corrected by the observations themselves. The variations of the compass too, in different places should be noticed.

“The interesting points of the portage between the heads of the Missouri & the water offering the best communication with the Pacific ocean should be fixed by observation, & the course of that water to the ocean, in the same manner as that of the Missouri.

“Your observations are to be taken with great pains & accuracy to be entered distinctly, & intelligibly for others as well as yourself, to comprehend all the elements necessary, with the aid of the usual tables to fix the latitude & longitude of the places at which they were taken, & are to be rendered to the war office, for the purpose of having the calculations made concurrently by proper persons within the U.S. Several copies of these as well as of your other notes, should be made at leisure times, & put into the care of the most trustworthy of your attendants, to guard by multiplying them against the accidental losses to which they will be exposed. A further guard would be that one of these copies be written on the paper of the birch, as less liable to injury from damp than common paper.

“The commerce which may be carried on with the people inhabiting the line you will pursue, renders a knowledge of these people important. You will therefore endeavor to make yourself acquainted, as far as a diligent pursuit of your journey shall admit, with the names of the nations & their numbers; the extent & limits of their possessions; their relations with other tribes or nations; their language, traditions, monuments; their ordinary occupations in agriculture, fishing, hunting, war, arts, & the implements for these; their food, clothing, & domestic accommodations; the diseases prevalent among them, & the remedies they use; moral and physical circumstance which distinguish them from the tribes they know; peculiarities in their laws, customs & dispositions; and articles of commerce they may need or furnish, & to what extent.

“And considering the interest which every nation has in extending & strengthening the authority of reason & justice among the people around them, it will be useful to acquire what knowledge you can of the state of morality, religion & information among them, as it may better enable those who endeavor to
civilize & instruct them, to adapt their measures to the existing notions & practices of those on whom they are to operate.

“Other objects worthy of notice will be the soil & face of the country, it's growth & vegetable productions, especially those not of the U.S. the animals of the country generally, & especially those not known in the U.S. the remains & accounts of any which may be deemed rare or extinct; the mineral productions of every kind; but more particularly metals, limestone, pit coal & saltpeter; salines & mineral water, noting the temperature of the last & such circumstances as may indicate their character; volcanic appearances; climate as characterized by the thermometer, by the proportion of rainy, cloudy & clear days, by lightening, hail, snow, ice, by the access & recess of frost, by the winds, prevailing at different seasons, the dates at which particular plants put forth or lose their flowers, or leaf, times of appearance of particular birds, reptiles or insects.

“Altho' your route will be along the channel of the Missouri, yet you will endeavor to inform yourself, by inquiry, of the character and extent of the country watered by its branches, & especially on it's Southern side. The North river or Rio Bravo which runs into the gulph of California, are understood to be the principal streams heading opposite to the waters of the Missouri, the character of the intermediate country, & the people inhabiting it, are worthy particular enquiry. The Northern waters of the Missouri are less to be enquired after, because they have been ascertained to a considerable degree, and are still in a course of ascertainment by English traders & travelers. But if you can learn anything certain of the most Northern source of the Mississippi, & of it's position relative to the lake of the woods, it will be interesting to us. Some account too of the path of the Canadian traders form the Mississippi, at the mouth of the Ouisconsin river, to where it strikes the Missouri, and of the soil and rivers in it's course, is desirable.

“In all your intercourse with the natives treat them in the most friendly & conciliatory manner which their own conduct will admit; allay all jealousies as to the object of your journey, satisfy them of it's innocence, make them acquainted with the position, extent, character, peaceable & commercial dispositions of the U.S., of our wish to be neighborly, friendly & useful to them, & of our dispositions to a commercial intercourse with them; confer with them on the points most convenient as mutual emporiums, & the articles of most desirable interchange for them & us. If a few of their influential chiefs, within practicable distance, wish to visit us, arrange such a visit with them, and furnish them with authority to call on our officers, on their entering the U.S. to have them conveyed to this place at the public expense. If any of them should wish to have some of their young people brought up with us, & taught such arts as may be useful to them, we will receive, instruct & take care of them. Such a mission, whether of influential chiefs, or of young people, would give some security to your own party. Carry with you some matter of the kine pox, inform those of them with whom you may be, of it's efficacy as a preservative from the small pox; and instruct & encourage them in the use of it. This may be especially done wherever you may winter.

