NEZ PERCE ETHNOBOTANY: A SYNTHETIC REVIEW

Report to Nez Perce National Historical Park
Spalding, Idaho

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I. Abstract

Plants contributed to traditional Nez Perce culture in both material and spiritual dimensions. Two important determinants of winter village location involved plants: local availability of early spring plant foods and accessibility of driftwood. Nez Perce seasonal travels were also planned largely around food plant availability. Plant foods provided over half the dietary calories, with winter survival depending largely on dried roots, especially kouse and camas. Techniques for preparing and storing winter foods enabled people to survive times of colder winters with little or no fresh foods. Favorite fruits dried for winter were serviceberries, huckleberries, elderberries, and chokecherries. Nez Perce textiles were made primarily from dogbane, tules, and western redcedar. The most important industrial woods were redcedar, ponderosa pine, Douglas-fir, willow, and hard woods such as yew and syringa. Yarrow and lovage were important medicinal plants, and plants such as wild rose and river sage were used for purification and spiritual protection. Most plants were important in more than one way.

II. Management Summary

Introduction and Objectives

Traditional Nez Perce culture was closely tied with the natural world, and plants had great importance materially and spiritually. Understanding Nez Perce relationships with the plant world can contribute to the overall understanding of Nez Perce culture, including subsistence, technology, medicine, spiritual matters, settlement patterns, travels, social organization, and relationships with other groups. Several studies have considered aspects of Nez Perce plant use in the context of other topics, but to date there has been no formal in-depth study of Nez Perce ethnobotany in all its ramifications. This paper reviews available data on Nez Perce plant use and synthesizes published information about the importance of plants in Nez Perce culture. The primary information sources for this study are:

- Observations by early Euroamerican explorers, botanists, and missionaries
- Information provided to researchers by Nez Perce people during the past 200 years
- Information published by Nez Perce people
- The archaeological record
- Photographs

Research Findings

For thousands of years, the people living in Nez Perce territory traveled extensively during the spring, summer, and autumn. Originally, they traveled on foot and by canoe. After they acquired horses during the early 1700's, they were able to carry more and journey farther. They spent their winters in villages, surviving on foods they had collected during the growing

season. The villages were usually located along major river valleys, where people had access to fish, water, driftwood, and the earliest fresh spring plant foods. The first plant foods of a new growing season were very important, releasing the people from their winter dependence on dried foods. After staying close to the village in winter, in spring they resumed their organized pattern of seasonal movement, traveling to specific areas in a planned sequence. The areas to which they traveled were determined primarily by availability of plant foods and fish in sufficient quantities to allow gathering extra supplies for winter. Hunting was not usually a primary factor in determining the areas visited, as people hunted wherever they were. Likewise, technologically-important plants normally did not direct travels because most of them were available in the same areas as food plants. Medicinal and spiritually important plants were usually gathered individually rather than as a group and thus were not important determinants of group travels. The general pattern was to move higher in elevation as the season progressed, following the availability of maturing roots and berries. By late summer, most of the people were in the mountains, and in the autumn they returned to the river valleys in time for the autumn fish runs. Seasonal travels gave the Nez Perce people access to fresh plant foods during six to seven months of the year and allowed them to accumulate and store enough food for the other five to six months. Prepared foods could be stored much longer than one year, so in years of abundance extra food supplies were cached in case of future food scarcity.

Plant Foods

Plant foods provided more than half the energy in the traditional Nez Perce diet, and dried plant foods, especially root foods, were crucially important to survival during the winter. Root foods were also important in trading with other groups who did not have them locally available in quantity. The most important Nez Perce root foods were kouse (qaws, dried tuberous roots of various species of the genus *Lomatium,* including cous (qá·msit, *L. cous)* and the favorite, Canby biscuitroot *(*qeqí·t, *L. canbyi)*), bulbs of camas (qémes, *Camassia quamash*), and tuberous roots of yampa (cawítx, *Perideridia gairdneri*). Together camas and kouse constituted the bulk of root foods stored for the winter. Bitterroot (litá·n, *Lewisia redeviva*) and wapato (*Sagittaria latifolia*) were also favorite root foods, but they are not abundant in Nez Perce territory and were obtained mostly through trade with groups from other areas. Other root foods were also eaten and stored for winter.

Many people, representing different Columbia Plateau groups, gathered annually in certain root food areas, especially large camas meadows such as those near Weippe and Moscow, Idaho. They came to these gatherings to dig roots, but also to visit friends, trade, dance, arrange marriages, play games, and race on foot or on horseback. These large gatherings were also the time when people arranged joint trips across the Bitterroot Mountains to hunt bison. The social importance of these get-togethers is demonstrated by the fact that Nez Perce people participated in gatherings at large camas grounds outside of Nez Perce territory, even though they had more than enough camas within their own homeland. Contemporary powwows and the stick game circuit have roots in these traditional camas-digging activity groups.

Lomatiums were the earliest source of fresh spring greens, and other spring vegetables included shoots of balsamroot (*Balsamorhiza* spp.) and cow-parsnip (ʔayc ʔayc, *Heracleum lanatum*). Spring greens were important to health because they provided vitamins, especially vitamin C, at a critical time of the year. The inner bark of certain trees was also a spring food, and it served as an emergency food at other times of the year.

Black tree lichen (ho·póp, *Bryoria fremontii*) was another vegetable food eaten in emergencies but also part of the regular diet. Some vegetable foods required special preparation to detoxify them or make them digestible. The long and labor-intensive process of pit-roasting camas and black tree lichen is a notable example.

Fruits most enjoyed by Nez Perce people and dried for winter include serviceberries (kel and kikéye, *Amelanchier alnifolia*), huckleberries (cemítk and ʔalaʔá·la, *Vaccinium* spp.), elderberries (míttip, *Sambucus cerulea* and mexseme míttip, *S. racemosa* var. *melanocarpa*), and chokecherries (tíms, *Prunus virginiana* var. *melanocarpa*). Other fruits dried for winter include "willowberries" (*Cornus sericea* ssp. *sericea*) and hackberries (*Celtis reticulata*). Hackberries are a very rich source of calcium and, along with kouse, probably contributed to the strong teeth of the Nez Perces (Scrimsher 1967: 81).

Plants in Technology

Industrial applications of plant materials in Nez Perce culture include fiber-based technologies (cordage, matting, basketry), the use of wood, and miscellaneous technological applications of non-woody plant parts. Nez Perce fiber technology used a variety of plant materials, but among the most important were dogbane (qeemu, *Apocynum cannabinum*), tules (tóko, *Scirpus acutus*), sedges (*Carex* spp.), and western redcedar (talátat, *Thuja plicata*). Dogbane was the material used for most fine string and twine, including the cordage used to make fish nets and cornhusk bags. This cordage was sought in trade by groups who could not obtain dogbane locally, including people from the Northwest Coast. Sedges probably provided much of the general-purpose Nez Perce cordage, ranging from the diameter of twine to that of thick rope. Big sagebrush (*Artemisia tridentata*) bark was used to make cordage for situations where abrasion resistance is important. A particularly interesting type of cordage is the stiff rope made from twisted willow stems (táxs, *Salix exigua*) or strips of willow bark and used for bridges, ladders, and lines to tie up canoes and rafts.

Matting was a versatile textile with many uses ranging from roofing and floor covers to clothing, food platters, and burial wrappings. Tules and, to a lesser extent, cattails (tóko, *Typha latifolia*), were the primary structural materials for Nez Perce mats. Tule mats were usually sewn together with cordage made from dogbane, sedges, or sagebrush bark. Other mats were made from bundles of grass and/or sedge, and these mats were probably used for sleeping and furniture. Stiff mats for drying fish were made from stalks of broomgrass and other more rigid materials.

Nez Perce baskets were of two basic kinds: soft flexible and stiff coiled. The Nez Perces used soft, flexible, round or flat baskets to gather and store roots. Nez Perce women may even have originated the techniques for making the soft flat bags ("cornhusk bags") characteristic of the Columbia Plateau. These bags were originally made from dogbane cordage. More recent versions use commercial string or twine, cornhusks, and commercial yarns made of wool, cotton, or synthetic materials. Sagebrush bark, cattails, and redcedar bark were used to make other types of soft baskets.

For cooking, carrying water, and gathering berries, stiff baskets were required. These were usually made from the roots of Western redcedar and were coiled rather than twined. Cooking and water-carrying baskets were waterproof because they were so tightly made, though sometimes they might also be coated with pitch. Stiff coiled baskets were also used

to store berries for the winter. Special bottomless coiled baskets were secured to rocks for hopper mortars used for mashing roots and other foods.

Although the lower portions of the Nez Perce homeland and the sites of winter villages are mostly areas of open shrub steppe or grassland, wood was available from trees growing in draws, on north-facing slopes, or alongside streams. Drift logs floating down the rivers were also a very important source of wood. The major industrial woods were western redcedar, ponderosa pine (lá·qa, *Pinus ponderosa*), Douglas-fir (páps, *Pseudotsuga menziesii*), willow, yew (támqay *Taxus brevifolia*), syringa (sisé·qiy, *Philadelphus lewisii*), serviceberry, and oceanspray (hisiimseqe, *Holodiscus discolor*). Of these, redcedar and yew were only available in the mountains (including the Moscow Mountains) or as driftwood. Dugout canoes were usually made from western redcedar, ponderosa pine, Douglas-fir, cottonwood (qápqap, *Populus balsamifera* var. *trichocarpa*) or sometimes quaking aspen, because these woods are lightweight and easy to work. Tools such as root digging sticks and bows required harder woods: yew, syringa, serviceberry, hawthorn (císnim, *Crataegus douglasii*, or télx, *C. columbiana*), and oceanspray. Wood frames for both temporary and permanent houses were usually made from poles of willow or lodgepole pine (qalámqalam, *Pinus contorta*).

Other plant parts were also used in Nez Perce technology. Roots/rhizomes, leaves, flowers, and fruits were brewed in hot or boiling water to produce dyes used for coloring baskets, mats, hide clothing, and other objects. Animal calls were made from hollow stems such as elderberry and cow-parsnip. Fluffy materials such as cattail down were used for insulation, cushioning, and absorption. The grains of silicon embedded in horsetails (sáyxsayk, *Equisetum* spp.) made them good polishers and fine abrasives. Conifer pitch and resin from buds and leaves of cottonwood were good adhesives. Soap was obtained from syringa leaves, flowers, or bark, clematis leaves (*Clematis ligusticifolia*), and cottonwood ashes.

Medicinal and Spiritually Important Plants

Medicinal and spiritual values of plants are more in the private realm. Traditional Nez Perce medicines were largely plant-based, and a wide variety of plants was used in healing. Most plants had more than one medical application. Yarrow (wapalwá·pal, *Achillea millefolium*) and lovage (qawsqá·ws, *Ligusticum canbyi*) were especially important medicines. Plants that provided spiritual purification and protection include wild rose (tá·msas, *Rosa* spp.), juniper (*Juniperus spp.*), true fir (pátoy , *Abies spp.*), and river sage (heqé·qe, *Artemisia ludoviciana*).

Plants were also used cosmetically (soaps, perfumes, hair tonic, face paints) and for entertainment (gambling and various other games, toys, music). Most plants were used in more than one way. For example, fernleaf lomatium was used for food, technology, medicine, and spiritual applications, and ponderosa pine was used for food, beverages, technology, medicine, spiritual applications, cosmetic purposes, and confections.

Euroamerican Influence

The arrival of Euroamericans in the Pacific Northwest began a period of profound change in Nez Perce life. The people were forced to abandon their traditional patterns of movement and to become sedentary on reservations that were a small fraction of their traditional homeland. Their relationships with the plant world changed drastically. By the

mid-twentieth century, most Nez Perce people relied more on agricultural crops than on gathering, preparing, and eating traditional foods (Harbinger 1964: 28, 52; Elizabeth Wilson in Harbinger 1967: 82; James 1996: 12, 17; Marshall 1977: 9-10). Commercial products such as cotton string or jute were now the materials most frequently used in weaving (James 1996: 63). Wool blankets, canvas, and commercially produced furniture were used in place of traditional matting. Metal and ceramic vessels served many purposes for which baskets or wooden containers were traditionally used. Mat lodges were difficult to construct due to scarcity of materials and were largely replaced with plank houses.

Despite all this, many Nez Perce families managed to maintain cultural traditions. In recent years the Nez Perce people have developed formal programs to preserve and reclaim their cultural heritage. More children are being instructed in traditional ways, and Nez Perce traditions are increasingly being incorporated into contemporary Nez Perce life. Many contemporary Nez Perce people include traditional foods in their diet.

Implications for Nez Perce National Historical Park

It is important that the Nez Perce Tribe be consulted before planning any of the following suggested projects and that Nez Perce people are closely involved with any implementation of these potential activities.

Culturally-Important Plant Habitats

- Most of the habitat for Nez Perce culturally-important plants has been drastically altered during the past 150 years through agricultural and industrial development. This makes it especially important to preserve remaining habitats. The published literature documents certain areas that were important traditional sources of plant resources. Some areas under National Park Service custody were undoubtedly among these, e.g. Big Hole National Battlefield and Heart of the Monster units of Nez Perce National Historical Park. Studies monitoring the effects of gathering activities on populations of food plants or technologically-important plants would provide baseline data helpful in land management decisions. This would have to be done through cooperative agreements with other land management agencies and landowners. Vegetation monitoring would involve establishing semi-permanent vegetation plots in areas regularly used for food collecting with control plots in comparable areas that are not used. Appropriate sampling methods are reviewed in Elzinga, et al. (1999). Regular inventory of microplots in the areas selected for study would monitor any changes in vegetation. Recording the amount and timing of human use in the study areas would allow researchers to evaluate relationships between this use and any vegetation change.
- A survey of traditionally used areas and evaluation of management policies could determine if any additional management methods could encourage targeted plant species. For example, traditional digging practices appear to help camas populations remain vigorous, and prescribed fire in camas meadows might stimulate camas growth. Musselshell Meadows, Camas Prairie, and Big Hole Battlefield would be candidates for experimental treatment by fire. In berrypicking areas, prescribed burning might increase both the number of plants and the number of fruits produced by each plant. However, any prescribed burning projects should be very carefully planned, carried out only when weather and vegetation conditions are appropriate,

and closely monitored. Such projects should include documentation of pre-treatment vegetation through establishment and sampling of monitoring plots in both treated areas and in control areas subject to similar use. Regular plot inventory of both burned and control areas would enable quantitative evaluation of fire effects on plant populations.

- Some of the traditional gathering areas impacted by development might be good candidates for habitat restoration. The low meadows in the Heart of the Monster unit of Nez Perce National Historical Park (near Kamiah, Idaho) probably supported camas before they were altered by agricultural use. The story of Nez Perce Creation reveals that as Coyote was being sucked into the Monster he left camas bulbs along the way. Since this story takes place near Kamiah, it suggests that camas used to grow there. Today the meadows are dominated by introduced pasture/hay grasses and alien weeds. For restoration to be possible, the aggressive weeds would first need to be removed, especially the grasses planted for hay. Carefully planned planting of native species including camas and non-chemical control of weeds during native plant establishment could create something resembling a natural camas meadow. Weed control during establishment of native plantings is a challenge and is labor intensive. However, a combination of biological control agents, carefully timed prescribed burning, and cutting/digging could be helpful. Since the town of Kamiah is on a site that formerly supported large stands of dogbane, dogbane may also have occurred in the Heart of the Monster unit. A restoration project for dogbane could also be developed, perhaps including cooperative agreements with adjacent landowners. The Kamiah Garden Club is actively interested in this kind of project and might want to be involved in cooperative efforts to restore habitats of culturally-important plants in their area.

Interpretation in Nez Perce National Historical Park

The current interpretive program at Nez Perce National Historical Park includes information on traditional plant use, and museum displays feature plant materials. Additional activities could enhance these excellent programs.

- The Spalding site and Big Hole Battlefield offer good opportunities for development of ethnobotanical trails. A number of traditionally important native plants still grow on the Spalding flood plains, including cottonwood, chokecherry, serviceberry, hackberry, wild roses, willow, and lomatium. An interpretive trail through the flood plain area could include discussion of how these plants and others were important in traditional Nez Perce culture. An ethnobotanical trail could also be developed at Big Hole Battlefield. At least 30 plants used by Nez Perce people occur at Big Hole, including camas, yampa, balsamroot, bitterroot, yarrow, elk thistle, pearhip rose, and Oregon-grape. Because of the diversity of plant species in the area, an interpretive trail would be a nice opportunity for people to learn how some of the traditionally important plants were used. Understanding the importance of plants often leads to a better appreciation for Native traditions and the importance of maintaining them. Such understanding can also draw attention to the negative impacts of uncontrolled development.

- At Spalding, an ethnobotanical garden could be designed to mimic natural plant habitats and could include a good variety of plant species important in traditional Nez Perce culture. Such a garden would be most easily maintained near the Visitor Center.

The garden could be arranged by habitat (wetland area, steppe, mini-forest), and interpretive signs could discuss plant uses. Local and regional gardening groups and other volunteers might be enlisted to help with the garden's establishment and maintenance. The Park is already considering growing native species in an on-site greenhouse, and if that becomes a reality, it could be a source for many of the plants in such a garden. Because of local aggressive weeds (e.g. poison-hemlock and yellow star-thistle) establishment of an ethnobotanical garden would involve a significant commitment of time to weed control.

- An ethnobotanical slide set could be developed for interpretive programs presented at the Spalding Visitor Center, illustrating traditionally important plants in their native habitats. Slides could show various stages of plant development as well as the material processed from the plant, if such detail is considered appropriate by the Nez Perce Tribe. For example, photographs of kouse might include the plant in its habitat, the roots as dug, and the processes of drying and grinding the roots and shaping them into cakes for storage. For fernleaf lomatium, the photographs could illustrate the young spring shoots, the large tuberous root, the plant in flower and fruit, and chopped roots. For cow-parsnip, appropriate photographs could include the young shoots on the plant and after they are peeled for eating, mature stems made into whistles, leaves on the plant and used as a poultice, and roots prepared for a medicinal decoction. For balsamroot, photographs could be used of the young flower stalks on the plant, with other views of peeled stalks, the plant's seed heads, and the seeds after processing. Photographs of dogbane could document the entire process of collecting stems, extracting the fibers, making cordage, and using that cordage in fishnets or basketry. Perhaps duplicates of the ethnobotanical slide set could be deposited at other visitor centers. Selected slides could be incorporated into various presentations to help visitors develop an appreciation for the close ties Nez Perce people have to the natural world and for the importance of preserving and restoring natural areas for Native use.
- If an agreement could be reached with people or agencies responsible for the land along the Grand Ronde River, it would be interesting to have an interpretive stop telling the story of How Beaver Stole Fire from the Pines and relating that story to the course of the river, the distribution of trees, and types of wood used for fire twirling sticks and hearths.
- If the Nez Perce Tribe considers it appropriate, another display could explain how during the 1877 persecution of Nez Perce people, the Joseph Band cached large quantities of kouse roots. The display would not specify where these roots were cached but could discuss how the U.S. Military burned the cache. Destruction of food caches was an appalling technique used to force Indians to abandon their traditional ways, cease resisting white settlement in their homeland, and conform to Euroamerican ideas of how they should live.

Museum Resources

- The Nez Perce Museum now has an ethnobotanical reference herbarium including 166 plant species. This includes nearly all of the plants that were traditionally the most important in Nez Perce culture and probably represents about half of the plants that were used. An active program of adding to this collection will increase its value through inclusion of additional species and through inclusion of other collections of the

same species. Including specimens of a plant such as camas from several different areas will illustrate variation and can demonstrate why certain areas were preferred for gathering. In addition, not all species in the collection were collected at more than one developmental stage. Collection of a plant at various growth stages (vegetative, flowering, fruiting) will help users recognize the plant at different times of the year. For woody plants, collection of winter twigs would also be a valuable addition.

- Museum Technician Linda Paisano has developed a proposal for building a reference collection of basketry materials. This reference collection would include samples of roots, bark, branches, and extracted fibers used in basketry. Each sample would include both "raw" and processed material and would be associated with a voucher specimen deposited in the ethnobotanical reference herbarium. Comparison of these reference materials with baskets and other textiles in the museum collection will greatly help in documenting the materials from which museum items were constructed. Such documentation can help in developing an overall understanding of plant materials used in different styles of basketry, changes in materials used through time, and why certain materials were used in particular ways.
- The ethnobotanical computer database developed for the current project is a good source of information about plants used by the Nez Perce people and other Columbia Plateau peoples. It is also a guide to published information about these plants. Information can be accessed in a variety of ways—by plant, by use category, by habitat, by authors of the articles—however the Park wishes to make it accessible. New plants can be added to this database and new information can be added for plants already included in the database. It would also be useful to incorporate digital photographs of the plants into the database system and to include reference to specimens in the ethnobotanical herbarium. The database can be helpful in a variety of Park programs: information for interpretive programs, planning Museum exhibits, and background information for land management decisions.
- The annotated bibliography that was part of this project constitutes another way of accessing information about Nez Perce ethnobotany. Each article, book, videotape, or other reference in the bibliography is accompanied by detailed information on the plants mentioned in the reference: habitat and distribution, description, uses, preparation methods, and available nutritional information.

Conclusion

Plants were intertwined in nearly all major aspects of traditional Nez Perce life and were important determinants of Nez Perce settlement patterns and seasonal travels. The Nez Perce National Historical Park and the Nez Perce people can use existing knowledge summarized in this report as a basis to determine what further studies would best contribute to understanding the importance of plants in Nez Perce culture and to Nez Perce educational programs.

III. Project Scope and Objectives

This project was developed by the Nez Perce National Historical Park (headquartered at Spalding, Idaho), with the assistance of Dr. Frederick York, Regional Anthropologist in the Seattle Office of the National Park Service. Work on this project was performed under contract.

The scope of this project is to document the importance of plants in Nez Perce culture and the use of plant resources within the traditional Nez Perce homeland.

Specific objectives of the project are:

1. To compile an annotated bibliography of publications and reports concerning the importance of plants in Nez Perce culture. This bibliography will be based on the archaeological record, ethnographic studies, popular articles, news reports, journals, and presentations.
2. To prepare a representative voucher collection of plants known (or suspected) to be or to have been important in Nez Perce culture. This voucher collection will include plant specimens, a photograph of the plant's habitat, and complete data about the locality where the plant was collected. The specimens will be carefully mounted using herbarium mounting techniques that maximize specimen conservation. A plant specimen may consist of more than one mounted sheet when more space is needed to provide a good representation of the plant. A plant species may be collected at more than one time to illustrate important features during different seasons of development. The voucher collection will be the core of the Nez Perce National Historical Park's herbarium. A set of duplicate specimens will also be prepared and offered to the Nez Perce Tribe for possible use in their educational programs.
3. To assemble a database of information on plants important to the Nez Perce people and other Columbia Plateau groups. The database will include plant names (Latin, Nez Perce, and English), a plant description, information on distribution and habitat, use category, specific uses, nutritional content, and other information.
4. To summarize Nez Perce plant use through time and make comparisons with plant use in other Columbia Plateau groups.
5. To discuss gaps in the documentation of Nez Perce use of plant resources and suggest possible future studies that may be helpful to 1) the Nez Perce Tribe in maintaining their cultural heritage and in having access to healthy populations of important plants, and 2) to the Nez Perce National Historical Park in managing Park lands to maintain and reestablish native plant communities and populations of plants important to the Nez Perce people.

IV. Summary of Foundation Studies in Ethnobotany

The term "ethnobotany" was coined in 1895 by John W. Harshberger, combining the words ethnology (the comparative study of people) and botany (the study of plants). Harshberger's work is regarded as the beginning of ethnobotany as an academic discipline (Harshberger, 1896). However, people have used plants as food, medicine, and technological resources ever since human origins. Ethnobotanists study the reciprocal relationships between cultures and the plants important to these cultures. Ethnobotany is a

synthetic science that draws upon expertise from different disciplines. The integrative focus of ethnobotanical study incorporates plant sciences (taxonomy, ecology, morphology, anatomy, genetic variation), social sciences (the anthropological study of religious and magical beliefs, social organization, cultural views of plants, and attitudes toward sharing cultural information), biochemistry, nutritional science, statistics, archaeological dating techniques, soil science, geography, and technological analysis. Plants have played major roles in determining the directions of modern culture, and ethnobotanists employ many disciplines in searching for answers to what these roles have been. At its core, ethnobotany is an observational science, but it requires detailed technical knowledge of plants.

Medicinal properties of plants

The first written records of human plant use describe plants used in medicine and are compilations of accumulated folk knowledge. They are called Herbals (Arber 1912). The earliest known Herbal is from Egypt, the Ebers Papyrus (1550 BC). The Ebers Papyrus gives instructions for herbal treatment of medical conditions. Plants discussed in this document include elderberry (*Sambucus* spp.), pine (*Pinus* spp.), onion (*Allium* spp.), poppy (*Papaver* spp.), and peppermint (*Mentha piperata*).

The earliest recorded formal investigations of relationships between plants and people were by Theophrastus, Greek philosopher and "Father of Botany." Theophrastus was a student of Plato and Aristotle, and in 323 BC he succeeded Aristotle as leader of the Lyceum (Aristotle's school and research institute). While Aristotle's interest in plants was abstract and philosophical, Theophrastus developed a more concrete approach, seeking "real-world" explanations. Theophrastus' manuscript, Historia Plantarum or "Enquiry into Plants," was published about 2300 years ago (about 300 B.C.). Volume 9 of this treatise deals with medicinal plants ("Of the Juices of Plants, and of the Medicinal Properties of Herbs"). Theophrastus aggregates the mythical and folk medicine of his time and includes observations made by Alexander the Great about medicinal plants.

The next recorded major study of plants used to improve human health was by Pedanios Dioscorides, a Greek physician living in the first century AD, about 400 years after Theophrastus. During his travels as an army surgeon Dioscorides recorded the medicinal uses of hundreds of plants. His manuscript, De Materia Medica, (appearing about 70 AD), describes over 500 plants used in medicine, listing plant name, habitat, morphological description, drug properties, medicinal uses, side effects, dosages, methods for harvesting and storage, detection of adulteration, veterinary uses, and magical and other non-medical uses. De Materia Medica remained the definitive source of information on medicinal plants for over 1500 years.

The studies documented in the Ebers Papyrus, Historia Plantarum, and De Materia Medica were early efforts to develop a formal approach to the study of relationships between plants and people. They laid the foundation for the formal study of ethnobotany.

The first known Anglo-Saxon herbal is the Herbarium of Apuleius Platonicus, completed late in the 11th century and apparently copied from a Greek herbal. The first herbal printed in the English language appeared in 1525 (author unknown). One of the greatest Chinese medical works, Pen Ts'ao (The Herbal), was compiled from ancient sources by Li Shih-Chen between 1550 and 1578. The year 1597 marks the first appearance of one of the most important books on plants ever published in the English language, John Gerard's The Herball (Gerard 1633). This book is still in print today (Gerard 1975).

In 1785, William Withering published results of his study of foxglove, An Account of the Foxglove and Some of its Medical Uses (Aronson 1985). This is considered one of the first modern studies in ethnobotany and an important advance in medicine because Withering employed a multidimensional approach. After hearing reports that gypsies used a mixture of herbs to treat edema (tissue swelling due to water accumulation), Withering interviewed a folk healer, obtained the formula used for the treatment, and determined that the active ingredient was foxglove, *Digitalis purpurea*. He then investigated the pharmacological activity of foxglove, saw the connection between foxglove and heart activity, and reported his results to his own culture with suggestions for further research. Another early example of a multidimensional approach was the isolation of an alkaloid from the Calabar bean[1] by two German chemists. They discovered that this substance greatly reduced pressure in the eye and thus found a treatment for glaucoma (Holmstedt 1972).

Plants in human diet and technology

Early studies of useful non-medicinal plants were stimulated by economic considerations. Christopher Columbus was sent by Queen Isabella of Spain to find a direct ocean route to the East Indies in the hope that Spain could control trade of spices such as cinnamon and black pepper. While the purpose of Columbus' voyage was finding an expeditious way to secure one category of useful plant (spices), another result was to bring back plants previously unknown in Europe. These included corn, cotton, bananas, tobacco, and allspice. From his observations of indigenous people using these plants in areas he visited, Columbus saw that they had great economic potential in Europe (Hobhouse 1986). Columbus was not an ethnobotanist, but his ethnobotanical discoveries were certainly significant and stimulated great interest in searching for other useful plants in little-known areas of the world. In 1663, this interest stimulated one of the more scientific early studies of indigenous plant use when John Josselyn spent eight years in New England studying plant use by American Indians (Josselyn 1674).

In the mid-1700's Carolus Linnaeus of Sweden significantly advanced ethnobotany with his study of plant uses by the Sami of Lapland. This may be the first time a formal study was conducted in order to learn about another culture rather than to find new plants useful to the culture of the investigator. Linnaeus was arguably the greatest observational biologist of his day, and he developed the currently accepted system of binomial nomenclature for plants[2]. In his study of the Sami he pioneered several ethnobotanical techniques: careful observation and recording, establishing a deep rapport with the people he studied,

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[1] The Calabar bean was the "ordeal bean" used in Nigerian tests of innocence.

[2] The Linnaean system of nomenclature is based on a hierarchical system of classification that infers relationship based primarily on reproductive features of plants (e.g. flower parts, fruit types). Each Linnaean plant name has two parts, the genus and the specific epithet, in Latin (or Latinized) words. The generic name of a plant tells us that, based on morphology, the plant is most similar to other species in the same genus. The genus name also indicates higher levels of classification of that plant, such as the family to which it belongs. For example, ponderosa pine (*Pinus ponderosa*) is more similar to other pines (e.g. lodgepole pine, *Pinus contorta*) than it is to members of other genera such as Engelmann spruce (*Picea engelmannii*). The name *Pinus* also indicates that pines are grouped with true fir (*Abies*), spruce (*Picea*), Douglas-fir (*Pseudotsuga*), and other coniferous genera in the pine family, Pinaceae, and that these genera are more similar to each other than to genera in a different family such as the willow family, Salicaceae.

learning the local languages, eating indigenous foods, and using indigenous plants in the same ways as the indigenous peoples did (Linnaeus 1737).

Joseph Banks, botanist on Captain Cook's voyage of 1770, made detailed observations of Australian plants and their use by aborigines. Banks' work stimulated many further studies of aboriginal plant use (Beaglehole 1962).

During the nineteenth century, ethnobotanical studies expanded. When Commander Charles Wilkes led the U.S. Exploring Expedition of 1838-1842 to Antarctica, he spent the Antarctic winters in the South Pacific. While in Samoa, Wilkes became interested in the titi ("leaf skirt"). Wilkes researched how this skirt was made and experimented with Samoan techniques for coloring barkcloth (Gray 1971). Kirkwood (1864, 1867) studied the ethnobotany of other important fiber plants: flax (*Linum usitatissimum*), hemp (*Cannabis sativa*), milkweed (*Asclepias* sp.), and nettles (*Urtica* sp.).

Ethnobotany in the Twentieth Century

A major change in the theoretical focus of ethnobotany developed during the late nineteenth century (Ford 1978).Previously, interviews and observation had been the basis of descriptive compilations of <u>cross-cultural</u> plant use. Anthropologists in the late nineteenth century recognized the need for systematic studies of relationships between plants and <u>individual</u> cultural groups. Ethnobotanical studies became more directed toward understanding thought patterns and cultural perceptions. The first published study employing this more inclusive concept was in 1916 by Robbins et al. (Castetter 1944). Succeeding twentieth-century ethnobotanical studies have generally taken the following approaches: plant use in cultures of the past, general studies of plants used currently in daily life, cross-cultural use of particular plants, nutritional studies and phytochemistry, indigenous agriculture, cultural ecology, and folk classification.

Plants and Past Cultures (Paleoethnobotany, Archaeobotany)

Though not an anthropologist or a botanist, explorer Thor Heyerdahl has conducted interesting experiments revealing ancient technological possibilities that were not previously recognized. Heyerdahl's studies of the feasibility of long-distance travel in vessels made of balsa, cattails, papyrus, and tules demonstrated that old civilizations such as those of Egypt and Polynesia had the technological capacity for ocean travel, perhaps for considerable distances (e.g. Heyerdahl 1953, 1958, 1978; Heyerdahl and Sjölsvold 1956). Heyerdahl's studies have also enabled new interpretations of the origins of the geographic distribution of certain food plants such as sweet potatoes, corn, and squash (Cutler and Balke 1971).

Many twentieth-century archaeological studies include analysis of plant use. Among archaeological sites in the American West that have been particularly significant to understanding plant use by past cultures are Lovelock Cave (Harrington 1929), the Palouse/lower Snake River rockshelters (Mallory 1966; Leonhardy and Rice 1970; Plew 1990; Endacott 1992; Hicks and Morgenstein 1994), Ozette (Croes 1977, 1980; Gill 1983), Hoko (Croes 1995), Calispell (Thoms 1987, 1988), sites in southwest Wyoming (Smith and McNees 1999), and various southwestern U.S. sites (Castetter and Bell 1942). Archaeological materials from Lovelock Cave, Fort Rock, the Palouse/lower Snake River rockshelters, and Hoko yielded significant information about plants used as a source of fiber for cordage, matting, basketry, duck decoys, and clothing. The Calispell excavations occurred in a

camas processing area, and a study of various sites in southwest Wyoming analyzed pit ovens used for processing other root foods. The Ozette site is in a mudslide that created an anaerobic environment, preserving much information about plants used for house construction, fiber, and food in a coastal environment (Croes 1977, 1980; Gill 1983).

Studies of human coprolites (fossilized excrement) have provided other data on food plants (Callen and Cameron 1960; Callen 1963). Charcoal from archaeological sites evidences fuel sources and plants cooked in pit ovens (Cook 1964). Tree ring and pollen studies analyze past environments and suggest how these relate to the plants used by people in the past (Haury 1935; Eiseley 1939; Deevey 1944; Anderson 1955; Giddings 1954; Bannister 1962; Martin and Sherrock 1964).

Studies of Plants used in Daily Life

Richard E. Schultes pioneered modern studies of psychoactive plants and was an early proponent of interdisciplinary studies (Schultes and Hofmann 1979; Schultes 1990, Schultes and Raffauf 1992). Studies of psychoactive plants yield insights into the origin and character of complex religious beliefs (Davis 1978). Schultes' studies are also important because of his techniques: botanical exploration, collection of voucher specimens, detailed recording of indigenous rituals and beliefs, and careful analysis. Many other studies of plant use in daily life have also made important contributions to our understanding of ethnobotany. These include Chamberlin's studies with the Gosiute Indians (Chamberlin 1911), Gunther's work with Pacific Coast peoples (Gunther 1945); studies of Blackfoot ethnobotany by Johnston and by Hellson and Gadd (Johnston 1962, 1970; Hellson and Gadd 1974); Yarnell's ethnobotanical work (Yarnell 1959, 1964), Turner's studies with British Columbia First Nations (e.g. Turner 1979; Turner et al. 1980; Turner et al. 1990; Turner 1997), and Leighton's work with the Cree (Leighton 1985).

Cross-Cultural Use of Particular Plants

Nancy Turner's work in British Columbia and northern Washington State has been a tremendous contribution toward understanding and documenting the importance of plants in indigenous Pacific Northwest groups. Turner's 1977 paper on black tree lichen is particularly important because so many early reports described this lichen (*Bryoria fremontii*) as an emergency food only. Turner was able to document that this was definitely not the case, that this lichen was an important and favored regular food among many interior Northwest groups. Turner's study of the cottonwood mushroom (hípew, *Tricholoma populinum*) (Turner et al. 1986) analyzes the nutritional contributions of this mushroom that was used by many North American indigenous groups. Several of her other studies compared the importance of certain plants and plant classification in various Northwest groups (Turner 1974, 1987, 1988a).

Other studies of cross-cultural use of individual plants focus on camas (Statham 1982; Turner and Kuhnlein 1983), piñon pine (Floyd and Kohler 1990), echinacea (Kindscher 1989), psoralea (Kaye and Moodie 1978), sunflowers (Heiser 1951, 1976), lichens (Perez-Llano 1944; Turner 1977), and members of the parsley family (Hunn and French 1981; Kuhnlein and Turner 1986; Meilleur et al. 1990; Hazlett 1991).

A 1965 comparison of non-use of edible plants in two Columbia Plateau indigenous groups presents interesting evidence for the importance of cultural factors in determining dietary composition (Strodt 1965).

The work of researchers like those cited has enabled compilation of encyclopedic information on plant use in North America (e.g. Millspaugh 1974; Beckstrom-Sternberg et al. 1994; Francois and Duke 1998; Moerman 1977, 1998).

Phytochemistry, Nutritional Studies, and Medicinal Properties

In early investigations of human reactions to poison-ivy and poison-oak (*Rhus radicans and R. diversiloba*), James McNair (1921, 1923) used an innovative approach that combined chemical analysis of the plants with experimentation using human volunteers. He found differences in toxic potency of poison-ivy at different growth stages and proposed chemical explanations. Another chemically-oriented study relates a high diabetes rate among indigenous peoples to adoption of a western diet (Nabhan 1989).

Nutritional analysis of plants emphasizes the importance of certain plants in the indigenous diet as well as the importance of preparation methods (Yanovsky and Kingsbury 1938; Konlande and Robson 1972; Benson et al. 1973). Investigations by Timothy Johns and others (Johns and Kubo 1988; Johns 1990) analyze how people have increased the usefulness of poisonous plants through preparation methods and detoxification. Some researchers have developed the concept of optimal foraging: that people will give more effort to securing the foods that will provide them with the greatest nutritional benefit (Smith 1983). However, this approach is somewhat controversial, as there are many other influences on people's allocation of time to securing various food resources.

The search for new sources of medicine has relied on ethnobotanical studies, especially in tropical areas where habitats are undergoing tremendous destruction (Cox and Balick 1994; Plotkin 1993). However, such studies also raise questions about intellectual property and the ethics of obtaining information from indigenous groups for commercial application (see discussion on p. 18, under "Ethnobotany Today").

Indigenous Agriculture

Studies of the development and importance of agricultural crops in indigenous groups have focused on sunflowers (Heiser 1951, 1976; Rieseberg and Seiler 1990), corn (Mangelsdorf 1964; Mangelsdorf et al. 1967; Beadle 1980; Bird 1980; Galinat 1985), peppers (Heiser and Smith 1953; Andrews 1986), potato family plants (Safford 1925; Yarnell 1959; Hawkes 1967; Heiser 1969; Grun 1990), beans (Mackie 1943; Kaplan 1981), millet (DeWet et al. 1983), squash and pumpkins (Bressani and Arroyave 1963; Paris 1989; Decker-Walters 1990), and avocados (Smith 1969; Storey et al. 1985). Recent studies have also focused on the development of agriculture itself in North America and the selective breeding of crop plants (e.g. Castetter and Bell 1942; Heiser 1951, 1969, 1976, 1981, 1985a, 1993; Galinat 1954; Woodbury 1961; MacNeish 1964; Flannery 1973; Iltis 1986). Recent analyses are redefining our concepts of what constitutes "agriculture" (Anderson 1991; Marshall 1999; Williams 1999).

Cultural Ecology

In 1980, a paper appeared which stimulated investigations on the large-scale importance of plants in Columbia Plateau indigenous groups. Kenneth Ames and Alan Marshall applied their familiarity with present and past cultures of the southern Columbia

Plateau to analyzing archaeological sites. Through their studies, they developed an explanation for major cultural change in the southern Plateau (Ames and Marshall 1980). Unlike previous studies, their paper credits sudden and profound changes in the way people lived to the changing availability and use of plant foods. This ecological paper caused many anthropologists to apply new and redefined criteria in their studies.

Cultural ecology is an important component of Nancy Turner's research. She has worked closely with First Nations peoples to ensure that traditional ethnobotanical knowledge is considered in the Canadian government's planning for management of ancient Pacific Northwest forests (Turner 1977, 1979, 1988a, 1988b, 1990).

Burning the Landscape

Use of fire as a vegetation and wildlife management tool has been documented in a number of different studies. Fire was used by indigenous people to create/maintain particular habitats as well as to improve conditions for the growth of specific plants, especially berry and basketry plants (Lewis 1973, 1977; Barrett 1979; Norton 1979; Barrett and Arno 1982; Williams 1999).

Plant Classification

The year 1966 marked the publication of an important paper that analyzed indigenous systems of plant and animal classification (Berlin et al. 1966). By stimulating discussions and inspiring researchers to study indigenous naming systems, this paper has helped anthropologists understand cultural perceptions of the natural world. Some subsequent studies have found similarities between indigenous plant taxonomy and the classification system of the scientific community (e.g. Turner 1988a).

Ethnobotany Today

Current ethnobotany reflects the influence of the trends outlined above. Ethnobotanical studies become increasingly important as loss of indigenous knowledge systems accelerates. Contemporary ethnobotanical studies concentrate on understanding how various cultures relate to the natural world and recording as much information as possible in order to preserve remaining knowledge. Some indigenous peoples desire to protect their knowledge of plant use by not sharing it with ethnobotanists or others from outside their culture. Other groups recognize how much of this knowledge has already been lost and assist ethnobotanists in recording remaining knowledge because they realize this will help preserve their cultural traditions. Conservation biology is an important component of contemporary ethnobotany. Ethnobotanists work closely with indigenous groups to preserve the biodiversity of their environment, including habitats of traditionally important plants.

Recent development of on-line databases providing information about plant uses (Beckstrom-Sternberg et al. 1994; Duke 1994; Moerman 1996; Sallah 1997; Earle 1999), have made information accessible to anyone with Internet access by way of a personal computer or Internet terminal. This is a boon because of the increased accessibility of information, but also a threat if this information is misused.

Contemporary ethnobotanists must deal with ethical issues related to intellectual property and indigenous rights. It is generally accepted today that indigenous consultants

willing to share information should be financially compensated. The actions of some drug and seed companies in "drug prospecting" and trying to patent traditional remedies or genetic material from traditionally important plants have caused indigenous people to be cautious about sharing their knowledge. Many of these people think that if such knowledge is commercialized they should be the ones to benefit, but others simply do not want commercialization of traditionally important plants in any form.

V. Previous Studies of Special Import to the Current Study

Theoretical/Methodological Models

Theoretical and methodological guidance for this analysis of the importance of plants in Nez Perce culture were provided by previous studies both within and outside of Nez Perce culture.

1) Studies interpreting the archaeological record: Mallory 1966; Leonhardy and Rice 1970; Ames and Marshall 1980; Pokotylo and Troes 1983; Plew 1990; Endacott 1992; Hicks and Morgenstein 1994; Chatters 1995; Lepofsky et al. 1996; Smith and McNees 1999,
2) Studies focusing on nutritional value and special preparation methods of native food plants: Harbinger 1964; Konlande and Robson 1972; Turner 1977; Hunn and French 1981; Timbrook 1982; Kuhnlein 1984; Norton et al. 1984; Kuhnlein and Turner 1986; Thoms 1987; Johns and Kubo 1988; Kuhnlein and Turner 1991, and
3) Other studies relating plants to cultural patterns: Strodt 1965; Statham 1975, 1982; Marshall 1977, 1999; Hart 1979; Churchill 1983; Theodoratus 1989; Hunn 1990; Meilleur et al. 1990; Gottesfeld 1992; and all of Turner's publications (e.g. 1974, 1977, 1978, 1979, 1988a, 1988b, 1990).

Subject Area

The earliest formal observations of Nez Perce ethnobotany by non-Nez Perce people were recorded by Thomas Jefferson's Corps of Discovery, led by Meriwether Lewis and William Clark between 1804 and 1806. Lewis, Clark, and other expedition members observed Nez Perce plant use, discussed plants with the people, and recorded the information in their journals (Coues 1893; Meehan 1898; Devoto 1953; Thwaites 1959 (1904); Ray 1971). Other early explorers, anthropologists, and visitors in Nez Perce territory also recorded some information on plant use (Cox 1957 (1832); Geyer 1846, 1847; Fletcher ca. 1890's; Sappington and Carley 1995). However, the next serious study of plant use by the Nez Perces was not until 100 years after the Lewis and Clark expedition, by Herbert Spinden (Spinden 1908a). Historical accounts also discuss Nez Perce plant use (McBeth 1908; McWhorter 1952, 1955; Josephy 1971; Ray 1974). The early reports are significant in that they record information about plants important in Nez Perce culture before it was vastly contaminated by Euroamerican influences.

The first detailed formal study of Nez Perce ethnobotany was by Lucy Harbinger, a graduate student at the University of Idaho (Harbinger 1964). Harbinger described the importance of plants in traditional Nez Perce culture and made comparisons with contemporary Nez Perce plant use. She documented certain cultural traditions centered on plants (e.g. the First Roots Ceremony) and described traditional Nez Perce meals. Harbinger

also listed important plants used for food, technology, medicine, and spiritual purposes, presented a Nez Perce system for classifying plants, and explained the traditional camas roasting process as described by a Nez Perce consultant.

Two other studies in the late 1960's also focus on the importance of plants in Nez Perce culture. Leda Scrimsher studied Nez Perce food plants and analyzed nutrient content of 14 of them, comparing this with nutrient content of analogous contemporary foods (Scrimsher 1967). Scrimsher found that the traditional Nez Perce foods discussed by her consultants were higher than contemporary analogues in all nutrients except iron and concluded that the abundance of calcium in the traditional diet was responsible for the Nez Perce people's strong teeth. She also pointed out that Nez Perce food storage procedures were the predecessors of contemporary "instant" foods and that fewer people were following a traditional diet. A study by Madge Schwede investigated the relationship of location of Nez Perce villages and camps with food resource availability (Schwede 1966). Schwede concluded that availability of fish was the primary determinant for village/camp location and availability of root foods was second.

Alan Marshall, in his doctoral dissertation, applied a broader view of factors influencing village location (Marshall 1977). Marshall's conclusions regarding plant foods differ somewhat from Schwede's. Whereas Schwede concluded that plant foods were of secondary importance in determining village location, Marshall concluded that plant foods were one of the primary factors. Marshall also includes firewood availability among the primary determinants of village location. Marshall's study individually analyzes the most important food plants and their relationship with Nez Perce movement patterns and social organization.

A subsequent analysis of southern Plateau demography and subsistence (Ames and Marshall 1980) was based on evidence in the archaeological record. This study presents evidence that climate change and availability of plant foods on the southern Columbia Plateau were in part responsible for the significant shift to a semi-sedentary way of life about 4500 years ago. Recently Jim Chatters has emphasized the importance of climatic change in stimulating this subsistence shift. His analysis credits food storage methods with enabling some groups to compensate for colder winters (Chatters 1995). According to this theory, groups without food storage technology either declined or left the area.

Angelo Anastasio considered many plant-related factors in his 1972 analysis of interactions among indigenous groups of the southern Columbia Plateau (Anastasio 1972). His analysis relates intergroup relations to subsistence activities including food collecting, preparation, and trade. Anastasio also stresses that plant foods (e.g. camas) and plant technologies (e.g. cornhusk bags) were an important determinant of Nez Perce political influence among Plateau groups. Nez Perce cornhusk bags and other plant-based manufactured items were highly desired in trade because of their fine workmanship. Certain plants were much more abundant in Nez Perce territory than in other areas, and the Nez Perces collected extra supplies of these to offer in trade. For example, Nez Perce camas bulbs were regarded as unusually high in quality. The extensive camas meadows in Nez Perce territory also provided an opportunity for other groups to gather with the Nez Perces to dig camas. These gatherings involved important social and political interchange.

Stuart Chalfant (1974: 99) concludes that the skill and specialization involved in Nez Perce food plant processing indicate that these plants have been important Nez Perce food items for a very long time. Specific studies of Nez Perce, Palouse, and other Plateau archaeological sites confirm the long-standing use of certain plants and provide other

information about plant use in the past (Swanson and Bryan 1954; Swanson 1962; Mallory 1966; Leonhardy and Rice 1970; Plew 1990; Endacott 1992; Mastrogiuseppe 1994, 1995, 1999). Leonhardy and Rice's paper is particularly important as it proposes a cultural chronology for the lower Snake River based on the archaeological record. This cultural chronology relates certain important social changes to plant foods.

A recent study by Caroline James analyzes the roles and attitudes of Nez Perce women (James 1996). James' book considers many aspects of culture, including plant use, and how Nez Perce women have adapted to social and political change.

Perhaps most important to understanding the importance of plants in Nez Perce culture are remarks and observations by Nez Perce people and the stories about plants in Nez Perce oral history (Phinney 1934; Slickpoo 1973; Broncheau-McFarland 1992; Axtell and Aragon 1997).

VI. Key Personnel

Joy Mastrogiuseppe is an ethnobotanist and plant taxonomist. She earned her B.S. in Biological Sciences and M.S. in Botany from Washington State University. She taught Botany at Paul Smiths College, Paul Smiths, New York, and was Curator of the Ownbey Herbarium, Washington State University, for 19 years. Since 1995, she has been Curator of the Washington State University Museum of Anthropology. Mastrogiuseppe has also served as consultant to various County, State and Federal Agencies, and has led workshops on various aspects of Botany and Ethnobotany. Recent work in ethnobotany includes identification and analysis of plant materials from archaeological sites in the Northwest U.S. and Alaska, learning about Northern Paiute use of plants, and identification of plant macrofossils associated with studies of past human environments. She also participates in the Northwest Native American Basketweavers Association and the California Indian Basketweavers Association.

Alan Marshall is an ethnoecologist, ethnobiologist, and cultural anthropologist at Lewis-Clark State College, Lewiston, Idaho. He earned his B.A. in Anthropology from the University of Minnesota, with a minor in Botany, and his M.A. and Ph.D. in Anthropology from Washington State University. Marshall is particularly interested in how people symbolize their relationships with their environment, especially their "natural" environment. He also studies Nez Perce social organization as related to environment, and his Ph.D. dissertation investigated this topic. He maintains a close relationship with the Nez Perce people and is a member of the Nez Perce Tribal Foundation Board. He serves as consultant for the Nez Perce Tribe concerning matters such as water rights and other issues of land use and Tribal rights. He also is a consultant for the U.S. Forest Service, the National Park Service, and private companies. Marshall has served as Consultant for the project summarized in this report.

VII. Methods

Technical terms are defined in the Glossary at the end of this report (p. 137).

Plant Names

Latin plant names used in this study are based on several sources. The primary sources are Hitchcock, et al. 1955-1969, Hitchcock and Cronquist 1976, and Hickman 1993. Recent research papers dealing with particular plants are the source of updated names not found in these primary references.

Nez Perce plant names and other Nez Perce terms are based primarily on Aoki 1994 with some spellings modified according to contemporary interpretations (Alan Marshall, personal communication 2000).

Nez Perce Place Names

Nez Perce place names not found in Aoki are spelled according to Sappington et al. (1995) and James (1996).

Bibliography

The annotated bibliography includes articles, scientific papers, books, and archival materials (letters, notes, photographs) selected for their relevance to Nez Perce ethnobotany and the ethnobotany of other Columbia Plateau indigenous groups. Materials were located through searches of library catalogues, Biological Abstracts, AGRICOLA (Agricultural On-Line Access), archives, local historical societies, references in published papers/books, and the Principal Investigator's previous work with the relevant literature. The primary libraries accessed are the Nez Perce National Historical Park library, Washington State University Libraries, Pullman, Washington, and the University of Idaho Library, Moscow, Idaho.

Library catalogues were searched via online catalogues over the Internet and local catalogues at the libraries. Key words searched for included "Nez Perce," "ethnobotany," "plants," "cultures," place names important in Nez Perce history, names of relevant archaeological sites, names of culturally important plants, and names of authors/investigators known to have involvement with studies of Columbia Plateau groups. References were chosen from the resulting lists based on potential relevance to Nez Perce ethnobotany and were included in the project bibliography if they contributed to the purposes of this study. As much as possible, selected documents represent Nez Perce plant use through time, and special effort was made to include time periods representing the evolution of Euroamerican attitudes towards indigenous peoples. Preference was given to studies involving consultation with and direct participation of Nez Perce people. The annotated bibliography includes documents involving various degrees of research and meticulousness, ranging from academicians using the scientific method through reports of non-professional interviews or anecdotal observations to fiction based on knowledge of Nez Perce plant use. Observations by early Euroamerican explorers are especially significant as they represent Nez Perce plant use before there was very much contamination by Euroamerican influence. Reports from archaeological excavations also provide important

information on Nez Perce plant use in the past and changes in Plateau groups related to plants.

Publication indices such as Biological Abstracts were searched via the CD-ROM edition for more recent publications and the books for older publications. The same key words and selection standards were employed as were used for searching library catalogues.

Database

Culturally-important plants mentioned in the documents found were tabulated in the Nez Perce ethnobotany database. The database is in the format of Microsoft Access 2000. The database includes the plants specifically documented in the literature as important to the Nez Perces, but it is not limited to these plants. It also includes plants not specifically documented as being used by the Nez Perces but known to be/have been important in other Plateau groups. These plants are thought to have a high probability of importance in Nez Perce culture at least in the past.

For each plant the following information was entered: Latin, Nez Perce, and English names, brief description, habitat, geographic distribution, plant parts used, use category, specific uses, any special preparation methods, nutritional value when that information is available, other plants used in similar ways, and other comments.

Voucher Collection

The purpose of the ethnobotanical voucher collection is to provide a representative sampling of plants important in Nez Perce culture. Criteria for including particular plants in the voucher collection were as follows.

1) Their importance as described by Nez Perce consultants involved in earlier studies
2) T heir importance in Nez Perce culture as documented by the literature
3) The frequency of their mention in the literature
4) Their presence in the archeological record
5) Plants used during different seasons of the year
6) Particularly interesting features of the plant's use or preparation, e.g. pit oven roasting, detoxification
7) Representation of different kinds of contributions to Nez Perce culture, e.g. spiritual cleansing, horse medicine
8) The availability/accessibility of the plant

A target plant list was developed based on these criteria. During botanical field work additional species were collected either because they are documented as important to other Northwest Native American groups or because they appear to have potential for use by Nez Perce people.

Plant collections focused on areas in traditional Nez Perce territory, but some specimens were collected in adjacent areas. Plants were collected only from populations of sufficient size and vitality that removal of plants would have little or no impact on the population. Whenever possible, plant specimens include all portions important to identification and all portions known to have been used by Nez Perces. For large plants, representative samples of important parts were collected. For example, for a shrub, the

collection might include a flowering branch, leaves, fruits, and a bark sample. When possible and appropriate, species were collected at different phenologic stages, e.g. young spring shoots, flowering, fruiting. Field notes recorded collection data: species, collectors, a unique collection number, collection date, locality, specific habitat, and comments about plant size, growth habit, abundance, flower color, and other interesting features. For most specimens the habitat was photographed on 35-mm slide film or color print film. Specimens were placed in plastic bags in an ice chest and pressed as soon as practical. Some delicate plants were pressed immediately in the field.

Each specimen was pressed as follows. The collection number and date were written on a sheet of newspaper or blank newsprint. The plants were arranged to fit a standard 11 ½" X 16 ½" sheet of herbarium paper and were folded or bent when necessary. The specimen was then put in a plant press consisting of two wooden ends and nylon straps. The newspaper containing the specimen was placed on a felt blotter with a double-face corrugate beneath. Another felt blotter and double-face corrugate were placed on top of the newspaper. When a specimen included bulky parts as well as delicate parts, a sheet of polyurethane foam was placed above the top blotter to even the pressure on the plant parts. The plant press was tightened with nylon straps fastened with slip-proof parachute buckles. It was then placed over moving air until the specimens were dry. To prevent possible insect contamination, dried plant specimens were frozen for at least two days at minus 20 degrees C before being brought into the Nez Perce National Historical Park Museum at Spalding, Idaho..

To prepare specimen labels, field notes were entered into a computer database (Microsoft Access). A merge file was developed in Microsoft Word and dynamically linked with the label database file. Labels were printed in a standard herbarium label format on 100 per cent rag content bond paper.

Photographic prints of the plant growing in its habitat were made directly from 35-mm slides by a commercial laboratory (Kodak, in Kent, Washington). These prints were somewhat disappointing, so color negative film was used for the remainder of the collections.

Voucher specimens were mounted in three stages:

1. Glue spray: Diluted white glue was sprayed on the back of the specimen, excess allowed to drip off, and the specimen placed on a 11 ½" X 16 ½" sheet of heavy weight 100 per cent rag herbarium paper that was laid on top of a double-face corrugate. The specimen was blotted to remove any excess glue, and weights used to keep plant parts in place. The specimen label was glued in the lower right-hand corner of the sheet with a paper-glue stick (UHU). A piece of waxed paper was placed over the herbarium sheet and a sheet of polyurethane foam on top of the waxed paper. A double-faced corrugate was placed on top of the foam sheet, and the next mounted specimen was placed on top of that corrugate. Specimens were stacked in this fashion with weight placed on top of the stack so as to minimize warping of the herbarium sheets as the glue dried. The stack of mounted specimens was placed in front of a fan to facilitate drying. Some specimens required more than one sheet to include the important representative plant parts.

2. Glue strapping: After the mounted specimens had dried, a hot glue gun was used to apply straps of hot-melt glue across plant parts. A paper-glue stick was used to attach a fragment packet and the habitat photograph to the sheet.

3. Sewing: Bulky specimens or large flat leaves were attached to the herbarium sheet by sewing with cotton button and carpet thread. A crewel needle was used to pull the thread straight through the herbarium paper, making a short stitch. The ends of the thread were tied with a surgeon's knot on the back side of the herbarium sheet, and a piece of book tape was placed over the knot. Typical places sewn include: a small stitch at right angles across a major leaf vein (passing through the leaf blade on either side of the vein), at right angles across a stem, and across the axis of a cone.

Standard-format National Park Service Museum Cataloguing forms were used to record important information about the specimen (plant name, classification, collectors and collection number, collection date, etc.) and accession numbers were assigned. The specimens are stored in insect-proof herbarium cabinets in the Nez Perce National Historical Park Museum at Spalding, Idaho.

VIII. Synthetic Overview of Nez Perce Ethnobotany

Introduction

> "September 20th, 1805. I set out early and proceeded on through a Countrey as ruged as usial passed over a low mountain and at 12 miles decended to a level pine Countrey, proceeded on through a butifull Countrey for three miles to a Small Plain in which I found maney Indian lodges. at the distance of 1 mile from the lodges, I met 3 Indian boys, when they saw me they ran and hid themselves in the grass, I desmounted gave me gun and horse to one of the men [and] gave them Small pieces of ribin & Sent them forward to the village. Soon after a man Came out to meet me, with great caution & Conducted me to a large Spacious Lodge . . . . The few men that were left in the Village and great numbers of women geathered around me with much apparent signs of fear. those people gave us a Small piece of Buffalow meat, Some dried Salmon beries & roots all of which we eate hartily."
>
> William Clark

With these words, William Clark recorded the first intrusion of Euroamericans into Nez Perce territory and the first direct meeting between the two cultures. A few Nez Perce people had previously encountered whites in other areas such as the lower Columbia River, but for most this was the first contact. Clark was leading an advance hunting party down the western slopes of the Bitterroot Mountains in search of food for Thomas Jefferson's Corps of Discovery. The Nez Perce people provided Clark with salmon, root foods, and berries, and he sent most of this food back to Meriwether Lewis and the main party of explorers. The kindness of the Nez Perces in providing this food saved the explorers from starvation.

The Nez Perce people are, in their own language, Nimipu, "the people" or "the real people." The story of the creation of the Nimipu involves a great battle between Coyote and a great monster that lived in the Clearwater Valley. Coyote allowed himself to be sucked into the monster, and, from the inside, he cut the monster into parts. Each part formed a different group of people. As Coyote held up the monster's heart, the first Nimipu sprang up from drops of blood. The heart itself was turned into a big rock that is still in the Clearwater Valley, near Kamiah.

The Nez Perce homeland is a land of river valleys, rolling hills, moist meadows, and forested mountains. Encompassing portions of what is now Idaho, Oregon, and Washington, traditional Nez Perce territory was centered on the middle Snake and middle Clearwater Rivers and their tributaries. The Nez Perce native land extends from the crest of the Bitterroot Mountains westward to the middle portion of the Snake River and the area of Dayton, Washington, northward to the Moscow Mountains and Lolo Pass, Idaho, and southward through the Wallowa Mountains, Oregon, and Salmon River Mountains, Idaho (Fig. 1). Elevation in this area ranges from about 700 ft. along river bottoms to over 10,000 ft. at the crest of the Bitterroot Mountains. Lower-elevation areas (the river valleys and the Palouse Hills) are dry, dominated by sagebrush steppe or bunchgrass prairie, with dry forests of ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) in moister spots such as north-facing draws and alluvial river bottoms. Valley slopes support colonies of smooth sumac (*Rhus glabra*), black hawthorn (*Crataegus douglasii*), snowberry (*Symphoricarpos albus*), and wild rose (*Rosa* spp.), as well as a rich variety of herbaceous

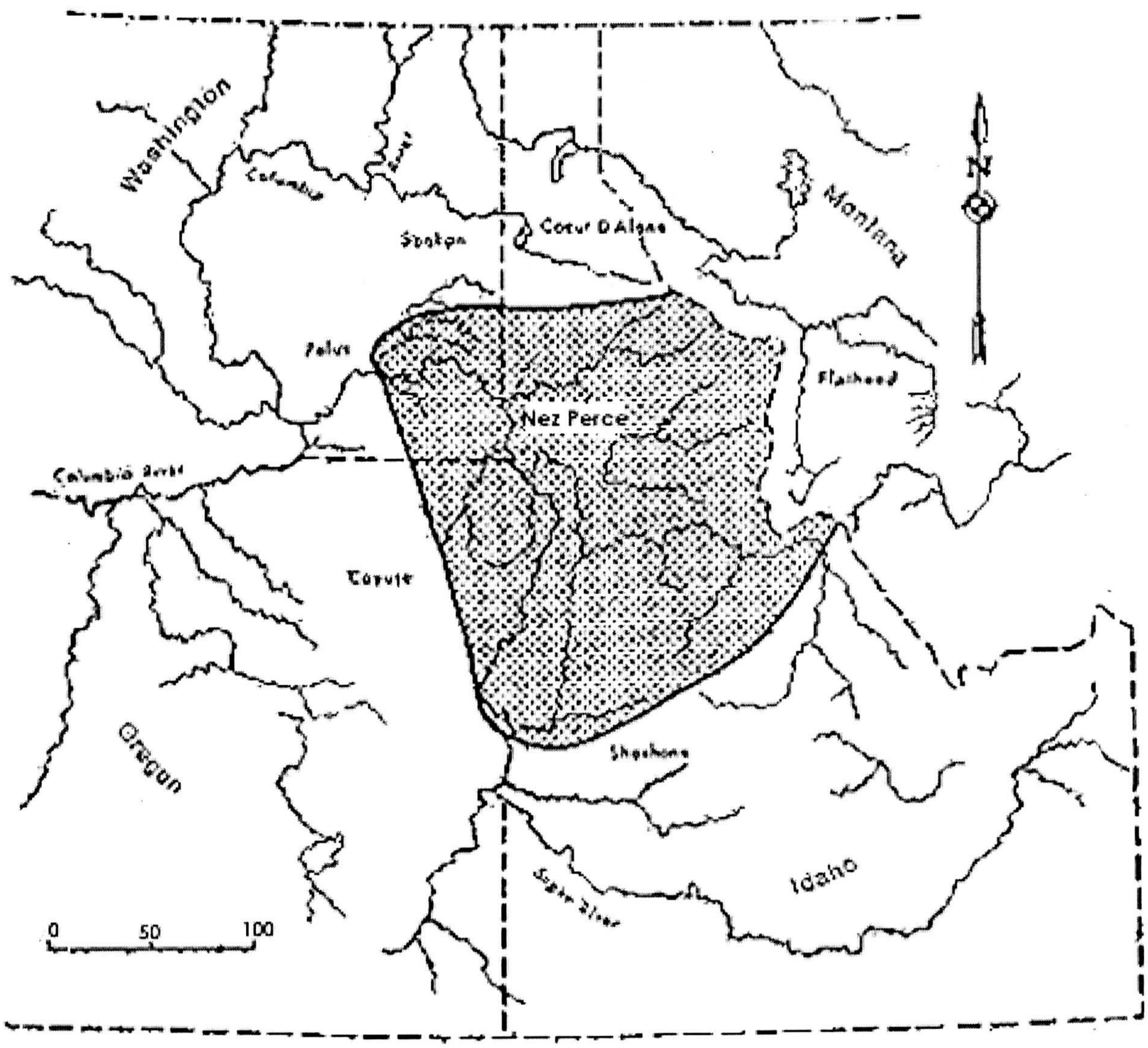

Figure 1. Pre-Reservation Nez Perce territory (from Marshall 1977: 2)

plants, mostly flowering in the spring. Rich riparian communities follow streams and lower slopes of draws, dominated by willow (táxs, *Salix* spp.), black cottonwood (qápqap, *Populus balsamifera ssp. trichocarpa*), quaking aspen (nisá·qapqap, *P. tremuloides*), alder (*Alnus* spp.), birch (*Betula* spp.), hawthorn (*Crataegus* spp.), hackberry (katámno, *Celtis reticulata*), red-osier dogwood or "willowberry" (piplá·c, *Cornus sericea ssp. sericea*), serviceberry (*Amelanchier alnifolia*), chokecherry (*Prunus virginiana*), and a variety of other shrubs. At higher elevations and in cooler tributary valleys slopes are clothed with mixed conifer forests including true fir (*Abies* spp.), western redcedar (talátat, *Thuja plicata*), tamarack or western larch (kimíle, *Larix occidentalis*), grand fir (pícpic, *Abies grandis*), Douglas-fir, western white pine (sé·ysey, *Pinus monticola*), lodgepole pine (qalámqalam, *P. contorta*), Engelmann spruce (*Picea engelmannii*), and, at high elevations and in frost pockets, subalpine fir (pató·sway, *Abies lasiocarpa*). The highest ridges support whitebark pine (lalxsáway, *Pinus albicaulis*) and subalpine larch (*Larix lyallii*).

The location of Nez Perce territory facilitated important trade links with Great Basin groups to the south, with other Columbia Plateau groups to the north, west, and east, with Northwest Coast groups to the west, and, especially after the arrival of the horse about 270 years ago, with Great Plains groups to the east. Archaeological evidence indicates that trade has long been important in Nez Perce culture and in the closely-related Palouse culture (Rice 1969; Leonhardy and Rice 1970: 9, 14; Broncheau-McFarland 1992: 58-67; Walker 1998). Even in cultural deposits thousands of years old, there are items that were not locally available within Nez Perce territory. These items include marine shells (e.g. *Olivella, Dentalium*) and obsidian from the northern Great Basin (Rice 1969; Ames, et al. 1998).

The staples of the traditional Nez Perce diet were fish and plant foods, together constituting 70-90% of the diet (Marshall 1977: 37; Churchill 1983: 44). For several thousand years before the arrival of Euroamericans in their homeland, Nez Perce people were highly mobile but spent their winters in "permanent" villages. During spring, summer, and early autumn, they moved to a series of seasonal camps, following the changing availability of food resources. Their general trend was to move higher as spring progressed into summer, accomplishing dual purposes. In higher places, plants were just reaching the best stages of development for gathering, and the higher areas are cooler. During autumn, the Nez Perce people returned to their winter villages, which were located in the valleys along major rivers or larger tributaries. Crucial resources determining village location were the availability of driftwood, of early spring root foods, and of year-round fish (Marshall 1977: 134). Usually families spent winter in the same village each year (Chalfant 1974: 105).

Women were responsible for maintaining a traditional Plateau household and performed most of the work necessary to do this (Boas and Teit 1930: 294; Wynecoop 1969: 11; Ruby and Brown 1970: 45; Hunn 1990: 137, 208; James 1996: 11-12). Women's tasks included gathering roots, greens, fruits, seeds, firewood (Fig. 2), medicinal plants, fiber plants, and natural coloring agents; making tools for collecting and preparing plant foods; preparing weaving materials; weaving baskets and bags; making fishnets; carrying water; keeping the fire going (fire-starting was usually done by men); setting up camps; constructing, maintaining, and dismantling lodges (men built lodge supports); hunting small game; processing meat and fish; maintaining fishing weirs; fishing with seine nets; caring for children; training daughters; and cooking meals. Plateau women also accompanied men on hunting trips that lasted more than one day and assisted with packing, made camp, cooked, tended the fires, and helped with the hunting (Ray 1932: 78). Due to their traditional roles, women were very closely associated with the plant world.

Figure 2. Tamapo, a Nez Perce woman, gathering wood.
From Nez Perce National Historical Park Photograph Archives NEPE-HI-2449, date unknown

Nez Perces in the Past

Cultural Changes through Time

Based on evidence from sites along the lower Snake River in Washington State, a chronology was developed that outlines cultural changes in this area during the past 12,000 years (Leonhardy and Rice 1970; Leonhardy 1980). The cultural history of this area is characterized by long periods of stability and then rather abrupt change (Leonhardy 1980). The Marmes Archaeological Site was especially valuable in developing an understanding of cultural changes, because it contained a nearly continuous record of human use over the past ten thousand years (Sheppard et al. 1987). Evidence from a variety of Columbia Plateau archaeological sites indicates that the general pattern of cultural change outlined by Leonhardy and Rice and refined by Ames and Marshall (1980), Leonhardy (1980), Chatters (1995), and others, occurred over much of the Plateau area. The timing of certain changes varies among local regions, and cultural changes along the Clearwater River differ to some degree from those along the lower Snake River (Sappington 1994). The following discussion focuses on cultural changes as they relate to plant materials.

Beginning more than 8000 years ago and until about 6300 years ago, seeds were apparently an important plant food source for people on the Columbia Plateau, evidenced by grinding rocks found at archaeological sites (Leonhardy and Rice 1970: 9). The grinding rocks were a platform on which seeds were ground into meal using a smaller rock (a mano) held in the hand. During this time people foraged in small mobile groups, moving their residence from one local area of productive food resources to another. Any storage of food supplies was minimal; foods were eaten as they were acquired. When the food in an area was used up, the people moved on to another area (Leonhardy 1980). The climate was cool and dry, and people used a moderate diversity of plant and animal foods (Chatters 1995: 387).

By about 5700 years ago, the climate had become somewhat warmer and drier. Around 5000 years ago, the climate became moister again, and people began living in more or less isolated pithouses, usually at the ecotone between forest and shrub steppe (Ames and Marshall 1980: 44; Chatters 1995: 388, 1998). Ecotonal areas are highly productive, and a greater diversity of foods would be available in these areas. Families remained in one location much longer than in earlier times, for more than a year, but they were still "opportunistic" foragers and did not rely on stored foods (Leonhardy 1980; Chatters 1995: 388). They left a local area when they had depleted the food resources available there.

But then, by about 3800-3700 years ago, there was a dramatic change. People rather suddenly (in archaeological terms) began following a very different way of life. They aggregated, living in "permanent" villages during the winter rather than moving from camp to camp or staying in an area only until locally available foods were depleted. The villages were mostly in river valleys but not necessarily located at the forest-shrub steppe ecotone (Chatters 1995: 361). In archaeological deposits from this time, grinding rocks are scarce and hopper mortar bases are frequent (Leonhardy and Rice 1970: 11; Leonhardy 1980). The hopper mortar is a stiff basket that is open at the bottom and secured in place over a rock that forms the base of the mortar (Fig. 3).

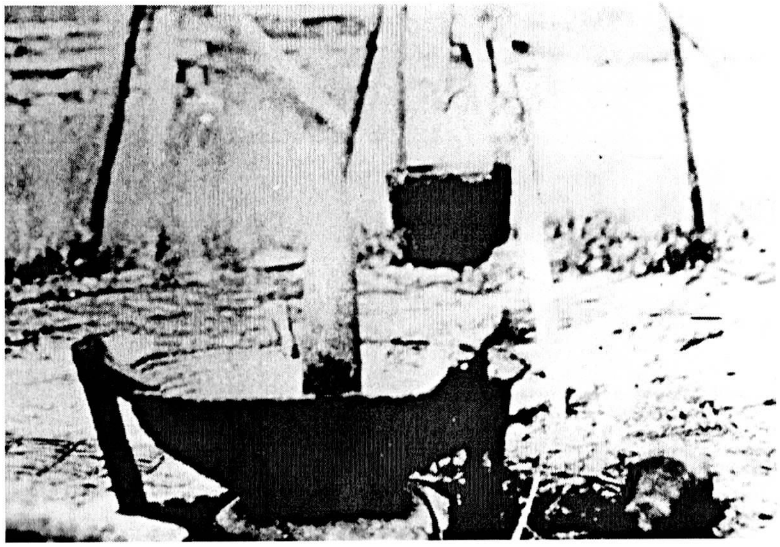

Figure 3. Hopper Mortar and Pestle
From Nez Perce National Historical Park Photograph Archives NEPE-HI-0370, date unknown

Hopper mortars were used with a pestle for crushing and mashing roots. The change from grinding rocks and manos in older cultural deposits to hopper mortars in more recent cultural deposits has been interpreted as an indication that root foods were becoming more important than seed foods. Handles from digging sticks are also found in archaeological deposits from this time period; they also suggest increasing importance of root foods (Leonhardy 1980). In spring, summer, and fall most of the people now moved from their winter villages to a series of seasonal camps according to a carefully planned schedule. Each seasonal camp was in an area where particular food resources such as root foods or fish were abundant, so the people were able to collect large quantities of foods there without depleting the supply available in subsequent years. Indeed, their techniques of digging root foods probably increased the productivity of these areas. Although the people returned to each resource-rich area repeatedly, they did not necessarily return to the same areas every year.

How were they able to survive through the winters with very limited fresh foods available? They did this by drying and long-term storage of large amounts of food—technology that apparently was not previously available or not much used during earlier times. At their seasonal camps, they collected large quantities of food, far more than they needed immediately, and brought it back to the winter village to be stored. This pattern of high mobility during the growing season and spending winters in one location has been called semisedentism. The semisedentary way of life was characteristic of most Columbia Plateau groups at the time of the 1804-1806 expedition by Lewis and Clark's Corps of Discovery.

Why there was a change from year-round mobility to semisedentism, from a foraging economy to one based on food storage, is a question that has stimulated much thought and discussion. Several explanations have been proposed. Some archaeologists believe it was simply a matter of population size. Greater numbers of people require more efficient methods of obtaining food. As a human population grows, more food is required. If food supply has increased because of climatic change or other factors, there is no difficulty in maintaining the larger population. If, however, there is no increase in available food supply,

a greater diversity of the available foods is consumed and the use of certain foods is intensified (Christenson 1980; Burtchard 1981; Galm 1985). According to the theories based on increasing population size, the year-round mobility previously characteristic of Snake River people became impractical with greater numbers or individuals. Therefore, survival required a higher degree of cooperation and communal food acquisition. A pattern evolved of more sedentary winters spent in permanent villages. This was possible due to food stores built up from gathering excursions during the growing season. However, since small pithouse villages occur in some areas where there is little evidence of food storage, certain archaeologists suggest that villages came first, at least in areas with food resources sufficient to enable winter survival without large amounts of stored food. According to this interpretation, increased population pressure caused intensification on fish and/or plant foods, but at a time when villages were already occupied year-round in some areas (Lohse and Sammons-Lohse 1987).

An alternative explanation for lack of storage facilities in a village is that food for the village was stored elsewhere (Alan Marshall, personal communication 2000). Storage of food away from villages was common as a protective measure (see discussion of food storage, p. 68).

Many archaeologists believe that while increasing population size can certainly stimulate change in patterns of subsistence activities, population size alone is not sufficient to explain the change from foraging to semisedentism. Some attribute the change in movement patterns to an increasing availability of and dependence on fish, concluding that the presence of winter villages on the Plateau is due primarily to the abundance and storability of salmon (Sanger 1967; Schalk 1977; Schalk and Cleveland 1983). Proponents of this concept point out that winter villages were usually located along rivers that had salmon runs. Some archaeologists and ethnographers take this idea a step further, believing that the change to a semisedentary pattern resulted from a complete cultural replacement. They suggest that Northwest Coastal people may have come to live on the Columbia Plateau via the Fraser River Basin in southern British Columbia, eventually replacing the original inhabitants of the area. This idea is based on technological changes during this time period.

Others propose that Plateau people may have become semisedentary partly because of the availability of fish and partly because of the increased mobility enabled by the rivers. River travel would allow easier access to other food sites and other groups of people (Bob Chenoweth, personal communication 2000).

However, Ames and Marshall (1980: 44, 45) suggest that increased use of fish, especially salmon, was more a result of village formation than a cause. Evidence is accumulating that plant foods were at least as important as salmon and other fish in enabling a more settled seasonal pattern (Ames and Marshall 1980: 44; Thoms 1987: 7, 1988). This interpretation associates development of villages with an intensification of root food use (Ames and Marshall 1980: 44-46). Because of the large dense stands of camas (qémes, *Camassia quamash*) that occurred in many areas of the Columbia Plateau, along with the less concentrated but more widely distributed lomatiums, a focus on root foods enabled winter subsistence without great winter mobility (Ames and Marshall 1980: 41, 44). The energy returns for gathering and storing root foods would be much greater than with seed foods. Proponents of the idea that plant foods were very important in enabling a semisedentary life style point out that the change in mobility was not restricted to areas where salmon occurred. For example, salmon were not directly available to the people in the Calispell

Basin of northeastern Washington State, but the transformation to village life occurred there at approximately the same time as it did along the salmon-rich rivers of the Columbia Plateau (Thoms 1988). Archaeological excavations in the Calispell Basin have yielded evidence that increasing availability of camas may have been very important in enabling the semisedentary mode of life in that area (Thoms 1987: 5, 7). The archaeological record indicates that large-scale camas processing intensified during the time of the change to semisedentism (Thoms 1987: 7, 1988).

A recent analysis of the change from foraging to semisedentism on the Plateau proposes a very interesting explanation centered on food storage (Chatters 1995). About 4300-4400 years ago, the climate cooled, resulting in much greater seasonal differences in productivity of the environment (Chatters 1995: 381-382, 385, 1998). Along the river valleys, plants with underground parts that could be used for food became more abundant and sources of seed foods became less abundant (Ames and Marshall 1980: 41, 45; Chatters 1995: 347-348). At the same time, the availability of food resources became more seasonally limited. Winters became much harder to survive because of the greatly reduced availability of foods and because mobility was more difficult. The human population declined substantially (Chatters 1995: 361, 379, 389). Although people may have lived in villages at the time of climatic change, it was not until about 3900-3800 years ago that Columbia Plateau people adopted a semisedentary life based on long-term food storage (Chatters 1995: 376). The delay between climatic change and semisedentism might be explained by a kind of selective pressure on cultural groups (Chatters 1995: 391). With a colder climate, people would be forced to adapt to a lack of fresh food during winter. If their traditional knowledge included methods of preparing food for long-term storage and of developing appropriate storage facilities, the adaptation would develop quickly. Because there was a 400-year delay before efficient food storage methods were widely used, this knowledge was apparently lacking at the time the climate changed (Chatters 1995: 389-390). Different groups might have tried different strategies to cope with the seasonal changes in available food supply. Some groups, through trial and error, developed the semisedentary seasonal movement pattern and strong reliance on stored plant foods that characterized Columbia Plateau peoples at the time of Euroamerican contact (Ames and Marshall 1980: 27-36; Chatters 1995: 390, 391). Instead of constantly moving in small groups or staying in one place until local food resources were exhausted, they began to follow a scheduled pattern of seasonal movement. During the winter, they did not travel much, but they remained highly mobile during the productive seasons. Plant foods, especially root foods, became very important in their diet, and they planned their seasonal travels according to the availability of these plant foods (Ames and Marshall 1980; 32-33). These were the successful groups (Chatters 1995: 390). Their ability to survive was enhanced by certain technological innovations: tools like the hopper mortar that enabled efficient processing of root foods, careful techniques of accumulating and preparing foods that enabled the people to build up sufficient winter reserves, and careful caching methods that maximized the preservation of stored foods and minimized their vulnerability to raiding (Ames and Marshall 1980: 26). Root foods were probably used long before storage played an important role, but storage systems enabled or reflected intensification of root food use (Ames and Marshall 1980: 44-45). The technology for getting food was the same as it had been previously, but the application of that technology was different (Leonhardy 1980).

Groups that adopted other strategies apparently had less success and declined in population or left the area. Some of the alternative strategies may be similar to those described in Plew's (1990) analysis of Shoshoni subsistence.

A change to living in winter villages also involved significant social change. Instead of an individual family moving from place to place in their quest for food, groups of families went out together. Instead of isolated families or individuals acting independently, people acted as communities. In order to do this there had to be community organization and leadership. Each village had its own "chief" (Leonhardy 1980).

Location of Nez Perce Villages

The location of Nez Perce villages depended largely on the availability of resources during winter and early spring (Marshall 1977: 134-135; Ames and Marshall 1980; 32). A study relating location of Nez Perce settlements to biophysical features of the environment (Schwede 1966) concluded that most "permanent" villages were at lower elevations because of the milder valley winters and the greater availability of fish. Marshall's more comprehensive study found that winter villages were located in canyon bottoms because chances of survival were maximized there by 1) greater availability of food resources during the winter, 2) greater availability of wood (driftwood), and 3) easiest access to spring food resources, especially the tuberous lomatiums, camas, and fish (Marshall 1977: 134). The canyons also offered good grazing for horses, which was an important consideration in more recent Nez Perce history. Villages were often at the mouths of tributary streams because high alluvial bars tend to build up at these locations, making them good places to catch driftwood for fuel and technology, and because the tributaries are spawning grounds for non-anadromous fish (important spring food resources) (Marshall 1977: 134-135).

The Horse

About 1730 A.D., Columbia Plateau people first acquired horses that were descendants of horses brought to the North American continent by early Spanish explorers (Haines 1938). The Nez Perce people were quick to realize how horses could help them, and they integrated horses into their lives at least as rapidly as any other Plateau group. Nez Perce horses were renowned for their speed and stamina, traits developed through selective breeding systems that the Nez Perce people developed. Incorporation of horses into Nez Perce life enabled greater efficiency in seasonal movements, food gathering and hunting, general transporting of materials, and warfare. After acquisition of the horse, there were fewer Nez Perce villages, but each village was larger (Leonhardy 1980). Possession of horses also changed social structure because greater cooperation was necessary and this meant stronger leadership. This is the time when aggregations larger than the individual village became important and the great chiefs became powerful (Leonhardy 1980). With horses, some Nez Perces regularly traveled eastward across the Rocky Mountains to hunt buffalo, trade, and strengthened ties with people of the Great Plains. Prior to acquiring horses, Nez Perce people sometimes traveled to the Great Plains, but now they were able to do it more often, stay a longer time, and carry back more bison pelts. Nez Perce culture adopted many elements from Great Plains culture, including the hide tipi, hide clothing, and a new style of decorative elements. One effect of these changes was less reliance on plant materials in certain aspects of Nez Perce technology.

Food Plants

Women were the primary providers of plant foods in traditional Plateau societies and were responsible for both gathering and preparation (Ackerman 1982; 46, 52, 56; Hunn

1990: 137, 206-207; James 1996; Hunn, et al. 1998). More attention has been devoted to men's responsibilities as providers of food through hunting and fishing, and many anthropologists regarded plant foods as supplementary (Clark 1960). However, various researchers have concluded that plant foods were very significant in the Columbia Plateau diet. According to some estimates, they were even more significant than animal foods (Hunn 1990: 177; Hunn, et al. 1998: 526). Certainly, plant foods were more significant than mammalian and bird food sources. Marshall conservatively estimated that plant foods constituted at least 30-40 per cent of the traditional Nez Perce diet (Marshall 1977: 37-38, 64), and Hunn estimated that 66 per cent of the typical Plateau diet (contributing 55 per cent of total calories) was plant foods (Hunn 1990: 177). The most important Nez Perce plant foods are listed in Table 1, from Marshall (1977). Table 2 lists these and other reported Nez Perce plant foods, as well as plants important for technology, medicine, and spiritual purposes.

Nez Perce food-gathering was generally a communal activity, often on the level of the family. Digging root foods often involved large social gatherings, bringing together people from different cultural groups. A skilled root digger was greatly honored, just as a good hunter or fisherman would be.

Following the Seasons

Because the availability of food plants and fish is restricted to limited time periods, they were the primary determinants of Nez Perce seasonal movements. Plants for technology were gathered in conjunction with food plants, i.e. in or near places where food plants were "ripe" (Marshall 1977: 46). Since medicinal and spiritually important plants were usually gathered by individuals, their locations were not a primary determinant of Nez Perce movement or settlement patterns (Marshall 1977: 46). Hunting was not as important in scheduling seasonal travels because the people hunted wherever they were.

The Nez Perce pattern of seasonal movement was typically as follows (Drury 1958; Harbinger 1964; Ray 1974; Marshall 1977: 157; Hunn and French 1981; Endacott 1990; Buan and Lewis 1991; Anonymous 1997; Hunn, et al. 1998): Winters were spent in lower-elevation villages, usually along the major rivers, while relying on stored foods for subsistence. These villages were located in areas where early spring resources were conveniently available. Important food resources in the early spring include young shoots of plants such as lomatiums (*Lomatium* spp.) and balsamroot (*Balsamorhiza* spp.)(sometimes dug even before they emerged above the ground surface), early root foods such as biscuitroot, yellowbells (stiméx, *Fritillaria pudica*), and onions (*Allium* spp.), and the spring fish runs. As the season progressed and early root foods passed the best stage for digging, people traveled to somewhat higher elevations such as the Palouse prairie and the slopes of the middle Clearwater Valley to collect later plant foods. These foods included more lomatiums, camas, early-ripening berries, and green vegetables. Summers were spent at various camps in the mountains collecting camas, berries, late lomatiums, and many other foods. Men hunted in all these areas. In autumn, the people returned to the river valleys for the autumn fish runs. Autumn was also the usual time for collecting black tree lichen (ho·póp).

Alan Marshall has described Nez Perce seasonal activities in greater detail (Marshall 1977: 60-61, 157). Nez Perce seasonal movement was determined by plant resource maturation. Nez Perce territory includes four elevational zones for plant resources, characterized by (in order of increasing elevation) sagebrush/rabbitbrush (valleys),

snowberry (plateaus), Oregon boxwood (foothills), and huckleberry (mountains). The sagebrush/ rabbitbrush zone had the earliest available plant foods, from early through late spring. Fishing was also very important during the spring. When spring salmon runs began nearly all members of the village participated in fishing or preparation of the salmon for storage. As the sagebrush/rabbitbrush zone became too dry to provide plant foods, the abundant root foods on the plateaus (the snowberry zone) were becoming ready to gather. A major festival (the "First Fruits" ceremony) marked the move up to plateau areas. Grangeville, Camas Prairie, Craigmont, Weippe Prairie, and the Wallowa Mountains were important camas-digging areas in late spring-early summer. People from various other groups joined the Nez Perces in large encampments at the camas fields. During the summer, people continued moving upwards as the plateau zones dried out and plant resources matured in the foothills. In late summer small groups traveled up into the mountains to pick berries and hunt (the groups were small so that there would be enough prey animals to support the group). Through this seasonal sequence of movement, plant foods were available to the Nez Perce people for six to seven months of the year, in sufficient quantities to permit storage of these foods for use during the other five to six months (Marshall 1977).

A recent study of the Coeur d'Alene people attributes their relative lack of mobility to the abundance and diversity of food resources in their home territory and concludes that the higher mobility of Nez Perce people is due to a lower diversity of locally available food resources (Striker 1995: 87-90). This conclusion is based on comparisons of the Coeur d'Alene data with Leda Scrimsher's 1967 study of Nez Perce native foods (Scrimsher 1967). However, Striker assumes that most Nez Perce foods were included in Scrimsher's study, and that is not the case. Scrimsher's study was intentionally based on a limited sample of the diversity of Nez Perce foods. The variety of foods available in Nez Perce territory is no lower than in Coeur d'Alene territory. Some of the available foods are different, and certain other foods are available in different amounts in the two areas, but the overall diversity of available foods is similar. Coeur d'Alene people followed a different pattern of seasonal movements than the Nez Perces (Palmer 1998), and meat and fish were more important in the Coeur d'Alene diet (Strodt 1965: 27). Concluding that Nez Perce people traveled widely because they did not have sufficient foods in their home territory is not correct. It is important to consider the contributions of cultural traditions and beliefs in determining patterns of geographical movement. The Nez Perces had ample quantities of food in their home territory. When they traveled to other areas to trade for foods it was to obtain particular "treat" foods not available or not very common at home, e.g. wapato (*Sagittaria latifolia*) and wokas (sá·slaqs, *Nuphar polysepalum*). They offered other foods from their own territory in trade, e.g. kouse and camas. The social activities associated with trade meetings were also a very important incentive for attending these gatherings. The spirit of adventure was probably another strong motivating factor behind many Nez Perce travels, especially in crossing the Bitterroot Mountains to the Great Plains to hunt bison. More importantly, travelers are highly respected in Nez Perce culture, and traveling increases one's status. This has been especially true for women.

Root Foods

Root foods and fish were the primary staples of the traditional Nez Perce diet. The "root foods" include all plants with underground parts used for food: roots, bulbs, tubers, corms, and rhizomes. Nez Perce people enjoyed a great diversity of root food plants: "That's all they lived on was roots" (Viola Morris in Morris ca. 1975). Some neighboring groups (for

example the Flatheads, the Kootenai, and many Great Plains groups) had just a few kinds of root foods abundant in their home territories and relied on trade with Nez Perce people for other root foods for which they hungered (Johnson 1969: 72; Morris ca. 1975).

The flowering of a root food plant (qe·qí·t, *Lomatium canbyi*; Fig. 4) marked the beginning of spring in traditional Nez Perce society. Root foods were dug with the efficiently

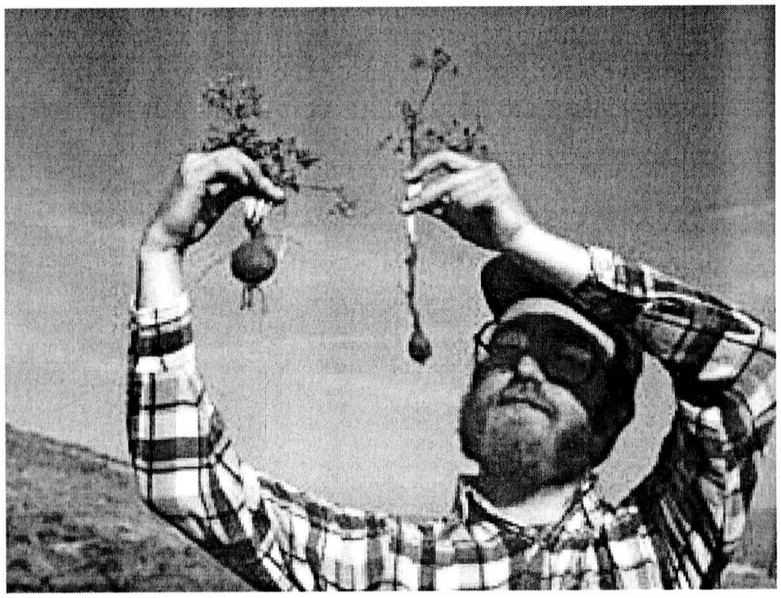

Figure 4. *Lomatium canbyi*, qeqí·t, the favorite Nez Perce Spring Root Food.

designed digging stick, the tukas (Fig. 5). Digging sticks were traditionally made from strong wood such as mountain-mahogany (póhos, *Cercocarpus* spp.; Fig. 6), serviceberry, yew (támqay, *Taxus brevifolia*), syringa (sisé·qiy, *Philadelphus lewisii*), oceanspray (hisiimseqe, *Holodiscus discolor*) (Fig. 7), and hawthorn. A handle of wood, antler, bone, or stone was perforated in the middle and bound, glued, and/or lashed firmly to the stick (Fig. 5). Adult digging sticks were usually two to three feet long with a sharply pointed fire-hardened tip (Boas and Teit 1930: 55; Spinden 1908a: 201). Many digging sticks curved slightly at the end, but others were straight. Reportedly, curved diggers were used in soft ground and straight ones were better for rocky soils (Boas and Teit 1930: 55). After European contact digging sticks were made from iron (Fig. 5). To dig a root the digger inserted her tukas into the ground near the base of the plant stem and used it as a lever to pry up the underground parts (Figure 8). Because of its narrow shape and sharp tip, this type of digging stick is much more efficient than a shovel or a trowel. In rocky soil the digging stick can more readily penetrate narrow spaces between rocks. In dense populations of a root food plant, the digging stick was used to lift chunks of earth from which the roots or bulbs were then removed (Marshall 1999: 178). Root diggers carried soft twined baskets tied to their waists, and when a basket was full of roots, it was emptied into a larger basket.