“As it is impossible for us to foresee in what manner you will be received by those people, whether with hospitality or hostility, so it is impossible to prescribe the exact degree of perseverance with which you are to pursue your journey. We value too much the lives of citizens to offer them to probably destruction. Your numbers will be sufficient to secure you against the unauthorized opposition of individuals, or of small parties: but if a superior force, authorized or not authorized, by a nation, should be arrayed against your further passage, & inflexibly determined to arrest it, you must decline it's further pursuit, and return. In the loss of yourselves, we should lose also the information you
will have acquired. By returning safely with that, you may enable us to renew the essay with better calculated means. To your discretion therefore must be left the degree of danger you may risk, & the point at which you should decline, only saying we wish you to err on the side of your safety, & to bring back your party safe, even if it be with less information.

“As far up the Missouri as the white settlements extend, an intercourse will probably be found to exist between them and the Spanish posts at St. Louis, opposite Cahokia, or Ste. Genevieve opposite Kaskaskia. From still farther up the river, the traders may furnish a conveyance for letters. Beyond that you may perhaps be able to engage Indians to bring letters for the government to Cahokia or Kaskaskia, on promising that they shall there receive such special compensation as you shall have stipulated with them. Avail yourself of these means to communicate to use, at seasonable intervals, a copy of your journal, notes & observations of every kind, putting into cypher whatever might do injury if betrayed.

“Should you reach the Pacific ocean, inform yourself of the circumstances which may decide whether the furs of those parts may not be collected as advantageously at the head of the Missouri (convenient as it supposed to the waters of the Colorado & Oregon or Columbia) as at Nootka sound or any other point of that coast; & that trade be consequently conducted through the Missouri & U.S. more beneficially than by the circumnavigation now practiced.

“On your arrival on that coast, endeavor to learn if there be any port within your reach frequented by the sea-vessels of any nation, and to send two of your trusty people back by sea, in such way as shall appear practicable, with a copy of your notes. And should you be of opinion that the return of your party by the way they went will be eminently dangerous, then ship the whole, & return by sea by way of Cape Horn or the Cape of Good Hope, as you shall be able. As you will be without money, clothes or provisions, you must endeavor to use the credit of the U.S. to obtain them; for which purpose open letters of credit shall be furnished you authorizing you to draw on the Executive of the U.S. or any of its officers in any part of the world, in which draughts can be disposed of, and to apply with our recommendations to the consuls, agents, merchants or citizens of any nation with which we have intercourse, assuring them in our name that any aids they may furnish you shall be honorably repaid, and on demand. Our consuls Thomas Howes at Batavia in Java, William Buchanan of the Isles of France and Bourbon, & John Elmslie at the Cape of Good Hope will be able to supply your necessities by draughts on us.

“Should you find it safe to return by the way you go, after sending two of your party round by sea, or with your whole party, if no conveyance by sea can be found, do so; making such observations on your return as may serve to supply, correct or confirm those made on your outward journey.

“In re-entering the U.S. and reaching a place of safety, discharge any of your attendants who may desire & deserve it; procuring for them immediate payment of all arrears of pay & cloathing which may have incurred since their departure and assure them that they shall be recommended to the liberality of the legislature for the grant of a souldier's portion of land each, as proposed in my message to Congress: & repair yourself with your papers to the seat of government.