The importance placed on the First Roots Ceremony is evidence of the significance of root foods. Each spring this ceremony celebrated the renewed availability of fresh root foods, usually in April, before fresh roots were dug. Neighboring groups were invited to share remaining winter food stores at this feast. The first day of the First Roots Feast is a thanksgiving ceremony. After this ceremony, a small ritual drink of water is taken and the

root feast begins (James 1996: 117). Feasting continues for up to six more days, with many foods being served, accompanied by dancing and visiting (Harbinger 1964: 23-24). The First Roots Ceremony honors the root foods so important to survival as well as the women who dig these roots. It also demonstrates that the host group has been successful in gathering and storing enough food to survive the winter and early spring. A First Roots ceremony is a common thread among Plateau groups, though the specific roots that are gathered first vary depending on tradition and local environment (Clark 1960). Sometimes at these ceremonies any uneaten food had to be burned in order to avoid jinxing the new season's productivity (Hunn et al. 1998: 242).

Figure 5. Carrie Eneas and another woman digging camas, Musselshell Meadows, ID. The tukas in the foreground is a traditional style, made of hard wood such as mountain mahogany, syringa, or oceanspray. The tukas at the left is steel. From Nez Perce National Historical Park Photograph Archives NEPE-HI-3177, date unknown

Root foods were important in everyday trading activities between the Nez Perces and other groups and in the special "trades" such as the wedding trade (Morris ca. 1975; Ackerman 1982: 61; Marshall 1999: 180). To represent women's activities, sacks (traditionally cornhusk bags) of roots including at least both camas and kouse were offered by a bride's family to the family of the groom (Harbinger 1964: 30-35; Slickpoo 1973: 48; James 1996: 86-87). The bride's family received from the groom's family such items as horses, fish, meat, buckskin clothing, and buffalo robes, representing men's activities (Harbinger 1964: 35; Slickpoo 1973: 48; Schuster 1998).

The most important Nez Perce root foods were kouse (*Lomatium* spp., including the favored qeqí·t, *L. canbyi*; Fig. 4), camas, and yampa (cawítx, *Perideridia gairdneri* and *P. bolanderi*). By far, more kouse and camas were stored for winter use than any other plant foods (Marshall 1977: 52). Bitterroot (litá·n, *Lewisia redeviva*) and wapato were also favored roots, although only small quantities of these plants actually grow in Nez Perce territory (Daubenmire 1975).

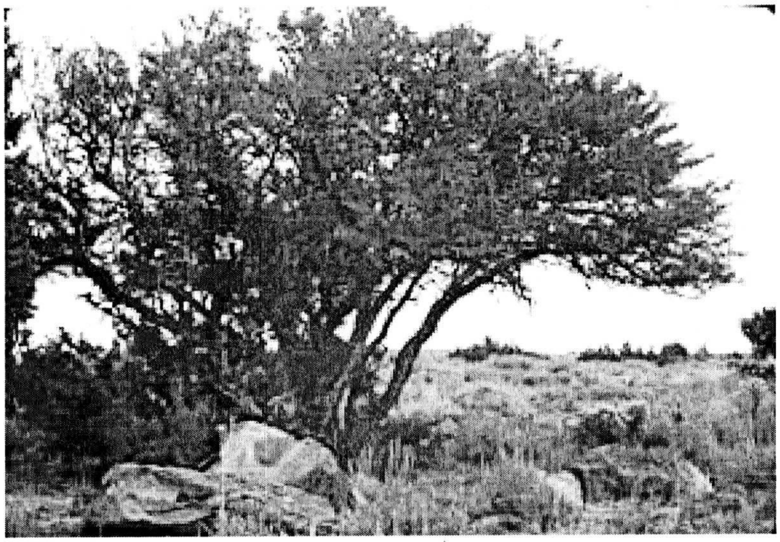

Figure 6. *Cercocarpus montanus*, mountain-mahogany
One of the hard woods used to make digging sticks.

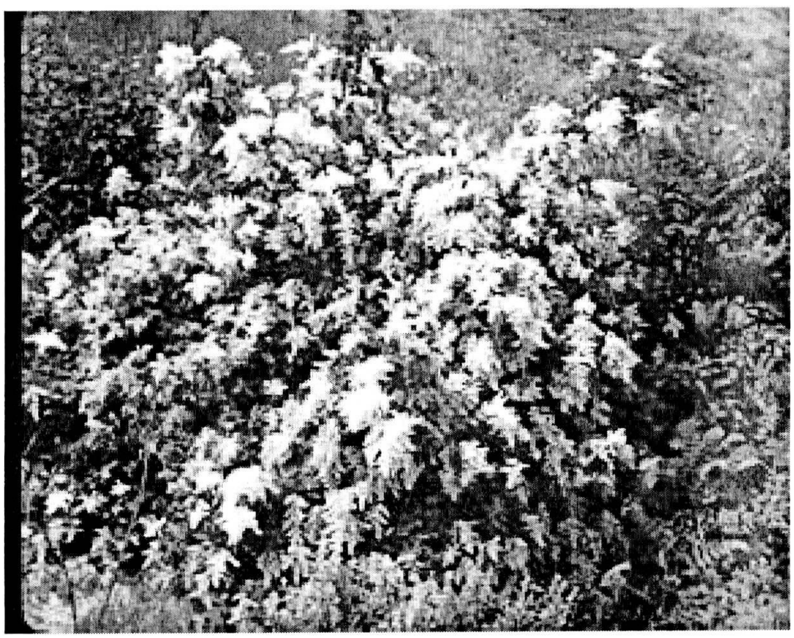

Figure 7. *Holodiscus discolor*, hisiimseqe (oceanspray)
One of the hard woods used to make digging sticks.

Kouse

Kouse (qaws) is a generic term for the dried tuberous roots of any of several species of *Lomatium* (*L. ambiguum*, *L. canbyi* (Fig. 4), *L. gormanii* (Fig. 9), *L. cous* (Fig. 10), *L. farinosum*, *L. macrocarpum*, *L. rollinsii*, *L. salmoniflorum* (Fig. 11), and *L. triternatum* (Fig. 12). These species tend to grow mostly in rocky places (Figs. 11, 12, 13). Kouse provided a substantial portion of Nez Perce winter food stores (Scrimsher 1967: 24; Marshall 1977: 52).

Figure 8. Nez Perce women digging roots, 1974
Kay Bohnee, Elsie Maynard, and Helene Youngman
Posed photo, courtesy of the Lewiston Morning Tribune
Nez Perce National Historical Park Photograph Archives Photograph # NEPE-HI-0545

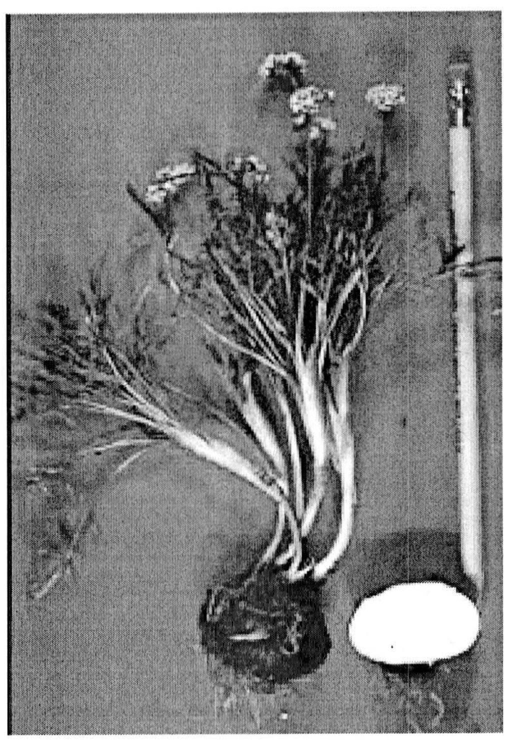

Figure 9. *Lomatium gormanii*, cí·ci·ta, an early spring root food.

Eight kinds of lomatium are among the 34 food plants considered most important in Nez Perce culture (Table 1) (Marshall 1977: 48-60). Lomatium plants are very abundant in Nez Perce territory, so abundant that the Nez Perces shared their lomatium digging grounds with neighboring groups such as the Coeur d'Alenes (Striker 1995: 82). Lomatiums are in the parsley family, called Apiaceae or Umbelliferae (an older name). Botanist Charles Geyer in 1846 referred to the Columbia Plateau (which he called "Upper Oregon") as the "Apparent centre of the Umbelliferae . . . in North America" (Geyer 1846: 203). The diversity of lomatiums in Nez Perce territory added variety not only to their diet but also to their trade offerings. Kouse was a highly desirable trade item for groups who did not have much of it in their native territories, for example the Flathead and the Crow (Gunther 1950: 177; Alcorn and Alcorn 1968, 1974.)

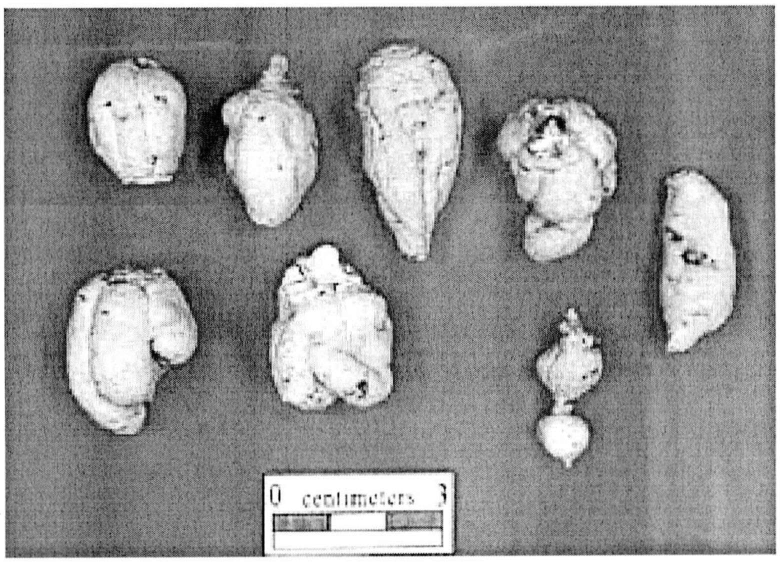

Figure 10. Peeled root tubers of *Lomatium cous*, qá·msit.

Figure 11. *Lomatium salmoniflorum*, ilqú·lx, an important source of vitamin C in spring.

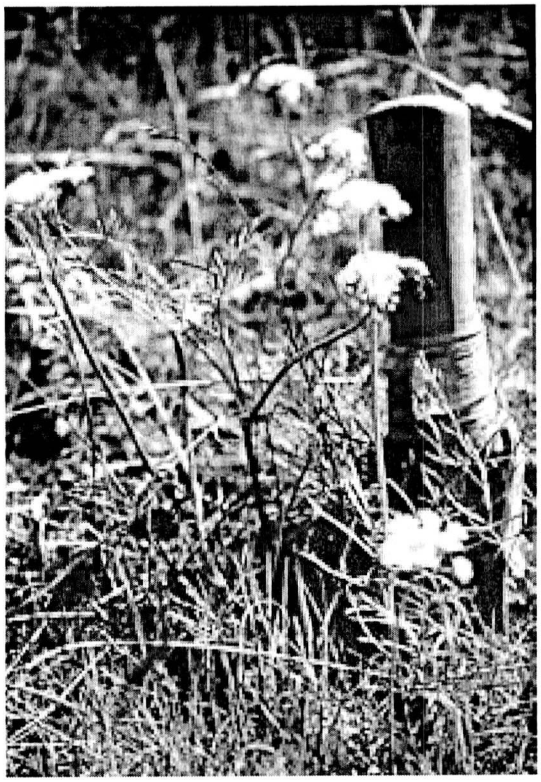

Figure 12. *Lomatium triternatum*, péqiy, eaten for spring greens and a root food.

Figure 13. *Lomatium grayi*, wewí·mn, an important source of vitamin C in spring.

The tuberous lomatium roots were usually dug in spring at a time when the dark skin slips off easily. If time did not permit peeling roots immediately, they were buried until they could be processed (Arneson 1993; Minerva Soucie, personal communication 1996). When dug

up, these roots were peeled with the hands or with a small chipped-stone tool (James 1996: 12).

The traditional Nez Perce story "Locust" illustrates the importance of digging root foods at the appropriate time. Locust was hated because when everyone else was digging roots for winter food she did not, nor would she help her mother-in -law peel the roots. They were very difficult to peel because the skin was tight and hard. Later on, when the soil was dry and hard and everyone else had stopped digging, Locust went out and dug large bags of roots to bring home. These roots were easy to work with; the skins just slipped right off and the roots didn't even need to be ground. Locust dug more roots in one day than her mother-in-law had all summer, and no one hated her any more (Phinney 1934: 115-116).

The objective of the spring's earliest regular digging activities was the favorite Nez Perce spring plant food, roots of qeqí·t, Canby biscuitroot (Fig. 4) (Marshall 1977: 49). Canby biscuitroot occurs on lithosols in the western portions of Nez Perce territory. Two other lomatiums actually grow and flower earlier in the season, sometimes even in December, but they are not so flavorful and were not favored root foods. These are salt-and-pepper plant (cí·ci·ta, *L. gormani*) and Salmon River desert-parsley (ilqú·lx, *L. salmoniflorum*). Their roots were dug mostly in times when food stores were low or as an early-season respite from stored foods. Snake River desert-parsley occurs along the lower Clearwater and lower Snake Rivers, and salt-and-pepper plant is common everywhere in the region. Root tubers of fernleaf lomatium (titálam, *L. dissectum*) are very large, but because of their strong taste they were primarily an emergency food. The upper portion of fernleaf lomatium roots (i·cus) is very oily and was not usually eaten (Marshall 1977: 48), though it was used medicinally. Fernleaf lomatium is common in a variety of habitats ranging from deep silt-loam soils to talus. In years when winter stores had run low, fernleaf lomatium roots were dug in January or February (Marshall 1977: 48).

Somewhat later in the season (usually May to June, depending on the area and the weather patterns), the people traveled to areas where cous (qá·msit, *L. cous*) and nineleaf lomatium (péqiy, *L. triternatum*) were abundant and dug the roots of these species. Cous is the best known of the lomatiums that Nez Perce people used for food and the one most intensively and extensively gathered (Geyer 1847: 305; Marshall 1977: 52). It occurs abundantly on slopes of the Snake, Clearwater, Salmon, and Grand Ronde Valleys. Preferred cous-digging grounds included the extensive stands on Camas Prairie of central Idaho (Curtis 1911: 41; Marshall 1977: 52) and in the Fields Springs area of Asotin County Washington (Wilfong 1990: 45). Roots of desert-parsley (wewí·mn, *Lomatium gray*; Fig. 13), Coeur d'Alene lomatium (laqáptat, *L. farinosum*), and potato biscuitroot (*L. macrocarpum*) were eaten less often, although the tuberous roots of potato biscuitroot are large. Nez Perce people enjoyed the taste of Coeur d'Alene lomatium even more than cous, but Coeur d'Alene lomatium is too scarce in Nez Perce territory to be a staple food (Marshall 1977: 52). Some groups, e.g. the northern Paiutes, included potato biscuitroot in items they offered for trade (Minerva Soucie, personal communication 1996). Other lomatium species growing in Nez Perce territory also have tuberous roots (e.g. *L. rollinsii*, which <u>might</u> be the plant called yíqew) and were probably also eaten).

Lomatium roots were dug in large quantities, and a digger brought home "many" cornhusk bags full of roots (Axtell and Aragon 1997: 45). Digging so many roots represents a huge amount of work, and, in the past, Nez Perce women did nearly all the root digging. Lomatium roots were eaten fresh (especially cous with its nutty flavor) or boiled whole. Canby biscuitroot was often boiled with the skins on and then peeled (Harbinger 1964: 15). In the Kamiah area Canby biscuitroot was usually only eaten fresh or fresh-cooked, but

downstream or nontreaty Nez Perce groups dried and stored it (Harbinger 1964: 15; Marshall 1977: 49). For winter food, peeled lomatium roots were dried in the sun and the smaller ones stored whole, often strung on a cord and hung up (B. Miles ca. 1975). When a Nez Perce youth went out in search of his guardian spirit, he brought a bag of kouse roots, five roots per day (Scrimsher 1967: 28). Sometimes the roots were smoked like meat and fish (B. Miles ca. 1975). The largest roots were not considered desirable because they were often hollow inside and not as good (B. Miles ca. 1975). Medium-sized roots were squeezed in the hand (B. Miles ca. 1975), placed in the sun to dry somewhat, and then pounded in mortars until they became like dough. The dough was then formed into long brick-shaped loaves, small cakes, patties, or "fingerprint balls," which were all sun-dried for winter storage (Spinden 1908a: 203; Turney-High 1933; Harbinger 1964: 13; Scrimsher 1967: 27-28; B. Miles ca. 1975; James 1996: 17). As with the whole roots, kouse cakes were often pierced with holes so that they could be strung on a cord and carried while traveling (Spinden 1908a: 203).

Prepared kouse loaves were sometimes eaten in the summer but mostly were reserved for winter food (B. Miles ca. 1975). Kouse was a reliable winter staple, keeping two years or longer if it is stored in a cool dry place (Scrimsher 1967: 28; Morris ca. 1975). Huge amounts of kouse were stored for future use. In May of 1877, Chief Joseph's people were forced to leave their homeland and move to Lapwai within a month (Howard 1881: 71-72). They secretly cached two tons of dried kouse in a cave located in the general area where they spent their winters. They believed it safer to leave the cached food there than risk transporting it across the flooding river and thought that they would be able to use the kouse when they came back home after the disagreement with the United States was over (Alcorn and Alcorn 1974; Wilfong 1990: 45). After the Nez Perce people left the area, General O.O. Howard's soldiers found the cache and, as part of the campaign to defeat the Nez Perces, burned it (McWhorter 1952: 176; Alcorn and Alcorn 1974).

The tuberous roots of lomatiums are very starchy (Figs. 9, 10). Cous provides 350-400 Kilocalories (kcal) of energy per 100-gram portion of dry tubers and is 2.5-6 per cent protein (Benson et al. 1973; Keely 1980: 37). It is also one of the best sources of potassium among all root foods (Benson et al 1973). Cous contributes significant amounts of vitamin C and iron to the diet: one cup of fresh cous contains about one-third the Recommended Dietary Allowance (RDA) of vitamin C and about one-third the RDA of iron for a man (one-fifth the RDA of iron for a woman) (Hilty et al. 1972). Canby biscuitroot is also a very rich source of calcium (Scrimsher 1967: 67).

It is probable that the abundance of lomatium plants greatly increased during the period of climatic cooling that occurred about 4500 years ago (Ames and Marshall 1980: 41, 42). This would have been one factor enabling Plateau peoples to adapt to the change in climate and perhaps stimulating the development of sophisticated food storage systems.

Camas (qémes)

Camas is a plant in the lily family (Liliaceae), growing in moist to wet meadows at various elevations in western North America (Fig. 14). A flowering camas meadow seen from a distance often resembles a pond or lake because of the dense drifts of azure, deep blue, or purple flowers. Meriwether Lewis commented in his journal entry for June 12 1806 "the quawmash is now in blume at a Short distance it resembles a lake of fine clear water, so complete is this deseption that on first Sight I could have sworn it was water" (Devoto 1953: 402). Other observers also remarked on this illusion, e.g. Oliver Marcy (Baird 1999: 50, 56).

Sometimes camas flowers are bright white (usually isolated individuals among a blue/purple-flowered population (Fig. 14)), or pale blue. The pale blue form can form "pure" stands, with no dark blue flowers. Camas plants grow from edible bulbs (Fig. 15). Camas was

CAMAS

Figure 14. White-flowered camas plants among a population that is mostly blue-flowered.

Figure 15. Processing camas bulbs, ca. 1890 (note the pestle).
From Nez Perce National Historical Park Photograph Archives NEPE-HI-0773

an extremely important Nez Perce food because of its nutritional content, its storability, and its reliability. Camas is available through a long period of the growing season, especially with the elevational range traveled by Nez Perce people. Camas bulbs from higher elevations were prized because of their larger size. Camas plants were prolific and predictable even with varying moisture conditions from year to year (Plew 1990). Camas was also an important item in trading with other groups (Turner and Kuhnlein 1983).

The camas meadows in Nez Perce territory were renowned for the unusual size and abundance of their bulbs (Anastasio 1972: 48). The Nez Perce story of Coyote and the

Monster (the creation of the Nimipu) tells that this abundance and quality of camas is because of Coyote's cleverness. As he was being sucked into the monster he left along the way great camas roots and great serviceberries, saying, "Here the people will find them and will be glad" (Phinney 1934: 27). Camas is also mentioned in other stories, such as "Bear Led Astray a Boy" (Phinney 1934: 345), where Bear prepares camas for the Boy's lunch and later digs more camas to take on the journey he and the Boy are about to begin.

Most camas digging took place as the plants were nearing the end of their spring flowering and in late summer-early autumn (Spinden 1908a: 201; Leechman 1972). According to some Nez Perce consultants, the people only dug bulbs that did not produce a flowering stalk (Scrimsher 1967: 18). Important camas digging areas in Nez Perce territory included the Paradise Creek meadows around Moscow, Idaho, and westward to Pullman, Washington; Weippe Prairie, Camas Prairie, and Musselshell Meadow, Idaho; and the Grande Ronde area in southeastern Washington and northeastern Oregon (Spinden 1908a: 201; Curtis 1911: 41; Chalfant 1974: 101, 136; Ray 1974: 93-94; Marshall 1977: 55; Morris ca. 1975). Sometimes individuals or individual families dug camas by themselves, but camas digging was often a time for important social gatherings. The Nez Perce people shared their large camas grounds with other groups (Anastasio 1972). Several camas fields in Nez Perce Territory were used in this way, including Paradise Creek meadows in May, Weippe in July, and Camas Prairie (Curtis 1911: 41; Ray 1974). Such gatherings included many other activities in addition to digging and roasting camas: renewing relationships with friends and relatives, arranging marriages, dancing, horse and foot racing, and gambling (Geyer 1847: 299-300). In interior British Columbia women digging root foods would sometimes wager a portion or all of their day's collections on the results of horse racing, so sometimes after a hard day's digging a woman would return with no roots (Turner 1997: 23). Camas gatherings were also used to plan joint excursions such as buffalo hunting trips, and camas-digging grounds were often trailheads from which such journeys began (Leechman 1972; Chalfant 1974: 101, 137; James 1996: 104).

At communal camas digging grounds, each band had its own camping spot and its own digging area. Within the band's digging area each family had its own spot, and it was considered bad to take someone else's place (Harbinger 1964: 26). A family left their tipi poles in their camping spot and no one else used them (Axtell and Aragon 1997: 43). A good digger could collect 80-90 pounds of camas per day, and the average daily yield per person was 50-60 pounds (Harbinger 1964: 28). Because digging camas aerates the soil and creates small open spaces, traditional digging activities enhanced the camas populations by allowing new seedlings to become established. However, too much soil disturbance destroys camas populations. Some indigenous people actually plowed large camas meadows when camas became a cash crop in the early 1900's. However, when they saw how devastating this was to the camas fields they stopped plowing and went back to traditional camas-digging methods (Ross 1998).

For many years, Euroamericans considered camas nearly worthless nutritionally (Turney-High 1933). Camas stores energy in its bulbs not as starch (as is the case for many other important root foods including kouse), but as another complex carbohydrate, inulin (Yanovsky and Kingsbury 1931; Turner and Kuhnlein 1983). Inulin constitutes approximately 52-59 percent of the total carbohydrates present in camas bulbs on a dry weight basis (Yanovsky and Kingsbury 1938; Plew 1992). This is important to note because inulin in its raw form is indigestible by the human system. Long slow cooking breaks down most of the inulin into simple sugar (fructose) that is easily digested (Konlande and Robson 1972). Among indigenous North American groups, camas was sometimes boiled (Spinden 1908a: 202; Boas

and Teit 1930: 56; Leechman 1972; Turner and Kuhnlein 1983). Usually, though, groups relying on camas as a dietary staple used a pit roasting procedure to render the bulbs digestible.

Pit oven roasting procedures vary among different groups and sometimes even among different families. Sometimes camas ovens were built with only shallow pits (De Smet 1905; Johnston 1970; Thoms 1987: 8). However, the following method for preparing a camas oven was typical (Geyer 1847: 300; Spinden 1908a: 201; Curtis 1911: 41; Turney-High 1933; Harbinger 1964: 11-12, 81-82; Scrimsher 1967: 20, 22-23; Downing and Furniss 1978; Thoms 1987: 8-9; James 1996: 17). A pit was dug in the ground two to four feet deep. Wood and round rocks were placed in the pit and a fire was built to get the rocks very hot. The hot rocks were leveled down and covered with about six inches of leaves, often sedges (*Carex* spp.), alder (wí·tx, *Alnus* spp.), skunk cabbage (temulté·mul té·mul, *Lysichiton americanum*), pine and fir needles, bracken fern (teqsté·qs, *Pteridium aquilinum*), or whatever other plants were conveniently located nearby. Often a layer of green willow (táxs, *Salix* spp.) stems was placed over the hot rocks to prepare a base for the leaves (Turney-High 1933; Scrimsher 1967: 22). Camas bulbs were placed on top of the leaves (sometimes the bulbs were in soft bags). More leaves were layered on top of the camas bulbs, and additional layers of bulbs and leaves added. After a final leaf layer was placed on top, water was poured through, creating steam when it hit the hot rocks. The filled and steaming pit was then covered with soil, and often a fire was built on top and was kept burning for two to three days. Often, a vertical tube (e.g. a hollow elderberry stem) was buried in the soil to allow addition of water for more steam. The camas was usually judged ready after it turned dark brown or black (Broncheau-McFarland 1992: 188). It was removed from the pit, sun-dried, and then stored whole in sacks or ground for porridge or cakes. Sometimes these cakes were wrapped in bluebunch wheatgrass (*Pseudoregneria spicata*) and again pit-roasted before storage (Spinden 1908a: 202; James 1996: 14). Ground dried camas was stored in soft flat bags or coiled baskets that were placed in a cave (Scrimsher 1967: 24; Broncheau-McFarland 1992: 50). If camas was overcooked to the point of burning, it was boiled and mixed with honey for a cough medicine (Harbinger 1964: 13).

Cooked camas is 30-50 percent sugars on the basis of dry weight (Konlande and Robson 1972). While these sugars may not be completely utilizable (Turner and Kuhnlein 1983), prepared camas is an excellent energy source. Protein content of camas bulbs is variable, possibly related to environmental factors where the bulbs grew (Scrimsher 1967: 67; Statham 1982; Plew 1992). However, camas often contains more than 10 per cent protein (Scrimsher 1967: 67; Plew 1992), higher than in comparable cultivated root vegetables (Hilty et al. 1972). Camas also provides minerals and small amounts of vitamin C, riboflavin, and thiamin (Benson et al. 1973).

Like kouse, dried prepared camas was often carried for travel food. The Coeur d'Alene people tell the story of Magdeline, a Blackfoot sent by her father alone across the Bitterroot Mountains to find and marry a Coeur d'Alene man. For her journey, Magdeline's father provided her with a ten-day supply of camas and dried meat (Seltice 1990).

When white settlers arrived in Nez Perce territory, they transformed the landscape through agriculture and other development. This transformation included the destruction of many traditional root food habitats. The effect on camas fields was especially devastating because camas habitat is prime agricultural land. Most of the large camas meadows were ruined through plowing, rooting by pigs, draining, and filling in. Pigs were an important agent of destruction for the extensive camas meadows near Moscow, Idaho. Moscow was originally called "Hog Heaven" because of its natural camas fields. Pigs love to eat camas bulbs, and they root them out of the meadows until there is no camas left. One early diary

entry from the San Juan Islands in western Washington illustrates the shortsightedness and prejudice of some of the white settlers: "We have but a few hogs yet; but in another year we expect to have more. They can do well on Kammus. There are quantities of it here on this island, and it is excellent for both Indians and hogs" (Winfield S. Ebey 1917, as cited in Norton 1979).

Camas has been called "the most important of all vegetal foods" for the Nez Perce people (Spinden 1908a: 201). However, I believe that kouse was probably equally important. Camas has received the greatest "publicity" because of the striking appearance of camas stands in bloom, because it was the first indigenous plant food given to the Corps of Discovery by Nez Perce people, and because there is a kind of "mystique" to the procedures used to cook camas bulbs. Also, camas grows in more concentrated populations in more restricted habitats than does kouse. Because camas meadows were sites of large social gatherings, they were an important source of controversy when Native people's movements were restricted. The early Euroamerican explorers and settlers on the Columbia Plateau seemed to regard kouse as less interesting and their reports reflect this. Some early reports also seemed to regard camas with more respect than kouse. However, large food stores destroyed by the U.S, Army are most often described as kouse (e.g. Alcorn and Alcorn 1974; Wilfong 1990: 45), and processed kouse would not be confused with processed camas. Both these root foods are nutritious and an important source of calories, but they were used in different ways. Kouse is starchy and an important source of calcium. It was used in many forms and was part of nearly every meal. Processed camas is sugary and sweet, usually has less calcium, and was often used to add flavor to other foods or as a treat. Camas from some areas also contains more protein than kouse. Both plants were staples, and I think that their dietary contributions were equally important.

Yampa (cawítx)

Yampa, like kouse, is a member of the parsley family, and it grows in meadows, along streams, and in other somewhat moist places. It was common in lower valleys and hillsides of Nez Perce territory, as well as the Camas Prairie (Chalfant 1974: 102). Most of the yampa growing in Nez Perce territory has disappeared due to domestic grazing animals and plowing (Harbinger 1964: 13-14; Morris ca. 1975)). Yampa has a stem from two to six feet tall, and its leaves are so narrowly divided that unless the plant is blooming it is very difficult to distinguish from the grass around it. The flowers form a white umbrella-shaped cluster. Yampa has a fleshy taproot that tastes like fresh young carrots, and this is the part of the plant that was one of the favorite and most important Nez Perce foods (Spinden 1908a: 204; Marshall 1977: 57; Table 1). An early botanist called yampa the "finest food plant of the Northwest Indians" (Piper 1906).

Yampa roots were dug in early to mid-summer, later than most of the lomatiums, which are in the same plant family. Yampa roots were peeled and eaten raw, roasted, boiled, or steamed. For storage, they were dried whole or ground and the meal formed into loaves or small cup-shaped cakes (Scrimsher 1967: 11; James 1996: 19). According to some reports, yampa could not be stored as long as other root foods (Harbinger 1964: 14; Arneson 1993), but certain Nez Perce consultants stated that yampa roots can be stored up to two years (Scrimsher 1967: 31). Yampa was used in soup, made into porridge, or formed into cakes that were carried while traveling and eaten dry. Yampa tubers contain 84 per cent carbohydrates (12-28 per cent starch), 2.4-7 per cent protein, and one per cent fat. Like cultivated carrots they are high in beta-carotene (Hilty et al. 1972, Benson et al. 1973), and they are much richer than carrots in protein, carbohydrates, fiber, ash, calcium, and

phosphorous (Scrimsher 1967: 67-68). Yampa tubers are also very rich in iron (Hilty et al. 1972).

Bitterroot (litá·n)

Bitterroot is a small succulent plant in the purslane family (Portulacaceae). It has fleshy roots, grows in rocky or sandy soils, and can tolerate the spring flooding that often occurs in shallow rocky soils that have poor drainage. Bitterroot leaves grow early in the spring, often shriveling before the appearance of the white, pink, or occasionally purple flowers (Fig. 16).

Figure 16. *Lewisia redeviva*, litá·n (bitterroot)

Nez Perce people greatly esteemed bitterroot, although not much of it grows in traditional Nez Perce territory. Bitterroot was also valued highly by other interior groups, being called "king of all the roots" by some (Turner et al. 1980: 116) and "chief" by others (Ackerman 1982: 53). Bitterroot grows on the fringes of Nez Perce territory, in the Bitterroot Mountains of Idaho and in the Imnaha area of Oregon. In the late spring or summer Nez Perce people dug bitterroots in these areas or in other areas not in their home territory (Spinden 1908a: 203; Chalfant 1974: 104; James 1996: 19). They often went to Nespelem, Yakima, and Pendleton to dig the roots (Morris ca. 1975). However, they obtained most of their bitterroot supply through trade (Scrimsher 1967: 33; James 1996: 19, 104).

Bitterroots are dug just before the flower buds open (Minerva Soucie, personal communication 1996). Roots that are dug at this stage are easy to peel as the skin slips right off. After peeling and washing, bitterroots were laid out on mats to dry whole (Fig. 17) and then stored in flat bags. Sometimes bitterroots were strung on a thong or piece of cordage to dry (Wilson 1916: 19). The roots were not usually ground up because this can make them bitter (Minerva Soucie, personal communication 1996). The fresh or dried roots were boiled or steamed until soft. Cooked bitterroot was often considered a dessert (Harbinger 1964: 14) and was often mixed with serviceberries or other fruits (Ray 1932: 100; Spier 1938: 26; Chalfant 1974: 104). In trade, a grain sack full of dried bitterroots was considered equivalent

in value to a good horse (Geyer 1847: 308). (The size of the sack is not specified but it was probably similar in size to a gunnysack, because that was a typical size for grain sacks.)

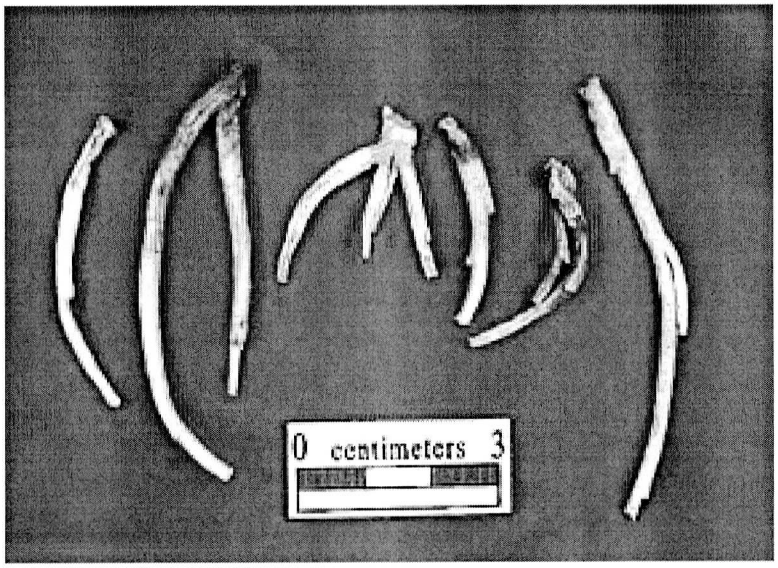

Figure 17. Peeled bitterroots

Bitterroot provided much of the carbohydrate requirement in some indigenous diets (DeSanto 1993). It has been said that just one ounce of dried bitterroot would provide a person enough nourishment for an entire meal and that a "handful" of bitterroot would feed four or five people for one meal (Brown 1868; Palmer 1871). However, other accounts call these statements "too credulous" (e.g. Havard 1895). Nutritional value of dried bitterroot is similar to that of brown rice except that bitterroot is higher in calcium and phosphorous and lower in iron (Walker 1978). Dried bitterroot contains about the same amount of protein as kouse, 2.5-6.0 per cent (Keely 1980: 37). Fresh bitterroots are high in vitamin C; one cup of bitterroot would provide about two-thirds the adult RDA for this vitamin (Benson et al. 1973).

<u>Wapato</u>

Wapato is an aquatic plant that is not abundant in Nez Perce territory, though large stands of it occur along the lower Columbia River and in Lake Coeur d'Alene. Usually wapato was gathered by women wading in the water and digging in the mud with their toes (Lewis 1844 v. II: 171-172; Smith 1976: 1-2; Darby 1996: 117, 122, 1998). The freed wapato tubers floated to the surface where they could be easily gathered and placed in canoes. In addition, the Coeur d'Alene people (and probably other groups as well) collected wapato tubers by digging in the mud of partially-dried wet places (Striker 1995: 32; Rodney Frey, personal communication 1999; Hollander 1999). The Nez Perces obtained most of their supply of wapato through trade (Spinden 1908a: 204; Curtis 1911: 49; Josephy 1965: 22; Scrimsher 1967: 44).

Wapato tubers were boiled or roasted, or dried and then soaked before use (Striker 1995: 32). Wapato is a rich energy source, yielding 3.6 kcal per dry gram, and it is higher in protein than most root foods (Table 3) (Keely 1980: 46a). The men of Thomas Jefferson's 1804-1806 Corps of Discovery really enjoyed the wapato they obtained from Columbia River

Indians and commented on it several times in their journals (Lewis 1844 v, II: 85, 90, 99, 103, 107, 112,115, 117, 160, 161, 165, 171, 177). Their taste for wapato was a striking contrast to the usual strong carnivorous preference of these explorers. They did not regard most indigenous root foods very highly; in Lewis' journals, there are frequent statements such as "all that could be obtained from them was a little fish and some dried roots" (Lewis 1844: 31), and "Nothing to eat except dried fish and roots" (DeVoto 1953: 242). Other early explorers of the Northwest United States were also impressed with wapato. Ross Cox in 1812 called it "excellent" (Cox 1957: 79).

Other root foods

Wild onions (sé·x, *Allium* spp.) were used as a seasoning, condiment, or supplemental food, not a staple (Scrimsher 1967: 38; Striker 1995: 33). Part of the reason for this is that some wild onions contain high levels of sulfides, which can make people ill if consumed in quantity (Terry Jacobsen, personal communication 1988). Onions were eaten raw or pit-cooked. Because onions (like camas) contain inulin, long slow cooking was often used to break down this complex carbohydrate into easily-digested simple sugars. If onions were dried and stored the leaves might be left on and braided together for suspending the bulbs in soups or stews to add flavor and allow easy removal of the bulbs.

Roots of arrowleaf balsamroot (pásx, *Balsamorhiza sagittata)* (Harbinger 1964: 18; Chalfant 1974: 98; Marshall 1977: 51; Broncheau-McFarland 1992: 189), hoary balsamroot (cilílx, *B. incana*) (Marshall 1977: 57), and mule's ears (tá·ko, *Wyethia amplexicaulis*) (Havard 1895) were occasional or supplementary foods. The taproots of these three plants are quite large but often rather woody. They require long preparation to make them digestible because they too contain inulin rather than starch (Yanovsky 1931; Teit 1930). However, they were sometimes stored for winter (Ray 1932: 100). Elk thistle (títux, *Cirsium scariosum*) and tobacco-root (ku·ye, *Valeriana edulis*) were also supplemental root foods that were pit roasted but usually not stored (Teit 1930; Scrimsher 1967: 40, 43; Marshall 1977: 54; Broncheau-McFarland 1992: 190). All of these plants except mule's ears are among the 34 most important Nez Perce food plants (Marshall 1977: 51, 54, 57; Table 1).

The Nez Perce people also valued wild hyacinths (cátoxc, *Triteleia grandiflora*) (Scrimsher 1967: 43; Marshall 1977: 51; Broncheau-McFarland 1992: 189), yellowbells (stiméx, *Fritillaria pudica*) (Marshall 1977: 49; Broncheau-McFarland 1992: 189), and glacier-lilies (xaxaacuiu tit, *Erythronium grandiflorum*) (Broncheau-McFarland 1992: 182). These plants are among the earlier spring root foods available but were only supplemental in the diet because they are very labor-intensive to gather. The bulbs of yellowbells and glacier-lilies and the corms of wild hyacinth are all small and usually deep in the ground, making them difficult to dig. Mariposa-tulip bulbs (ló·las, *Calochortus* spp.) and spring beauty roots (capcí·lay, *Claytonia lanceolata*) were summer dietary supplements, eaten fresh or cooked (Scrimsher 1967: 44; Marshall 1977: 55; Broncheau-McFarland 1992: 190). These plants do not occur in sufficient numbers to be staples. Despite their relative scarcity or difficulty to dig, wild hyacinth, yellowbells, mariposa-tulip, and spring beauty are all included in the 34 most important Nez Perce food plants (Marshall 1977: 49, 51, 55; Table 1).

Rhizomes of Bracken-fern were an important source of carbohydrates to the Nez Perce people (Broncheau-McFarland 1992: 24). They were gathered in late autumn, pit steamed or roasted, dried, and pounded into flour. This plant is now known to be carcinogenic. Rhizomes of cattails (*Typha* spp.) and tules (*Scirpus acutus* and *S. tabernaemontani*) are starchy and another good source of energy. Both these plants are called tóko in the Nez

Perce language. Cattail and tule rhizomes were eaten fresh, roasted, ground into flour, or boiled into syrup (Coville 1897; Turner et al. 1980: 59; Szczawinski and Turner 1980: 67; Broncheau-McFarland 1992: 181). Cattail rhizomes are 40-85 per cent carbohydrates by dry weight (Claassen 1919; Reed and Marsh 1955). Another root food "of great importance" to Northwest Indians (and part of the Nez Perce diet) was tobacco-root, *Valeriana edulis* (Havard 1895; Spinden 1908a: 204). This root has a very strong smell (to some people the odor resembles that of long-unwashed human bodies), but it tastes sweet. The roots were dug in late summer or autumn and pit-roasted for up to two days. They could also be wrapped in tule matting and stored fresh for up to a year (Spier 1938: 27).

Nodding microseris (*Microseris nutans*) was another supplemental Nez Perce root food; it was usually eaten raw (Spinden 1908a: 204). Additional root foods used occasionally include bistort (*Polygonum bistortoides*) (Broncheau-McFarland 1992: 181), alpine springbeauty (*Claytonia megarhiza*) (Spinden 1908a: 204), subalpine poppy buttercup (*Ranunculus eschscholtzii* (Broncheau-McFarland 1992: 182), and water-parsnip (*Sium suave*) (Spinden 1908a: 204; Scrimsher 1967: 43).

Columbia Plateau groups (possibly including the Nez Perces) also occasionally ate other root foods including other native thistles (Turner et al. 1990: 178-179), waterleaf (*Hydrophyllum capitatum*) (Teit 1930: 480; Turner 1997: 130), and false Solomon's seal (Turner et al. 1980: 48).

Spring Greens and Other Fresh Vegetables

The fresh green sprouts of tender spring plant growth were especially valued by Plateau people after a winter of dependence on stored foods. These spring shoots were a very important source of vitamin C at a season when it was greatly needed (Hunn and French 1981). Some of the earliest shoots to emerge are lomatiums. Nez Perce people ate several kinds of lomatium as spring greens: Salmon River desert-parsley (Fig. 11), nineleaf lomatium (Fig. 12), Gray lomatium (Fig. 13), and fernleaf lomatium. The new stalks of these plants were gathered just before flowering, or sometimes even before they had emerged above the ground surface, and peeled for eating (Chalfant 1974: 99; Scrimsher 1967: 37-38; Hunn 1990: 527; (Turner 1997: 83). So important were these first fresh plant foods that the First Foods Feast of some Columbia Plateau groups focused on them. The Yakama-Wanapam-Kittitas-Klikitat-Taitnapam First Foods Feasts celebrated the availability of Gray lomatium shoots (Schuster 1998).

Young peeled stems or leafstalks of another parsley-family plant, cow-parsnip (Fig.18), were used in the same way (Boas and Teit 1930: 57; Hunn et al. 1998: 527; Broncheau-McFarland 1992: 192). Peeling off the "skin" is very important with cow-parsnip stalks because it removes irritant chemicals in the outer layers that would otherwise make them

Figure 18. *Heracleum lanatum*, ʔayc ʔayc (cow-parsnip). Peeled young stems were eaten like celery.

inedible (Teit 1930, Kuhnlein and Turner 1986; Johns and Kubo 1988). In earlier times cow-parsnip shoots were also dried and stored by some groups (Kuhnlein and Turner 1986; Turner et al. 1990: 153). Scrimsher compared the nutrient content with that of celery. Cow-parsnip stalks were "decidedly" higher in all nutrients tested except iron (Scrimsher 1967: 66). The earliest shoots and young flower stalks of balsamroot were also Nez Perce spring vegetables and were important sources of vitamins (Chalfant 1974: 99; Harbinger 1964: 18; Scrimsher 1967: 34; Broncheau-McFarland 1992: 189; James 1996: 20). Many Plateau groups also ate mule's ear sprouts in the spring (French 1965; Hunn 1990:170). Young sprouts and lower stems of tules and cattails were another spring vegetable (Teit 1930: 481, 482; Szczawinski and Turner 1980: 67; Broncheau-McFarland 1992: 181).