“To provide, on the accident of your death, against anarchy, dispersion & the consequent danger to your party, and total failure of the enterprise, you are hereby authorised, by any instrument signed & written in your own hand, to name the person among them who shall succeed to the command on your decrease, & by like instruments to change the nomination from time to time, as further experience of the characters accompanying you shall point out superior fitness: and all the powers
& authorities given to yourself are, in the event of your death, transferred to & vested in the successor so named, with further power to him, & his successors in like manner to name each his successor, who, on the death of his predecessor shall be invested with all the powers & authorities given to yourself.

“Given under my hand at the city of Washington, this 20th. Day of June 1803.”

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LEWIS’S BOTANICAL TRAINING

Lewis had the soul of a plantsman. A typical day on the trail found him looking for plants. In dangerous places and at inopportune times, Lewis collected plants. So long as circumstances permitted, even in improbable situations, he collected. It was not only his duty to collect, it was his passion. Equally remarkable, he wrote with enthusiasm about them in the voluminous journals and in numerous notes on the blotting papers used to dry the plants.

Lewis’s descriptions could be brief but were often quite detailed. The following is from his account of plant, Clarkia pulchella, that botanist Frederick Pursh would later name in honor of expedition co-leader, Captain William Clark.

“I met with singular plant today in blume of which I preserved a specimine; it grows on the steep sides of the fertile hills near this place, the radix is fibrous, not much branched, annual woody, white and nearly smooth. the stem is simple branching ascending, 2 ½ feet high celdic, villose and of a pale red color...the style which elevates the stigma or lib is not a tube but solid tho’ it’s outer appearance is that of a monopetalous corolla swelling as it ascends and gliding in such manner into the limb that it cannot be said where the style ends, or the stigma begins;...I regret very much that the seed of this plant are not yet ripe and it is proble will not be so during my residence in this neighbourhood.”

Lewis’s comment is one of the rare journal entries where he records that he actually “preserved” a plant. Exactly how he preserved them is not certain, although he used some sort of plant press to flatten and dry the specimens, which rendered them easy to store and transport.

Why did Lewis pay such close attention to plants?

Lewis enjoyed observing and collecting plants. In addition, his mother was an herbalist. At the age of twenty-eight when Jefferson appointed Lewis to lead his company for the Pacific, he already knew the trees, grasses and flowers east of the Mississippi. But despite Lewis’s extensive practical training, President Jefferson realized that his personal secretary lacked some of the scientific skills he would need to make the most of his observations during the expedition. So in the spring of 1803 Jefferson sent Lewis to Philadelphia, the intellectual capital of the young country, to study with the greatest American scientists of the day – all of them friends of the President and members of the fledgling American Philosophical Society. In addition to celestial navigation and medicine, Lewis studied the science of botany. And although he spent but a few weeks in Philadelphia, Lewis may have learned botany from University of Pennsylvania professor Benjamin Smith Barton. He purchased Barton’s botany primer, the first of its kind produced in North America, as well as a guide to the plant classification system of the Swede, Carl Linnaeus, although Lewis rarely used Latin terminology in his journal writings.
THE LEWIS AND CLARK HERBARIUM

Lewis's journals are peppered with observations of the forests, prairies, and wildflowers that the Corps encountered. But most important for science, Lewis pressed and preserved his specimens for future study. The 226 plant specimens that survived the journey were dried, pressed specimens on herbarium sheets. Most are now housed in the Lewis and Clark Herbarium of The Academy of Natural Sciences. The plants of the Lewis and Clark Herbarium that survive today are comparable in quality to other two-hundred-year old specimens in museums around the world. The methods Lewis used are likely to be the same that botanists employ today.

We can imagine how Lewis worked. He clipped or pruned plant parts or uprooted entire specimens, and placed them in a dry oilskin bag. Later, laying the plants flat on a specimen page, Lewis sandwiched them between pages made of blotting material. He recorded the collection locality, date, and habitat on the blotter paper itself, along with occasional comments on how the Native Americans ate or used the plants. Lewis then stacked the plants between two boards and tied the plant press together with straps. Lewis probably placed the plant press near the evening fire, where warm air helped dry the collection. Over the course of several days, water was pressed from the plants, and once dry, specimens were kept flat and dry in another press. Much later, other botanists glued the specimens to high-rag-content herbarium sheets and stored them in protective cabinets in a museum.