Stinging nettles (wetetwé·tet, *Urtica dioica*) (Fig. 19) were a later-season vegetable, (Turner et al. 1980: 140; Turner et al. 1990: 289; Aoki 1994; Moerman 1998), and they are a very rich source of vitamin C (Tuba et al. 1944). Additional plants whose stems and leaves the Nez Perce ate for fresh vegetables include elk thistle (Scrimsher 1967: 40; Marshall 1977: 54; Broncheau-McFarland 1992: 190), clustered frasera (Scrimsher 1967: 40; Marshall 1977: 54; Broncheau-McFarland 1992: 190), and parsnip-flowered wild buckwheat (*Eriogonum heracleoides*) (Broncheau-McFarland 1992: 188). Plants that produce tender or fleshy shoots or leaves but were eaten less often include fireweed (*Epilobium angustifolium*) (Hunn et al. 1998: 527; Broncheau-McFarland 1992: 192), horsetails (sáyxsayk, *Equisetum* spp.) (Broncheau-McFarland 1992: 182), and stonecrop (*Sedum* spp.) (Broncheau-McFarland 1992: 188). Nez Perce people probably also ate cactus at least in some circumstances. The prickly-pear cactus (ʔístis, *Opuntia* spp.) was often eaten by Plateau people, sometimes as an emergency food. The spines were singed off and the stem segments (pads) roasted (Szczawinski and Turner 1980: 106; Turner et al. 1980: 93; Turner et al. 1990: 195).

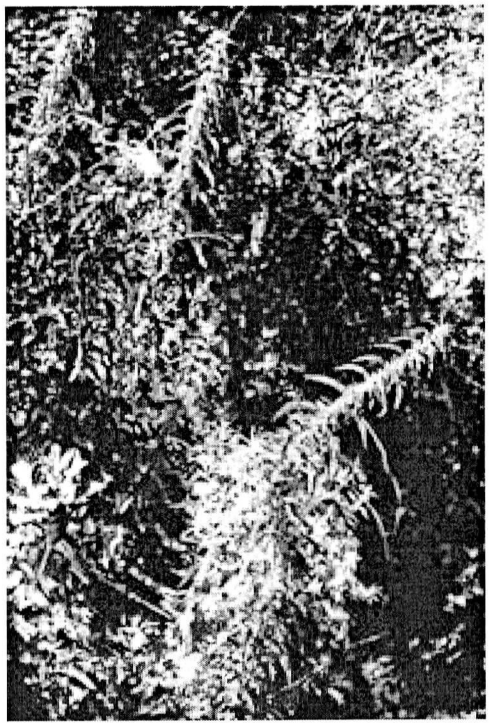

Figure 19. *Urtica dioica*, wetetwé·tet (nettles). Young shoots were cooked and eaten. Nettle stems were also a source of fiber for cordage.

Young tender shoots of the following plants were also gathered for spring vegetables by some groups. Though their use is not specifically documented in the literature for Nez Perce people, it is likely that Nez Perces ate at least some of them: milkweed (kam·ma, *Asclepias speciosa*) (Szczawinski and Turner 1980: 23), sedge (*Carex* spp.) (Coville 1897: 92), spring beauty/miners lettuce (*Claytonia lanceolata, C. megarhiza,* and *C. perfoliata*) (Szczawinski and Turner 1980: 24; Coffey 1994: 46), bedstraw (*Galium* spp.) (Szczawinski and Turner 1980: 24; Coffey 1994: 229), sunflowers (*Helianthus annuus*) (Turner and Szczawinski 1988: 38; Coffey 1994: 264), yellow monkeyflower (*Mimulus guttatus*) (Coffey 1994: 217; Tilford 1997: 98), broomgrass (toyqí·ks, *Phragmites australis*) (Szczawinski and Turner 1980: 61), watercress (*Rorippa nasturtium-aquaticum* (Hunn et al. 1998: 527), wild rose (tá·msas) (Turner and Szczawinski 1988: 169), new-growth sucker shoots of several *Rubus* species including thimbleberry (ta·xtá·x, *R. parviflorus*) (Szczawinski and Turner 1980: 148; Turner and Szczawinski 1988: 180), American brooklime (*Veronica americana*) (Szczawinski and Turner 1980: 155), and violets (*Viola* spp.) (Szczawinski and Turner 1980: 159).

Flowers as Food

Flowers of some plants, including clover (*Trifolium* spp.), were eaten occasionally (Broncheau-McFarland 1992: 188). Not specifically documented for Nez Perces but eaten by other groups are flowers of nineleaf lomatium (Turner et al. 1980: 70), elderberry (*Sambucus* spp.) (Turner and Szczawinski 1988: 58), violets (Szczawinski and Turner 1980: 160), and cattail spikes (Szczawinski and Turner 1980: 67; Turner et al. 1980: 59; Coffey 1994: 293). In a few cases, plant pollen was actually used as food. For example, cattail pollen was mixed with ground roots (in more recent times with commercial flour) for making bread (Szczawinski and Turner 1980: 67; Broncheau-McFarland 1992: 181).

Fruit Foods

Each day an indigenous Plateau person probably ate an average of 400–700 grams of native fruits (Keely et al. 1982). This fruit intake would contain substantial amounts of sugar, calcium, iron, magnesium, and zinc, as well as providing 4-7 times the adult RDA of vitamin C (Keely et al. 1982). Dried berries were sometimes used in the same manner as roots in everyday trading and in formal "trades" such as wedding trades (Harbinger 1964: 32). Among the diverse fruits and berries available to the Nez Perce people, three were most highly valued: serviceberries, huckleberries (cemítk, *Vaccinium* spp.), and elderberries (míttip, blue elderberry (*Sambucus cerulea)* and mexseme mittip, black mountain elderberry *(S. racemosa* var. *melanocarpa*)). Other fruits that were an important part of the traditional Nez Perce diet include cherries (tíms, *Prunus emarginata* and *P. virginiana*), roses, hawthorns, strawberries (téxtex, *Fragaria* spp.), thimbleberries, blackberries (cimú·xcimux cimú·k, *Rubus ursinus*), red raspberries (heʔilpéʔilp, *Rubus idaeus*), hackberries, "willowberries" (red-osier dogwood), and currants and gooseberries (*Ribes* spp.). Most fruits were picked by hand, but small fruits on low-growing plants such as fireberry (ʔalaʔá·la, *Vaccinium scoparium*) might be raked off with long-toothed combs (Boas and Teit 1930: 55; Turner 1997: 123).

For storage, fruits were dried whole, crushed and formed into cakes that were then dried, or cooked and dried on mats or layers of branches and grass (Turner 1997: 141, 144). Some berries were dried near a fire (Turner 1997: 118). Juice from cooking fruits might be poured over drying cakes of fruit a little at a time, giving the cakes a somewhat jellylike consistency (Turner 1997: 141).

<u>Serviceberries</u> (kikéye)

The Nez Perce story of Coyote and the Monster (the creation of the Nimipu), tells how Coyote, as he was being sucked into the monster, left along the way great camas roots and great serviceberries, saying, "Here the people will find them and will be glad" (Phinney 1934: 27). Serviceberry plants were abundant in Nez Perce territory, growing in side canyons, draws, river terraces, and on mountain slopes. Serviceberries ripen in late May to early June in the lowlands and later at higher elevations. They were the most important fruit for the Nez Perce people, especially as winter stores (Spinden 1908a: 204; Ray 1974: 95; Marshall 1977: 51, 58). The fruits were spread out to dry in a single layer on tule mats. Some Plateau people crushed fresh serviceberries in baskets and formed them into cakes before drying (Boas and Teit 1930: 57). Dried serviceberries might be stored in flat bags and eaten individually like raisins, or they were crushed and formed into disc-shaped cakes or 10-15 pound loaves for storage, sometimes with field mint sprinkled on them to repel insects (Spinden 1908a: 204; Ray 1974: 95; Hart 1979: 284; Turner et al. 1990: 256; Broncheau-McFarland 1992: 180; Turner 1997: 141). Serviceberry loaves were later cut up and eaten as a treat or soaked and mixed with other foods for pudding. Serviceberries were also used in pemmican and to sweeten other foods such as kouse, bitterroot, black tree lichen, soups, and stews (Hart 1976: 9; Turner 1997: 141). Serviceberries contain substantial amounts of calcium and phosphorous, as well as vitamins A and C (Scrimsher 1967: 67), though they provide less vitamin C than thimbleberries or rose hips (Tuba et al. 1944) (Table 4). They are considerably higher than raisins in all nutrients analyzed except for iron (Scrimsher 1967: 67). However, an earlier nutritional study found "unusually high" quantities of iron and copper in serviceberries,

about four times as much as in raisins (Rivera 1949). These differences in results may relate to geographic origin or growing conditions of the berries analyzed.

The best tasting serviceberries were gathered from high meadows, but the Nez Perce First Fruits Ceremony celebrated the ripening of the earlier but less-flavorful canyon serviceberries (kel) (Marshall 1977: 138). A respected male elder presided over the First Fruits Ceremony, giving thanks for life and food. Four respected female elders gave directions to young women on gathering, preparing, and serving foods. As with the First Roots Ceremony, people from neighboring villages were invited to share the host group's stored bounty. The ceremony marked a transition from using up foods stored the previous season to gathering and storing new supplies for the following winter, as well as from utilization of canyon resources to gathering in the uplands (Marshall 1977: 138). Many other Plateau groups also held First Fruits ceremonies, though the specific traditions vary (Clark 1960).

Huckleberries (cemítk)

Several kinds of huckleberries occur in the mountains of Nez Perce territory, including blue huckleberry (*Vaccinium globulare*), black mountain huckleberry (*V. membranaceum*), and fireberry. Huckleberries were gathered in mid- to late summer and were eaten fresh, or boiled, whole or mashed, or crushed for juice (Havard 1896). During the early 1800's and continuing into at least the early 1900's, entire villages went out to pick huckleberries in places where they were abundant. Favorite huckleberry areas included the Wallowa Valley, Oregon, and the areas around Grangeville, Elk City, Pierce, Clarkia, Musselshell, Craig Mountain, and the Lochsa, Selway, and Salmon Rivers, Idaho (Chalfant 1974: 103; James 1996: 20-21). Many Nez Perce people also went to Mount Adams, Washington, or to other areas of the Cascade Mountains to collect huckleberries because the berries there are larger (French 1965; James 1996: 21). The berries were dried and reconstituted by soaking them in water (Boas and Teit 1930: 57; Teit 1930). Often huckleberries were mixed with cooked black tree lichen (Broncheau-McFarland 1992: 185). A one-cup serving of huckleberries provides nearly half the adult RDA of vitamin C (Hilty et al. 1972) (Table 4).

Fireberry is different from the typical blue-purple huckleberries; it is a small yellow-green shrub with small bright scarlet berries. The berries are difficult to gather because of their small size, but they are tartly delicious and were dried for storage in years of abundant production (Marshall 1977: 59). Fireberries were often mixed into black tree lichen mush (Broncheau-McFarland 1992: 186). The Nez Perces often burned huckleberry/fireberry habitats, increasing both the number of plants and the number of berries produced on each plant (Barrett and Arno 1982; Williams 1999). Such burning was also done in serviceberry habitats.

Elderberries

Blue elderberry (míttip, *Sambucus cerulea*) is a large shrub/small tree that grows in canyons and draws, on river terraces, and at seeps and springs—in similar habitats to serviceberries but moister. Black elderberry (mexseme mittip, *S. racemosa* var. *melanocarpa*) grows in the mountains. Some studies indicate that Nez Perce people did not eat black elderberries (Harbinger 1964: 16). According to most reports, though, the Nez Perce people enjoyed both types of elderberries (Marshall 1977: 51-52, 58; Broncheau-McFarland 1992: 186). Apparently, some Plateau groups did not eat elderberries at all, e.g. the Wanapum (Gill and Thomas 1984).

Elderberries may flower at several different times during the summer, producing successive crops of berries. Each elderberry plant produces large numbers of fruits, especially in productive years. The berries begin ripening in midsummer and are easy to gather because they grow in large dense clusters (Fig. 20). They were eaten fresh or dried for storage and made into sauce or juice or used to marinate fish (Turner et al. 1980: 94). Elderberries were very popular among most Columbia Plateau peoples, including the Nez Perces (Fig. 21), and both the blue and black elderberries are listed among the most

Figure 20. *Sambucus cerulea,* míttip (blue elderberry)

Figure 21. Viola Morris picking blue elderberries, ca. 1970.
From Nez Perce National Historical Park Photograph Archives NEPE-HI-0177

important Nez Perce plant foods (Marshall 1977: Table 1). Blue elderberries are lower in vitamin C but higher in iron than many other native fruits (Norton et al. 1984) (Table 4).

<u>Cherries</u> (tíms**)**

Chokecherries (*Prunus virginiana* var. *melanocarpa*) and bitter cherries (*P. emarginata*) were important fruits in the traditional Nez Perce diet. Chokecherries, common along watercourses and draws, were preferred to bitter cherries. Some traditional Nez Perce stories mention chokecherries, e.g. in "Bear Led Astray a Boy" (Phinney 1934: 346). Chokecherries were important stored fruits as well as fresh food. Chokecherry pudding, made of ground up cherries, pits and all, and thickened with roots such as kouse, was a favorite treat (Scrimsher 1967: 47). For winter food, cherries were dried and stored whole, or, since the pits are relatively large, the cherries were ground and shaped into balls or cakes for storage (Boas and Teit 1930: 57; Teit 1930; Marshall 1977: 54). Ground cherries were shaped also used in pemmican and other mixtures (Scrimsher 1967: 47; Broncheau-McFarland 1992: 186). Although cherry pits contain cyanide, the oxidation that accompanies grinding and stirring denatures the poison (Timbrook 1982; Johns 1990). Sometimes fruit juice was extracted from cherries, or the dried cherries were brewed for tea (Turner et al. 1980: 128). Chokecherries contain only moderate amounts of vitamin C (Tuba et al. 1944), but they have one and one-half times as much vitamin C as cultivated cherries (Hilty et al. 1972).

<u>Hackberries</u> (katámno)

Hackberries are not often mentioned as a component of the Nez Perce diet. This may indicate that hackberry fruits became less important after the acquisition of Euroamerican foods. However, they were important in the traditional diet of people in the lower Snake River region. Hackberry plants are common on rocky slopes, in draws, and on the flood terraces along the Snake River, and frequent along the lower Clearwater River. Hackberry fruits are very rich in calcium, especially the pits. Nez Perce people gathered them during midsummer through autumn and ate them fresh or dried, often crushed up including the pits (Marshall 1977: 51; Broncheau-McFarland 1992: 187). Calcium-rich hackberries may have been important to the development of strong teeth in Nez Perce people (Scrimsher 1967: 81). Hackberry pits are by far the most numerous seeds in storage pits of the Palouse rockshelters along the lower Palouse and Snake Rivers (Mastrogiuseppe 1994: 3, 1995: 2, 1999: 15-16).

"<u>Willowberries</u>" (piplá·c)

Fruits of red-osier dogwood, sometimes called "willowberries" (Fig. 22) are another food not often mentioned in ethnographic accounts of the Nez Perce people. However, at some Palouse archaeological sites very near Nez Perce territory there is evidence that these fruits were stored (Mastrogiuseppe 1994: 3, 1995: 3). Red-osier dogwood shrubs are common in Nez Perce territory, growing in moist to wet places, especially along stream margins. Red-osier dogwood produces small white or blue fruits that have a relatively large stone and ripen in mid- to late summer. The Thompson people and other Plateau groups ate the fruits alone or mixed with serviceberries, rose hips, or chokecherries (Teit 1930: 490; Turner et al. 1980: 96; Turner et al. 1990: 204-205). Sometimes they were ground up and formed into cakes. Willowberry fruits are a rich source of vitamin C (Tuba et al. 1944) (Table 4).

Figure 22. *Cornus sericea* ssp. *sericea*, piplá·c (red-osier dogwood or "willowberry"). The fruits may be white or blue.

<u>Haws</u> (fruits of císnim and télx, hawthorn)

Black hawthorn is very common along the Snake and Clearwater Rivers and their tributaries, and along creeks in the higher areas surrounding the river valleys. Red hawthorn (télx, *Crataegus columbiana*) is less common and often grows at lower elevations than black hawthorn. Hawthorns can tolerate somewhat drier habitats than other riverine plants like willows and red-osier dogwood. Hawthorn fruits (Fig. 23) mature in late summer in the valleys or in early autumn in higher areas. They were eaten fresh or dried whole and stored for winter, especially if the serviceberries were scarce (Spinden 1908a: 204). Since hawthorn

Figure 23. *Crataegus douglasii*, císnim (black hawthorn). The fruits are black when ripe.

fruits have several rough stones in the center, they were often ground up (sometimes after boiling) and used in pemmican or shaped into cakes for winter storage (Spinden 1908a: 204; Ray 1974: 95; Scrimsher 1967: 49-50; Marshall 1977: 59; Broncheau-McFarland 1992: 181).

Apparently, haws do not keep as long in storage as other fruits without mold growing (Ray 1932: 103). The Coeur d'Alene people sometimes prepared haws by boiling them and spreading them in a thin layer on grass. The juice from boiling was poured over the berries, allowed to partially dry, and additional layers of boiled fruits/juice were added until there was a cake of the desired thickness (Boas and Teit 1930: 57). In his journals of the journey of the Corps of Discovery, Meriwether Lewis referred to purchasing hawthorn fruits from the Indians (e.g. Lewis 1814: 402). Hawthorn fruits are a good source of vitamin C (Tuba et al. 1944).

Currants and gooseberries

Currants and gooseberries (*Ribes* spp.) were abundant in Nez Perce territory. The pleasantly tart golden currants (kál, *R. aureum*) were the earliest fruits of the growing season. Wax currants (kimp'·meh, *R. cereum*) ripen after golden currants and are bland tending toward bitter in flavor, but sour purple gooseberries (pí·lus, *R. inerme*) are very flavorful. Swamp gooseberries (kimmé, *R. lacustre*) and sweet red gooseberry (kimmé, *R. oxyacanthoides*) were also eaten (Coville 1897; Spinden 1908a: 204; Turner 1997: 128, 129). Currants and gooseberries were eaten fresh or dried for future use, often mixed with other fruits (Scrimsher 1967: 51; Marshall 1977: 51, 54; Turner et al. 1980: 107-108). They were also sometimes crushed for juice (Turner et al. 1980: 106-108). Sour purple gooseberries were sometimes mashed and made into soup that might also include root foods (Striker 1995: 26). Sticky currant (*R. viscosissimum*) was used in making pemmican (Broncheau-McFarland 1992: 180).

Strawberries (téxtex)

Wild strawberries (blueleaf strawberry, *Fragaria virginiana,* and woods strawberry, *F. vesca*) were usually eaten fresh (Spinden 1908a: 204). Woods strawberries grow at somewhat higher elevations than blueleaf strawberries; both are common in Nez Perce territory. Since they are small and do not grow in large clusters, gathering wild strawberries requires effort, but their tart flavor makes the effort worthwhile. Fruits of woods strawberry are sweeter and more flavorful than those of blueleaf strawberry. Sometimes when strawberries were abundant they were boiled or mashed for sauce and juice (Steedman 1930). Strawberries were not usually stored (they do not dry as well as other fruits) except in years when they were abundant (Turner et al. 1980: 105; Turner et al. 1990: 260). They contain good amounts of vitamin C (Tuba et al. 1944) (Table 4).

Thimbleberries (ta·xtá·x)

Thimbleberry plants are quite abundant in Nez Perce territory. Thimbleberries are very soft fruits and not as juicy as most *Rubus* species. Thimbleberry plants bloom over a long time period, and thus the fruits ripen a few at a time. This is both an advantage in that the fresh fruits are available through a good portion of the summer and autumn and a disadvantage in that picking the fruits is inefficient. According to some studies, thimbleberries were only eaten fresh (Harbinger 1964: 17), but others indicate that they were sometimes dried for storage or crushed for juice (Teit 1930; Scrimsher 1967: 50; Marshall 1977: 58). Harbinger (1964: 17) concluded that thimbleberries were never very important in the Nez Perce diet. Thimbleberries contain much higher levels of vitamin C and calcium than most of today's commercial berries, including strawberries and blueberries (Kuhnlein 1984; Norton et al. 1984) (Table 4).

Other species of *Rubus*

Like thimbleberries, blackberries and raspberries were usually eaten fresh. Native blackberries have larger seeds than thimbleberries but are juicier. Like thimbleberries, blackberries contain significant amounts of vitamin C and calcium (Kuhnlein 1984; Norton et al. 1984), and they were sometimes dried for winter (Spinden 1908a: 204; Scrimsher 1967: 50). Blackcap raspberries (*R. leucodermis*) and red raspberries, both ripening in mid- to late summer, were also relished as fresh fruits and fruit juice, but they contain lower nutrient levels than thimbleberries and blackberries (Kuhnlein 1989). Raspberries were sometimes dried whole for winter (Boas and Teit 1930: 57).

Roses (tá·msas)

Rose fruits, called hips, were not a favorite Nez Perce fruit, but they were eaten during times when other fruits were scarce Spinden 1908a: 204; Ray 1974: 95): in winter (they remain on the plants through the winter), in years when production of more favored fruits was poor, and during travels. The seeds and hairs inside the hips were usually removed before the fruits were eaten. Rose hips were sometimes dried and stored for winter if the supply of other fruits was not abundant (Marshall 1977: 57-58). Sometimes rose hips were brewed for tea, and they are a very rich source of vitamin C (Table 4). Just three rose hips contain about the same amount of vitamin C as a medium-sized orange (Hunter and Tuba 1943). Rose hips provide between 500 and 2000 mg per 100 grams, as compared to about 55 mg vitamin C per 100 grams of oranges (Kavanagh 1942).

Other fruits

Some fruits that were part of the traditional Nez Perce diet but not eaten as often were usually not stored due to limited availability or because their taste was less desired. Fruits of kinnikinnick (also called bearberries) (hotó·to, *Arctostaphylos uva-ursi*) were eaten fresh, in stew, fried, or dried (Boas and Teit 1930: 57; Teit 1930; Clark 1960; French 1965; Broncheau-McFarland 1992: 186). They were an important winter emergency food because, like rose hips, they persist on the plants. Nez Perces also occasionally ate Oregon-grape fruits (qiqétqiqet, *Berberis* spp.) (Turner et al. 1980: 85; Broncheau-McFarland 1992: 187). Some reports indicate that Oregon-grapes were mashed in baskets, spread on rocks to dry, and stored (Spier 1938: 26). Other fruits sometimes eaten on the Columbia Plateau but not usually stored include red twinberries (Turner et al. 1980: 94) and highbush-cranberry (*Viburnum edule*), picked after the first frost (Turner et al. 1980: 95).

Seed Foods

Seed foods did not play as important a role in the Columbia Plateau diet as they did in that of the Great Basin people, primarily because of the abundant protein-rich fish readily available along rivers of the Columbia Plateau. Seed foods preferred by the Nez Perces include pine, balsamroot, sunflowers, and wokas.

Pine seeds

Pine seeds (*Pinus*) locally available to the Nez Perces were smaller than the piñon pine seeds so important to Great Basin people. Nez Perce people gathered green pine cones during late summer through autumn and placed them in a fire to cause the cone scales to spread open. The seeds were then shaken out and roasted, parched, or boiled. Sometimes

they were crushed and mixed with fruit or pounded into flour that was used to make mush. All kinds of pine seeds were eaten when available, but Nez Perce favorites were the large seeds of the high-elevation whitebark pine (lalxsáway) and the lower-elevation ponderosa pine (lá·qa) (Geyer 1846: 204; Turner et al. 1980: 28, 32; Broncheau-McFarland 1992: 184, 193). In many years whitebark pine seeds are not available because the trees have not produced many cones. Clark's nutcrackers (*Nucifraga columbiana*) and squirrels also relish whitebark pine seeds (Fig. 24). Clark's nutcrackers and squirrels have a symbiotic relationship with whitebark pine, extracting the seeds from unopened cones and caching them for winter use (Lanner 1997). Whitebark pine seeds do not all germinate the first year, and seeds left in buried caches are the source of most new whitebark pine trees. This accounts for the typical clumped pattern of whitebark pine trees.

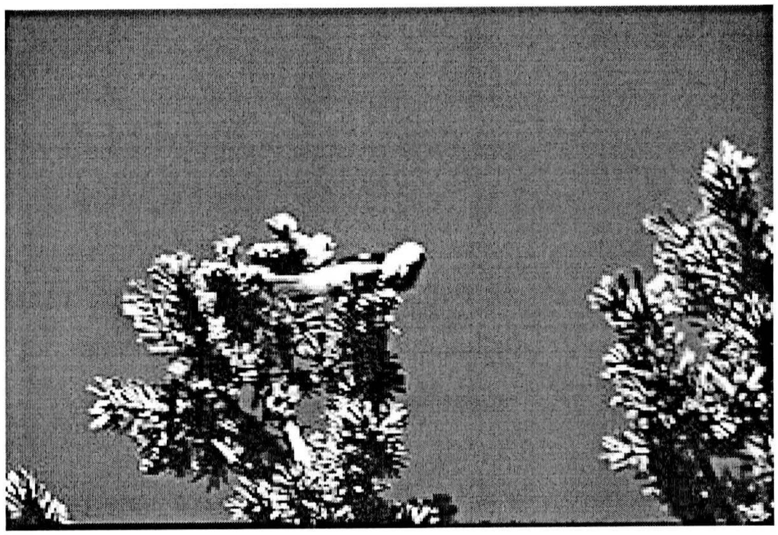

Figure 24. *Pinus albicaulis*, lalxsáway (whitebark pine) with Clark's nutcracker (*Nucifraga columbiana*). This bird caches whitebark pine seeds and helps perpetuate the tree. Nez Perce people ate whitebark pine seeds, especially in years of abundant cones. Because the birds cause many cones to fall to the ground, they help make them more easily available to humans.

Ponderosa pine seeds were more reliably available and more numerous in Nez Perce territory. They are much smaller than whitebark pine seeds but larger than seeds of white pine (sé·ysey) or lodgepole pine (qalámqalam). White pine and lodgepole pine seeds were also eaten but were "of small importance to the Nez Perce" (Broncheau-McFarland 1992: 26). Ponderosa pine seeds were prepared in the same way as those of whitebark pine. They are a very nutritious food, containing more than 20 per cent protein (King and McClure 1944).

Sunflower seeds

Seeds of balsamroot, also called spring sunflower, were gathered in early summer, and true sunflower seeds (*Helianthus annuus*) were gathered in late summer to autumn. Both kinds were roasted and eaten whole or pounded into meal, shells and all (Coville 1897; Boas and Teit 1930: 55; Scrimsher 1967: 34-35; Chalfant 1974: 99; Heiser 1951, 1976: 31; Turner et al. 1980: 81; Broncheau-McFarland 1992: 189; James 1996: 20). The seed meal was often mixed with fat and shaped into cakes or balls used for a very nutritious snack (Spinden 1908a: 205).

These balls or cakes could also be stored for several months (Scrimsher 1967: 35). The traditional story of "Weasel" tells how Weasel prepared food for his brother to take hunting by crushing sunflower seeds and mixing them with fat (Phinney 1934: 201). Another story, "The Disobedient Boy," also refers to the grinding of sunflower seeds (Spinden 1908b; Phinney 1934: 357).

Cultivated sunflower seeds are 14-28 per cent protein, 20-50 per cent oil, 19 per cent carbohydrates, and significant amounts of minerals (Heiser 1976; Seiler et al. 1991). Since cultivated varieties have been bred to increase oil content (Heiser 1976: 57), wild sunflower seeds are probably lower in oil. The related mule's-ears seeds (*Wyethia amplexicaulis*) are much thinner than balsamroot or sunflower seeds but were eaten by some indigenous groups as an emergency food (Chamberlain 1911). Mule's-ear seeds ripen in midsummer.

<u>Wokas</u> (sá·slaqs)

Wokas is the Klamath name for seeds of the yellow pondlily, *Nuphar polysepalum*. Yellow pondlilies were not numerous in Nez Perce territory but the seeds were obtained through trade (Scrimsher 1967: 44). A primary source of wokas was the Klamath people, who gathered the seeds in large numbers (Coville 1897, 1902) (Fig. 25). Wokas was toasted in an open basket with live coals or over the fire, causing the seeds to crack open somewhat like popcorn (Coville 1897, 1902). The seeds are eaten immediately or ground into meal for porridge or bread (Coville 1897).

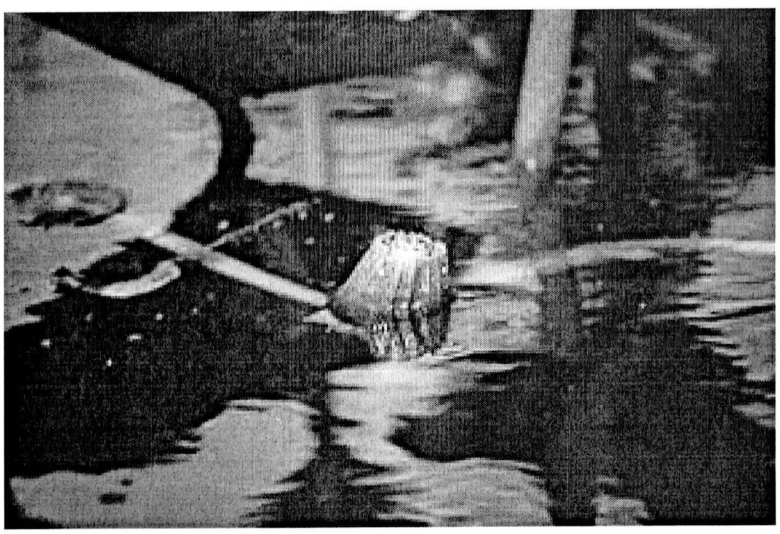

Figure 25. *Nuphar polysepalum*, sá·slaqs (yellow pond lily). The semi-submerged fruits were gathered and the seeds extracted for food. Nez Perce people obtained most of their supply through trade.

<u>Other seeds</u>

Other plants whose seeds were used for food by the Nez Perce include bistort and other polygonums (Broncheau-McFarland 1992: 179, 187), northern bedstraw (Broncheau-McFarland 1992: 192), and goosefoot/lambsquarters (*Chenopodium* spp.) (Spinden 1908a: 205). Some northern Plateau groups removed the stones from red-osier dogwood fruits and ate them like nuts (Turner 1997: 107). Other Plateau groups ate seeds of Great Basin wildrye, bluebunch wheatgrass (*Pseudoregneria spicata*), dogbane, tules/bulrushes, and cattails (Coville 1897; Hunn et al. 1998). Some of these seeds were used only occasionally.

Bark for Food

Many Columbia Plateau people enjoyed the juicy, sweet, inner bark of various trees. Bark was not a primary food for the Nez Perces, but it was nevertheless an important dietary component. Probably the bark consumed in greatest amounts by Nez Perce people was ponderosa pine, partly because of the local availability of these trees. Nez Perce people considered ponderosa pine bark (cuké·ymit) a treat and preferred its taste over that of lodgepole pine, though they ate bark of both pines (Geyer 1846: 205; Harbinger 1964: 19; Broncheau-McFarland 1992: 183). Bark from young ponderosa pine trees not producing cones was considered the best (Turner 1997: 55).

Nez Perces and their neighbors ate other kinds of bark occasionally or as emergency foods, including willow (Broncheau-McFarland 1992: 179), cottonwood (Boas and Teit 1930: 55; Malouf 1969; Wynecoop 1969: 12), and quaking aspen (Boas and Teit 1930: 55; Wynecoop 1969: 12; Kuhnlein 1990).

Most inner bark was eaten in spring when the sap is running, making it easy to cut the bark from the tree. According to one report, lodgepole pine bark was ready to eat earlier than that of ponderosa pine in the southern Plateau (Spier 1930: 165-166), but this seems strange to me since lodgepole pine occurs at higher elevations or in frost pockets. Bark was also used as emergency food in winter or during other times of need. Sometimes inner bark was dried and ground into flour. Tree bark is not a rich source of nutrients, but it provides energy and can be important during times of food shortage. Sugar content of various edible barks ranges between 1.5 per cent and 6.5 per cent. Bark also provides significant amounts of vitamin C, calcium, potassium, and other minerals. For example, quaking aspen inner bark is an excellent source of vitamin C (Tuba et al. 1944) and has been analyzed at 1.3 per cent protein. The inner bark of black cottonwood contains 0.2-2.5 percent protein (Enzmann et al. 1969; Kuhnlein 1990).

It was only the innermost bark layers and/or the cambium that were used for food. The cambium is the layer of actively growing cells that forms wood to the inside of the trunk and bark to the outside. To extract these layers, a large vertical strip of bark was peeled from a tree by inserting a knife or a special bark stripper under the bark and pulling outward on the freed edge. The soft inner layers were then peeled or scraped off and eaten fresh (Harbinger 1964: 19; Scrimsher 1967: 36; James 1996: 20). If this was done at the best time for eating the bark (spring), the fresh young layers adhered to the bark and could be scraped off the piece removed. If bark was cut at other times of the year the edible layers usually stuck to the wood and had to be scraped off the tree (Harbinger 1964: 18-19; Turner et al. 1980: 28). This method of collecting bark was also used by many other Northwest groups (e.g. the Coeur d'Alene (Boas and Teit 1930: 55-56), the Okanogan (Turner et al. 1980: 28), the Thompson (Turner 1988b, Turner et al. 1990: 102), the Haisla, the Wet'suwet'en, and the Gitksan (Gottesfeld 1992)) as well as groups in other areas, e.g. the northern Paiute (Minerva Soucie, personal communication 1995). The scars left on the trees are called cambial peel scars, and the trees are called peel trees. Whether bark was removed for food or for technology, peel trees are indicators of culturally important areas and still survive in many places. These places include Thomason Meadow in Wallowa County, Oregon (Churchill 1983) and along the Lolo Trail through Idaho into Montana (McLeod 1980; Broncheau-McFarland 1992: 26, 118-122). Meriwether Lewis noted in his journal for June 17 1806, in the Bitterroot Mountains (on the return trip eastward of the Corps of Discovery), "I was in front

and could only prosue the derection of the road by the trees which had been peeled by the natives for the iner bark of which they scraped and eate . . . ." (Devoto 1953: 404).

Lichens and Fungi

<u>Black tree lichen</u> (ho·pop)

Black tree lichen (also called bear hair lichen) is an epiphyte—growing on tree branches and bark, depending on the trees for support and access to light but not parasitic in any way. The tangled brown to black lichen filaments hang from the branches, resembling clumps of hair that might have been snagged as a bear walked by. Sometimes the lichen strands are nearly a yard long. Early Euroamerican explorers and ethnographers mention that this lichen was an emergency food for Plateau peoples including the Nez Perces (Coville 1897; Thwaites 1904, Spinden 1908a: 205; Josephy 1965: 19). It is true that this plant was used as an emergency food, but it was also a regular part of the Nez Perce diet (Drury 1958: 134; Scrimsher 1967: 35; Marshall 1977: 59; Turner 1977; Broncheau-McFarland 1992: 190; Axtell and Aragon 1997: 44). Large amounts of the lichen were sometimes stored for winter (Scrimsher 1967: 35). It was regarded as a delicacy (Morris ca. 1975), and among the Sanpoil-Nespelem, black tree lichen cooked with onions was described as "one of the best liked of all vegetable preparations" (Ray 1932: 104). The appearance of black tree lichen in Columbia Plateau Native stories affirms its importance in their diet. One story tells how black tree lichen originated from the braided hair of the trickster Coyote. When Coyote's braid caught in a pine tree he was climbing and he was not able to loosen it, he cut the braid off to free himself. Then, so as not to waste his hair that was hanging from the tree branch, he changed it into food that would thereafter be gathered by the people (Mourning Dove 1933). Another traditional story, "The Disobedient Boy," refers to people gathering and eating this lichen (Phinney 1934: 358).

Black tree lichen was gathered from its coniferous tree hosts during midsummer or early autumn. It could also be gathered at other times but the quality was not as high. The lichen was pulled down from higher branches with a stick or, after Euroamerican contact, a wire hook (Turner et al. 1980: 11; Axtell and Aragon 1997: 44). Lichens growing on tamarack or ponderosa pine and lichens from trees at higher elevations were considered the tastiest (Harbinger 1964: 17; Scrimsher 1967: 36; Marshall 1977: 59; Turner 1977; Morris ca. 1975). The collected lichens were cleaned, washed well, soaked in water to remove their bitterness, and squeezed to remove excess water. They were then steamed overnight in a pit oven, in layers separated by layers of leaves (Wilson 1916). A fifty-pound gunnysack full of the lichen cooked down to about a half gallon of prepared ho·pop (Morris ca. 1975). Often camas was roasted together with ho·pop (Geyer 1847: 301; Havard 1895; Harbinger 1964: 17; Scrimsher 1967: 35; Alcorn and Alcorn 1968, 1974; Chalfant 1974: 99; Axtell and Aragon 1997: 44) but usually in separate layers (Turner et al. 1980: 44). Sometimes ho·pop was cooked with onions (Alcorn and Alcorn 1974; Boas and Teit 1930: 57). An alternative cooking method was fermentation of the lichens followed by cooking for a shorter time. While it was still soft, the gelatinous cooked ho·pop was eaten fresh, or pounded into meal and then dried, or shaped into loaves or balls, sometimes mixed with yampa (Turner 1997: 89; Striker 1995: 22; Axtell and Aragon 1997: 44). The dried loaves could be stored for as long as three years (Turner 1997: 35). Dried prepared ho·pop was ground or chopped and cooked for cereal, pudding and other desserts, or "licorice soup" (Chalfant 1974: 99; Axtell and Aragon 1997: 44). Pieces of dried ho·pop might also be dipped like crackers into soups or stews (Turner 1997: 35).

Because of its bland taste cooked ho·pop was often combined with other foods such as camas (Geyer 1847: 301; Scrimsher 1967: 36; Axtell and Aragon 1997: 44), onions (Scrimsher 1967: 36; Turner 1997: 35), kouse, yampa, bitterroot, or berries (Scrimsher 1967: 36; Broncheau-McFarland 1992: 190) (Turner 1977; Turner et al 1980; Axtell and Aragon 1997: 44), or recently with sugar, raisins, or apples (Turner et al. 1980: 14; Axtell and Aragon 1997: 44; James 1996: 20). Cakes of ho·pop were one of the foods carried on journeys. Ho·pop is a good source of protein (5-6 per cent), starch (ca. 25 per cent), fat, calcium, and potassium (Benson et al. 1973, Turner 1977). It contains more iron than salmon, camas, kouse, bitterroot, and yampa (Yanovsky and Kingsbury 1938; Benson et al. 1973).

<u>Cottonwood mushroom</u> (hípew)

Among the fungi that the Nez Perces used for food, the cottonwood mushroom was probably the most important (Aoki 1995; James 1996: 19-20). This mushroom grows at the base of cottonwood or quaking aspen trees or on decaying stumps, usually where the soil is sandy (Turner et al. 1987; Turner 1997: 44). For food use the mushrooms were collected in the autumn, usually after the first heavy rains. After the mushroom caps were peeled and the stalks and gills cleaned, they were eaten raw, cooked fresh, or strung to dry. Dried mushrooms were soaked to reconstitute them and then were fried or boiled. The cottonwood mushroom is rather tough but has an excellent flavor (Turner et al. 1980: 16). They could also be dried for winter. As mushrooms go, cottonwood mushrooms are fairly high in nutritional value. They provide small but meaningful amounts of calories, fiber, vitamin C, and minerals such as iron, copper, and zinc (Turner et al. 1987).

Beverages and Confections

Some fruit juices have been mentioned above in discussions of the fruits from which they were made. Sumac (tiltitíltit, *Rhus glabra*) (Turner et al. 1980: 59; Turner and Szczawinski 1988: 33) and Oregon-grape fruits (Turner et al 1980: 85) were also crushed for a tart drink by some indigenous groups (Havard 1896; Balls 1970). Mountain-tea was brewed from the dried leaves of mountain-laurel (*písqu, Ledum glandulosum)* (Harbinger 1964: 18; Scrimsher 1967: 40; Turner and Szczawinski 1984: 66; Broncheau-McFarland 1992: 193*)*. Leaves of various conifers including pine, tamarack, spruce (heslíps, *Picea engelmannii*), true fir, Douglas-fir (páps), and western redcedar (talátat) were brewed into tea that is a valuable source of vitamin C (Turner and Szczawinski 1984: 29). Other refreshing beverages were brewed from leaves of mint, pipsissewa (*Chimaphila umbellata*) (Turner et al. 1980: 101; Broncheau-McFarland 1992: 182), strawberry (Broncheau-McFarland 1992: 186), raspberry/blackberry (Turner and Szczawinski 1984: 180, 184), huckleberries (Turner and Szczawinski 1984: 99), fireweed (Broncheau-McFarland 1992: 192), nettles, ceanothus (Turner 1997: 168), and wild buckwheat (Broncheau-McFarland 1992: 188); from flowers of clover (Broncheau-McFarland 1992: 188) and roses; from cones of juniper (ciké·yelx, *Juniperus* spp.) (Turner and Szczawinski 1984: 25); and from fruits of bedstraw.

Sap of certain trees was collected for drinking. Among these are water birch (heslíps, *Betula occidentalis*) and tamarack (Havard 1896; Broncheau-McFarland 1992: 184). Some plants were used as an emergency source of water, especially the succulent ones such as stonecrops or prickly-pear cactus (Havard 1896; Coville 1903).

Plants were also a source of "sweets" or confections for indigenous people. Douglas-fir sugar is a white sweet crystalline sugar mix that is exuded on the leaves of some Douglas-fir trees under certain growing conditions (Turner 1988b, 1997: 57). It was a special treat, hard

to find. Conditions today do not seem to favor the release of Douglas-fir sugar; it is now even more difficult to find (Turner et al. 1990: 108; Turner 1997: 57). Another source of a sweet treat was broomgrass. Aphids sometimes gather on this tall grass in great numbers, at times almost obscuring the plant itself. The aphids extrude a sweet sap which people licked off the plants, formed into balls, or dissolved in water for a sweet drink (Szczawinski and Turner 1980: 64). The jellied sap of tamarack was used as a sweetening syrup (Broncheau-McFarland 1992: 184; Turner 1997: 51) or, when hardened, eaten like candy (Turner 1997: 50; Broncheau-McFarland 1992: 184). Tamarack pitch and pitch from other coniferous trees was chewed like chewing gum (Turner et al. 1980: 25; James 1996: 20; Broncheau-McFarland 1992: 26). Other sources of chewing gum were the milky saps of milkweed (Broncheau-McFarland 1992: 191), mountain-dandelion (*Agoseris glauca* (Turner et al. 1980: 75), rubber rabbitbrush (qémqem, *Chrysothamnus nauseosus*), and white hawkweed (*Hieracium albiflorum*) (Broncheau-McFarland 1992: 181). Nez Perces also occasionally ate buffalo berries (*Shepherdia canadensis* or *S. argentea*) whipped into a froth (Wilson 1916: 18; Turner et al. 1990: 209-210; Broncheau-McFarland 1992; 194-195; Striker 1995: 29). Young pollen cones of ponderosa pine (and probably other conifers) were also eaten as a confection.

Seasonings

Some of the staple foods in the Nez Perce diet were rather bland in flavor, but certain plants used for seasoning helped make these foods more interesting. Berries were often included in soups and stews or in cooked black tree lichen to add extra flavor (Boas and Teit 1930: 57; Teit 1930; Scrimsher 1967: 36; Broncheau-McFarland 1992: 185, 186). Onions were often added to bland foods such as ho·pop (Ray 1932: 104; Scrimsher 1967: 36; Szczawinski and Turner 1980: 60). A grass growing on high, open canyon ridges was used as a pepper-like seasoning called piséqes (Alan Marshall, personal communication 2000). Salmon were barbecued on red-osier dogwood twigs, or wood chips from this shrub might be used to impart a salty taste (Turner 1979: 213). Other plants used by some indigenous groups to add a salty taste are the stem base or roots of cow-parsnip (Chestnut 1902; Coffey 1994: 161) and the stems and leaves of monkeyflower (Tilford 1997: 98). Powdered kinnickinick berries were sprinkled on liver or meat to add flavor (Hart 1979: 281; Coffey 1994: 90), and mint leaves were used to season meat and vegetables (Hart 1979: 284; Coffey 1994: 203). Other Plateau seasoning herbs include peeled chokecherry twigs; leaves of wild ginger (*Asarum caudatum*), angelica, wild rose, and false Solomon's seal; flowers and young leaves of lomatiums or wild strawberries; and fruits of sweet cicely, yampa, and meadowrue (*Thalictum* spp.) (Brown 1868; Turner 1979: 245; Coffey 1994: 164; Kuhnlein 1991; Tilford 1997: 142, 156, 166, 178, 184; Turner 1997: 87, 144, 150; Moerman 1998). Monkeyflower foliage was used by some American Indian groups for a general flavor enhancer (Tilford 1997: 98).

Food Preparation and Storage Methods

In earlier times, Nez Perce people served plant foods and meat at the same meal but not mixed together (Harbinger 1964: 21). For example, they considered the flavor or salmon and bitterroot ruined if they were cooked together (Harbinger 1964: 21). A typical meal would include kouse or camas mush, gravy, berries, root foods, fish, and meat (Harbinger 1964: 21). Some consultants said that after Euroamerican contact, "everything" was mixed together in a stew (Harbinger 1964: 21). The reason for this change is not known.

Columbia Plateau people developed sophisticated cooking procedures for the plant foods available to them. Indigestible substances were rendered digestible by involved methods of preparation. Some examples detailed earlier in this report include pit roasting of camas, balsamroot, and other foods to break down the inulin into easily-digested simple sugars, and pit cooking of black tree lichen to change the fibrous lichens to a gelatinous food. Other special preparation methods removed or denatured toxic substances in plants. For example, chemicals (furanocoumarins) in the outer layers of cow-parsnip stems cause skin blistering in the sunlight and would cause blisters and sores in and around the mouth and throat if ingested (Camm et al. 1976; Kuhnlein and Turner 1986). However, Northwest Native groups peeled cow-parsnip stems before eating them, removing the layers containing these chemicals (Teit 1930; Kuhnlein and Turner 1986). Cooking buttercup roots or parching buttercup seeds removes their toxicity (Broncheau-McFarland 1992: 182). Grinding chokecherries oxidizes potentially poisonous cyanide-containing compounds in the pits and thus denatures the poison (Timbrook 1982).