What happened to the plants? Upon his return to the East, Lewis turned the plants over to others, and despite a rather convoluted history, the plants were kept remarkably free from harm and have been passed down to later generations of scientists. Now, at the beginning of their third century, the plants still fascinate. We can still see the flowers that must have caught Lewis's attention when he first plucked them. We can discern the angled knife cuts where branches and twigs were severed from parent plants. On some of the herbarium sheets we read in Lewis's own handwriting where and when they were collected, or of the uses the American Indian tribes had for these plants, or a comment that shows the beauty that Lewis saw in these plants, new to him and to science.

**DO THE FOLLOWING ACTIVITIES BEFORE YOUR VISIT TO THE GARDEN**

**INTRODUCTION TO THE EXPEDITION**

**Share with the class:**

*Thomas Jefferson’s instruction to Meriwether Lewis in full or chosen excerpts. Ask the question, “Why do you think Thomas Jefferson was interested in plants?” Discuss with the class.*

In Lewis and Clark: Across the Divide, historian Carolyn Gilman explained the answer this way: “‘New and ‘useful’ were the criteria that governed Lewis’s collecting, requiring him to recognize and reject plants already known to science, and gather only novel ones with some use. He was not motivated purely by abstract science; lucrative plant cures and crops could be important to commerce. Medicinal and psychoactive plants discovered
earlier – particularly sassafras and tobacco – were pillars of the republic's economy. As the Napoleonic wars in Europe cut into commerce, there were urgent calls to find America's dependence on foreign medicine. As a result, Lewis showed a preference for medicinal plants, food plants, and showy flowering plants with potential for gardening and landscaping, and those that represented the climate or landscape.

**DISCUSS WITH THE CLASS:**
What would Lewis need to know to be able to identify, collect, and preserve plant specimens so that people back home could learn about them? Remember, there were no computers, not television, no cameras, etc.

How could Lewis have learned this information? Examples: looked at books, talked to plant experts, visited botanical collections, and studied the vocabulary botanists use to describe plants.

Once Lewis found a plant to collect, what do you imagine he would have done with it in order to preserve it?

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**PRACTICE PLANT OBSERVATION ACTIVITY**

**PURPOSE:**
To have students practice describing plants

**Length of Activity:** 1 hour over two days

**Materials:**
- Bunch of beets with leaves still attached or a complete common flowering plant
- Labeled Plant Diagram – one per student
- Blank Plant Diagram – one per student
- Numbered Plant images – one per pair of students

**BACKGROUND:**
Meriwether Lewis not only collected plants, he described them in his journals. He included information of where they grew, how they grew what they looked like and how people used them. This information could help others find and identify those plants in the future.

**EXPLAIN TO THE CLASS** that botanists use special terms to refer to plant parts, how they appear and are shaped. This makes it easier for botanists, plant scientists, to be sure that they understand each other and can identify a plant from its description. Here are some basic descriptors that the students should use to describe a plant. Use the completed diagram to help them learn basic plant anatomy. They can test their knowledge by putting the following terms in the correct blanks; the definition of each term is given below. (Worksheets on following pages)

**Flower:** the reproductive unit of angiosperms (flowering plants)
**Flower Stalk:** the structure that supports the flower
**Leaf:** the mostly flat structures that grows from the stem whose main function is to make food for the plant
**Petiole:** a leaf stalk; it attaches the leaf to the stem
**Root:** the structure that obtains water and minerals from the soil, stores energy and provides support for the plant
**Stem:** the main support of the plant
**Show the students** the plant and have them describe it without using its’ name. Discuss and write on the board the kinds of words used: color, shape, smell, texture, size, plant parts – flower, leaf, stem root...