Methods of preparing plant foods increased their storage life and enabled their availability during the winter or while traveling. Berries were dried over or near a fire, or air-dried on tule mats (James 1996: 20). Root foods were dried whole or ground into meal and shaped into loaves or patties. Greens were also sometimes dried. Various foods were mixed together in pemmican, providing a balance of protein, vitamins, and other nutrients. The prepared foods were stored in caches. Common methods of preparing food caches involved building platforms on stilts or, more often, digging storage pits (likés) in the ground (Boas and Teit 1930: 27). Where possible these storage pits were located in caves or under rock overhangs, but sometimes they were in the open. Food caches in open areas were usually located on well-drained hillsides (Slickpoo 1973: 35). Food caches were distributed over an area in order to reduce the probability that the entire winter supply would be lost to raiding by animals or by other humans. Furthermore, food caches were not near people's houses and were often at some distance from the winter village in order to reduce the chance of raiding by Nez Perce dogs. Having food caches at a distance also reduced the chance of the food supply burning up in a structural fire (Chance 1991).

A storage pit was lined with rocks and then plant material such as redcedar or cottonwood bark, leaves of Great Basin wildrye (suséʔey, *Leymus cinereus*), and perhaps fragments of textiles (Slickpoo 1973: 35; Hicks and Morgenstein 1994; Mastrogiuseppe 1994: 28-29). A layer of foods such as fish, roots, and berries was placed on this lining material, perhaps in baskets, hide bags, or in bundles wrapped in small mats (Slickpoo 1973; Hicks and Morgenstein 1994; James 1996: 31). Tule mats, or sometimes other plant materials, were placed over the food layer and more food on top of the separating layer. Foods and lining materials were layered in this way to fill the pit, which was covered with a final insulating and protective layer of plant material such as wildrye (Hicks and Morgenstein 1994; Mastrogiuseppe 1994: 28) or ponderosa pine needles (Turner et al. 1980: 32), followed by soil and then rocks (Slickpoo 1973; James 1996: 32). Using a food storage pit made it more difficult for outside groups to raid a group's food stores than if they were aboveground. Locating the storage pits in caves made them more difficult for outsiders to find. The layer of soil and rocks on top of the pit helped protect the stores from raiding animals. There is evidence that aromatic plants such as field mint (*Mentha arvensis*), yarrow, and river sage (heqé·qe, *Artemisia ludoviciana*); were placed in storage pits to repel insects, further protecting the stored food (Hart 1976: 64, 1979: 284; Mastrogiuseppe 1994: 5). The Klamath people used the strong-smelling tobacco-root in their food caches in order to repel raiding animals (Spier 1930).

Even after they began farming, Nez Perce people continued to use storage pits to keep produce such as potatoes, onions, squash, and melons through the winter (James 1996: 69). The dried food stores of Columbia Plateau Indians have been called the forerunners of contemporary pre-cooked instant foods (Scrimsher 1967: 81).

Plant Foods and Nutrition

The traditional Nez Perce diet was well-balanced, and foods available in Nez Perce home territory provided the nutrients necessary for good health (Tables 3, 4). Most of the protein needs were provided by fish, and, to a lesser extent, meat. Plant foods were the primary source of carbohydrates, vitamins, and minerals. Nearly all of the traditional plant foods are excellent sources of calcium, but iron content is low, with black tree lichen being the best iron source (Scrimsher 1967: 67). Estimates of the relative caloric contributions of plant foods in the total Columbia Plateau indigenous diet range from 30-40 per cent (Marshall 1977: 64) to 50-55 per cent (Hunn 1990: 177; Hunn et al. 1998: 526).

Nez Perce methods of preparing, preserving, and storing plant foods helped them acquire these nutrients even during the winter months. Some studies have compared traditional foods with contemporary equivalents and found that traditional foods were higher in many nutrients (Yanovsky et al. 1932; Yanovsky and Kingsbury 1938; Tuba et al. 1944, 1945; Scrimsher 1967; Benson et al. 1973; Keely 1980, Kuhnlein 1984; Kuhnlein and Turner 1991).

Feasts

Food feasts illustrate the importance of plant foods and fish to the Nez Perce people (Harbinger 1964: 23-25). Feasts are a form of ta·la·pósa. Ta·la·pósa is the Nez Perce word meaning "to worship" (Alan Marshall, personal communication 2000). The First Roots Feast and First Fruits Feast are described earlier in this report (pp. 37-38, 56). Other important feasts celebrated the first food gathering or hunting by a child. A Nez Perce girl's first root digging and berry picking were celebrated with a ta·la·pósa feast when she was six to ten years old, celebrating the child's first contribution to the group labor (Harbinger 1964: 23; Slickpoo 1973: 47). Food procured by the child was included in the foods served at these feasts. Speeches were given encouraging the child's efforts, with elders speaking first, and the girl's family presented gifts to those attending. The eating of the first roots or berries gathered by a girl was believed to make her a good worker. If an expert root digger or fruit gatherer ate the first roots or berries gathered in quantity by a girl, the girl would become a good provider for the general welfare (Slickpoo 1973: 47).

Contemporary Diet

After contact with Euroamericans, Nez Perce people shifted their pattern of eating to include European agricultural crops. This change was due to a number of factors and was not necessarily by choice. It is clear that many Nez Perce people were forced to largely abandon their traditional foods by the destruction of native habitats and by the desire of missionaries and government to "civilize" American Indian societies. The missionaries exerted tremendous pressure on indigenous groups to give up their cultural traditions (including gathering and storing native foods) and adopt "white" ways.

During the 1960's, a survey of traditional food used questioned a sample of adult Nez Perce people from Lapwai, Idaho. These people reported eating traditional plant foods as follows: huckleberries 76 per cent, kouse 68 per cent, Canby biscuitroot 62 per cent, yampa 66 per cent, camas 58 per cent, black tree lichen 54 per cent, and bitterroot 42 percent (Scrimsher 1967: 78). According to this study, fewer people ate the other traditional plant foods such as balsamroot stalks, serviceberries, elderberries, and chokecherries. Today the percentages of people eating these traditional foods is undoubtedly different and less than in the 1960's. However, in recent years the number of people eating traditional foods has increased.

Diabetes is a health problem affecting some contemporary Nez Perce people as well as many other indigenous groups of the world. Studies have shown that adoption of a "Western" diet drastically increased the rate of diabetes among indigenous peoples (Nabhan 1989; Anonymous 1993; Abrams 1996). Returning to a more traditional diet has helped. Some contemporary Nez Perce people have controlled their diabetes and restored health by incorporating traditional foods into their diet: camas, cous, other root foods, native fruits, fish, and elk or deer (Anonymous 1993; Abrams 1996).

Food for Horses

During the growing season, Nez Perce horses grazed on grasses, sedges, and other available fresh plants. In winter, whatever fresh foliage was available for grazing was supplemented with hay, cottonwood bark, and brush collected by the horses' caretakers (Ruby and Brown 1970: 26). Sedges and grasses (especially bluebunch wheatgrass and Great Basin wildrye) were collected for horse feed. Some reports indicate that horsetail hay was used if grass/sedge hay became short, and that horsetails might also be fed to horses to relieve diarrhea resulting from eating new spring grass (Turner et al. 1980: 18).

One interesting hypothesis proposes that horses may have contributed significantly to the disappearance of bison from the Columbia Plateau during the 1800's. This hypothesis is based on the lack of abundant forage for large hooved grazers in Plateau environments. Some Plateau people kept large herds of horses, and this was especially true for the Palouses and the Nez Perces. According to this idea, the horses might have greatly reduced the amount of available forage for bison and thus contributed to their decline (Carl Gustafson, personal communication 1997). Others believe that horse grazing would have had little impact on bison.

However, horses almost certainly contributed to the decline of Plateau bison in another way. Hunting bison from horseback was more efficient and effective than hunting on foot.

Plants in Technology

Without access to metals or glass, indigenous Columbia Plateau groups developed techniques of making all the tools and supplies required for their lives. Many functions of the metal or glass goods used by Eurasian cultures were fulfilled in traditional Nez Perce culture with implements made from plant materials. For example, digging sticks were made from wood and antler; baskets used for cooking and gathering were made from plant fibers; and eating utensils might be made from wood or matting.

Plant materials used in indigenous technology include extracted fibers, wood, bark, pitch, roots, stems/branches, leaves, flowers, fruits, cones, lichens, and fungi. Contributions of plant materials to traditional Nez Perce technology are discussed below by use category.

Cordage

Cordage quite literally tied the Nez Perce world together. For all kinds of binding, tying, and lashing, cordage was made mostly from plant fibers. Cordage was also the basic material for constructing baskets, mats, and clothing. Depending on its purpose, cordage ranged from fine strands the diameter of thread to heavy thick ropes (Fig. 26). Since little or no cordage has been recovered from archaeological sites along the Clearwater River or other Nez Perce village locations, this discussion will focus on cordage from Palouse rockshelters along the lower Snake River, adjoining Nez Perce territory.

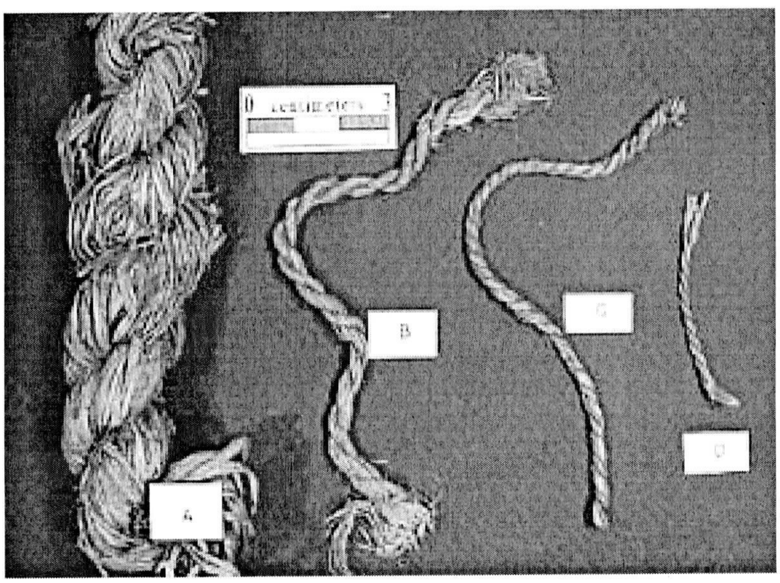

Figure 26. Cordage made from stems and leaves of sedges (*Carex* spp.).

<u>Dogbane</u> (qeemu)

The finest cordage was made from qeemu or tall dogbane, formerly called Indian-hemp. This plant was common along the Clearwater and Snake Rivers, growing in dense stands along river shores and in other moist areas. It is the material most widely used in traditional Nez Perce weaving and sewing (James 1996: 61). The stems have long straight fibers just under the "bark," and these fibers have great tensile strength that is not lessened when they are wet. Dogbane plants were usually gathered in autumn, when the leaves turn

yellow. At this time of the year the dogbane fibers are mature: longest, strongest, and easiest to extract from stems. Stems were cut at ground level, sometimes split lengthwise (Turner 1979: 169), and dried. The dried stalks were pounded to loosen the fibers, and stem tissues were broken every inch or so along the stem to make it easier to extract the fibers. To remove all the non-fibrous tissue, the stems were then drawn across an edge or an edge was drawn along the length of the stem, or the non-fibrous tissue was removed by hand. The extracted fibers are numerous, fine-textured, and very strong. The bundle of fibers from a stem was twisted by rolling it along the thigh with a damp hand. This creates a twisted strand that is much stronger than a straight bundle of fibers. Length of the strand was increased by splicing in the fiber bundle from another stem with an interlocking V about half the length of each stem. To make fine cordage, two of these twisted strands were twisted together in the opposite direction from the twist of the individual strands (Fig. 27). Another method of making fine twine is to take the bundle of fibers from a dogbane stem and bend it double to make two strands. The two strands are tightly wrapped around each other in one direction while twisting the fibers in each strand in the opposite direction. This creates two-strand cordage in one step.

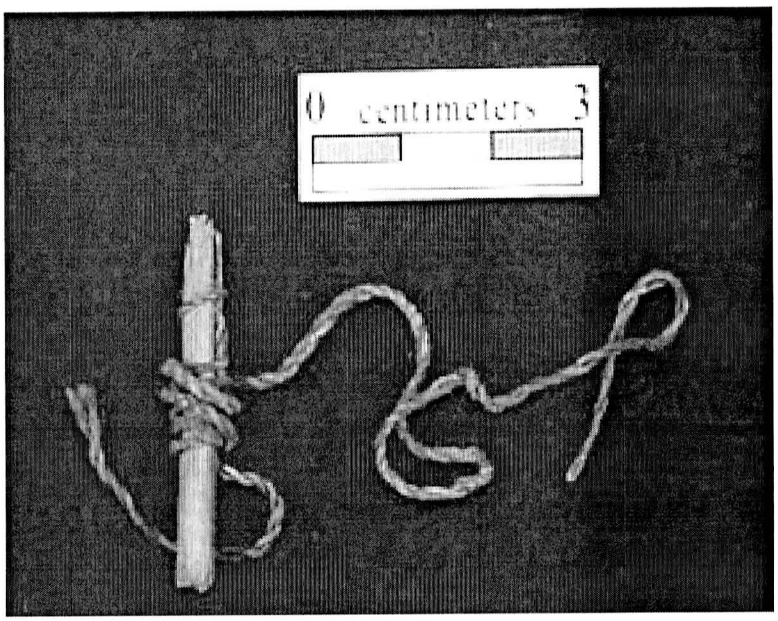

Figure 27. Fine cordage made from *Apocynum cannabinum*, qeemu (tall dogbane).

Some two-strand dogbane cordage recovered from archaeological sites along the lower Snake River is only 1-1.5 mm in diameter. For such fine cordage as this the dogbane stems were probably split in half and fibers from only one half used for each length of cordage, with the fibers from the other half spliced to the end.

Whenever fine, strong cordage was needed, dogbane twine was used (Figs. 27, 28, 29).

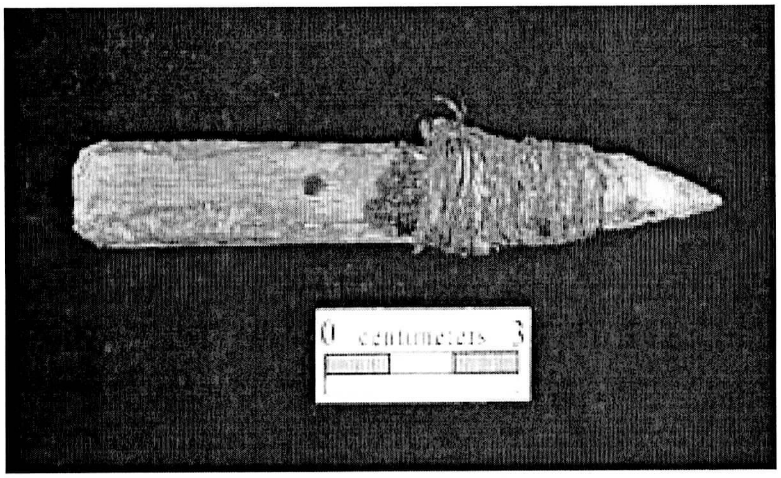

Figure 28. Palouse knife (archaeological). The handle is western redcedar, and it is hafted to the blade with dogbane cordage. The black stains are from conifer pitch used as an adhesive.

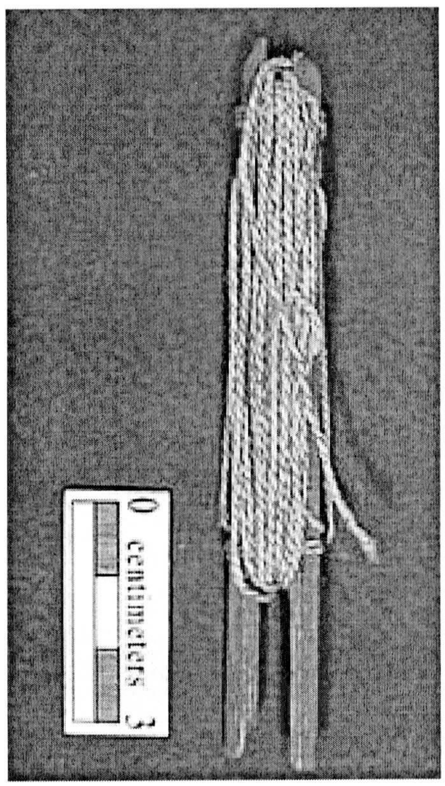

Figure 29. Fine dogbane cordage on a Palouse net shuttle made of western redcedar wood (talátat, *Thuja plicata*).

Much of the cordage recovered from rockshelters of the Columbia Plateau is made of dogbane (Mills and Osborne 1952; Swanson and Bryan 1954). Dogbane cordage and sinew were the basic Nez Perce (and Plateau) thread materials (Boas and Teit 1930: 20, 189). Fine dogbane cordage was the basis (warp and weft) of the traditional soft flat bag (the "cornhusk bag") of the Columbia Plateau. It was also the best material for making fishnets

and fishing lines because it retains its tensile strength in water (Fig. 29). Another interesting use of dogbane cordage was the counting string used by a Nez Perce woman to record events in her life.

Dogbane cordage was a valued trade item for groups living where the plant is sparse or absent, such as the Northwest Coast (Turner et al. 1980: 73). According to Nez Perce consultants, dogbane had disappeared from the Clearwater area by the 1960's (Harbinger 1964: 57). However, a few populations along the lower Snake River had reestablished themselves to at least some extent on the new (post-dam) shoreline by 1999.

Spreading dogbane (*Apocynum androsemifolium*) was sometimes used as a substitute for tall dogbane, but spreading dogbane is not as desirable (Turner 1979: 169; Minerva Soucie, personal communication 1998). It is a much smaller plant; the stems have fewer fibers; the fibers are shorter; and the cordage made from them is not as strong. Fibers from the stems of stinging nettles are also twisted into fine cordage (Coville 1897: 95), but nettles were used more along the Northwest Coast and in other areas where dogbane is not directly available (Gunther 1945: 28). Nettle fibers break more easily during processing and are weaker and somewhat coarser than dogbane fibers (Minerva Soucie, personal communication 1999).

Other plant fibers sometimes used for fine cordage include wild flax (*Linum perenne*) (Coville 1897: 99), fireweed (*Epilobium angustifolium*) (Szczawinski and Turner 1980: 132; Turner and Szczawinski 1984: 78), honeysuckle vine (*Lonicera ciliosa*) (Turner 1979: 205), and milkweed (Turner et al. 1980: 74; Broncheau-McFarland 1992: 191). All of these plants have coarser fibers than dogbane, and they are often more difficult to extract. For example, milkweed has only a few (three or four) relatively coarse fibers per stem (Minerva Soucie, personal communication 1999).

Sedges

Coarser cordage (from medium twine to very thick rope) was made from sedges, *Carex* spp. (sometimes called meadowgrass). Sedge cordage recovered from archaeological sites along the lower Snake River ranges from 5 mm to 5 cm in diameter (Fig. 26) (Mallory, 1966, Endacott 1992, Mastrogiuseppe 1994: 4, 1995: 4). Non-flowering sedge stems were gathered for cordage when they had completed most or all of their seasonal growth. They were cut off just below the base of the stem, dried, and then rehydrated before use. To make sedge cordage, whole sedge stems with attached leaves were twisted together (occasionally just the leaves were used). Like dogbane cordage, sedge cordage was usually two-stranded. Sedges are an efficient cordage material because they require little or no pre-processing except drying. They were readily available in camas meadows, along riverbanks, and in many other moist to wet habitats. Sedge fibers are quite strong and more resistant to decay than grass fibers. Their strength is illustrated by an 1848 incident during construction of a church by the Coeur d'Alene Indians. A commercial rope brought by the missionaries broke while it was being used with pulleys to raise the pillars and columns that would support the church roof. The Coeur d'Alene workers made a new rope from sedges growing locally, and this sedge rope worked very well without breaking or wearing out (Seltice 1990: 49).

Sagebrush (q̓émqem)

Big sagebrush (*Artemisia tridentata*) is the plant that "defines" arid interior western North America. Its tough shredding bark can be peeled off in long strips and was often used to

make fine to medium-diameter cordage (Fig. 30). The fibers in sagebrush bark are short, so even when twisted into cordage they do not have as much tensile strength as dogbane or sedges. However, sagebrush bark cordage has greater resistance to abrasion than other kinds of cordage, and so it was used for items where this property is important, including floor mats and sandals. The Fort Rock sandals (the famous sandals found in a central Oregon cave by Luther Cressman in 1938) are made of sagebrush bark cordage. Radiocarbon dating determined that these sandals were made about 10,000 years ago (Cressman 1981), so it is clear that sagebrush bark has been used to make cordage for a very long time. Sagebrush bark is also one of the cordage materials used by the Palouse people to sew together tule mats and for the cords with which to hang mats or tie them to a roof frame.

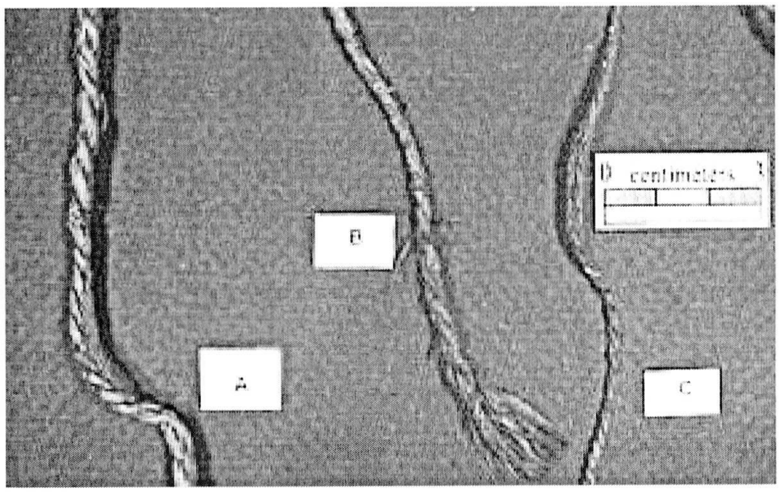

Figure 30. Cordage made from sagebrush bark (q́émqem, *Artemisia tridentata*)

<u>Grasses</u>

Grasses were also used for cordage, but most grasses in Nez Perce territory do not have strong fibers and so were only used for temporary purposes or in combination with other materials. Of the grass leaves that have stronger fibers, two kinds were often used for cordage by Palouse people (Mastrogiuseppe 1994: 7, 11, 12, 14, 15, 17, 18, 21, 23, 1995: Table 1) and probably also by Nez Perce people. Broomgrass is very tall and forms dense colonies in moist to wet areas such as seeps, springs, and ponds. Its leaf blades are short (usually less than six inches long) but have strong fibers. Great Basin wildrye is a big bunchgrass growing in moist low places, usually alkaline. Great Basin wildrye leaves are long, with fibers somewhat less strong than those of broomgrass. Palouse people also made smaller amounts of cordage from alkali cordgrass (*Spartina gracilis*). Some Palouse cordage was made entirely from alkali cordgrass or included stems of this grass used together with sedge stems or leaves of broomgrass or Great Basin wildrye (Mastrogiuseppe 1994: Table 1, 1995: Table 1). Use of alkali cordgrass for cordage apparently has not been recorded for other groups, and its use by Palouse people may have been due to local availability of the grass along the lower Palouse River. Occasionally Palouse cordage also includes stems of bluebunch wheatgrass (*Pseudoregneria spicata*) or needle-and-thread (*Hesperostipa comata*), but this is usually a minor component with the primary cordage material being sedges (Mastrogiuseppe 1994: Table 1, 1995: Table 1).

Other materials used to make "soft" cordage

It appears that at least in the past, Nez Perce people made cordage with Western clematis (*Clematis ligusticifolia*) bark. This is not directly recorded in the published literature, but it is mentioned in the old Nez Perce story of Coyote killing the monster at Kamiah and thereby creating the Nimipu people. When Coyote comes to Kamiah to confront the monster, he hides under a "grass bonnet" and ties himself to three mountains with "Coyote rope" (western clematis cordage) so that he will not be drawn into the monster too quickly (Spinden 1908a: 268; Curtis 1911: 162; Phinney 1934: 19). The Sanpoil-Nespelem and the Okanogan-Colville people wove bags, small mats, and clothing with bark of western clematis (Boas and Teit 1930:183; Ray 1932: 45; Spier 1938; Kennedy and Bouchard 1998).

Other plant materials sometimes used for soft cordage include stems of tules or spikerush (*Eleocharis* spp.), cattail leaves (Spier 1930; Mastrogiuseppe 1994: Table 1), and juniper bark (Swanson 1962).

Stiff cordage from woody plants

For special applications, Columbia Plateau people made cordage from strips of willow bark or whole young stems of sandbar willow (*Salix exigua*) (Fig. 31), or from bark or stems of bitter cherry (Harbinger 1964: 54; Turner 1979: 239, 262-263; Turner et al. 1990: 264; Mastrogiuseppe 1994: Table 1). This rope might be used in situations where strength is more important than flexibility, e.g. tying up canoes and rafts, lashing fish weirs, making flexible ladders, or building suspension bridges. When the Coeur d'Alene Indians were building their first church in 1848, they used willow cordage to lash the rafters to the wall uprights (Seltice 1990: 49). Lashings and pliable ladders were also made with the bark of Rocky Mountain maple (*Acer glabrum* var. *douglasii*) (Turner 1979: 159), western clematis (*Clematis ligusticifolia*) (Turner 1979: 228), red-osier dogwood (Turner 1979: 215), and redcedar (Turner 1979: 85), as well as orange honeysuckle vines (*Lonicera ciliosa*) (Turner 1979: 205).

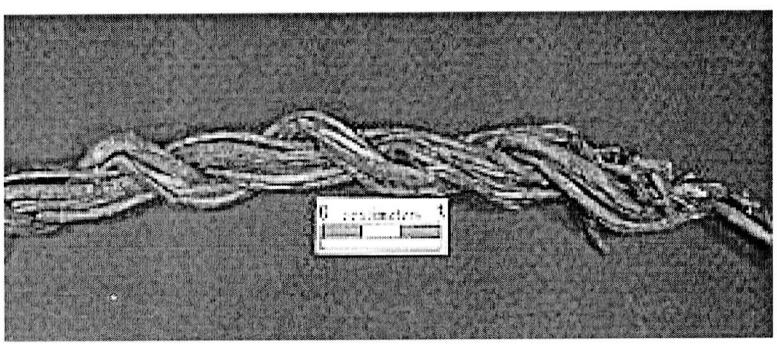

Figure 31. Stiff cordage made of sandbar willow stems (*Salix exigua*). This type of cordage was used for such purposes as suspension bridges and tying up boats.

Matting

Matting was the general-purpose textile among Plateau peoples. Mats served many purposes: roofing, rugs, room dividers, furniture, mattresses, food-drying surfaces, separating layers in food storage pits, plates and platters, and clothing (Curtis 1911: 45; Harbinger 1964: 57; Teit and Boas 1978: 47; Hicks and Morgenstein 1995). The most versatile and widely used

matting was made of tules (Fig. 32). Because of their versatility, durability, and portability, tule mats were extremely important in any geographic area where tules grow. Tules are wetland plants that live in quiet shallow water, usually in a sandy or gravelly soil. In Nez Perce territory tules occurred in appropriate habitats along rivers and creeks and in marshlands, but much of this habitat has been altered through draining, agriculture, domestic grazing, commercial development, and intense competition from wetland weeds like reed Canary grass, *Phalaris arundinacea*. Reed Canary grass is believed to be native in this region, but thick deposition of fine-textured topsoil eroded from plowed fields has created streamside habitats that greatly favor this aggressive grass. Up to eight or ten feet of silt loam has been deposited over the "natural" streambeds of many streams in the Palouse country (Richard Old, personal communication 1985). Under these conditions, tules have a tough time competing.

Figure 32. *Scirpus acutus*, tóko (tules), growing with other wetland plants. Tules were used for food, matting, and medicine.

Tule plants have straight unbranched bare stems up to 10 feet tall (Fig. 32). At the base of the stem there are leaf sheaths with a little point at the tip that represents the leaf blade. For weaving material, some groups preferred to cut tule stems in late summer to early autumn while they are still green (Minerva Soucie, personal communication 1997). Tules can, however, be collected later, even into winter if they have not broken, and members of other groups apparently favored cutting tules after a killing frost (Ross 1998).

Tule stems are usually dried for at least a week before use. They shrink somewhat during drying, so if they are used fresh the resulting mat becomes loose and doesn't hold together well (Minerva Soucie, personal communication 1997). Soaking the dried stems in water for about two days prepares them for use.

Tule stems were the ribs (warp elements) of tule mats and were lined up with the broad lower end of one stem beside the narrow upper end of the next stem, alternating this way so that the mat was straight. In Palouse tule mats, and probably also those of the Nez Perces, the tule stems were sewn together with a large gently curving needle made of bone or wood such as yew (Turner 1979: 120). The material used to sew the tules together was cordage made from sedges, sagebrush, dogbane, tules, or cattail leaves (Fig. 33) (Spinden 1908a: 195; Boas and Teit 1930: 11; Mastrogiuseppe 1994: Table 1, 1995: Table 1;

James 1996: 33). Usually near each margin of a tule mat there is a row of twining rather than sewing. This strengthens the mat and helps reduce splitting of tule stems (Fig. 33). Some mats were made entirely by twining.

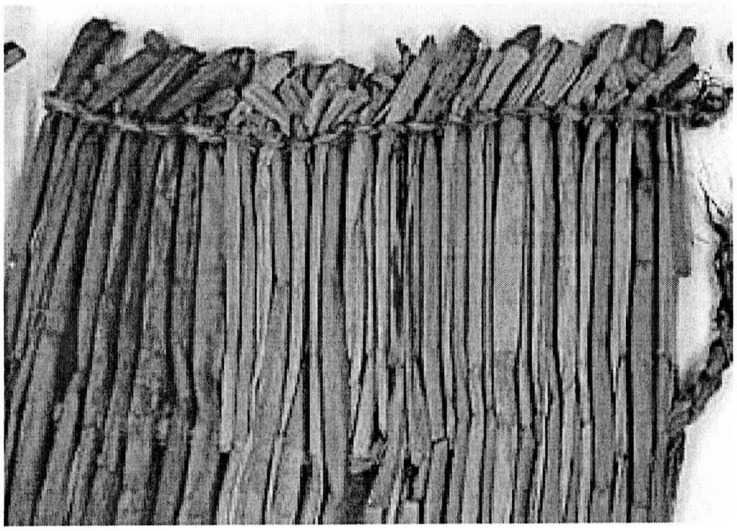

Figure 33. An archaeological tule mat fragment. The stems were sewn together with sedge cordage (at bottom of view), but the mat margins were twined.

Often mat margins were finished simply, with the cut ends of the tule stems forming the mat edges (Fig. 33). Some Plateau groups made mat margins more decorative by cutting the tule ends in patterns of different lengths (Boas and Teit 1930: 12). For extra strength and decoration mat margins were sometimes finished with a selvage. This might be formed by bending the tule ends back and catching the cut ends in the marginal row of twining, by winding the tule ends into a twined border, or by braiding the ends together along the mat margin (Fig. 34) (Mallory 1966). The most involved selvages were wide strips of twilled over-and-under plaiting. In addition to fancy selvages, other decorative elements were used in mats, such as coloring some tule stems for designs or combining different construction methods (e.g. plaiting, twining, twilling). The mats are works of art.

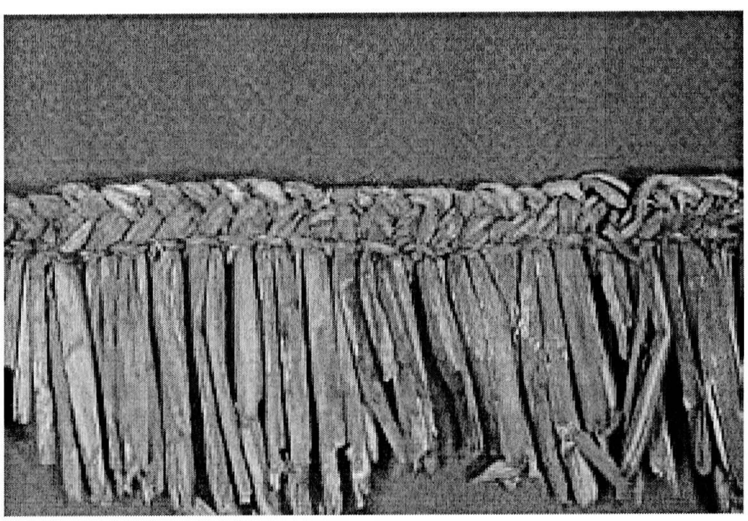

Figure 34. Archaeological tule mat fragment with a braided margin.

Layered tule mats formed the roofing/siding of the large mat lodges used by Nez Perces at the time of Euroamerican contact. The mats were oriented with the tule stems vertical, the grooves between the stems channeling rainwater down to the ground and tending to shed snow (Fig. 35). A mat hanging over the doorway was oriented with the tule stems parallel to the ground and could be easily rolled up in warm weather. In hot weather, mats forming the sides of a dwelling might also be removed (James 1996: 33). After the Nez Perce and other Plateau groups acquired the horse (about 1730) and strengthened their long-established relationships with people of the Great Plains, they began using tipis for conveniently movable shelter. Nez Perce tipi frames were originally covered with tule mats (Fig. 36). Tules were good material for these purposes because the stems are filled with spongy, air-filled tissue that makes them good insulators. Tule stems shrink when dry and swell when wet, so the mats form a watertight surface in the rain but allow good air ventilation during drier periods. Tule mats are also very light and easily rolled up for carrying on seasonal travels. After the arrival of Euroamerican goods, tule mats were gradually replaced with canvas, woven cloth, and wool blankets (Figs. 35, 36, 37).

Figure 35. A tule lodge on the Umatilla Reservation, ca. 1910. The man, Red Elk, is Nez Perce; the woman's identity is unknown.
From Nez Perce National Historical Park Photograph Archives NEPE-HI-C33558

Stacked tule mats formed springy mattresses, pillows, or surfaces to sit on. The mats were also suspended on pole frameworks to provide a ventilated surface for drying foods (Harbinger 1964: 57). A special application of tule mats was as wrapping for burials. For burial mats, tules were collected and prepared in special ways. Other uses of tule mats include wall hangings, room dividers, floor covers, food mats, placemats, and food preparation surfaces (Turner et al. 1980: 37; Turner et al. 1990: 116; James 1996: 33) (Fig. 15), and wrapping bundles of food for storage (Hicks and Morgenstein 1994). Sometimes cattail mats were used for the same purposes as tule mats (Coville 1897; Turner et al. 1980: 59; Broncheau-McFarland 1992: 181), but Nez Perce people usually preferred tules because they are stronger, more resistant to splitting, better insulators, and more waterproof (James 1996: 63). Tule mats were highly desired as trade items by people who did not have abundant tules growing in their home territory.

Figure 36. Tule tipi at Lapwai, ID, ca. 1910. The woman's identity is unknown.
From Nez Perce National Historical Park Photograph Archives NEPE-HI-0400

Figure 37. Tule and canvas tipi, ca. 1890. The woman (identity unknown) is surrounded with "women's things," including a traditional digging stick and basketry. The coiled basket she is holding is imbricated (see definition on p. 84).
From Nez Perce National Historical Park Photograph Archives NEPE-HI-2473

In caves and rockshelters along the lower Palouse River, there are also fragments of "grass" mats (Mallory 1966) (Fig. 38). The warps of these mats consist of bundles of grasses or sedges (primarily bluebunch wheatgrass (*Pseudoregneria spicata*), needle-and-thread (*Hesperostipa comata*), bottlebrush squirreltail (*Elymus elymoides*), Great Basin wildrye, woolly sedge (*Carex pellita*), or beaked sedge (*C. vesicaria*) twined together with sedges (Fig. 38). Usually the margins of these grass mats were braided. The mats are thick and were

probably used for mattresses, pillows, furniture, or food preparation. This type of grass mat has also been found in at least one rockshelter in Grant County, Washington.

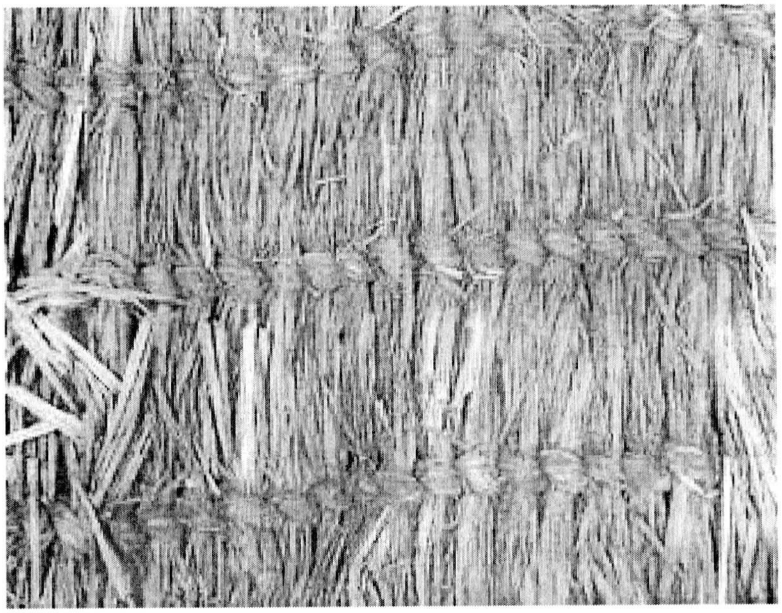

Figure 38. An archaeological twined "grass" mat made of sedges.

Other materials were used to make special-purpose mats. Stems of reedgrass made a rigid openwork mat useful for drying wet materials or oily fish such as salmon (Teit 1909: 490; Hunn 1990: 192; Mastrogiuseppe 1994: 17, 22). Mats of woven bark (usually willow or redcedar) or serviceberry branches served similar purposes (Leiberg 1897: 52; Boas and Teit 1930: 11; Turner 1979: 85, 232, 262).

Basketry

Nez Perce basketry employed all three of the basic basket-making techniques: plaiting, twining, and coiling. However, twining was the method most often used.

Soft Baskets

It is thought that Southern Columbia Plateau people, perhaps the Nez Perces, originated and developed the techniques of making the soft flat twined bags so important on the Plateau (Conn 1985; Schlick 1994; Miller 1996: 44) (Fig. 39). These bags are so closely identified with Nez Perce culture that commonly any soft flat bag of unknown origin is labeled "probably Nez Perce" (Schlick 1994). These bags are called "cornhusk bags" because in later times cornhusks were used in their manufacture, though only for decoration and not in the actual structure of the bag.

The original flat bags were made entirely from dogbane (Curtis 1911: 45). Both warp and weft were dogbane cordage, closely twined into bags of many sizes ranging from small purses to large food storage bags the size of commercial gunnysacks. The bags are quite flexible, which makes them ideal for storage of dried roots (they conform to the shape), for wearing as backpacks, or for carrying on horses. Soft flat Nez Perce bags were highly desired trade items among Great Plains groups (Gunther 1950).

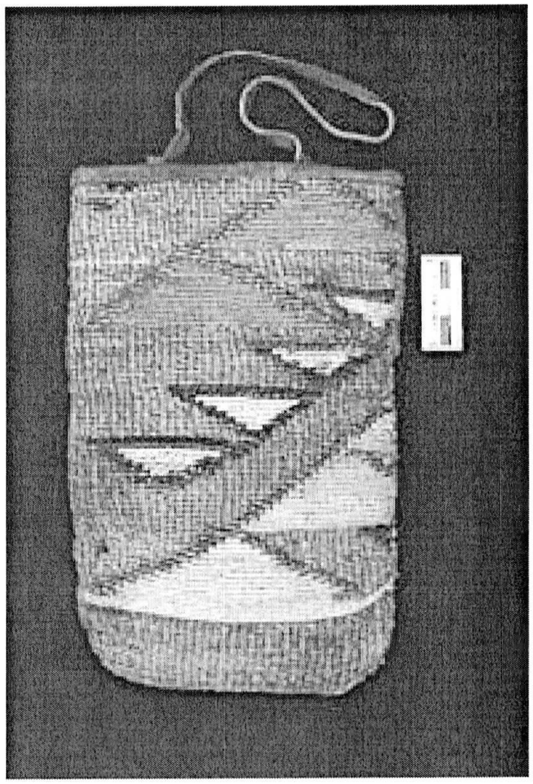

Figure 39. A Nez Perce "cornhusk" bag.
In Museum of Anthropology, Washington State University

Twining is a process that uses two weft strands or "weavers." These weavers wrap around the warps (the ribs of the basket), one to the inside of the warp strand and one to the outside. In the space between warps, the wefts cross and twist so that the inner one comes to the outside while the outer one goes to the inside. Twining creates a thicker and more durable basket than simple over-and-under weaving techniques.

Originally, designs were added to flat bags using dogbane fibers collected at two different times, when the color of the fibers differs, or by coloring dogbane cordage with natural dyes (Ray 1932: 36). Other naturally colored plant materials were also added for decorative strands, including horsetail rhizomes (dark brown to black); bark of willow, redcedar, or bitter cherry (various shades of red-brown); and sagebrush bark (brown) (Ray 1932: 36). Grasses, sedges, and beargrass (yé·ye, *Xerophyllum tenax*) were also used, colored with natural dyes (Ray 1932: 37; Ackerman 1996: 36). The colored strands were woven into the bag using a special technique called false embroidery. In false embroidery the third, colored, strand is wrapped around the outer weft as twining progresses. The colored strand stays completely on the outside of the warps. With this method, the design appears only on the outside of the bag and the strength of the bag is not compromised by frequent changes in weft strands as colors are changed. With the arrival of corn on the Plateau (believed to be during the 1830's) inner cornhusks were dried, split and used for the false embroidery strands, but cornhusks were not used for structural elements of the bags. Often the cornhusks were dyed (usually with commercial dyes) for colored designs.

When commercial twines arrived on the Columbia Plateau (probably with the early Euroamerican traders and missionaries), indigenous people began to use them in place of

dogbane, first for the warp elements and later for both warp and weft. Cotton or jute string from hop fields was gathered after the harvest, and gunnysacks were unraveled. These sources of commercial cordage saved a great deal of time that would have been spent processing dogbane. Even though these materials are not as durable as dogbane, they were widely adopted. In recent years, commercial yarns (cotton, wool, or synthetic) have contributed the design colors or have been used for wefts or for the entire bag—warps, wefts, and decorative strands.

"Cornhusk" weaving techniques are also used to make belts, vests, and horse regalia.

Plateau women used the same basic twining technique and the same materials to make the conical "Plateau hat" and the soft round bags commonly called Sally bags. However, for these hats and bags the design element (e.g. sagebrush bark, bitter cherry bark, horsetail rhizomes, or beargrass) was woven in by wrapping it around the twist of the two dogbane weft strands, between the warp elements (Pat Gold, personal communication 1996). With this method, the design shows on the inside as well as the outside. Sally bags were used to collect roots during digging and, when full, were emptied into larger storage bags. The origin of the name "Sally bag" is uncertain, but several ideas have been proposed (Schlick 1994). I believe the most likely of these is that early Euroamerican explorers thought the bags were made from willow, confusing dogbane plants with small willows because the leaf shape is similar and the stems of both plants are red. They may have called the bags Sally bags after the Latin name for willow (*Salix*).

Plateau weavers also made soft baskets and bags from the bark of sagebrush, redcedar, bitterbrush, willow, and nettles (Geyer 1846: 205, 1847: 300; Leiberg 1897: 52; Boas and Teit 1930: 12; Spier 1930; Ray 1932: 36; Turner 1979: 242). The Coeur d'Alene people made twined sedge baskets (Boas and Teit 1930: 12). Pieces of a twined basket (including the basket "start") were recovered from Squirt Cave along the lower Snake River, in Palouse territory adjacent to Nez Perce territory (Endacott 1992) (Fig. 40). The warps of this basket are sagebrush bark cordage.

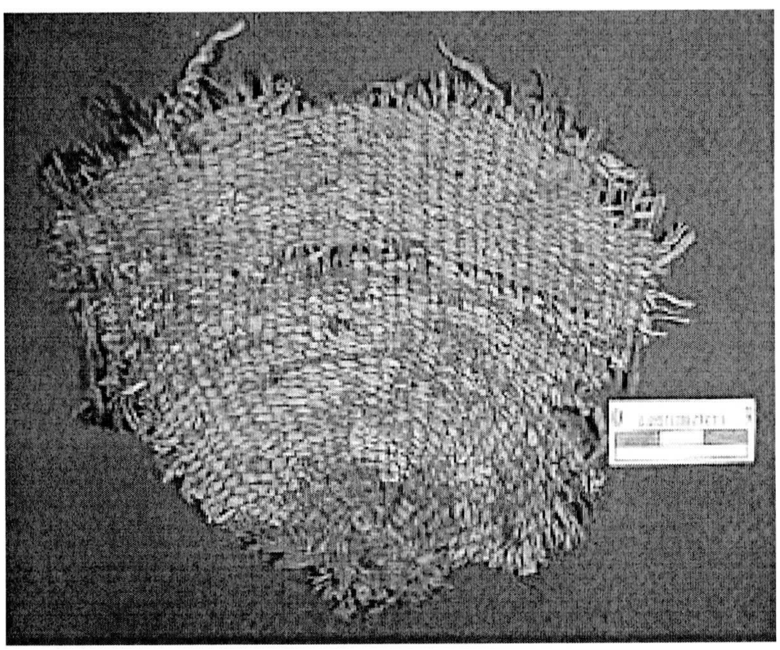

Figure 40. Palouse basketry fragment with sagebrush bark ribs (warps).

A different type of soft flat bag was made from tules or cattails by the Sanpoil-Nespelem and Okanogan people (Turner 1979: 130). These bags were the size of gunnysacks and were open-twined. Like Nez Perce cornhusk bags, they were used for storage of foods such as salmon, meat, and roots (Ray 1932: 37). The Klamaths and the western Columbia River Sahaptins also wove large tule baskets for food storage (Spier 1930: 187, 190; Hunn and French 1998). Northern Paiute people used tule stems or cattail leaves to quickly make open-twined temporary baskets for gathering waterfowl eggs (Minerva Soucie, personal communication 1996). It is possible that Nez Perce people used similar tule and cattail baskets.