**Distribute plant images,** one for each pair of students. Have them produce a neatly written or typed description of what they see. Assign each description a letter. Make up a document with all the descriptions and make copies for the students.

The next day, place the plant images around the room. Give the students the list of descriptions. Ask them to match the descriptions to the plants. They should write next to the assigned letter of the description, the number designation of the photograph of the plant that matches that description. Such as description “A” is of plant “7”.

Write the plant photograph numbers on the board and ask the students which description letter they assigned to each. List the responses on the board to determine how good the descriptions were. Find out if all the descriptions assigned to a particular plant were the same. Discuss any problems the students may have encountered.

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**DO THE FOLLOWING ACTIVITIES AFTER YOUR VISIT TO THE GARDEN**

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**POST FIELD TRIP ACTIVITY**

At the Idaho Botanical Garden the student will make a written description of a plant, sketch it, collect part of the plant, and bring it back to school to be mounted after it has dried. If you’d like, have them research some special information or cool fact about the plant they collected, as well as were it grows naturally. They should add this information to the section at the bottom of the Plant Data sheet they get on the field trip.

**Purpose:**
To have students practice the process and skills used by botanists to dry, press and mount a plant specimen.

**Materials:**
- Plant press made at school, or a phone book – BRING IT WITH YOU ON THE FIELD TRIP!
- White glue
- 8.5” X 11” card stock or posterboard, one per student
- Paintbrushes or cotton swabs for applying glue to card stock

**How to make a plant press:**
Items Needed:
- Large piece of cardboard
- Four thick rubber bands
- Sheets of old newspaper
- Scissors
Making the Plant Press:
- Cut the cardboard into four 4” X 8.5” rectangles
- Cut the newspaper into 36 4” X 8.5” rectangles
- Put down one piece of cardboard, place 12 rectangles of newspaper on top. Add a piece of cardboard to the pile, and cover with 12 pieces of paper. Do so once more and finish with a piece of cardboard on top.
Label the diagram with the following terms:

Flower
Petiole
Shoot
Leaf
Stem
Taproot
PLANT DIAGRAM FOR PRACTICE PLANT OBSERVATION ACTIVITY

- Sacajawea’s Bitterroot*
- Sulfur Buckwheat
- Snowberry
- Ponderosa Pine
- Arrowleaf Balsamroot
- Red-osier Dogwood
- Rubber Rabbitbrush
- Nootka Rose
- Black Hawthorn
- Quaking Aspen
- Blue Camas
- Lewis’s Flax
- Western Columbine
- Indian Blanket

*These plants can be seen in the Lewis and Clark Native Plant Garden at the Idaho Botanical Garden, except for Sacajawea’s Bitterroot. This plant is endemic to Idaho, but was not found by the Lewis and Clark Expedition. The Common Bitterroot is found in IBG’s Lewis and Clark Native Plant Garden.
2.
LS. Life Sciences
   LS1.A: Structure and Function
   Plants have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (LS1-4-1)

SS. Social Studies
   Standard 1: History
   Goal 1.1: Build an understanding of the cultural and social development of the United States.
   Identify characteristics of different cultural groups in Idaho (4.SS.1.1.1)
   Describe ways that cultural groups have influenced and impacted each other. (4.SS.1.1.2)
   Explain the role of explorers and missionaries in the development of Idaho. (4.SS.1.1.3)

Goal 1.3: Identify the sovereign status and role of American Indians in the development of the United States.
   Identify the five federally recognized American Indian tribes in Idaho: Coeur d’Alene, Kootenai, Shoshone-Bannock, Nez Perce, and Shoshone-Paiute Tribes and current reservation lands. (4.SS.1.3.1)
   Discuss how Idaho’s tribes interacted with and impacted existing and newly arriving people. (4.SS.1.3.2)

Standard 3: Economics.
   Goal 3.1: Explain basic economic concepts
   Describe and analyze how American Indians and early settlers met their basic needs of food, shelter, and water. (4.SS.3.1.1)