Stiff Baskets

For many uses a soft basket would not work. For example, if berries were collected into a soft bag they would crush. Stiff baskets were made for berry picking, boiling, carrying water, winnowing, and for hopper mortars (Scrimsher 1967; Teit and Boas 1978: 55; James 1996: 61). They were probably also used for gathering fresh plant shoots, flower heads, and seeds. Most often, these baskets were constructed using the coiling technique rather than twining. Coiled baskets were made from a foundation element coiled around to form the bottom and sides of the basket. Stitches of another material are wrapped around the foundation element to join the foundation coils together. The foundation elements were usually split redcedar roots or split willow stems, but other materials were also used, including spruce roots, redcedar bark, and birch stems (Spinden 1908a: 199; Boas and Teit 1930: 18; Ray 1932: 35; James 1996: 31). Materials for stitching the coils together included split redcedar roots, sedges, grasses, and spikerush (*Eleocharis* spp). Coiled baskets (especially berry baskets) were often decorated with a technique called imbrication, where on the outside of the basket a flat strip of plant material is tucked under each stitch or every other stitch. Imbrication creates a mosaic-like pattern of little raised rectangles. Usually materials used for imbrication contrast in color with the base material (Fig. 37). Materials commonly used for a creamy white color include leaves of beargrass (Broncheau-McFarland 1992: 191; Arneson 1993: 56; James 1996: 61) or split stems of broomgrass (Coville 1897: 91; Szczawinski and Turner 1980: 64; Turner et al. 1990: 143), Great Basin wildrye (Turner 1979: 141), or reed-canary grass (Turner 1979: 144, 146). Redcedar bark and bitter cherry bark give a reddish-brown color (Arneson 1993: 56). For dark brown or black, Plateau weavers used horsetail rhizomes (Coville 1897; Turner 1979: 64; Arneson 1993: 56; James 1996: 61). Some baskets are imbricated only for the design itself, with the background being the regular coiling stitches. However, on the Columbia Plateau, imbrication often covered the entire surface of the basket (see the basket held by the woman in Fig. 37).

A Yakama story describes how basketmaking originated. A young Klickitat girl who was very lonely and didn't feel worth much sat under a redcedar tree. The tree began to talk to her and convinced her to dig up some of its roots to make a basket. Systematically the tree led the girl through the basketmaking process (including imbrication with beargrass) until she knew how to make a watertight coiled basket. She was so happy at learning to do this that she forgot to be lonely or discouraged (Beavert 1974: 61-66).

Baskets made with tight coiling were watertight and could be used for cooking food. Cooking baskets were made from split willow stems or redcedar rootlets, and they tapered outwards, being narrower at the bottom than at the top (Curtis 1911: 45; Boas and Teit 1930: 18). Sometimes cooking baskets were coated with pitch or rubbed with kinnickinick berries to help them hold water, but a very tightly coiled basket made this unnecessary. Dropping

hot rocks into a basket of water quickly brings it to a boil (James 1996: 37). Rocks used for this purpose were usually about the size of a chicken egg, though not everyone used the same size rocks (Chance 1991). Sometimes a network of green twigs such as serviceberry was placed in the bottom of the basket to prevent the hot rocks from burning through the basket (Turner 1979: 232). Hopper mortars were coiled bottomless baskets used to crush roots, fruits, and sometimes seeds (Fig. 3) (Teit and Boas 1978: 55).

A special type of coiled basket was made from split roots of water birch and worked into a broad, shallow, pan shape with flaring sides (Spinden 1908a: 194). This was used for winnowing and cleaning soil from food roots. Another kind of large winnowing basket was made from red-osier dogwood (Curtis 1911: 44-45). Hopper mortar baskets were also made of red-osier dogwood (Curtis 1911: 45) and probably also willow and other shrub wood.

A very different kind of stiff basket was made by peeling broad strips of bark from western redcedar trees, folding them over to form a flattish cylinder, and fastening the edges together (Malouf 1969; Berglund 1992; Broncheau-McFarland 1992: 118). These folded bark baskets were used for berry picking (Schuster 1998). Peeled redcedar trees are documented at several sites in the Oregon Cascades (Berglund 1992) and along the Nee-Me-Poo trail across the Bitterroot Mountains (Broncheau-McFarland 1992: 118-122). Where available, bark of water birch, cottonwood, quaking aspen, or pine was used to make a similar basket (Boas and Teit 1930: 17; Ray 1932: 38). Most of these bark baskets were intended only for temporary use (Boas and Teit 1930: 16-17).

Through habitat destruction and restriction of access, available sources of basketry materials have been drastically reduced in Nez Perce territory. Because very few stands of old-growth western redcedar remain, there are not many areas where people are allowed to gather redcedar roots or bark. The availability of tules and dogbane is low because of dams along the Snake River and the elimination of many marshy areas through filling, channelizing, industrial development, and housing developments. Herbicides and other kinds of pollution present an additional problem, as preparation of basketry materials often requires putting them in the mouth. Despite these impediments, there has been a resurgence of traditional Nez Perce basketry in recent years. This is due to the determination of many contemporary Nez Perces to return to and maintain their cultural traditions.

Clothing

When most people think of traditional clothing of Columbia Plateau people, they picture hide garments decorated with porcupine quills, shells, beadwork, and feathers. However, this style of clothing was a relatively late development in this area, adopted and adapted from the Great Plains. Earlier Plateau clothing was made primarily with plant fibers (Ray 1932: 45; Schuster 1998), though there is scant record of early clothing of southern Columbia Plateau peoples. It is known that willow, redcedar, and sagebrush bark were used in Yakama-Wanapum-Kittitas-Klikitat-Taitnapam clothing (Schuster 1998). In the northern Plateau, men and women both wore breechcloths made of the bark of willow, sagebrush or other plant fibers (Ray 1932: 45; Turner et al. 1990: 172; Miller 1998: 260). In summertime, men wore little or no other clothing and women wore capes, skirts, or aprons. These garments were often woven from the softened bark of willow, western clematis, bitterbrush, redcedar, or sagebrush, with twined wefts of dogbane cordage (Teit 1909: 507; Ray 1932: 45; Turner 1979: 85, 182-183, 228, 242, 262). In winter, men and women wore poncho-like shirts made from these same fibers, with breechcloths and leggings (Ray 1932: 45). Women's leggings were woven of soft dogbane cordage, while men usually had fur

leggings (Ray 1932: 45; Miller 1998: 260), but sometimes leggings were made from sagebrush bark (Kennedy and Bouchard 1998) or tules (Stern 1998: 453). Robes were made from willow or sagebrush bark; some people may have had fur robes (Ray 1932: 45). Shaped tule or cattail mats were probably used for clothing where flexibility was less important than ventilation or the ability to shed water. Some pieces of tule matting from rockshelters along the lower Palouse River have a tapered shape and could be the remnants of capes. Tule capes are known among other Columbia Plateau groups (Boas and Teit 1930: 41). Some groups wore clothing made from plant fibers during the summer and used skin clothing in winter (Miller 1998: 259).

Traditional Nez Perce clothing was probably quite similar to the garments described above (Josephy 1965: 16). Footwear probably included sandals or boots of sagebrush bark, rose branches, tule stems, or cattail leaves (Teit 1909: 305; Turner et al. 1990: 172; Miller 1998: 260; Stern 1998: 453). Sagebrush bark is particularly appropriate for footwear since it is more resistant to abrasion than most materials. In cold weather footwear was stuffed with fluffy insulating materials such as shredded sagebrush, willow, or rabbitbrush bark, black tree lichen, conifer needles, sedge or grass leaves, or the seed fluff of milkweed, cattails, and clematis (Turner 1979: 127; Turner et al. 1980: 53). Other, coarser, stuffing materials are balsamroot leaves and the bark of cottonwood and quaking aspen (Spier 1938). Balsamroot leaves were also used for insoles (Szczawinski and Turner 1980: 92).

Coloring Agents

Natural dyes added color to basketry and other textiles, wood, hide, and body paints. Many of these coloring agents were derived from plant parts. They were often mixed with cottonwood resin (Turner et al. 1980: 135) and set with a mordant of alumroot (*Heuchera cylindrica*). Later, commercial dyes were used instead of the natural coloring agents.

Yellow

For a bright greenish-yellow or lemon-yellow color in basketry and other fiber-based technology, the wolf lichen (*Letharia vulpina*) was used. It was boiled in water for soaking the item to be colored, or the lichen was simply dipped in cold water and used as both paint and brush (Coville 1897; Boas and Teit 1930: 8; Arneson 1993: 70). Wolf lichen (*Letharia vulpina*) is the bright chartreuse lichen with short branches that grows on bark and branches of coniferous trees, often growing together with black tree lichen. Another source of yellow color is the bark from rhizomes of Oregon-grape (Spinden 1908a: 222; Boas and Teit 1930: 8; Broncheau-McFarland 1992: 188; Arneson 1993: 70; Ackerman 1996: 123; James 1996: 61). The color resulting from Oregon-grape rhizomes is golden yellow grading to brown, depending on how long the material to be colored is soaked. Indian-paintbrush flowers (*Castilleja* spp.) also yield a golden-yellow color even when the flowers themselves are red (Ackerman 1996: 123). For a bright yellow color in basketry materials and porcupine quills, northern bedstraw roots (*Galium boreale*) were boiled for a long time and the liquid used (Turner 1979: 277; Broncheau-McFarland 1992: 192). Adding wolf lichen to the northern bedstraw soaking solution intensified the yellow. Split redcedar roots might be colored pale yellow by adding Douglas-fir needles to the water that is soaking the roots (Turner 1979: 112). A solution of sunflower root (Arneson 1993: 70) (perhaps actually balsamroot) or alder bark (Hart 1979: 275; Turner 1979: 193) can also produce a yellow color. In some areas of the Columbia Plateau, people used ponderosa pine pollen steeped in hot water to produce a pale yellow color (Turner 1979: 110, 112).

Red

Red face and body paint was prepared by drying and powdering the Indian paint fungus (*Echinodontium tinctorum*) and mixing the powder with grease or pitch (Harbinger 1964: 59; Turner 1979: 53; Arneson 1993: 71). Other plant sources of red face paint were powdered red-osier dogwood bark mixed with cottonwood resin (Turner 1979: 215; Turner et al. 1980: 97) and ground yew wood mixed with fish oil (Ray 1932: 52; Turner 1979: 120). Red for coloring textiles and wood was sometimes obtained simply by squeezing the juice from fruits of raspberries, blackcaps, chokecherries, huckleberries, or thimbleberries (Turner 1979: 247, 248; Arneson 1993: 71). Red could also be obtained from boiled alder bark ((Boas and Teit 1930: 8; Harbinger 1964: 55; Turner 1979: 194; Turner et al. 1980: 87), and roots of northern bedstraw (Turner 1979: 277) or stoneseed gromwell (Turner et al. 1980: 91). Boiled alder bark could also produce an orange or red-brown color (Harbinger 1964: 55; Broncheau-McFarland 1992: 184).

Blue and Purple

Larkspur flowers (*Delphinium* spp.) produced a lovely vibrant blue or light blue color (Boas and Teit 1930: 8; Turner 1979: 229; Arneson 1993: 70). The fruits of blue beadlily (Turner 1979: 269), huckleberries (Arneson 1993: 70), and serviceberries (Turner 1979: 232) were also used to add blue color. An unidentified lichen was another source of blue coloring (Curtis 1911: 44). Purple could be obtained from mashed huckleberries (Ray 1932: 37; Arneson 1993: 70), serviceberries, blackberries (Turner 1979: 277; Arneson 1993: 71), and black twinberries (*Lonicera involucrata*) (Turner 1979: 208). Boiled bitterbrush fruits also produce a purple color, but it fades quickly (Coville 1897).

Green

The usual Nez Perce source of green coloring was algae collected from streams (Spinden 1908a: 222; Arneson 1993: 70; James 1996: 61). Snowberry (cícaqiy) leaves (Boas and Teit 1930: 8; Arneson 1993: 70) and redcedar boughs (Turner 1979: 82) were also sources of green coloring for Columbia Plateau groups. The Blackfoot people used Baltic rush (*Juncus balticus*) to produce a greenish-brown color (Turner 1979: 269).

Brown and Black

For brown to black colors in basketry, weavers usually used fibers that were naturally that color: bitter cherry bark for red-brown, sagebrush bark from medium to dark brown, and horsetail rhizomes and maidenhair fern stalks for black. However, boiling yampa roots and black tree lichen produces a dark brown to black solution for coloring basketry materials (Shawley 1975; Arneson 1993: 70).

The Importance of Wood

Wood was the basic construction material, even though the supply of wood in Nez Perce territory was somewhat limited except in the mountains. The only trees easily available in the low valley areas were ponderosa pine, Douglas-fir, willow, poplar, cottonwood, and quaking aspen. More limited amounts of alder, water birch, and Rocky Mountain maple were also present. However, drift logs brought downstream by the rivers greatly increased the supply of available wood, especially western redcedar. Redcedar

was the most important source of wood for Nez Perce industrial use. It is strong, lightweight, resistant to decay, and easily worked. Redcedar wood was used for making dugout canoes, rafts, lodges, snowshoes, fish traps, paddles, boxes, cradleboards, hunting bows, pegs, net shuttles, spoons, pins to prevent meat shrinkage while drying, fishnet floats, and drum frames. Redcedar bark was also an important industrial material, for leantos, roofing, canoe seats, storage containers, and blankets.

For general use, wood was split with a stone maul and wedges made of antler. Carving and boring tools allowed shaping of wood pieces, and smoothing was often done with horsetail stems. To form bends and curves, wood was soaked in water and then heated. Wood points were strengthened through fire hardening (Malouf 1969), a process whereby the pointed end was placed in the hot ground near a fire or held over a fire until it became just slightly charred.

It is ironic that in search of firewood the Corps of Discovery at least twice appropriated split planks in Palouse villages that were vacant because the people were away on their seasonal travels (Ambrose 1996: 304). In the instances recorded in the party's journals, they used this wood for fires to dry out supplies and clothing, but they apparently did not attempt to replace the wood or to provide some kind of compensation for it. The explorers had been charged with establishing good relations with indigenous people, but their own desires and needs came first. Obviously, if wood was difficult for them to find it was also difficult for the Palouse people to obtain. It must have been discouraging for the Palouses to return to their villages and find their wood gone.

Transportation

Indigenous groups in areas with large expanses of marshy habitat and/or quiet water made canoes and rafts from the buoyant stems of tules. These groups include in western North America the Spokane (Ross 1998), the Coeur d'Alene (Boas and Teit 1930: 72; Palmer 1998), the Okanogan (Boas and Teit 1930: 212; Kennedy and Bouchard 1998), the Nicola band of the Thompson (Teit 1900: 256), the Shuswap (Teit 1909: 532), the Klamath (Spier 1930), and the Northern Paiute (Wheat 1967), and in South America the Uros of Peru/Bolivia (Beetle 1945; Heiser 1985b). Nez Perce people occasionally used rafts made from tule stems or cattail leaves (Gulick 1981: 197).

However, the swift-flowing streams and rivers navigated by the Nez Perces usually require a more substantial boat. They depended on dugout canoes (Fig. 41), and these were usually made from logs of Douglas-fir (Spinden 1908a: 223), ponderosa pine (Harbinger 1964: 54), western redcedar (Curtis 1911: 45; Harbinger 1964: 52; Broncheau-McFarland 1992: 185), cottonwood (Turner 1979: 254; Turner et al. 1980: 134), or, occasionally, quaking aspen (Turner 1979: 258). Ponderosa pine was the most numerous tree in the valleys of Nez Perce territory. Some Nez Perce consultants have reported that western redcedar makes the best canoes because it is so lightweight and resists decay (Harbinger 1964: 52, 54; Broncheau-McFarland 1992: 185). However, some Klamath consultants have said that redcedar canoes are too lightweight to handle well, and they tend to crack when dry (Spier 1930). Other Nez Perce people have indicated that the wood most frequently used for dugout canoes was Douglas-fir, and that canoes were chiefly made from drift logs coming down the rivers in the springtime (Spinden 1908a: 223). A good Douglas-fir canoe will last fifteen or twenty years (Spier 1930). Of the four canoes at the Nez Perce National Historical Park, two are made of western redcedar, one of ponderosa pine, and one of cottonwood (Bob Chenoweth, personal communication 2000).

Figure 41. Nez Perce dugout canoe on the Clearwater River, 1910.
Photograph by Edward S. Curtis.
From Nez Perce National Historical Park Photograph Archives NEPE-HI-1803

Hollowing a tree trunk to make a Nez Perce dugout canoe began by burning out the center and then finishing by cutting and scraping with an adze (Spinden 1908a: 223; Harbinger 1964: 52). Conifer pitch provided a good caulking and waterproofing material. Canoe paddles were often made from western redcedar, pine, or fir (Boas and Teit 1930: 72; Ray 1932: 119), and poles used to push canoes in shallow water were often lodgepole pine (Coville 1897).

During the passage of the Corps of Discovery on their 1805 westward journey through Nez Perce country, the Nez Perce people taught the explorers how to make dugout canoes (Ambrose 1996: 301). "To save them [the men of the Corps of Discovery] from hard labor, we have adopted the Indian method of burning out the canoes" (Gass 1904: 152). The Nez Perce people also allowed the explorers to use large ponderosa pine trees from Nez Perce lands (McWhorter 1952: 18; Gulick 1981: 23).

Wood rafts were used for water transportation, especially before horses arrived in Nez Perce territory. As with canoes, western redcedar was preferred for rafts (Harbinger 1964: 52).

For land transportation the Nez Perces relied on foot travel and, later, horses. Saddle frames were made of wood, most often cottonwood (Gass 1904: 235; Harbinger 1964: 55; D. Miles ca. 1975). In the winter, foot travel was aided by snowshoes made of western redcedar, Douglas-fir, yew, hackberry, mountain-mahogany, Rocky Mountain maple, and willow (Spinden 1908a: 223; Harbinger 1964: 54, 57), with syringa or mountain-mahogany reinforcement (Harbinger 1964: 56). The snowshoe mesh was rawhide strips or cordage made from dogbane, wild flax (*Linum perenne*), nettles, or other strong plant fibers (Fig. 42) (Coville 1897). For pulling loads (by humans, dogs, or horses), travois were constructed from lodgepole pine, ponderosa pine, or western white pine. Toboggans were made from Douglas-fir branches.

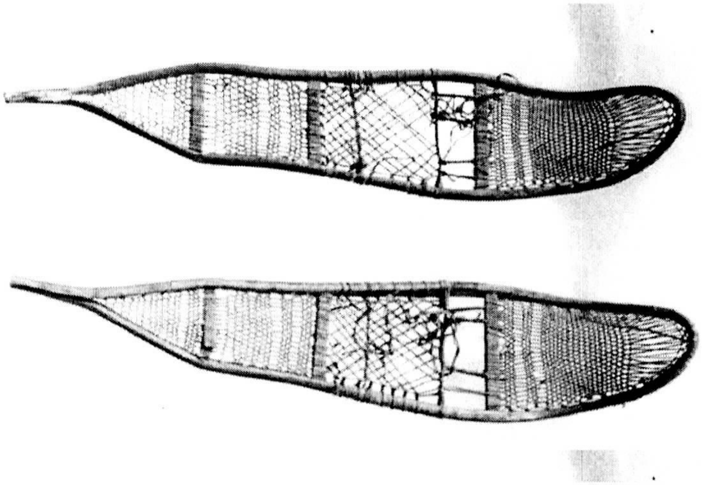

Figure 42. Nez Perce snowshoes. The central webbing is cordage made from plant fibers.
Ralph Williams collection.
From Nez Perce National Historical Park Photograph Archives NEPE-HI-0174

Housing

During their seasonal travels the Nez Perce people built temporary shelters at regular camping spots. Camping lean-tos were often put together using western redcedar bark (Geyer 1846: 205; Boas and Teit 1930: 25; Broncheau-McFarland 1992: 185), brush (Boas and Teit 1930: 26), or tule mats that were carried from place to place (Curtis 1911: 43; Boas and Teit 1930: 22; Schuster 1998). More recently, lean-tos were often replaced by Great Plains-style tipis. For tipi poles, the Nez Perce people used young true fir, Douglas-fir, white pine (Harbinger 1964: 53, 54), or, most often, lodgepole pine (Malouf 1969; Broncheau-McFarland 1992: 26). Like the winter dwellings, tipis were covered with tule mats (Wynecoop 1969: 11; Slickpoo 1973: 32; James 1996: 33) (Figs. 36, 37). When people moved camp, the lightweight tule mats were simply rolled up and the poles taken down. The poles were usually left for the next time the party camped in that same spot (Axtell and Aragon 1997: 43), but the tule mats were carried along to the next campsite. Sometimes tipis were covered with bison hides, but Nez Perce people had a limited supply of bison hides and probably preferred to use them for robes (Spinden 1908a: 197). After the arrival of Euroamerican influence, canvas and blankets formed most tipi coverings, often in combination with tule mats (Figs. 36, 37). Sometimes temporary lodges were constructed from brush, especially true fir or Douglas-fir (Teit and Boas 1978: 62, 228, 333).

The oldest "permanent" constructed house type known on the Columbia Plateau is the "semisubterranean earth lodge" or pit house (Leonhardy and Rice 1970; Ames and Marshall 1980: 35). These were winter dwellings that were used over a broad geographic area, from Asia to South America (Ames and Marshall 1980: 37). Pit houses are so called because they were constructed over a depression dug in the ground, usually three to four feet deep. A typical pit house was built with a frame of willow poles or Douglas-fir saplings erected over the excavated area in a broadly conical shape. The poles were lashed to a center post with strong cordage such as willow bark. A smoke hole was left open near the central post, but it could be closed over with tule mats. The roof of the pit house was several layers of matting (usually tule mats), or sometimes planks split from driftwood and covered with a layer of grass or brush and then soil (Ray 1932: 31; Schuster 1998). Entrance to the dwelling

was by a ladder extending down from the roof near the center pole. The ladder might be a notched log (Schuster 1998) or two poles with rungs lashed on with willow bark thongs (Ray 1932: 31). Often the pit house had a sleeping ledge around the central fire area. Pit houses are referred to in traditional Nez Perce stories such as "Gusty Wind and Zephyr" (Phinney 1934: 335) and "Coyote and Fox" (Phinney 1934: 463).

During more recent times, pit houses were largely replaced with multifamily mat lodges. Mat lodges were elliptical or semi-rectangular A-frame buildings up to 150 feet long or even more (Josephy 1965; Slickpoo 1973: 32). At first, the lodges were built over excavated depressions (Curtis 1911: 42), but later they were built on the ground surface (Ray 1932: 31; Josephy 1965; Hunn and French 1998). Rafters were formed with two rows of poles embedded in the ground, slanting inward (the "uprights") and lashed together to form the peak of the roof. At the peak, two parallel ridgepoles were lashed to the uprights (Spinden 1908a: 196), using willow branch cordage or other strong cordage (Ray 1932: 32). The ridgepoles extended the full length of the lodge (Spinden 1908a: 196). At both ends of the lodge, poles were angled in to the roof peak to form a semicircular shape (Curtis 1911: 42; Hunn and French 1998). Horizontal poles lashed to the rafters at intervals down the sides finished the lodge frame, which was then covered with layers of tule or cattail mats (Curtis 1911: 42; Slickpoo 1973: 32; Schuster 1998). The mats were tied to the frame with cordage, leaving the entire length of the space between the two ridge poles open for smoke outlet and to admit light (Lewis 1844: 47; Spinden 1908a: 196; Curtis 1911: 42; Boas and Teit 1930: 22; Cox 1957: 88; James 1996: 32). Poles were often lashed on around the outside of the structure to help hold the mats in place (Fig. 35). The lodge entrances were usually at the short (rounded) ends and often had an outer and an inner door—the outer one at the outside of the semicircular end and the inner door below the place where the end poles met the roof peak. Mats were hung from this junction area to divide the main living chamber from the semicircular space at the end of the lodge. This space, along both sides of the passageway between outer and inner doors, was used for storage (Boas and Teit 1930: 28; Ray 1932: 33). Lewis and Clark reported seeing very large mat lodges with closed ends and several entrances along the sides (Thwaites 1959: 358-359).

Except for the central strip of the lodge, around the hearths and under the open part of the roof, house floors were covered with tule mats or sometimes with a thick layer of grasses, sedges, rushes, pine needles, or small boughs of true fir, Douglas-fir, hemlock, or redcedar (Spinden 1908a: 199; Boas and Teit 1930: 27; Ray 1932: 33; Teit and Boas 1978: 63; Schuster 1998).

Other Structures

Nez Perce sweat lodges and menstrual lodges were built of willow poles over an excavated pit and roofed with grasses and soil (canvas in more recent times) (Boas and Teit 1930: 26; James 1996, p 39; Axtell and Aragon 1997: 71-72). The door was often of twisted cottonwood bark (Curtis 1911: 42). In menstrual lodges, the floor was covered with tule mats or fir boughs and had mattresses around the side (Spinden 1908a: 198; Hunn and French 1998: 385). During travels, a separate tipi was set up as the menstrual lodge. The sweat lodge floor was usually covered with Great Basin wildrye, fir branches, or spikerush stems (Spinden 1908a: 198; Turner 1979: 269; Hunn and French 1998). During residence at short-term campsites, a skin or mat-covered sweat lodge was set up over a shallow excavation, and the frame was usually left at the campsite to be used again (Slickpoo 1973: 54; James 1996: 36-37).

Equipment for Getting and Preparing Food

Some Plateau groups made elk and moose calls from cow-parsnip or elderberry stems (Teit 1909: 520). Most Nez Perce hunting bows were made of wood. Yew and syringa were choice woods for bows because of the wood's strength and flexibility (Boas and Teit 1930: 61; Curtis 1911: 45; Harbinger 1964: 56; Wynecoop 1969: 8; Slickpoo 1973; Broncheau-McFarland 1992: 185, 191). Since syringa is abundant in lower-elevation Nez Perce territory, it was probably used more often than yew. Other local woods used to make bows are oceanspray, mountain-mahogany, wild cherry, hawthorn, red-osier dogwood, tamarack, juniper, Douglas-fir, western redcedar, Rocky Mountain maple, and occasionally willow or ninebark (*Physocarpus malvaceus*) (Spinden 1908a: 212; Curtis 1911: 45; Ray 1932: 87-88; Malouf 1969; Slickpoo 1973; Turner 1979: 72, 76, 156, 236, 262, 277; Broncheau-McFarland 1992: 191). Woods not native to Nez Perce territory were also used for bows. For example, wood of Osage-orange (*Maclura pomifera*), brought in from eastern North America, was highly desired for making bows because of its great strength, hardness, and durability (Bob Chenoweth, personal communication 2000).

Sometimes bows were made from bighorn sheep horn and wrapped with cherry bark (Spinden 1908: 212; Teit 1909: 519; Boas and Teit 1930: 60). Bow strings were most often made from sinew but some bowstrings were cordage made from plant fibers such as dogbane or the inner bark of western clematis (Smith 1953: 101; Miller 1998). Arrow shafts were made from straight branches of serviceberry (Spinden 1908a: 213; Teit 1909: 519; Boas and Teit 1930: 63; Harbinger 1964: 56; Hart 1979: 288), syringa (Curtis 1911: 45; Wynecoop 1969: 8), wild rose (Teit 1909: 519; Broncheau-McFarland 1992: 179), elderberry (Broncheau-McFarland 1992: 186), and mountain maple (Hart 1979: 288; Broncheau-McFarland 1992: 183), or from stems of broomgrass (Szczawinski and Turner 1980: 64) or even Great Basin wildrye (for hunting small animals) (Turner 1979; 141; Turner et al. 1980: 55). For hunting waterfowl Coeur d'Alene people made special arrows of redcedar wood winged with goose feathers that were attached by wrapping with bark. These arrows floated vertically in the water and so were easy to find and recover (Teit and Boas 1978: 100). Atlatl and spear shafts were made from the same woods as arrow shafts, or from Douglas-fir (Spinden 1908a: 213). Among the Okanogan-Colville people, arrow points were sometimes made of syringa wood (Turner et al. 1980: 108), and young Flathead boys used hawthorn points on their practice arrows (Turner 1979: 141). An arrow point made of Douglas-fir was among materials recovered from the Marmes rockshelter along the lower Palouse River (Mastrogiuseppe 1999: 33), but it is not known if this kind of point was actually used in hunting or if it was a training device or a toy. Mashed or powdered toxic plants such as water-hemlock (*Cicuta douglasii*), death-camas (*Zigadenus* spp.), false hellebore, and sagebrush buttercup (qémqem, *Ranunculus glaberrimus*) were sometimes used as arrow poisons (Turner 1979: 269, 271, 276; Turner et al. 1990: 250). Juniper was also sometimes used on arrow points to cause coagulation of the blood (Turner et al. 1980: 20). Quivers were often twined with sagebrush bark. Hunters washed themselves with an infusion of rose branches or a quaking aspen branch decoction to eliminate the human scent (Turner 1979: 258; Turner et al. 1980: 131). Knives were often hafted to wood handles, especially redcedar (Fig. 28).

Fishing also depended heavily on plant products. Fishing platforms were supported by long pine poles connecting tripods made from pine saplings lashed together with willow or serviceberry stem cordage (Ray 1932: 59). The platform surface was formed with slats of redcedar, willow, pine, or Douglas-fir, or with various kinds of branches (Ray 1932: 59). Spear

shafts and gaff poles were syringa, yew, mountain-mahogany, serviceberry, true fir, Douglas-fir, hawthorn, and Rocky Mountain maple, because these woods are not weakened or warped by water (Spinden 1908a: 208; Harbinger 1964: 53, 56; Landeen and Pinkham 1999: 94). Syringa or hackberry braces were used to reinforce the hooks on trident spears (Spinden 1908a: 208; Harbinger 1964). Fish weirs and traps were constructed from various woods, especially willow and western redcedar (Spinden 1908a: 211; Josephy 1965; Turner 1979: 76, 261; Landeen and Pinkham 1999: 47) but also red-osier dogwood (Turner et al. 1980: 97) and cottonwood (Ray 1932: 62). Net floats were usually redcedar because of its light weight. The nets themselves were made by knotting together fine cordage, usually dogbane (Spinden 1908a: 210; Pat Gold, personal communication 1997; Landeen and Pinkham 1999: 94), using shuttles of bone or wood such as western redcedar (Endacott 1992) (Fig. 29). Dogbane fishnets were sometimes quite large, up to 30 yards long and four feet wide (Landeen and Pinkham 1999: 46). Nets were sometimes waterproofed with conifer pitch such as ponderosa pine pitch (Turner 1979: 108). Coeur d'Alene fishing nets were sometimes made of twisted branches of red-osier dogwood (Geyer 1847: 290). Dip net frames were of willow because it is tough yet flexible (Spinden 1908a: 210; Harbinger 1964), and their poles were made with the same types of wood as spears: syringa, yew, mountain-mahogany, serviceberry (Broncheau-McFarland 1992: 180), true fir, Douglas-fir, hawthorn, and Rocky Mountain maple (Spinden 1908a: 210).

Fishhooks, awls, and pins were sometimes made from thorns such as those of hawthorn and greasewood (Boas and Teit 1930: 10; Turner 1979: 234; Hunn 1990: 190; Broncheau-McFarland 1992: 181), from cactus spines (Turner et al. 1980: 93), or from tightly twisted dogbane twine (Landeen and Pinkham 1999: 94). Some Nez Perce people rubbed fishing hooks and lines with Oregon sunshine plants (*Eriophyllum lanatum*) to obscure them from salmon (Harbinger 1964: 58). The fishing line was dogbane cordage (Spinden 1908a: 210). All kinds of lashing, tying, and anchoring of fishing gear, including canoes and rafts, were done with coarse waterproof cordage made of willow bark or twisted willow stems (Fig. 31) (Turner 1979: 264-265; Mastrogiuseppe 1994: 12, 17, 20).

The use of fernleaf lomatium in fishing is especially interesting. Pieces of fernleaf lomatium root were tossed into the water, or a solution made from the root was poured in. This acted as a fish stupefant, temporarily paralyzing the fish so they floated to the surface where they could be scooped up. This method of fishing is not specifically recorded for the Nez Perces but is known to have been used by the Wanapum (Gill and Thomas 1984), the Yakama (Hunn 1990: 113, 163), the Okanogan-Colville (Turner 1979: 165; Turner et al. 1980: 66), and other groups. The seeds of the European weed, common mullein (*Verbascum thapsus*), have also been used to stupefy fish (Mitich 1989; Tilford 1997: 102).

Fish were often dried on racks made of willow, on stiff mats like those made of reedgrass to allow good air circulation. Often Great Basin wildrye was used to separate layers of fish during drying.

Equipment for gathering plant foods was also made from plant materials. Digging root foods required a tukas (digging stick). This had to be of a hard, very strong and durable wood such as mountain mahogany, syringa, hawthorn, oceanspray, serviceberry, or yew (Teit 1930b: 91; Leechman 1972; Downing and Furniss 1978). The digging stick was sharp-pointed on the end and had a horizontal handle of wood such as chokecherry, birch, or hawthorn, or antler, occasionally of stone (Fig. 5). Small digging sticks were made for children as they began to learn the skills of their culture. After metals became accessible, the traditional wood shafts of digging sticks were replaced by shafts made of steel.

Soft baskets were used to collect root foods, and root processing often involved mashing the roots in basket hopper mortars (Fig. 3). Mortars might also be of wood such as chokecherry or pine, often from a burl (Scrimsher 1967). Mortars and pestles were so valuable that they were passed down from generation to generation (James 1996: 28). When roots were strung on a thong for drying, the thong was often a strip of willow bark. As mentioned above, long-toothed wood combs might be used for stripping berries from low-growing shrubs.

Bunchgrass leaves or large leaves (skunk-cabbage, thimbleberry, clustered frasera, arrowleaf balsamroot, and bracken fern) were often wrapped around fresh foods for temporary storage (Harbinger 1964: 58; Turner 1979: 68, 121-122, 249). For long-term storage, dried foods were kept in soft bags, stiff baskets, or wrapped in small pieces of matting, grass, or ferns.

For removing food from boiling water or from racks over a fire, tongs were made from strong wood such as Douglas-fir (Turner 1979: 112) or Rocky Mountain maple (Turner et al. 1980: 59). Barbecue skewers for cooking foods were usually willow because this wood did not impart other tastes to the food (Turner 1979: 261). Chokecherry wood was also used (Turner 1979: 239).

Fire

Fuel for fires was whatever was easily available and abundant: wood of sagebrush, bitterbrush, ponderosa pine, aspen, cottonwood, and willow, bark of ponderosa pine, and conifer cones. Driftwood was the primary source of firewood for Nez Perce people, and it was split with elk antler wedges and mauls made of strong wood such as black hawthorn (Ray 1932: 43). To keep a fire through the night it was banked with dense wood such as root wood and burls, or dead dry cottonwood. Tinder materials were used to rekindle the fire in the morning. Shredded bark of sagebrush, bitterbrush, pine, or redcedar; pine needles, bark, and cones; cattail flower spikes; and dry grasses all made good tinder (Boas and Teit 1930: 29; Ray 1932: 43; Harbinger 1964: 54; Scully 1970: 31; Turner 1979: 88, 108, 110, 136, 182). Some Plateau groups favored ponderosa pine bark, wood, and young growth for fuel on camping trips because it burns and cools quickly, making it difficult for other, possibly antagonistic, groups to determine how long ago people had left the campsite (Turner 1979: 108).

Fires were started with hearths of dead cottonwood roots or wood from willow, pine, birch, cottonwood, redcedar, or the lower stem of western clematis. Twirling sticks ("drills") were made of, lodgepole pine, redcedar, serviceberry, sagebrush, elderberry, birch, last year's ponderosa pine growth, dead tops of Douglas-fir, upper branches or roots of cottonwood, willow roots, or pine cone hearts (Coville 1897; Spinden 1908a: 200; Boas and Teit 1930: 29; Ray 1932: 43; Turner 1979: 77, 255, 260). The Nez Perce story of "How Beaver stole Fire from the Pines" explains why these particular woods are used (Packard 1891). During the time before there were people in the world, only the pine trees had the secret of fire, and they carefully guarded it. During one very cold winter, all the animals were in danger of freezing. The pines were gathered around a big fire for their great council, and Beaver, by hiding below the bank, caught a live coal that rolled down the bank. He raced off, carrying the coal with him and with the pine trees in pursuit. By darting from side to side when they were close and running straight out when they were further behind, Beaver escaped with the fire. As he ran, he gave some fire to willow, some to birch, and some to

other woody plants. These are the kinds of wood that still have fire in them, and they give it up most easily when they are rubbed together.

Beaver's tortuous path of escape is the course of the Grand Ronde River, and the pine trees that chased him remained where they became tired, now growing along the river's banks. Most of the pine trees tired at the same time, forming a dense grove of pines there, but the trees that continued the pursuit are scattered further along the river, almost until it reaches the Snake River (Packard 1891).

Conifer pitch was used for torches (Harbinger 1964: 54).

For smoking meat and fish, a "mellow" wood such as alder, willow, cottonwood, red-osier dogwood, or hawthorn was preferred, but ponderosa pine cones were also used (Boas and Teit 1930: 9; Harbinger 1964: 54; Slickpoo 1973: 35; Broncheau-McFarland 1992: 184). One step in tanning hides was to hang them over a fire of decaying Douglas-fir (Broncheau-McFarland 1992: 185), ponderosa pine (Turner 1979: 108), cottonwood (Teit and Boas 1978: 45), redcedar (Turner 1979: 76), or pine cones (Harbinger 1964: 54; Teit and Boas 1978: 45; Turner 1979: 108). Smoking a deer hide over burning decayed Douglas-fir wood allows it to develop a golden-brown color, while with decayed cottonwood the hide becomes yellow (Ruby and Brown 1970: 23; Ackerman 1996: 83). Some Plateau groups used juniper for smoking hides, sometimes adding sagebrush to the fire for a dark color (Turner 1979: 71). To prepare a hide for smoking, it was soaked in an alkali such as the "tea" from steeping elderberry bark or cottonwood ashes in hot water, and the hair was scraped off (Ackerman 1996: 97). Plateau hide stretchers were often made of willow (Turner 1979: 261; Ackerman 1996: 95).

Tongs for working with a fire (moving burning wood, heating rocks, etc.) were made from two slender pieces of wood bound together at one end with willow bark cordage. For carrying fire while traveling, a "slow match" was made by lighting a two to three foot long piece of sagebrush bark cordage, redcedar bark, or similar material; this would hold a fire for three or four days (Boas and Teit 1930: 29; Ray 1932: 43).

Other Household Items

Bedding

Mattresses could be made from cottonwood bark or boughs of Douglas-fir or other conifers laid down on the ground so that the "arch" of the branches is upward (Spinden 1908a: 199; Turner et al. 1980: 35). Other bedding materials include bracken fern and various sedges, rushes, and grasses, including spikerush and Great Basin wildrye (Turner 1979: 68, 141, 269). Stacked tule mats were probably the most frequently used bedding material. Pillows were rolls of matting, skins, or skin bags stuffed with tules, bunches of dried grass, or cattail fluff (Boas and Teit 1930: 28; Teit and Boas 1978: 229). For backrests people might use rolled-up matting, full storage baskets, or bark slabs (Boas and Teit 1930: 27). The Nez Perce cradleboard was usually made with a redcedar backboard (Broncheau-McFarland 1992: 185), although willow was sometimes used by the Palouse people and probably also by the Nez Perces (Mastrogiuseppe 1999: Fig. 8). The cradleboard hoop was a narrow strip of strong wood curved into an arch after soaking in hot water. Hoop materials include syringa (Turner et al. 1980: 108; Turner et al. 1990: 230; Mastrogiuseppe 1999: 33), red-osier dogwood, and willow (Harbinger 1964: 54).

Household utensils and maintenance

Most Nez Perce spoons and bowls were made of wood (Slickpoo 1973), usually tamarack, birch, mountain-mahogany, and alder (Curtis 1911: 45; Harbinger 1964: 54, 55, 57). Cottonwood was also used to make spoons (Boas and Teit 1930: 28). Burls and knot areas made the strongest bowls. Awls and hair combs were made from strong woods such as syringa and oceanspray (Boas and Teit 1930: 10; Harbinger 1964: 54-55; Broncheau-McFarland 1992: 191). Dishes, food tongs, handles, body armor, games, gambling pieces, and many other implements were also made from wood such as syringa, Douglas-fir, and willow (Curtis 1911: 44; Harbinger 1964: 54-55; Broncheau-McFarland 1992: 191).

Plateau brooms were made from tightly bundled branches of snowberry (Turner 1979: 211) or other abundant shrubs. For clearing snow from around the house, sagebrush branches served as snow brooms or paddle-like shovels were made of wood (Ray 1932: 30).

Several easily available plants provided soap. The leaves, flowers, or bark of syringa swished through water made a suds that was effective in cleaning (Harbinger 1964: 56; Turner 1979: 223-224; Turner et al. 1980: 108). In some regions of the Columbia Plateau, western clematis leaves were rubbed together in water and then removed, and the sudsy water was used for washing (Turner 1979: 228; Turner et al. 1980: 119). Cottonwood ashes or green inner bark were another source of soap (Turner 1979: 255; Turner et al. 1980: 134; Turner et al. 1990: 276)

Fine scouring, sanding, smoothing, and polishing of wood, bone, and stone were accomplished with horsetail stems, which contain large amounts of tiny abrasive silica crystals (Coville 1897; Turner 1979: 64). Sometimes inner cottonwood bark was used for soap during the polishing process (Turner et al. 1990: 276).

In addition to its use for caulking and waterproofing, conifer pitch was a good general-purpose adhesive (Boas and Teit 1930: 62; Harbinger 1964: 54; Malouf 1969; Turner 1979: 105, 112; Turner et al. 1980: 32). Cherry "gum" and the sticky resin from cottonwood buds were also used for gluing (Spinden 1908a: 184; Turner 1979: 256; Turner et al. 1980: 134-135).

Personal Items and Cosmetic Uses of Plants

When threatened by the approach of enemies, indigenous peoples would often hide underwater, breathing through a tube made from a hollow stem such as elderberry or angelica (*Angelica* spp.) (Turner 1979: 271). Among some Plateau groups, the large, softly hairy leaves of arrowleaf balsamroot were used to train young boys to walk silently and softly. The leaves were strapped around the boys' feet, and they tried to see how far they could walk without tearing the leaves. Some of them even learned to run silently without tearing the balsamroot leaves (Szczawinski and Turner 1980: 92; Turner et al. 1980: 81).

Columbia Plateau people used soft plant materials for wound dressings, diapers, menstrual pads, and other applications where absorbency is needed. Good materials for these purposes include shredded sagebrush, willow, or rabbitbrush bark, black tree moss, conifer needles, grass or beargrass leaves, decayed quaking aspen wood, and seed fluff of milkweed, cattails, and clematis. These materials might also be used for stuffing pillows and saddle pads (Coville 1897).

Long-toothed hair combs, similar in design to berry-stripping combs, were made of syringa (Boas and Teit 1930: 46; Broncheau-McFarland 1992: 191). Some Plateau people crimped their hair with heated rods of an unidentified red wood (Boas and Teit 1930: 150).

Sometimes sweetgrass (*Hierchloe odorata*) was worked into the hair for scent (Boas and Teit 1930: 50). For hair tonic, several kinds of preparations were used, including subalpine fir (Broncheau-McFarland 1992: 183), a leaf poultice of snowbrush ceanothus (*Ceanothus velutinus*) (Broncheau-McFarland 1992: 192), Douglas-fir needles crushed and mixed with fat or marrow (Turner et al. 1980: 35), the liquid from boiled roots of arrowleaf balsamroot or Great Basin wildrye (Turner et al. 1980: 82), an orange honeysuckle plant infusion (Hart 1979: 276), or the liquid from boiled wild flax stems and flowers (Teit 1930). The wild flax decoction was also used to produce a "nice" complexion (Teit 1930). Willow twigs or other fine but strong twigs were used to clean the teeth (Turner 1979: 261). Chewing conifer pitch was another method of cleaning the teeth.

Many different plants were used as deodorants and antiperspirants. They include crushed snowberry fruits, powdered true fir bark, and quaking aspen bark (Ray 1932: 220; Broncheau-McFarland 1992: 183). Plants were also used to perfume the body: stems and leaves of mint, seeds of columbine (yeqehteʔí léht, *Aquilegia formosa*), meadowrue (*Thalictrum spp.*), or prairie-smoke (*Geum triflorum*) crushed or chewed and rubbed on the skin, true fir leaves crushed and rubbed on, powdered sweetgrass leaves, or roots or whole plants of twisted-stalk and false Solomon's seal tied onto the body (Boas and Teit 1930: 50; Turner 1979: 269, 275-277; Broncheau-McFarland 1992: 183).

Before the arrival of glass trade beads in the late 1700's, Nez Perce people made beads from stone, bone, wood, fruits, and seeds (Broncheau-McFarland 1992: 63; James 1996: 47). The glossy fruits of stoneseed gromwell or the seeds or cones of juniper make attractive beads (Turner 1979: 73, 203). Dried berries such as kinnickinick may also have been used for beads (Turner 1979: 273). Children wore slender rods of wood (probably spiraea) in their ears (Boas and Teit 1930: 46).

Young Columbia Plateau girls sometimes braided strawberry runners into belts and headbands (Turner 1979: 277). Many boys scarified their bodies during puberty training. Scarification was sometimes done with burning rather than cutting, using live coals or lighted tule stalks (Boas and Teit 1930: 134). For tattooing, people used a sharp bone or a needle made of hard wood (Boas and Teit 1930: 52), perhaps syringa (Teit and Boas 1978: 46) or oceanspray.

Toys and Games

Many Nez Perce toys were made from wood: dolls, toy cradleboards, horses, and toy hunting bows. Toy bows were made from syringa and toy arrows were made from serviceberry (Harbinger 1964: 56). Girls played with toy horses made from forked serviceberry twigs with a doll "riding" in the crook of the twig (Harbinger 1964: 56). Whistles and blowguns were made from hollow stems such as elderberry, cow-parsnip, angelica and horsetails (Turner 1979: 163, 271; Gill and Thomas 1984), from easily hollowed twigs such as those of quaking aspen (Turner 1979: 258), or from rolled up bark or moistened leaves. Nez Perce children used flowering stalks of goldenrod (*Solidago canadensis*), cattails, and tules as swords and whips in play battles. A toy spear was made from Great Basin wildrye stems with a hawthorn spine on the tip). One game popular among the Coeur d'Alene, Okanogan, and Thompson was the ball-and-pin game, where children use a hawthorn spine or sharpened stick or bone to try to catch a ball tossed into the air. The ball was made of grass, tules, bark, or young cow-parsnip flowering heads (Boas and Teit 1930: 98; Turner 1979: 130, 234).

Lacrosse-style games were greatly enjoyed by Columbia Plateau people (Teit 1909: 364). The sticks were made of wood and the netting was probably dogbane twine. Adult Nez Perces also greatly enjoyed gambling. This ranged from wagering on the results of horse or foot races to organized games such as the Stick Game (called the "Hand Game" on the Great Plains) (Fig. 43). This was the most popular gambling game in the Northwest (Spinden 1908a: 254). In the Stick Game, two teams face each other across an empty strip of ground. Two people on the same team have two small pieces of hollow bone, one white and one with a black stripe around it. They each hide their bones, one in each hand, manipulating them to confuse the other team. The object of the game is for the other team to guess which hands hold the white bones. Before the game begins, wagers are placed on which team will be the most successful in making these guesses. Each team starts out with five "counter" sticks (Fig. 43) that traditionally were made of serviceberry or willow wood (Brunton 1998). (In earlier times each team began with ten counter sticks.) The team that wins the first guess starts with a sixth stick, called the "kick stick," which in old times was worth ten counter sticks (Brunton 1998). The kick stick is usually carved or painted and may be larger than the regular counter sticks. One of the willow pieces recovered during excavations at Marmes Rockshelter may be a kick stick (Mastrogiuseppe 1999: 31). Both teams have a designated "pointer" who is experienced at interpreting the movements of people hiding the bones, movements designed to confuse and deceive. If the pointer guesses correctly for both people hiding the bones, the guessing team gets the bones to hide. If both guesses are wrong, the hiding side gets two counter sticks and hides the bones again. If one guess is right and the other wrong, the hiding team gets one counting stick and the guessing team gets one set of bones. Then one bone handler on the hiding team hides their remaining set of bones and the pointer hides the set of bones just won. They expose them at the same time, and if the position of the white bones is the same for both bone handler and pointer, the guessing team wins the other set of bones. Otherwise, the hiding team wins another counter stick and both teams hide the bones again. When the guessing team wins both sets of bones, they sing a special song and rhythmically beat with sticks on a log or board in front of them (Fig. 43) or, more recently, on hand drums. That team then becomes the hiding team. The team that wins all eleven counter sticks wins the game and their supporters win their wagers.

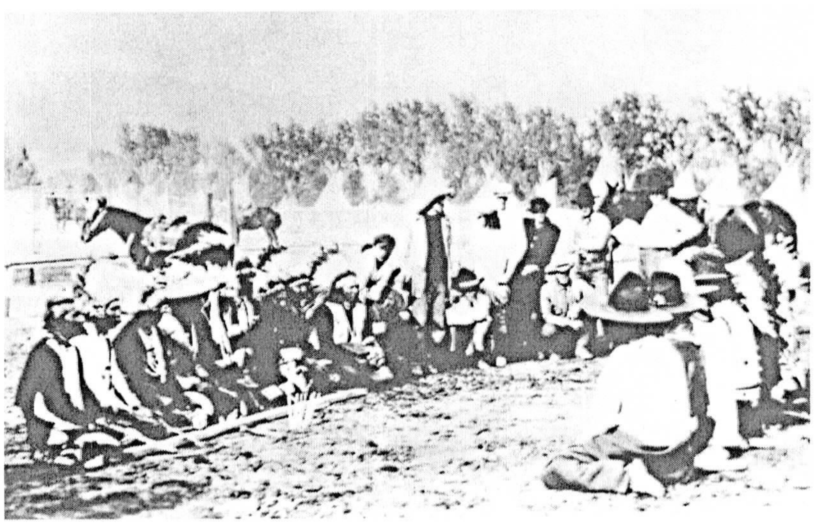

Figure 43. Stick game at Lewiston, ID, ca. 1922. Note the counter sticks stuck into the ground. From Nez Perce National Historical Park Photograph Archives NEPE-HI-0364

Music

The primary musical instruments in Nez Perce culture are the flute and the drum. The traditional Nez Perce flute was usually made from a straight elderberry stem (Spinden 1908a: 231; Harbinger 1964: 56), though some were made from bird bone (Olsen 1979). Elderberry stems have been used to make flutes in many different areas of the world; the Latin name of this plant (*Sambucus*) is derived from the Greek sambuke, referring to a small flute in ancient Greece (Olsen 1979). Elderberry is a very good material for flutes because the stems are the appropriate diameter (about an inch) and have a very large soft pith that is easy to hollow out. The flute has six finger holes and a rectangular opening that the player blows into like blowing across the top of a pop bottle. A plug of pine pitch at the opening focuses the stream of air downward into the hollow air chamber. Sometimes flutes were made from less long-lasting materials, hollow stems of plants such as cow-parsnip (Harbinger 1964: 56) and even, according to one report, poison-hemlock, which was introduced into this country probably during the early part of the twentieth century (Ron Pond, personal communication 1997). Perhaps the way the flute is played prevents this plant's toxicity from causing problems. Recently some Nez Perce flutes are carved from redcedar.

Nez Perce drums are of two types, the hand drum and the large "war drum." Hand drums were made with deerskin tightly stretched over a round wood frame. The frame was made by soaking in hot water a thin strip of wood three to four inches wide and bending it to form a hoop shape, with the ends lashed securely together and probably glued with pitch. Wood for drums was usually redcedar, Rocky Mountain maple, oceanspray, or juniper (Turner 1979: 72, 76, 156, 236; Turner et al. 1980: 20, 59, 126). The drumstick was probably made from hard durable twigs of syringa, hawthorn, serviceberry, or oceanspray. The large drums, played by four to eight drummers, were a more recent development and are thought to reflect the infusion of Great Plains culture that came about after Nez Perce people began using horses (Olsen 1998). The wood used for the large drums was probably redcedar, ponderosa pine, or Douglas-fir.

Another Nez Perce percussion instrument is the rasp, a stick with a series of notches (Spinden 1908a: 230). A stick or a piece of bone was scraped along the notches, and a piece of rawhide bound to the notched stick served as a sounding board. Dance rattles often used seeds, but it has not been documented what kinds of seeds were used by the Nez Perce people. Some possibilities are stoneseed gromwell, juniper, ponderosa pine, and dried berries such as those of kinnickinick (Turner 1979: 273).

Plants in Medicine

Sources of information on Nez Perce plant medicines are restricted primarily to Harbinger (1964) and Broncheau-McFarland (1992). Some mention of medicinal plants is also found in Chalfant (1974), James (1996), and Axtell and Aragon (1997). Information on plants used in Nez Perce medicine is drawn from these five publications.

Among Nez Perce people, medicinal knowledge was, and is, often regarded as private, and the use of plants for medicine varied among families (Harbinger 1964: 61). Traditional Nez Perce healing with medicinal plants should not be confused with shamanism or spiritual curing of "unnatural" diseases, although for some conditions both kinds of treatment are applied. The Nez Perce medicinal repertoire included many plant materials--roots, bark,

wood, twigs, herbaceous stems, leaves, flowers, fruits, seeds--that were used alone or in combination. Plant medicines were prepared very carefully, following strict procedures, in order to prevent loss of effectiveness. For many illnesses, the plant medicines were brewed in hot water (making an infusion) or boiled (making a decoction, which is more concentrated) and the liquid was drunk. If an ill person could not drink, liquid medicinal preparations were administered through a tube made from the hollow stems of plants like horsetails, cow-parsnip, or elderberry (Ray 1932: 218). Infusions and decoctions might include several different plant parts or different kinds of plants, depending on the condition under treatment. They were also applied as external washes. Externally-applied ointments and poultices were important in treating both external and internal conditions. The ointments and poultices were made from whole, chopped, or ground plant parts (roots, rhizomes, stems, leaves, fruits) or pitch, often mixed with fat or marrow. Sometimes plant parts were simply chewed or eaten for medicine, or smoke from the dried plant parts was inhaled. Smoking of medicinal plants was especially helpful for conditions like clogged sinuses.

Some medicinal plants are toxic and were used only in carefully controlled small doses. Toxic plants used medicinally on the Columbia Plateau include dogbane, milkweed, larkspur (*Delphinium* spp.), false hellebore (Boas and Teit 1930: 258; Broncheau-McFarland 1992: 194), death camas (*Zigadenus* spp.), and perhaps the most poisonous plant of all, water-hemlock (*Cicuta douglasii*). If a person did ingest too much of a toxic plant (and a very small amount can be too much), sagebrush tea could be tried as an antidote.

According to Chalfant (1974: 99), lovage root (qawsqá·ws, *Ligusticum canbyi*) was the most important Nez Perce medicine. Some of the medical applications for this general medicine and for other plants are mentioned below by category of use.

Tonics

General tonics were used at the change of seasons to get the systems going, or at other times to perk up someone who just wasn't feeling well. These treatments were believed to purify the blood. One of the plants used for tonics, yarrow, is also important for a variety of other medical applications. For a yarrow tonic, either an infusion or a decoction was made from pulverized plants (Broncheau-McFarland 1992: 181). Other Nez Perce tonics are infusions/decoctions of creeping Oregon-grape stems and rhizomes, water birch roots, and Douglas-fir, redcedar, or tamarack leaves (Harbinger 1964: 64; Broncheau-McFarland 1992: 187-188).

Respiratory Ailments

Colds and influenza

The common cold was an irksome ailment in early times just as it is now. A variety of materials was used in treating cold and influenza symptoms. One method of relieving cold symptoms in many Columbia Plateau groups was to place leaves of river sage or big sagebrush in the nostrils for an hour or so or to inhale steam from a sagebrush or river sage infusion (Ray 1932: 217; Steve Gill, personal communication 1982). This treatment has not specifically been reported in the literature for Nez Perce people but it is likely that they used it. Plant infusions and/or decoctions were often used by Nez Perces to treat colds. These were made from roots of lovage (Harbinger 1964: 63), sweet-cicely (*Osmorhiza occidentalis*) (Broncheau-McFarland 1992: 193), sumac (Broncheau-McFarland 1992: 189), or stream

violet (*Viola* orbiculata (Broncheau-McFarland 1992: 194); from bark of tamarack (Harbinger 1964: 65) or willow (Broncheau-McFarland 1992: 179); from stems/leaves of quaking aspen (Broncheau-McFarland 1992: 184), redcedar (Harbinger 1964: 65; Broncheau-McFarland 1992: 185), Douglas-fir (Broncheau-McFarland 1992: 185), field mint (Harbinger 1964: 65), or mountain-tea (James 1996: 20); from seeds of meadowrue (*Thalictrum occidentale*) (Broncheau-McFarland 1992: 194); or from stems, leaves, and cones of Utah juniper (*Juniperus scopulorum*) (Harbinger 1964: 65). Coughs were treated with a bark decoction of tamarack (Harbinger 1964: 65), a stem/leaf decoction of redcedar (Broncheau-McFarland 1992: 185), or a syrup made from boiled camas mixed with honey (Harbinger 1964: 13). A grand fir pitch poultice might be placed on the chest to relieve congestion (Broncheau-McFarland 1992: 183). For sore throat a poultice of cocklebur (*Xanthium strumarium*) leaves was packed around the neck (James 1996: 150-151). Cocklebur is an alien plant introduced from Europe, so it would not have been available here in earlier time. Traditional sore throat treatments include chewing lodgepole pine buds, tamarack sap, or sweet-cicely roots (Harbinger 1964: 65; Broncheau-McFarland 1992: 183, 193); drinking infusions/decoctions of water birch, lovage, or sweet-cicely (Harbinger 1964: 63, 64; Broncheau-McFarland 1992: 193); or smoking rose licorice-root roots (Broncheau-McFarland 1992: 191). Fever and chills were treated by infusions/decoctions of lovage or rose licorice-root (Harbinger 1964: 63; Broncheau-McFarland 1992: 193), sagebrush bark and foliage (Harbinger 1964: 65), yarrow leaves (Broncheau-McFarland 1992: 181), field mint stems and leaves (Harbinger 1964: 65), snowberry stems and leaves (Harbinger 1964: 65; Broncheau-McFarland 1992: 194), meadowrue seeds (Broncheau-McFarland 1992: 194), or stream violet roots (Broncheau-McFarland 1992: 194). Another treatment for fever and chills was inhalation of steam from a water birch root decoction (Harbinger 1964: 64).

Other respiratory diseases

Respiratory ailments such as pneumonia, tuberculosis, and whooping cough were treated with many of these same plants. One treatment for tuberculosis is drinking infusions from bark and leaves or stem tips and fruits of sagebrush for two weeks, and then, following a two-week "rest," for two more weeks (Harbinger 1964: 65). Another is drinking small doses of an infusion of cut-up roots of fernleaf lomatium or Salmon River desert-parsley, or a decoction from roots of silverleaf phacelia (yewék, *Phacelia hastata*) (Harbinger 1964: 65, 67). For pneumonia, a lovage root decoction was drunk (Harbinger 1964: 63).

Chest ailments in general were treated by drinking a decoction of lovage or water birch (Harbinger 1964: 63, 64), by chewing sweet-cicely (Broncheau-McFarland 1992: 193), by smoking roots of rose licorice-root (Broncheau-McFarland 1992: 193), or inhaling powder from pulverized roots of green false-hellebore (*Veratrum viride*, a toxic plant) (Boas and Teit 1930: 258; Broncheau-McFarland 1992: 194). Sinus congestion was often treated by smoking tobacco mixed with root oil from Salmon River desert-parsley or fernleaf lomatium (Harbinger 1964: 67).

Internal Conditions

Digestive ailments

Stomach and intestinal conditions were usually treated with infusions and decoctions. For stomachache, the sufferer might chew leaves of alumroot or drink an infusion or decoction of water birch roots or alumroot leaves (Harbinger 1964: 64; Broncheau-McFarland 1992: 193). Upset stomach and indigestion were treated with

infusions/decoctions of wild raspberry leaves (James 1996: 149), dried milkweed roots (Broncheau-McFarland 1992: 191), or yarrow (Broncheau-McFarland 1992: 181). Eating ho·pop or sheep-sorrel (cicyúkis, *Rumex acetosella*) leaves was another treatment for upset stomach and indigestion (Harbinger 1964: 18, 68; Broncheau-McFarland 1992: 190). Sheep sorrel is another introduced alien plant.

To control diarrhea a Nez Perce person would eat ho·pop (Harbinger 1964: 18; Broncheau-McFarland 1992: 190) or take infusions of field mint (Harbinger 1964: 65), willow bark (Broncheau-McFarland 1992: 179), redcedar boughs (Harbinger 1964: 65; Broncheau-McFarland 1992: 185), oceanspray stems and leaves (Broncheau-McFarland 1992: 180), or silverleaf phacelia (Harbinger 1964: 64). Some of these treatments, especially the willow bark infusion, were also used for dysentery (Broncheau-McFarland 1992: 179).

The best-known Nez Perce laxative is cascara bark (sálam, *Rhamnus purshiana*) (Broncheau-McFarland 1992: 191). Eating quantities of sumac fruits or fruits or foliage of starry Solomon's seal (*Smilacina stellata*) would achieve the same purpose (Broncheau-McFarland 1992: 189, 194).

Circulatory system

Leaf poultices, especially yarrow, were used to stop bleeding from cuts and wounds (Broncheau-McFarland 1992: 181). Internal hemorrhage was treated with decoctions of creeping Oregon-grape rhizomes (Harbinger 1964: 64) or, for bowel hemorrhage, silverleaf phacelia roots (Harbinger 1964: 65).

Plant medicines for treating heart conditions included mashed fruits of black hawthorn (Broncheau-McFarland 1992: 181).

Urinary and reproductive systems

A whole-plant infusion of field horsetail (*Equisetum arvense*) or other horsetail species was used as a diuretic (Broncheau-McFarland 1992: 182). To stimulate urination a variety of lupine species could be used in infusion (Broncheau-McFarland 1992: 182).

To facilitate childbirth a decoction was drunk, made from plants such as silverleaf phacelia (Harbinger 1964: 64). Heated leaves of ponderosa pine were placed on the abdomen to help deliver the placenta (Broncheau-McFarland 1992: 193). Once the child was born, the mother would sometimes eat bitterroot in order to increase milk production (James 1996: 19, 73).

Venereal disease was a problem for many American Indian groups, and one of the Nez Perce treatments was a root infusion of showy aster (*Aster conspicuous*) (Broncheau-McFarland 1992: 191).

Other internal problems

Ruptures (type unspecified) were treated with a quaking aspen bark infusion (Broncheau-McFarland 1992: 184).

Contagious Diseases

Contagious diseases were often treated with a decoction of lovage roots (Harbinger 1964: 63). This decoction was also used to induce sweating or drowsiness (Harbinger 1964:

63). For mumps, a stream violet root poultice was applied to the swellings (Broncheau-McFarland 1992: 194).

Aches and Pains

Headache

Headache was treated with infusions and decoctions of lovage (Harbinger 1964: 63), field mint (Harbinger 1964: 65) and big sagebrush (Harbinger 1964: 65),

Backache

A soothing treatment for a sore back was a poultice of ponderosa pine pitch (Broncheau-McFarland 1992: 193). A different treatment that involves sweat bathing impressed the Corps of Discovery in 1806 on their eastward journey home. One of the members of the explorers' party was incapacitated by his chronic back problems. He was treated with a Nez Perce method of alternating heat and cold along with drinking horsemint (*Agastache urticifolia*) tea. The man sat in a pit lined with hot rocks and covered with blankets over a frame of branches. He sprinkled water on the rocks to generate as much steam as he could bear, steamed for 20 minutes, and was then quickly plunged twice into cold water. He was then put back in the pit for 45 minutes, removed, wrapped in blankets and allowed to gradually cool. During the entire procedure, he drank copious amounts of horsemint tea. The following day he had very little pain, and within two weeks was apparently permanently cured (Cutright 1969: 293-294).

Bones and Joints

Arthritis, rheumatism, sore joints, and broken bones were treated with poultices using cow-parsnip leaves (Harbinger 1964: 67), skunk-cabbage leaves or roots (Broncheau-McFarland 1992: 189), mules ear roots (Broncheau-McFarland 1992: 178), or ponderosa pine pitch (Broncheau-McFarland 1992: 193). An interesting treatment was whipping the sore area with nettles or rubbing powdered nettles on it (Axtell and Aragon 1997: 78; Harbinger 1964: 68). This treatment was often applied repeatedly in the sweathouse (Axtell and Aragon 1997: 78). It works through counter-irritation of the affected area. The principle of counter-irritation was also applied by other Plateau groups, using nettles (Turner et al. 1990: 289), buttercups (Turner 1984), fernleaf lomatium (Turner et al. 1990: 154), or cow-parsnip (Meilleur et al. 1990).

Muscles

For sore muscles a poultice was applied of pounded cottonwood leaves (Harbinger 1964: 66) or the area was switched or rubbed with nettles (Harbinger 1964: 68; Axtell and Aragon 1997: 78).

Earache

Warm onion juice was squeezed into ears to relieve earache (Harbinger 1964: 68).

Toothache

Leaves of yarrow (Harbinger 1964: 66) or field mint (Broncheau-McFarland 1992: 193) were placed directly on a tooth/gum area to relieve toothache.

Skin Conditions and Wounds

To treat cuts, sores, wounds, swellings and skin infections, peeled leaves of rattlesnake plantain were placed on the affected area (Broncheau-McFarland 1992: 192). Root oil from fernleaf lomatium or Salmon River desert-parsley was also rubbed on for this purpose (Harbinger 1964: 67). Other treatments used leaf poultices or whole leaves of subalpine fir (Broncheau-McFarland 1992: 183), cow-parsnip (Harbinger 1964: 67), snowbrush ceanothus (Broncheau-McFarland 1992: 191-192), or skunk-cabbage (Harbinger 1964: 66), root poultices of baked sticky geranium (*Geranium viscosissimum*) (Broncheau-McFarland 1992: 192), skunk-cabbage (Harbinger 1964: 66), or penstemon (kitímkitim, *Penstemon wilcoxii*) (Harbinger 1964: 66), poultices of powdered willow bark, snowberry leaves and fruits, or conifer pitch (Broncheau-McFarland 1992: 179,183, 194).

For bruises and rashes poultices were also applied, using yarrow leaves (Broncheau-McFarland 1992: 181), peeled rattlesnake-plantain leaves (Broncheau-McFarland 1992: 192), leaves and/or seeds of sumac (Harbinger 1964: 66-67; Broncheau-McFarland 1992: 189), and powdery decaying pine wood (Harbinger 1964: 67). Common burn treatments included poultices of lodgepole pine pitch (Broncheau-McFarland 1992: 26), leaves of elderberry (Harbinger 1964: 66), and snowbrush ceanothus (Broncheau-McFarland 1992: 191-192), powdered leaves of quaking aspen (Broncheau-McFarland 1992: 184), or skunk-cabbage roots or leaves (Harbinger 1964: 66). Boils and pimples were treated by applying poultices of lodgepole pine pitch or elderberry leaves (Harbinger 1964: 66; Broncheau-McFarland 1992: 26). One treatment for warts was a sticky geranium root decoction or the sap from this plant (Broncheau-McFarland 1992: 192). To relieve chapping, crushed leaves and fruits of snowberry were placed on the skin (Broncheau-McFarland 1992: 194).

A number of plants were used to treat dandruff. One dandruff treatment was poking ponderosa pine needles into the scalp (Broncheau-McFarland 1992: 193).

Non-irritating leaves such as those of cottonwood were often used for bandages (Harbinger 1964: 66).

Other Medical Conditions

American Indians suffered from a number of eye problems, possibly caused by smoke, inadequate light, or snow reflectivity. To treat eye problems Nez Perce people used fresh willow leaves (Broncheau-McFarland 1992: 179), root oil from fernleaf lomatium and Salmon River desert-parsley (Harbinger 1964: 67), a poultice of snowberry leaves and fruits (Broncheau-McFarland 1992: 194), or an infusion of grand fir leaves (Broncheau-McFarland 1992: 183). Peeled leaves of rattlesnake-plantain were applied to snakebites; swollen feet were treated with cow-parsnip roots; and pipsissewa leaves were used for an astringent (Broncheau-McFarland 1992: 182, 192).

Insect Repellants

Some of the plants that Nez Perce people used in a smudge to repel insects are subalpine fir, grand fir, and yarrow (Harbinger 1964: 71; Turner 1979: 272). Fernleaf lomatium or Salmon River desert-parsley thrown into the fire also kept insects away (Harbinger 1964: 67), as did sprigs of fir, river sage, sagebrush, or field mint worn or hung in the house

(Harbinger 1964: 71; Turner 1979: 275; Broncheau-McFarland 1992: 193). Insect repellant plants known to be used by other groups include onion rubbed on the skin (Turner 1979: 269), sticky geranium (root decoction (Hart 1979: 282), rabbitbrush leaves (Ray 1932: 217), and yarrow leaves rubbed on or smudged (Mitich 1990; Tilford1997: 166).

Healthy Infants

Plant materials were used to treat medical conditions in infants as well as adults. For example, powdery decaying pine wood was applied to the skin for cradleboard rash (Harbinger 1964: 67), and pulverized true fir leaves were used as baby powder (Broncheau-McFarland 1992: 183). To induce sleep, puffball (*Lycoperdon* sp.) spores were rubbed on a baby's eyelids (Broncheau-McFarland 1992: 187). An infusion of catnip (*Nepeta cataria*), an introduced plant available only after the arrival of Euroamericans, was given to babies to keep them strong (Harbinger 1964: 66).

Horse Medicine

Horses became exhausted on long runs, and they were often revived with remarkable plant stimulants. One of the best stimulants used by Nez Perce horse riders was sugar-bowls (*Clematis hirsutissima*). Scrapings from the root of this plant were held by the tired horse's nostrils, and upon inhaling the fumes the horse revived quickly (Geyer 1847: 301-302; Morgan 1981). Fernleaf lomatium roots were used in a similar way (Harbinger 1964: 67; Hunn 1990: 354;l Meilleur et al. 1990).

Horse wounds that had become infested with larvae were treated with poultices of cottonwood leaves (Harbinger 1964: 66). Other plants such as pine, pitch of other conifers, sticky geranium, and sweetgrass were used by Plateau groups to treat sores and wounds in horses, but this has not specifically been documented for Nez Perce medicine. Maggot infestations were treated with cottonwood and quaking aspen bark. Distemper and infestations of ticks or lice were treated with fernleaf lomatium (Harbinger 1964: 67; Meilleur et al. 1990).

Plants with Multiple Medicinal Uses

Most Nez Perce medicinal plants were used to treat more than one ailment, and some plants had numerous medicinal applications. This section discusses selected examples of plants with many medicinal uses. Since other Plateau groups used these plants in additional ways not specifically documented for Nez Perces, the discussion of known medical applications includes uses by these other groups as well as those documented for the Nez Perces.

As mentioned above, one of the most important Nez Perce general medicines is lovage. This plant grows in swampy places in the mountains. It was dug in the fall when the roots were ripe; if dug earlier it had no taste and its medicinal properties were not as strong (Morris ca. 1975). It is used for many ailments, chewed, prepared as a tea, inhaled in steam, or ground up and smoked in a tobacco mixture (Harbinger 1964: 63; Morris ca. 1975). Great Plains Indians did not have lovage in their homeland and highly valued its medicinal properties. It was one of the most desired trade items from Nez Perce people (Morris ca. 1975).

Yarrow was also very important medicinally, used to treat the following conditions: digestive ailments (root infusion or whole plant decoction), colds (root infusion, whole plant decoction, flower infusion), influenza (flower infusion), tuberculosis (whole plant decoction), fever and inducing sweat (whole plant decoction), headache (root infusion), circulatory ailments (whole plant decoction), bladder ailments (flower infusion), cuts, rashes, sprains, bleeding, aching joints (leaf poultice), sciatica, broken bones, toothache (root poultice), stimulation of energy (whole plant decoction internally), eyewash, skin ailments, snakebite, disinfecting (whole plant decoction as external wash), and venereal disease (root infusion) (Harbinger 1964: 66; Broncheau-McFarland 1992: 181).

Other examples of plants with multiple medicinal uses are fernleaf lomatium and sagebrush. Both of these plants have antibiotic properties. Fernleaf lomatium was used as a tonic (the shoots) and to treat a wide variety of other conditions: colds, flu, coughs, tuberculosis, arthritis, rheumatism, dandruff, and poor appetite (a root infusion/decoction), sinus ailments (roots smoked with tobacco), sores (a root poultice or oil from the root rubbed on), sore back, sprains, broken bones, boils, burns, bruises (a root poultice), swellings (a root poultice or washing with a decoction), and sore eyes (root oil) (Harbinger 1964: 67; Meilleur et al. 1990). The root was also used to repel insects, to treat horses for distemper and ticks or lice, and to revive horses suffering from exhaustion (Harbinger 1964: 67; Meilleur et al. 1990). The Blackfoot valued fernleaf lomation so highly that they called it "Big Medicine" (Tilford 1997: 184).

Sagebrush helped people suffering from indigestion, stomach cramps, diarrhea, colds (leaves in nostrils, drinking leaf infusion, or inhaling stem from leaf infusion), pneumonia, tuberculosis, coughs, fever, headache, sore throat (leaf infusion), and tonsilitis, toothache, cuts, sores, wounds, inflamed eyes, aches and pains, and ant bites (leaf poultice) (Harbinger 1964; 65). Sagebrush leaves also provided a general antidote to poison.

Willow bark is the original source of the active ingredient in aspirin, and it was used to treat pain, fever, and inflammation. Willow also helped diarrhea, dysentery, summer flu, cuts, and sore eyes (Broncheau-McFarland 1992:179). Its relatives quaking aspen and black cottonwood were used to treat pain, inflammation, and fever, as well as upset stomach, heartburn, colds, coughs, tuberculosis, whooping cough, rheumatism, broken bones, sore muscles, skin irritations including sores, burns, swellings, bruises, and ringworm, childbirth, ruptures, sore eyes, venereal disease, and maggot infestations in horses.

Conifers also had many medicinal uses. Douglas-fir, for example, was used as a tonic and to treat anemia, high fever, colds, digestive ailments, urinary ailments, rheumatism, injured bones, cuts, boils, skin ailments, and venereal disease. A decoction of Douglas-fir bark was an antidote for skin irritations caused by touching water hemlock. Tamarack was used for a tonic and for colds, coughs, sore throat, tuberculosis, arthritis, cleansing wounds, washing babies, and as an antiseptic. Lodgepole pine, white pine, and ponderosa pine were used for stomach ailments, ulcers, colds, influenza, sore throat, tuberculosis, high fever, chest congestion, internal bleeding, kidney ailments, rheumatism, backache, muscle pain, inflamed eyes, earache, chapped skin, abscesses and boils, to help babies sleep, to help deliver the placenta, dandruff, and wounds and sores in horses. True firs and junipers were also used to treat cuts, sores, and skin infections (Broncheau-McFarland 1992: 183). Pitch from all these trees was an important medicinal substance available to the Nez Perces. Pitch infusions and decoctions were drunk to treat gastrointestinal ulcers and other digestive ailments, to stimulate appetite, for respiratory ailments (tuberculosis, whooping cough), gonorrhea, sore eyes, and cancer. Pitch ointments and poultices were used to treat respiratory ailments (colds, chest congestion, sore throat), skin conditions (cuts/wounds,

sores, burns, infections, boils), aches and pains, broken bones, goiter, earache, as an external antiseptic, to restore hair, and to help babies sleep. Pitch was also applied to sores and wounds in horses.

Education

Education of Nez Perce children was a process beginning at birth and continuing at least until they acquired all the necessary life skills and other important cultural knowledge. Teaching was done by example, by allowing children to experiment and make mistakes, and through storytelling. Many traditional stories incorporate a moral or practical lesson. The roles of plants in Nez Perce stories represent the importance of plants in Nez Perce culture. Already this report has noted several of these stories (page numbers refer to pages in this report): the creation of the Nimipu (pp. 9, 26, 46, 55), "Locust" (p. 43), the Blackfoot girl Magdeline's journey across the Bitterroot Mountains (pp. 47-48), "Weasel" (p. 63), "The Disobedient Boy" (pp. 63, 65), how Coyote lost his braid (p. 65), the story explaining how American Indians learned to make baskets (p. 84), "Coyote and Fox" (p. 91), and "How Beaver stole Fire from the Pines" (pp. 94-95). Following are additional examples of traditional Nez Perce stories involving plants, from Phinney (1934). The following page numbers are from Phinney's book.

"Red Willow" (red-osier dogwood) is red because it was stained by the blood of a girl who had been shot by her brother. He hid the arrow that killed her among the willows so that he would not be blamed, and ever since those willows have been red (pp. 175-176).

In "Blue Jay and the Well-Behaved Maiden," Blue Jay's legs that the maiden so admired turned out to be just bones wrapped with black pine "moss" (pp. 17-18).

In "Cottontail Boy and the Snowshoe Rabbit," Cottontail Boy tells what a comfortable lodge he has and how he uses hackberry wood to cook his roots (p. 3). Gathering and cooking root foods are also mentioned in many other stories, including "The Glutton" (p. 38), "Young Stars" (p. 107), "Coyote and Fox" (pp. 304-305), "Gusty Wind and Zephyr" (p. 336), "Wild Goat a Woman Carried Away" (p. 401), and "The Beaver Brothers and the Modest Maiden" pp. 434-435, 437).

Serviceberries, the most important Nez Perce fruit, are also mentioned in stories such as "Coyote the Interloper" (pp. 282-283) and "Bear Led Astray a Boy" (p. 346).

The inclusion of plants in these stories illustrates how important it was for Nez Perce children to learn how various plants were used for food and for other purposes. More than 20 plants are mentioned in one story, "Skunk Goes Looking for His Scent." This story tells of how skunk, while searching for his scent, encountered different plants along his way. Some of them were sweet and helpful to him and others were not. On his return trip he gave the sweet plants a sweet taste and the unhelpful plants a bitter or sour taste (Slickpoo 1972: 28-36.

Knowledge of harmful plants was also an important part of education, and some of the traditional stories focused on these plants. The Spokane people have a story about poison-ivy (qalamtitqá), "Coyote and the Spring at Plante̦'s Ferry" (Wynecoop 1969: 74), that warns people to keep away from this spring where poison-ivy grows.

Spiritually Important Plants and Purification

Indigenous Columbia Plateau peoples had great respect for the land and living things. Spiritual considerations linked them closely to nature and permeated their lives. All things in nature could influence people's lives: rocks, water, heavenly bodies, plants, and animals (Slickpoo 1973). Smohalla, the great Wanapum spiritual leader who started the "Dreamer Religion," expressed this spirituality in his reaction to the missionaries' agricultural zeal:

> "You ask me to plow the ground. Shall I take a knife and tear my mother's bosom? You ask me to dig for stone. Shall I dig under her skin for her bones? You ask me to cut grass and make hay and sell it and be rich like white men. But how dare I cut off my mother's hair?"

Most of the early Euroamerican explorers, traders, missionaries, and settlers had no understanding of the Native spiritual realm. This was largely because indigenous beliefs were so different from those of the new arrivals, but another reason was that many traditional spiritual beliefs and practices were, and are, private matters.

Nez Perce ceremonies of purification, thanksgiving, protection, and spiritual healing usually involved plants. These ceremonies are generally private. The following discussion suggests some of the importance of plants in Nez Perce spiritual life.

Sweat Baths

The sweat lodge was the center of much of the social life of a Nez Perce village, and much teaching and training of children was done there (Slickpoo 1973: 54; Axtell and Aragon 1997: 69). Sweat baths were taken for cleaning, relaxation, and to get wisdom (Axtell and Aragon 1997: 69). Sweat baths also provided purification and spiritual protection of the body, especially in preparation for root digging, berry picking, hunting, fishing, the stick game, or a spirit quest (Axtell and Aragon 1997: 68). To this end, strong-scented plants were used in conjunction with the sweat bath, strewn on the floor, burned, used to scrub the body, and brewed in water for washing or drinking after the sweat bath. Plants used for these purposes include river sage, sagebrush, true firs, pine, redcedar, Douglas-fir, juniper, and lovage (Harbinger 1964: 54; James 1996: 79).

Cleansing the System

Before a Nez Perce hunter went out in quest of food animals, he purged his system to purify it. This cleansing was usually done by inducing vomiting with willow or red-osier dogwood twigs poked down the throat (Curtis 1911: 51; Harbinger 1964: 67; Broncheau-McFarland 1992: 179). Such purging was also done by a young adult who had not yet seen his vision-spirit, to prepare for other activities or events, and to purify people who had touched a dead body (Curtis 1911: 51, 65).

Cleansing Places

River sage burned as a smudge is believed to purify an area, drive away bad spirits, bring good luck, and provide other spiritual benefits (Aoki 1994; Hunn et al. 1998: 536; King 1998). If a tragedy or bad thing has happened in a particular spot, river sage smoke is used to cleanse that spot (King 1998).

Keeping Away Bad Spirits

Sprigs of cedar, true fir, juniper, snowberry, or wild rose foliage may be hung in buildings or on cradleboards as protection from bad things, to ward off illness, and to keep away bad dreams (Harbinger 1964: 71, 72; Broncheau-McFarland 1992: 179; Aoki 1994; James 1976: 75). Snowberry branches were also hung or draped on cradleboards for spiritual protection (Harbinger 1964: 72; Broncheau-McFarland 1992: 179; James 1996: 75). Fir, Douglas-fir, and juniper might also be burned to protect an area (Harbinger 1964: 54, 71; Broncheau-McFarland 1992: 179; Aoki 1994; James 1976: 75). Rose twigs were placed on a person who had been caring for someone now deceased in order to frighten away the spirit (Harbinger 1964: 71-72).

Other plant materials also had spiritual importance, but the ones mentioned above are more publicly known.

Social Smoking

Pipe smoking by men was important in Nez Perce social and political life and in certain ceremonies. The pipes consisted of a long wood stem and a bowl usually made of stone. Pipe stems were made from Rocky Mountain maple, syringa, ponderosa pine, elderberry, and highbush-cranberry (Turner 1979: 158, 209, 222, 272; Broncheau-McFarland 1992: 183; Aoki 1994). The smoking mixtures might include leaves of native tobacco (*Nicotiana attenuata*), kinnickinick, pinemat manzanita, pipsissewa, or red-osier dogwood bark (Geyer 1847: 289; Coville 1897: 102-104; Wilson 1916; Boas and Teit 1930: 130; Turner et al. 1980 96, 104, 140; Broncheau-McFarland 1992: 57, 191).

Plants of Many Values

The Nez Perce people were intimately acquainted with their environment and the ways in which plants could contribute to their lives. Most plants were used for more than one purpose. The following examples are some of the plants that were important to Nez Perce culture in a variety of ways.

Western redcedar has been called the plant with the greatest number of uses overall among North American Indians (Turner 1979: 74; Moerman 1998). Redcedar was important in Nez Perce culture for food (inner bark/cambium), technology (rootlets in basketry; bark for leantos, roofing, canoe seats, storage containers; inner bark for basketry, cordage, matting, blankets, clothing; wood for canoes, rafts, lodges, snowshoes, fish traps, paddles, boxes, cradleboards, bows, pegs, net shuttles, spoons, pins to prevent meat shrinkage while drying, fishnet floats, drum frames; boughs for green coloring), medicine (tonic, respiratory ailments, diarrhea, arthritis, rheumatism, dandruff, leprosy, childbirth recovery), and for spiritual purposes (incense, to scrub skin in the sweathouse).

Cattails and tules are also plants of many uses: food (rhizomes, young shoots, young flower spikes, pollen, seeds), technology (the most important plants for mats, also used for basketry, cordage, temporary rafts, cattail seed fluff for stuffing moccasins, babies' diapers, insulation, and pillows), medicine (digestive disorders, preventing thirst, stopping bleeding), and spiritual purposes (wrapping bodies for burial).

Many other plants were also important to Nez Perce culture in numerous ways. Fernleaf lomatium was important for food because the young spring shoots are available very early (February or March) and the large tuberous roots served as emergency food. The plant was also important in technology (fishing, hunting) and, especially, in medicine. Cow-parsnip, a plant related to fernleaf lomatium, also had important applications in these three categories.

Names Honoring Plants

Because of the importance of plants in their culture, the Nez Perces named seven months of the year in recognition of plants. These are traditional names used long before the arrival of European influence in Nez Perce territory (Anonymous 1993). The names sometimes differed among different Nez Perce bands (e.g. between "upriver" Nez Perces and those "downriver"), so a month might have more than one name or more than one interpretation of a name.

ʔalatamá·ł. This name refers to the time we call February. The meaning given for ʔalatamá·ł is "all little things" (Fletcher ca. 1890's) or "the month of swelling buds" (Spinden 1908a: 237; Ray 1974: 93; Landeen and Pinkham 1999: 55) because this is when the earth begins to warm up, the earliest plants begin to grow, and animals begin to emerge from their burrows (B. Miles ca. 1975). Another meaning for this name is "hard time to build fire" or "fire borrowers" because at this time people could only start fires from rotten logs, and if they did not have access to these they might need to borrow from their neighbors (Slickpoo 1973: 30; B. Miles ca. 1975).

latí·ṫal (March). This is the "month of flowers" (Spinden 1908a: 237; Ray 1974: 93) or "the beginning of flowers blooming" (Slickpoo 1973: 30; Anonymous 1993; Landeen and Pinkham 1999: 55), things coming to life (B. Miles ca. 1975). This is the month when new plants, especially root foods, come into flower. Lá·tis is the Nez Perce word for flower or flowering (Anonymous 1993). Alice Fletcher (ca. 1890's) listed kakatetat as the name for March, referring to the digging of qeqí·t.

qaqi·ṫá·ł (April). This is the time of digging the favorite Nez Perce early root food, qeqí·t (*Lomatium canbyi*) (Spinden 1908a: 237; Slickpoo 1973: 30; Ray 1974: 93; B. Miles ca. 1975; Anonymous 1993; Landeen and Pinkham 1999: 55). Alice Fletcher listed ʔápaʔá·ł as the name for April (referring to the gathering and preparation of kouse) (Fletcher ca. 1890's).

ʔápaʔá·ł (May). This season is named after ʔápa, kouse bread. This is the month of collecting and processing lomatium roots and making kouse bread (Spinden 1908a: 237; Ray 1974: 93; Slickpoo 1973: 30; B. Miles ca. 1975; Anonymous 1993; Aoki 1994; Landeen and Pinkham 1999: 55). Late May and early June was sometimes called **hilal**, the time when streams rise from melting snow (Landeen and Pinkham 1999: 55).

tustimasá·ṫal means "upper land" (Anonymous 1993) and refers to the time we call June. June was the season of moving up to higher elevations because at this time of year the root foods in the main Clearwater-Snake-Grande Ronde valleys have developed past the stage where they are good for digging (Slickpoo 1973: 30; B. Miles ca. 1975; Anonymous 1993; Landeen and Pinkham 1999: 55). Roots in higher areas were now ready to dig (B. Miles ca. 1975). June is also the time when syringa blooms, and flowering of syringa indicated that deer in the mountains could be hunted (Landeen and Pinkham 1999: 55). Another interpretation of tustimasá·tal is that it refers back to when the Nez

Perces hunted buffalo, and this month was when the buffalo walked around with "chaps on" because they had shed most of their heavy winter coat except that on their lower legs (B. Miles ca. 1975). Spinden (1908a: 237) and Fletcher (ca. 1809's) cite a different name for June, honoring the first salmon run. Aoki (1994) lists both tustimasá·tal and ʔápaʔá·ł for June.

hó·plal (October). This season is named after the autumn leaves, especially the golden leaves of tamarack (Fig. 44) (Slickpoo 1973: 30; B. Miles ca. 1975). At this time, the tamarack trees are beginning to shed their needles (B. Miles ca. 1975; Landeen and Pinkham 1999: 55). Fletcher (ca. 1890's), Spinden (1908a: 237), and Ray (1974; 363) list a different name for October, honoring the autumn salmon run, and list hó·plal as the name for November.)

Figure 44. *Larix occidentalis*, kimíle (tamarack or western larch) on Lolo Pass, ID, in October. The month of hó·plal was named after the golden tamarack trees.

sexliwá·ł (November). This is the season of shedding leaves (Slickpoo 1973: 30; Landeen and Pinkham 1999: 55).

Interestingly, three (Slickpoo 1973) or four (Fletcher ca. 1890's; Spinden 1908a: 237; Ray 1974: 93) months are named in honor of fish. The remaining Nez Perce months are named in honor of other important features: when weather is coldest, when firewood is scarce, when snow is melting in the mountains, and when the fetus is in the womb of the deer (Slickpoo 1973: 30-31).

The differences between Slickpoo and Miles' names for the months of the year and those listed by Fletcher, Spinden, and/or Ray may reflect differences among Nez Perce bands, differences in seasonal changes in different portions of Nimipu country, or changes in names during the twentieth century. They may also result from some misunderstanding on the part of Fletcher and/or Spinden. Fletcher's (ca. 1890's) names for March, April, May, and June are one month "ahead" of those given by others. For example, the name she lists for March is the name the Nez Perce authorities give for April.

Geographic places are also named in honor of plants. The peak now called Craig Mountain was a geographic marker dividing Nez Perce people of the lower Clearwater and Snake Rivers into the "upriver" and the "downriver" groups. The Nez Perce name for Craig

Mountain is Lok kh ma sam (Pine Tree Mountain) (Sappington et al. 1995). Lock ka yah'ma was a village also deriving its name from pine trees. Kamiah, Idaho, was the site of an important Nez Perce village called qémyexp, after the large stands of qeemu (tall dogbane) growing there (James 1996: 9). Toe e ko'poo and Tu ka yute'po were named in honor of large stands of tóko (tules) (Sappington et al. 1995), another critically important fiber plant. A large village on what is now called Thorn Creek was Sisnim'poo, named after the native hawthorns (Sappington et al. 1995). Wit kee'sp was named for alder trees growing along the stream where the village was located, probably Steptoe Canyon (Schwede 1966).

Nez Perce Plant Classification

The Nez Perce plant classification system is not hierarchical like the European systems. Alan Marshall makes an interesting point that this may be a reflection of the egalitarian, non-stratified Nez Perce society (Alan Marshall, personal communication 2000). Plants are classified according to their growth form and by their usefulness to people (Harbinger 1964; Alan Marshall, personal communication 2000). Trees are tewlí·kt; shrubs are pátan ("brushy"); and "soft" or herbaceous plants are hehen (Harbinger 1964; Alan Marshall, personal communication 2000). Within these groups, there are other categories of plants. For example, a generic term for pine trees is lá·qa (this is also the specific name for ponderosa pine) (Harbinger 1964). The various kinds of true fir are recognized as being the same kind of tree (pátoy) (Harbinger 1964). Cottonwoods, aspens, and willows are grouped together, probably at least partly because they all have very soft easily worked wood that is not very strong. It is not known if this group of trees had a Nez Perce name (Harbinger 1964).

Native plants with edible roots are qíʔnit (Harbinger 1964; Aoki 1994). All large non-edible roots are éxs (Harbinger 1964). Native berries are timá·nit (Harbinger 1964; Aoki 1994). Plants with medicinal uses are sáykiptat'as (the general term for medicine) (Harbinger 1964; Aoki 1994).

Land Stewardship

Some anthropologists believe that Columbia Plateau people did not actively practice conservation (Hunn 1999: 165, 167-168), but others interpret Native practices as land stewardship directed toward perpetuating important resources (Marshall 1999: 178-182, 184). For example, Plateau people, including the Nez Perces, periodically burned vegetation. They did this for a variety of reasons that include increasing the supply of certain plants (e.g. camas, serviceberries, huckleberries, willows). Controlled burning of camas meadows tends to favor camas, increasing the number of camas plants and the size of the bulbs. Controlled burning of berry patches reduces shading and competition, increases the sprouting of the plants, and increases the production of berries. Controlled burning of the habitat of willows and other shrubs used in basketry stimulates the plants to send up the long straight sprouts desired for weaving.

Although the Nez Perce people regularly visited specific areas to dig root foods, they did not necessarily return to a particular area every year. This practice allows time for plant populations to recover from direct and indirect effects of human activities. Methods and timing of digging root foods actually helped increase populations of the plants. Many root foods were not dug in quantity until their seeds were mature, and the disturbance of the soil surface caused by digging enhanced the opportunity for establishment of new seedlings.

"The Kamas is an inexhaustable source of food to the Indians for though they dig the bulbs in great quantities the new bulbs grow larger and better on the ground that is dug over" (Oliver Marcy in Baird 1999: 50). They also replanted dug roots that were too small (Marshall 1999: 178). Digging activities were important in another way for plants such as camas. Because camas grows in moist to wet soils that are often poorly aerated, digging can actually increase the availability of soil nutrients to the plants. When camas was dug late in the season, people sometimes placed fruits/seeds in the newly dug holes to increase chances for establishment of new plants (Turner and Kuhnlein 1983; Marshall 1999: 178). Digging practices benefited bitterroot populations in a similar way. When digging bitterroot the women would sometimes scoop out the "heart" of the plant (where the dividing cells are) and drop it back into the hole. The plant often regenerated from this heart and because of the soil disturbance may have grown more strongly. This regenerative ability is the basis of the specific epithet for bitterroot—*redeviva*, from the Latin *redevivus*, living again. Flowering bitterroots collected by Lewis and Clark in 1806, pressed, and dried for an herbarium specimen were planted two or three years later in Philadelphia. The roots sent up new leaves for more than a year, but they did not flower (Geyer 1847: 308; DeSanto 1993: 18, 30), probably because they were not given the appropriate growing conditions. Charles Geyer also planted roots that he had collected at least a year earlier, and they grew well for a time at Kew Gardens in London (Geyer 1846: 308). A recent "reenactment" of the Indian process of replanting the root crown succeeded in establishing new plants, though these lived for just one year (DeSanto 1993: 59).

Nez Perce Relationships with Other Groups

The gathering together of Nez Perce people and people from other areas fostered social visiting, peaceful relationships, and trade. These gatherings also set the stage for arranging marriages and other important tribal and inter-tribal activities. Knowledge of the location of rich root and fruit resources was passed down from generation to generation, and productive populations of these foods were shared with neighboring tribes. Though knowledge of medicinal plants was private, needed treatments were applied to friendly non-Nez Perces as well as within the Nez Perce culture.

Plants were important in Nez Perce trade with other groups: Nez Perce people offered kouse, camas, lovage rot, a variety of dried fruits, dogbane cordage, and cornhusk bags, and they sought bitterroot, wapato, and wokas, as well as certain technologically important plants and non-plant materials.

Perhaps the best example of how the importance of plants in Nez Perce culture affected their relations with other groups centers on camas. Euroamerican activities such as plowing, draining, rooting by pigs, application of pesticides, and high-density cattle grazing had a devastating effect on the natural camas fields so extensive in traditional Nez Perce territory. On top of that, Euroamericans wanted to prevent Nez Perce people from following their traditional ways of traveling to different camas meadows at different times, or even from digging camas at all. Serious cultural misunderstandings were behind Euroamerican efforts to break Native American ties to a traditional way of life. The United States military and many of the early religious missionaries used the obliteration of native food sources by farmers as one means of attempting to force Native Americans to abandon their cultural traditions (e.g. Statham 1975: 78).

> "The white people will come in great numbers. . . . They will come across and settle on all the buffalo plains in the land of the Rising Sun and

> upon these our camas. . . . They will settle upon the shores of all our lakes and rivers. They will settle in the forests, in the hills and even on the very summits of our highest mountains. There will be no more vacant or open land. . . . They will plow up the prairie lands where the camas and all eatable roots grow, and there shall be no more camas."

This is the Coeur d'Alene transcription of a speech by Jesuit priest Alexander Diomedi, as cited in Palmer (1999: 7). Botanist John Leiberg observed in 1895: "With the advance of settlements came the utilization of the camass fields as hay meadows. This ended the existence of the plant, except as a weed in the farmers' fields, and the camass digging in the Coeur d'Alene basins . . . is now a thing of the past." (Leiberg 1897: 37-38)

Burning cached Nez Perce food supplies and preventing access to traditional root-digging areas were cruel weapons in the arsenal aimed at forcing the indigenous people to conform to the Euroamerican concept of a "civilized" way of life. Destruction of camas meadows and restriction of access to them were among the important causes of Nez Perce/Euroamerican conflict and military battles (Statham 1975; Smith 1978).

Some of the early Euroamerican settlers adopted the use of certain native foods. It is interesting that their acceptance or rejection of native plant foods was based partly on previous familiarity with these plants (Theodoratus 1989). The most important Nez Perce staple plant foods like camas and kouse were not familiar to the white intruders, and most of them had difficulty understanding why they were important to the Nez Perce people. The U.S. Census Report of 1890 said, "Camas has a sickening taste, and a blackish appearance inside and out. It is liked by Indians and will fatten hogs, making very fine flavored meats, but it is not palatable to a white man" (Leechman 1972). However, a few settlers did eat camas (Leechman 1972).

The large-scale loss of camas meadows had effects on indigenous groups extending beyond the drastic reduction of one of the most important food staples. Many cultural traditions surrounded the digging and preparation of camas (Smith 1978; Statham 1975,1982) and the large social gatherings associated with camas digging were very important in Nez Perce culture. Nez Perce people welcomed other Plateau groups to Nez Perce camas digging grounds. Nez Perces also traveled to neighboring territories to dig camas (Anastasio 1972) despite the plentiful supply of camas in the Nez Perce homeland. With the loss of most of these large camas meadows, the people also lost this opportunity for social interaction with friends and neighbors. They were no longer able to lead their lives in the traditional way, traveling to specific areas to gather specific foods. They could no longer dig enough camas, kouse, and other root foods for a winter supply. The Nez Perce people became farmers because they could not continue to live and thrive as they had before.

The idea of farming was alien to the Nez Perce people and most other Columbia Plateau Native groups, although they did practice their own non-intrusive horticulture (Marshall 1999). Chief Joseph expressed this view: "We want to hunt buffalo and fish for salmon, not plow and use the hoe. We do not plant; we harvest only the grain and berries that Mother Earth Willingly gives us" (Howard 1971: 130). A Coeur d'Alene man, Augusta, expressed the same feelings: "We are not like you. You need bread. We have camas. You require good clothing, we are satisfied with deer skins and buffalo robes. We can live comfortably on what you would think poor and wretched" (Palmer 1999: 8). These eloquent statements communicated Native American beliefs, but they were ignored or disparaged. The Indians were forced to become farmers.

Plants in Contemporary Nez Perce Culture

There has been considerable publicity at the end of the 20th century concerning how Nez Perce fishing has been restricted by dam construction, commercial logging, pollution, and commercial fishing. Less attention has been directed toward restrictions on traditional plant use, but they have been no less significant. Euroamerican settlement in the Nez Perce homeland seriously restricted Nez Perce access to traditional plant resources. Early religious missionaries and the United States government exerted strong pressure for Nez Perce people to abandon their traditional ways and become sedentary farmers living on a reservation much smaller than their far more expansive traditional territory. White agricultural development in Nez Perce territory has reduced or even eliminated populations of certain traditional food plants. Aggressive weed species (a consequence of grazing by domestic animals and of plowing of otherwise disturbing land) have further impacted persisting populations of traditionally important plants. The extensive camas meadows formerly so characteristic of Nez Perce territory have been mostly reduced to little remnant patches here and there. Loss of productive meadows and marshes has also reduced or eliminated many other important plants, including dogbane, yampa, tules, sedges, and broomgrass. Logging has pretty much eliminated old-growth stands of redcedar from Nez Perce territory. Some traditionally important plants are probably not remembered in contemporary Nez Perce culture. Comparison of early ethnobotanical reports (Lewis 1814; Geyer 1846, 1847; Spinden 1908a) with ethnobotanical observations in more recent studies (Harbinger 1964; Scrimsher 1967; Marshall 1977; Broncheau-McFarland 1992; James 1996) can provide some information about more recent changes in plant use. Most of these changes are the result of decreased availability of traditional food and fiber plants and the adoption of a Euroamerican diet and Euroamerican technology. Nez Perce people have always been adaptive and creative about incorporating technological elements of other cultures into their own. Thus, for example, as native dogbane became less available to them they began using commercial hemp twine, commercial string, and disassembled gunnysacks to weave their soft flat bags. They also adopted the use of commercial dyes and synthetic yarns. During recent years there has been a resurgence of interest in traditional plant fiber technology. Many Native artists who learned traditional techniques as adults are passing the traditions down to their children and grandchildren. With the easy communications and travel of contemporary times, Native weavers experiment with techniques and materials characteristic of groups from other geographic areas. Some contemporary Nez Perce people make flutes and drums using traditional materials, and the stick game remains very popular. Traditional medicine is also practiced, usually in combination with use of modern medical facilities.

With respect to food plants, Nez Perce people were forced to adopt a Euroamerican diet because of restrictions on their movements and degeneration or destruction of traditional food plant habitats. Weedy plant species introduced from other continents were also used for foods, e.g. salsify (*Tragopogon dubius*), watercress, dandelion (*Taraxacum officinale*), lambsquarters (*Chenopodium album*), and sheep sorrel. As discussed earlier in this report in the section on Food Plants, some Nez Perce people have recently returned to a more traditional diet for health reasons.

Even at the time the earliest observations of Nez Perce plant used were recorded by non-native people, Nez Perce culture had been considerably influenced by Great Plains groups and Euroamerican trade goods. Two of the earlier changes in Nez Perce plant use

were the abandonment of clothing based on plant fibers in favor of hide clothing and the gradual displacement of tule mats with hides, canvas, and woven blankets. The archaeological record provides some evidence of early plant use, but plant materials do not preserve well unless they are in very dry protected areas such as caves or in very wet anaerobic conditions. Even in such areas the softer plant tissues do not persist very long, although recent studies focusing on small plant fragments in sediment samples have provided information on plant use thousands of years ago (e.g. Stenholm 1985; Mastrogiuseppe 1999).

IX. Recommendations for Further Studies

This study summarizes knowledge of the importance of plants in Nez Perce culture through time, as synthesized from published literature. The most significant gaps in knowledge of Nez Perce ethnobotany are a) the importance of plants in contemporary Nez Perce culture, b) comparisons of plant use between Nez Perce people at Lapwai, at Nespelem on the Colville Reservation, and on the Umatilla Reservation, and how any differences relate to Nez Perce history, and c) more detailed evidence from the archaeological record indicating plant use prior to Euroamerican contact.

The following recommended studies would enhance understanding of Nez Perce ethnobotany.

1. An assessment of the importance plants in contemporary Nez Perce culture could involve close consultation with the Nez Perce Tribal Executive Committee, the Cultural Resources Department, and other knowledgeable individuals. This study (or series of studies) could involve interviews with people in several different age groups, from elders to children. Interested consultants could provide information about present plant use and plant use in the past, because the current conception of past plant use could differ from the conceptions of Nez Perce people twenty and thirty years ago. Recent changes could be evaluated with respect to contemporary Nez Perce culture and the influences of various non-Nez Perce groups. One aspect of this study could be a comparison of Scrimsher's 1967 survey of traditional plant foods by Nez Perce people with new data. The use of traditional plant foods today is likely different. To what extent do contemporary Nez Perce people eat traditional plant foods, and are there any changes since the 1960's in the foods used? Such a study would also attempt to fill gaps in existing data (e.g. important plants described but not identified in previous studies and plants thought to have been used by Nez Perce people but not documented one way or the other.

2. The two primary segments of the Nez Perce people (the "treaty bands" at Lapwai and the "non-treaty bands" now mostly associated with the Colville Confederated Tribes and the Confederated Tribes of the Umatilla Reservation) differ in some philosophical views. Do these differences extend to the importance of plants in their culture? If all groups were interested in participating, valuable insights could be gained through a comparison of plant use between the treaty and non-treaty bands.

3. The archaeological record from the lower Clearwater River has not provided much documentation of plant use. However, there may be existing sediment samples and "level bags" from other excavations that have not been analyzed for plant remains. Identification of such macroremains and evaluation in conjunction with other materials from the same levels could provide more evidence concerning the past importance of plants. There may also be wood or charcoal pieces from previous excavations that could

be identified. Many archaeological textiles and other materials from rockshelters in or near Nez Perce territory have not been analyzed. Previous studies have been done of textile samples from Squirt Cave along the Snake River and Marmes, McGregor, and Porcupine rockshelters along the lower Palouse River. However, in each case except Marmes only a portion of the excavated materials has been examined. Study of more of these materials and of materials from other rockshelters and caves could provide more information on past plant use.

4. Many traditional Nez Perce plant-gathering areas have been altered to the extent that the important plants no longer occur there. A specific inventory of important traditional gathering areas could be based on areas suggested by Nez Perce consultants. This could involve assessment of current conditions at areas that were important providers of root foods, berries, and technologically important plants. The study could include but not be restricted to the following areas: Musselshell Meadow, Weippe Prairie, Packers Meadow, Grangeville Prairie, Paradise Creek meadows, Kamiah, the Wallowa Valley, the Grande Ronde camas meadows, Tolo Lake and Camas Prairie, Craig Mountain above Slickpoo, the Grangeville and Orofino area, Elk City, Pierce, Huckleberry Butte east of Clarkia, China Point, Big Hole Valley, and "across the Clearwater River from Lapwai [Creek?]".

5. Nancy Turner's criteria of cultural significance (Turner 1988a) are applicable to other areas. It would be very interesting to apply these criteria to plants documented to be important in Nez Perce culture.

6. How do men and women relate to the plant world in contemporary Nez Perce society? It appears that in many Columbia Plateau groups, gender roles have been redefined to some extent. It has apparently always been the case that some men dug roots and wove baskets while some women hunted large animals, but is there a difference in the degree of such participation?

7. Alan Marshall analyzed the relationships of Nez Perce social organization with the natural environment and the availability of resources in pre-reservation times. An additional question might be how people's use of plants is related to contemporary Nez Perce social relationships, social position, and where people live.

8. The habitat of dogbane and tules along the Snake River was flooded by dam construction, but there is evidence that remnants of some populations are persisting in areas below dams and that some new populations are becoming established in favorable areas along the new shoreline. A survey of the shores of the lower Clearwater and lower Snake Rivers could locate persisting and new dogbane and tule populations. These populations could be monitored to assess their resource potential and enable management of the habitat and possible habitat restoration.

9. To what extent are traditional plant medicines used by contemporary Nez Perce people?

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XI. Glossary

achene: a dry one-seeded fruit that does not split open at maturity, e.g. sunflower "seeds."

annual: a plant that lives only one year, germinating from seed, growing, producing seed, and drying up. Some annuals grow as "winter annuals," germinating late in the autumn, surviving the winter, and then resuming growth in the spring.

biennial: a plant that lives two seasons. The first season the seed germinates and leaves grow in a rosette at ground level. The second season one or more flowering stalks grow from the basal rosette, and after seeds are set the plant dries up.

blade: the main, expanded, part of a leaf, usually flat

bulb: an underground storage structure that represents a giant bud, including a central stem surrounded by fleshy scales (modified leaves)

cambium: the actively growing layer of cells surrounding the trunk of a woody plant between the wood and the bark

capsule: a dry fruit that splits open along two or more lines when seeds are mature

catkin: a dense cluster of tiny unisexual flowers that usually do not have petals. Catkins are often long and pendulous (e.g. birch, poplar) but may be short and upright (e.g. pussywillow).

cespitose: growing in dense clusters or tussocks, e.g. bunchgrasses

compound leaf: a leaf whose blade is subdivided into separate leaflets. Each leaflet looks like a little leaf, but the leaflets are attached to one leafstalk.

coniferous: cone-bearing trees such as pine, fir, yew, and larch

corm: an underground storage structure that is flattish and represents a compressed stem

cultural deposits: sediments containing things that humans have left

deciduous: a woody plant that loses its leaves each year, non-evergreen

decoction: a liquid in which plant material has been boiled, as for medicine. A decoction is stronger than an infusion.

dioecious: a unisexual plant, with an individual plant producing only male or only female flowers

drupe: a fleshy fruit with a central hard stone, e.g. cherries

ecotonal area: the area of intersection between two different habitats

ecotone: the boundary between two different habitats

emergent aquatic: an aquatic plant rooted in the mud and growing up through the water, producing flowers and/or leaves above water level

follicle: a narrow dry fruit that splits open along one side when the seeds are mature

generic: referring to the **genus** level in the scientific system of plant classification

genus: a group of related species, more closely similar to each other than to species in other genera. Example: sunflowers are in the genus *Helianthus* and are more similar to each other than they are to yarrow (genus *Achillea*).

gills: the spore-producing part of common mushrooms, usually on the underside of the mushroom's cap and consisting of flat parallel plates of cells

glabrous: without hairs

glaucous: coated with a layer of wax. A glaucous leaf often looks bluish or whitish green.

herbaceous: without woody tissue

herbaceous perennial: a plant that lives for years, dying back to the ground in winter and sending up new growth from the roots each spring, non-evergreen

herbal: a book describing plants, usually with reference to their medicinal properties

hopper mortar: a mortar consisting of a bottomless coiled basket secured over a flat rock base

indigenous: native to an area

infusion: a "tea" resulting from steeping plant material in very hot water, often used for medicinal preparations but also for other purposes. An infusion is weaker than a decoction.

inulin: a complex carbohydrate found in many bulbs and roots, indigestible by humans

lithosols: very shallow rocky soils

mano: a smoothed rock held in the hand and used to grind foods, especially seeds, on a flat grinding stone

monoecious: a plant with unisexual flowers, but flowers of both sexes are produced on the same plant

mortar: a strong, usually bowl-shaped container in which material is mashed, ground, or pounded with a club-shaped implement called a pestle

ovate: egg-shaped

palmately compound: a compound leaf with the leaflets fanning out from a central attachment, like the spread fingers of a hand

perennial: a plant that lives for at least a few years

pestle: an implement (usually club-shaped) for mashing, grinding, or pounding substances in a strong container called a mortar

pinnately compound: a compound leaf with the leaflets in a row along each margin of the central stalk; shaped like a feather

pod: a dry fruit that splits open along both sides when seeds are mature

raceme: an elongate simple flower cluster where each flower is borne on a little stalk

rays: the outer strap-shaped flowers of some members of the sunflower family (e.g. sunflowers, daisies)

rhizome: a creeping underground stem that can send up new aerial shoots

semi-sedentary: a way of life involving active movements from place to place during part of the year and residing at "permanent" settlements the rest of the year (e.g. winter)

serrate: with a finely toothed edge

sessile: without a stalk

shrub steppe: arid habitats dominated by shrubs such as sagebrush

smudge: very slow burning of material, producing smoke

species: the basic unit of plant classification. A species is a group of morphologically very similar plants that can breed with each other but usually (not always) cannot successfully interbreed with members of other species.

spike: a narrow simple flower cluster where the flowers do not have stalks

stamen: the male, pollen-producing organ of a flower

stolon: a horizontally creeping stem that is above the ground surface and can send out new leafy shoots; also called a runner

thallus: the plant body of a lichen, fungus, or alga, not differentiated into stem and leaves

tuber: an underground storage structure that is fleshy and usually starchy. A stem tuber has buds along the sides (the "eyes" of a potato), but a root tuber will grow only from the top

APPENDIX A. TABLES

Table 1. Food Plants Most Important in Traditional Nez Perce Life from Marshall 1977

Latin name	Nez Perce name	Plant family	
Allium spp.	sé·x	Liliaceae	lily family
Amelanchier alnifolia (canyon form)	kel	Rosaceae	rose family
(higher slopes form)	kikéye	Rosaceae	rose family
Balsamorhiza incana	cilílx	Asteraceae	sunflower family
Balsamorhiza sagittata	pásx	Asteraceae	sunflower family
Bryoria fremontii	ho·póp	Alectoriaceae	Alectoria family
Calochortus sp.	ló·las	Liliaceae	lily family
Camassia quamash	qémes	Liliaceae	lily family
Celtis reticulata	katámno	Ulmaceae	elm family
Cirsium scariosum	títux	Asteraceae	sunflower family
Claytonia lanceolata	capcí·lay	Portulacaceae	purslane family
Crataegus douglasii, C. columbiana	télx	Rosaceae	rose family
Fritillaria pudica	stiméx	Liliaceae	lily family
Lomatium canbyi	qeqí·t	Apiaceae	parsley or carrot family
Lomatium cous	qá·msit	Apiaceae	parsley or carrot family
Lomatium dissectum var. multifidum	titálam	Apiaceae	parsley or carrot family
Lomatium (L. farinosum or L. rollinsii?)	laqáptat	Apiaceae	parsley or carrot family
Lomatium gormanii	cí·ci·ta	Apiaceae	parsley or carrot family
Lomatium grayi	wewí·mn	Apiaceae	parsley or carrot family
Lomatium salmoniflorum	ilqú·lx	Apiaceae	parsley or carrot family
Lomatium triternatum	péqiy	Apiaceae	parsley or carrot family
Lomatium sp.	yíqew	Apiaceae	parsley or carrot family
Perideridia gairdneri	cawítx	Apiaceae	parsley or carrot family
Prunus virginiana var. melanocarpa	tíms	Rosaceae	rose family
Ribes aureum	kál	Grossulariaceae	currant family
Ribes sp. (gooseberry)	pí·lus	Grossulariaceae	currant family
Rosa spp.	tá·msas	Rosaceae	rose family
Rubus parviflorus	ta·xtá·x	Rosaceae	rose family
Sambucus cerulea	míttip	Caprifoliaceae	honeysuckle family
Sambucus racemosa var. melanocarpa	mexseme mittip	Caprifoliaceae	honeysuckle family
Triteleia grandiflora	cátoxc	Liliaceae	lily family
Vaccinium globulare	cemítk	Ericaceae	heath family
Vaccinium scoparium	ʔalaʔála	Ericaceae	heath family
Valeriana edulis	ku·ye	Valerianaceae	vervain family

Table 2. Plants Important in Traditional Nez Perce Culture and in Other Columbia Plateau groups

Latin name	Nez Perce name	English name	Plant family
		tewlí·kt - trees	
Abies grandis	pícpic	grand fir	Pinaceae, pine family
Abies lasiocarpa	pató·sway	subalpine fir	Pinaceae, pine family
Acer glabrum var. douglasii		Rocky Mountain maple	Aceraceae, maple family
Alnus rhombifolia		white alder	Betulaceae, birch family
Betula occidentalis	heslíps	water birch	Betulaceae, birch family
Celtis reticulata	katámno	hackberry	Ulmaceae, elm family
Cercocarpus ledifolius	póhos	curlleaf mountain-mahogany	Rosaceae, rose family
Cercocarpus montanus		birchleaf mountain-mahogany	Rosaceae, rose family
Juniperus scopulorum	ciké·yelx	Rocky Mountain juniper	Cupressaceae, cypress family
Larix occidentalis	kimíle	tamarack, western arch	Pinaceae, pine family
Picea engelmannii	heslíps	Engelmann spruce	Pinaceae, pine family
Pinus albicaulis	lalxsáway	whitebark pine	Pinaceae, pine family
Pinus contorta	qalámqalam	lodgepole pine	Pinaceae, pine family
Pinus monticola	sé·ysey	white pine	Pinaceae, pine family
Pinus ponderosa	lá·qa	ponderosa pine	Pinaceae, pine family
Populus balsamifera var. trichocarpa	qápqap	black cottonwood	Salicaceae, willow family
Populus tremuloides	nisá·qapqap	quaking aspen	Salicaceae, willow family
Pseudotsuga menziesii	páps	Douglas-fir	Pinaceae, pine family
Salix amygdaloides	táxs	peachleaf willow	Salicaceae, willow family
Taxus brevifolia	támqay	yew	Taxaceae, yew family
Thuja plicata	talátat	western redcedar	Cupressaceae, cypress family
		pátan – shrubs and other small woody plants	
Alnus incana	wí·tx	mountain alder	Betulaceae, birch family
Amelanchier alnifolia - canyon form	kel	serviceberry	Rosaceae, rose family
higher slopes form	kikéye	serviceberry	Rosaceae, rose family
Arctostaphylos nevadensis		pinemat manzanita	Ericaceae, heath family
Arctostaphylos uva-ursi	hotó·to	kinnickinick	Ericaceae, heath family
Artemisia tridentata	qémqem	big sagebrush	Asteraceae, sunflower family)
Berberis aquifolium var. aquifolium	qiqétqiqet	Oregon-grape	Berberidaceae, barberry family
Berberis aquifolium var. Repens	qiqétqiqet	creeping Oregon-grape	Berberidaceae, barberry family
Ceanothus sanguineus		redstem ceanothus	Rhamnaceae, buckthorn family
Ceanothus velutinus		mountain-balm	Rhamnaceae, buckthorn family

Table 2. Plants Important in Traditional Nez Perce Culture and in Other Columbia Plateau groups (continued)

Latin name	Nez Perce name	English name	Plant family
		pátan – shrubs and other small woody plants (continued)	
Chimaphila umbellata		pipsissewa	Ericaceae, heath family
Chrysothamnus nauseosus	qémqem	rubber rabbitbrush	Asteraceae (sunflower family)
Clematis ligusticifolia		western clematis	Ranunculaceae, buttercup family
Cornus canadensis		bunchberry	Cornaceae, dogwood family
Cornus sericea ssp. sericea	piplá·c	red-osier dogwood	Cornaceae, dogwood family
Crataegus columbiana	télx	red hawthorn	Rosaceae, rose family
Crataegus douglasii	císnim	black hawthorn	Rosaceae, rose family
Holodiscus discolor	hisiimseqe	oceanspray	Rosaceae, rose family
Juniperus communis		common juniper	Cupressaceae, cypress family
Ledum glandulosum	písqu	mountain-laurel	Ericaceae, heath family
Ledum groenlandicum		bog-laurel	Ericaceae, heath family
Linnaea borealis		twinflower	Caprifoliaceae, honeysuckle family
Lonicera ciliosa		orange honeysuckle	Caprifoliaceae, honeysuckle family
Lonicera involucrata		black twinberry	Caprifoliaceae, honeysuckle family
Lonicera utahensis		red twinberry	Caprifoliaceae, honeysuckle family
Pachistima myrsinites		mountain boxwood	Celastraceae, staff-tree family
Philadelphus lewisii	sisé·qiy	syringa, mockorange	Hydrangeaceae, hydrangea family
Physocarpus malvaceus		ninebark	Rosaceae, rose family
Prunus emarginata	tíms	bitter cherry	Rosaceae, rose family
Prunus virginiana var. melanocarpa	tíms	chokecherry	Rosaceae, rose family
Purshia tridentata		bitterbrush	Rosaceae, rose family
Rhamnus purshiana	sálam	cascara	Rhamnaceae, buckthorn family
Rhus glabra	tiltitíltit	smooth sumac	Anacardiaceae, cashew family
Rhus radicans	qalamtitqá	poison-ivy	Anacardiaceae, cashew family
Ribes aureum	kál	golden currant	Grossulariaceae, currant family
Ribes cereum	kimmé	wax currant	Grossulariaceae, currant family
Ribes inerme	pí·lus	sour purple gooseberry	Grossulariaceae, currant family
Ribes lacustre	kimmé	swamp gooseberry	Grossulariaceae, currant family
Ribes niveum		snow gooseberry	Grossulariaceae, currant family
Ribes oxyacanthoides	kimmé	sweet red gooseberry	Grossulariaceae, currant family
Ribes viscosissimum		sticky currant	Grossulariaceae, currant family
Rosa gymnocarpa	tá·msas	baldhip rose	Rosaceae, rose family
Rosa nutkana	tá·msas	Nootka rose	Rosaceae, rose family

Table 2. **Plants Important in Traditional Nez Perce Culture and in Other Columbia Plateau groups** (continued)

Latin name	Nez Perce name	English name	Plant family
	pátan – shrubs and other small woody plants (continued)		
Rosa woodsii var. ultramontana	tá·msas	pearhip rose	Rosaceae, rose family
Rosa spp.	tá·msas	wild rose	Rosaceae, rose family
Rubus idaeus	heʔilpéʔilp	wild raspberry	Rosaceae, rose family
Rubus leucodermis		blackcap raspberry	Rosaceae, rose family
Rubus nivalis	cicmúxcicmux	snow dewberry	Rosaceae, rose family
Rubus parviflorus	ta·xtá·x	thimbleberry	Rosaceae, rose family
Rubus ursinus	cimú·xcimux cimú·k	trailing blackberry	Rosaceae, rose family
Salix exigua	táxs	sandbar willow, coyote willow	Salicaceae, willow family
Salix scouleriana	táxs	Scouler willow	Salicaceae, willow family
Sambucus cerulea	míttip	blue elderberry	Caprifoliaceae, honeysuckle family
Sambucus racemosa var. melanocarpa	mexseme mittip	black mountain elderberry	Caprifoliaceae, honeysuckle family
Shepherdia canadensis		buffaloberry	Elaeagnaceae, Russian-olive family
Spiraea betulifolia		birchleaf spiraea	Rosaceae, rose family
Spiraea douglasii		pyramid spiraea	Rosaceae, rose family
Symphoricarpos albus	cícaqiy	snowberry	Caprifoliaceae, honeysuckle family
Vaccinium globulare	cemítk	blue huckleberry	Ericaceae, heath family
Vaccinium membranaceum	cemítk	black mountain huckleberry	Ericaceae, heath family
Vaccinium scoparium	ʔalaʔá·la	fireberry	Ericaceae, heath family
Viburnum edule		squashberry, highbush cranberry	Caprifoliaceae, honeysuckle family
	hehen –"soft" plants (herbaceous)		
Achillea millefolium	wapalwá·pal	yarrow	Asteraceae, sunflower family
Adiantum pedatum		maidenhair fern	Adiantaceae, maidenhair fern family
Agastache urticifolia		horsemint	Lamiaceae, mint family
Agoseris glauca		mountain-dandelion	Asteraceae, sunflower family
Allium spp.	sé·x	wild onion	Liliaceae, lily family
Angelica spp.		angelica	Apiaceae, parsley or carrot family
Apocynum androsemifolium		spreading dogbane	Apocynaceae, dogbane family
Apocynum cannabinum	qeemu	dogbane	Apocynaceae, dogbane family
Aquilegia formosa	yeqehteʔí léht	columbine	Ranunculaceae, buttercup family
Artemisia ludoviciana	heqé·qe	river sage	Asteraceae, sunflower family
Asarum caudatum		wild ginger	Aristolochiaceae, Dutchman's-pipe family

Table 2. Plants Important in Traditional Nez Perce Culture and in Other Columbia Plateau groups (continued)

Latin name	Nez Perce name	English name	Plant family
		hehen –"soft" plants (continued)	
Asclepias speciosa	kam·ma	milkweed	Asclepiadaceae, milkweed family
Aster conspicuous		showy aster	Asteraceae, sunflower family
Balsamorhiza incana	cilílx	hoary balsamroot	Asteraceae, sunflower family
Balsamorhiza sagittata	pásx	arrowleaf balsamroot	Asteraceae, sunflower family
Bryoria fremontii	ho·póp	black tree lichen	Usneaceae, usnea family
Calochortus sp.	ló·las	Mariposa-tulip	Liliaceae, lily family
Calypso bulbosa		fairy slipper orchid	Orchidaceae, orchid family
Camassia quamash	qémes	camas	Liliaceae, lily family
Carex pellita		woolly sedge	Cyperaceae, sedge family
Carex spp.		sedge	Cyperaceae, sedge family
Carex vesicaria		bladder sedge	Cyperaceae, sedge family
Castilleja spp.		Indian-paintbrush	Scrophulariaceae, snapdragon family
Chenopodium spp.		goosefoot	Chenopodiaceae, goosefoot family
Cicuta douglasii		water-hemlock	Apiaceae, parsley or carrot family
Cirsium scariosum	títux	elk thistle	Asteraceae, sunflower family
Cirsium undulatum		wavyleaf thistle	Asteraceae, sunflower family
Claytonia lanceolata	capcí·lay	spring beauty	Portulacaceae, purslane family
Claytonia megarrhiza		alpine springbeauty	Portulacaceae, purslane family
Claytonia perfoliata		miners-lettuce	Portulacaceae, purslane family
Clematis hirsutissima		sugar bowls	Ranunculaceae, buttercup family
Clintonia uniflora		beadlily	Liliaceae, lily family
Conium maculatum		poison-hemlock	Apiaceae, parsley or carrot family
Delphinium spp.		larkspur	Ranunculaceae, buttercup family
Echinodontium tinctorum		Indian paint fungus	Polyporaceae, pore fungus family
Eleocharis palustris		field spikerush	Cyperaceae, sedge family
Eleocharis rostellata		beaked spikerush	Cyperaceae, sedge family
Elymus elymoides		bottlebrush squirreltail	Poaceae, grass family
Epilobium angustifolium		fireweed	Onagraceae, evening-primrose family
Equisetum arvense	sáyxsayk	field horsetail	Equisetaceae, horsetail family
Equisetum hyemale	sáyxsayk	Dutch scouring-rush	Equisetaceae, horsetail family
Equisetum laevigatum	sáyxsayk	smooth scouring-rush	Equisetaceae, horsetail family
Equisetum palustre	sáyxsayk	marsh horsetail	Equisetaceae, horsetail family

Table 2. Plants Important in Traditional Nez Perce Culture and in Other Columbia Plateau groups (continued)

Latin name	Nez Perce name	English name	Plant family
		hehen –"soft" plants (continued)	
Eriogonum heracleoides var. angustifolium		parsnip-flowered wild buckwheat	Polygonaceae, knotweed family
Eriophyllum lanatum	qayqayat	Oregon sunshine	Asteraceae (sunflower family)
Erythronium grandiflorum		glacier-lily	Liliaceae, lily family
Fragaria vesca	téxtex	woods strawberry	Rosaceae, rose family
Fragaria virginiana	téxtex	blueleaf strawberry	Rosaceae, rose family
Frasera fastigiata		clustered frasera	Gentianaceae, gentian family
Fritillaria pudica	stiméx	yellowbells	Liliaceae, lily family
Galium aparine		cleavers	Rubiaceae, madder family
Galium boreale		northern bedstraw	Rubiaceae, madder family
Geranium viscosissimum		sticky geranium	Geraniaceae, geranium family
Geum triflorum		prairie smoke	Rosaceae, rose family
Glycyrrhiza lepidota		wild licorice	Fabaceae, pea family
Goodyera oblongifolia		rattlesnake-plantain	Orchidaceae, orchid family
Helianthus annuus		sunflower	Asteraceae, sunflower family
Heracleum lanatum	ʔayc ʔayc	cow-parsnip	Apiaceae, parsley or carrot family
Hesperostipa comata		needle-and-thread	Poaceae, grass family
Heuchera cylindrica		alumroot	Saxifragaceae, saxifrage family
Hieracium albiflorum		white hawkweed	Asteraceae, sunflower family
Hierchloe odorata		sweetgrass	Poaceae, grass family
Hydrophyllum capitatum		waterleaf	Hydrophyllaceae, waterleaf family
Iris missouriensis		wild blue iris	Iridaceae, iris family
Juncus balticus		Baltic rush	Juncaceae, rush family
Letharia vulpina		wolf lichen	
Lewisia redeviva	litá·n	bitterroot	Portulacaceae, purslane family
Leymus cinereus	suséʔey	Great Basin wildrye	Poaceae, grass family
Ligusticum canbyi	qawsqá·ws	lovage	Apiaceae, parsley or carrot family
Linum perenne		wild flax	Linaceae, flax family
Lithospermum ruderale		stoneseed gromwell	Boraginaceae, borage family
Lomatium ambiguum		swale biscuitroot	Apiaceae, parsley or carrot family
Lomatium canbyi	qeqí·t	Canby biscuitroot	Apiaceae, parsley or carrot family
Lomatium cous	qá·msit	cous	Apiaceae, parsley or carrot family
Lomatium dissectum var. multifidum	titálam	fernleaf lomatium	Apiaceae, parsley or carrot family

Table 2. Plants Important in Traditional Nez Perce Culture and in Other Columbia Plateau groups (continued)

Latin name	Nez Perce name	English name	Plant family
		hehen –"soft" plants (continued)	
Lomatium farinosum	laqáptat	Coeur d'Alene lomatium	Apiaceae, parsley or carrot family
Lomatium gormanii	cí·ci·ta	salt and pepper lomatium	Apiaceae, parsley or carrot fame
Lomatium grayi	wewí·mn	Gray desert-parsley	Apiaceae, parsley or carrot fame
Lomatium macrocarpum		potato biscuitroot	Apiaceae, parsley or carrot family
Lomatium salmoniflorum	ilqú·lx	Salmon River lomatium	Apiaceae, parsley or carrot fame
Lomatium triternatum	péqiy	nineleaf lomatium	Apiaceae, parsley or carrot fame
Lomatium sp.	yíqew		Apiaceae, parsley or carrot fame
Lupinus spp.		lupine	Fabaceae, pea family
Lycoperdon sp.		puffball	Polyporaceae, pore fungus family
Lysichiton americanum	temulté·mul té·mul	skunk-cabbage	Araceae, arum family
Mentha arvensis		field mint	Lamiaceae, mint family
Microseris nutans		nodding microseris	Asteraceae (sunflower family)
Mimulus guttatus		monkeyflower	Scrophulariaceae, snapdragon family
Nepeta cataria		catnip	Lamiaceae, mint family
Nicotiana attenuata		wild tobacco	Solanaceae, potato family
Nuphar polysepalum	sá·slaqs	yellow waterlily	Nymphaeaceae, waterlily family
Oenothera strigosa		common evening-primrose	Onagraceae, evening-primrose family
Opuntia spp.	ʔístis	prickly-pear cactus	Cactaceae, cactus family
Osmorhiza depauperata		bluntfruit sweet-cicely	Apiaceae, parsley or carrot family
Osmorhiza occidentalis		western sweet-cicely	Apiaceae, parsley or carrot family
Paeonia brownii		native peony	Paeoniaceae, peony family
Penstemon wilcoxii	kitímkitim	penstemon	Scrophulariaceae, snapdragon family
Perideridia bolanderi		yampa	Apiaceae, parsley or carrot family
Perideridia gairdneri	cawítx	yampa	Apiaceae, parsley or carrot fame
Phacelia hastata	yewék	silverleaf phacelia	Hydrophyllaceae, waterleaf family
Phacelia heterophylla	yewék	varileaf phacelia	Hydrophyllaceae, waterleaf family
Phalaris arundinacea		reed canary grass	Poaceae, grass family
Phragmites australis	toyqí·ks	reedgrass, broomgrass	Poaceae, grass family
Polygonum bistortoides		bistort	Polygonaceae, knotweed family
Polygonum phytolaccaefolium		fleeceflower	Polygonaceae, knotweed family
Pseudoregneria spicata		bluebunch wheatgrass	Poaceae, grass family
Pteridium aquilinum	teqsté·qs	bracken fern	Dennestaedinaceae, hay-scented fern family
Pterospora andromedea		pinedrops	Pyrolaceae, wintergreen family

Table 2. Plants Important in Traditional Nez Perce Culture and in Other Columbia Plateau groups (continued)

Latin name	Nez Perce name	English name	Plant family
		hehen –"soft" plants (continued)	
Ranunculus eschscholtzii		subalpine poppy buttercup	Ranunculaceae, buttercup family
Ranunculus glaberrimus	qémqem	sagebrush buttercup	Ranunculaceae, buttercup family
Rumex acetosella	cicyúkis	sheep sorrel	Polygonaceae, knotweed family
Rumex venosus		sand dock	Polygonaceae, knotweed family
Sagittaria latifolia		wapato, arrowleaf	Alismataceae, water-plantain family
Scirpus acutus	tóko	tule, bulrush	Cyperaceae, sedge family
Sedum spp.		stonecrop	Crassulaceae, stonecrop family
Sium suave		water-parsnip	Apiaceae, parsley or carrot family
Smilacina racemosa		false Solomon's seal	Liliaceae, lily family
Smilacina stellata		starry Solomon's seal	Liliaceae, lily family
Solidago canadensis		goldenrod	Asteraceae (sunflower family)
Spartina gracilis		alkali cordgrass	Poaceae, grass family
Thalictrum occidentale		western meadowrue	Ranunculaceae, buttercup family
Tricholoma populinum	hípew	cottonwood mushroom	Tricholomataceae, Tricholoma family
Trifolium longipes		longstem clover	Fabaceae, pea family
Trifolium macrocephalum		largeheaded clover	Fabaceae, pea family
Trifolium pratense		red clover	Fabaceae, pea family
Trifolium repens		white Dutch clover	Fabaceae, pea family
Triteleia grandiflora	cátoxc	wild-hyacinth	Liliaceae, lily family
Typha latifolia	tóko	cattail	Typhaceae, cattail family
Urtica dioica	wetetwé·tet	nettle	Urticaceae, nettle family
Valeriana edulis	ku·ye	tobaccoroot, valerian	Valerianaceae, vervain family
Veratrum viride		green false hellebore	Liliaceae, lily family
Verbascum thapsus		common mullein	Scrophulariaceae, snapdragon family
Veronica americana		American brooklime	Scrophulariaceae, snapdragon family
Veronica anagallis-aquatica		water pimpernel	Scrophulariaceae, snapdragon family
Viola canadensis		Canada violet	Violaceae, violet family
Viola orbiculata		streamside violet	Violaceae, violet family
Wyethia amplexicaulis	tá·ko	mule's ears	Asteraceae, sunflower family
Xanthium strumarium		cocklebur	Asteraceae, sunflower family
Zigadenus spp.		death-camas	Liliaceae, lily family
Xerophyllum tenax	yé·ye	beargrass	Liliaceae, lily family

Table 3. Nutrient Content (Selected) of Some Vegetable Foods in the Traditional Nez Perce Diet (per 100 g dry weight)[3]

Latin name	Common name	Energy	Protein	Fat	Carbohydrates	Vitamin C	Vitamin A	Calcium
	kilocalories	grams	grams	grams	milligrams	RE	milligrams	
Bryoria fremontii lichens	black tree lichen	389	4.4	9.0	76		9	50-400
Shoots:								
Balsmorhiza sagittata	arrowleaf balsamroot		0.3			14		241
Heracleum lanatum	cow-parsnip	20-332	0.4-17.7	0.2-0.6	3.8-83	3.5-60	7.5	28
Root foods:								
Camassia quamash bulbs	camas	375	2.4-34.0	0-35-0.5	63			69-280
Lewisia redeviva roots	bitterroot	99-343	2.5-5.9	0.1-0.6	22-84	0-8.0		60-400
Lomatium canbyi roots	"snowdrops"	111-370	2.1-4.5	0.2-3.0	24--87	0-8.0		39-1250
Lomatium cous roots	cous	325-385	2.5-6.2	1.0-1.2	80-83	0-8.0		70-520
Perideridia gairdneri roots	yampa	286-350	2.4-6.2	0.3-1.7	74-79	3.0		130-200

[3] From Yanovsky and Kingsbury 1938; Scrimsher 1967; Hilty et al. 1972; Benson et al. 1973; Keely 1980; Plew 1992.

Table 4. Nutrient Content (Selected) of Some Fruit and Seed Foods in the Traditional Nez Perce Diet[4]

Latin name	Common name	Energy kilocalories	Protein grams	Fat grams	Carbohydrates grams	Vitamin C milligrams	Vitamin A RE	Calcium milligrams
Amelanchier alnifolia	serviceberry	90-365	0.7-5.8	1.2-2.8	21.4-80.4	6.0-24	0.5-86	69-520
Cornus sericea ssp. sericea	"willowberry"					112		
Crataegus columbiana	red hawthorn	87	2.0	0.7	21			
Crataegus douglasii	black hawthorn	52-352	0.3-3.2	1.4-1.7	9.5-82.8	9.5	8	31-880
Fragaria spp.	wild strawberry	54	0.6	0.9	12-13	24-60		21-64
Helianthus annuus	annual sunflower	560	24.0	47.3	20			120
Prunus virginiana	chokecherry						5-19	
Rosa spp.	wild rose	55-74	1.6-2.4	0.6-0.7	17.6-21.3	414-3700	180-263	77
Rubus idaeus	wild raspberry	65	0.6	0.8	16	14-40	13	36
Rubus leucodermis	blackcap raspberry	79	1.2	1.4	18	18	4	38
Rubus parviflorus	thimbleberry	99-110	1.7-3.1	1.2	23-25	78		42-129
Rubus ursinus	trailing blackberry	53-57	2.5-3.2	0.8-0.9	10-13	20-28	1	32-50
Sambucus cerulea	elderberry	72-74	2.6-3.5	0.5-1.2	14.6-16.4	16-33		25-38
Smilacina racemosa	false Solomon's-seal	88	2.3	0.6	21	51-122		17-39
Vaccinium membranaceum	mountain huckleberry	54	0.6	0.5	13	6.6-12	0.5-1.0	14

[4] From Yanovsky and Kingsbury 1938; Kavanagh 1942; Hunter and Tuba 1943; Tuba et al. 1944; Rivera 1949; Heiser 1976; Keely et al. 1982; Kuhnlein 1984, 1989.