Eugene S. Hunn

Department of Anthropology
University of Washington
Seattle, Washington 98195

and

David H. French

Department of Anthropology
Reed College
Portland, Oregon 97202

Lomatium: A Key Resource for Columbia Plateau Native Subsistence

Abstract

Ethnobiological research with contemporary Sahaptin-speaking Indians highlights the key role played by species of *Lomatium* (Umbelliferae) as sources of food energy and Vitamin C. Contemporary Sahaptin speakers' knowledge of *Lomatium* morphology and natural history reflects this contribution: 14 "folk species" recognized in native terminology correspond to 12 scientific species, at least 10 of which were eaten.

Introduction

Analyses of the aboriginal foraging economies and their resource base in northwestern North America have stressed the abundance of the local fisheries nearly to the exclusion of the role of other available resources (Sneed, 1971; Hewes, 1973; Donald and Mitchell, 1975; Palmer, 1975a). These studies thus leave the impression that a male-dominated fishery was sufficient to provide for the population, and that the female economic contribution, primarily the harvest of vegetal foods, was non-essential. A long-standing bias in the anthropological literature is thus supported (Martin and Voorhies, 1975). We will argue that, for the interior plateau region of the middle Columbia River basin, the vegetable staples harvested by women were as important in native subsistence as the fish and game harvested by men. In support of this contention, we will demonstrate 1) the availability of these staples in sufficient quantity—taking into account native harvesting techniques—to meet the caloric needs of the estimated pre-contact population; and 2) the intensity of cultural interest directed by these peoples toward a single genus of plants, *Lomatium*, several species of which were staple elements or key supplements in the aboriginal diet.

It may be noted that, by contrast with native treatment, the lomatiums are infrequently and inconsistently named in English. There are no accepted common names for most of them, and such terms as "biscuit-root," "desert parsley," and "Indian celery" have been used for more than one species, making it easier for ethnographers to underestimate the number and importance of the plants the Indians recognize.

Indians for whom lomatiums were the primary vegetable resource occupied the Columbia River region from near The Dalles, Oregon, to Priest Rapids, Washington. Most of these Indians spoke a common language, known to linguists as Sahaptin, which their descendants still speak on and around the Yakima, Warm Springs, and Umatilla Reservations (Rigsby, 1965). The Nez Perces, the Cayuse, the Chinookan-speaking Wasco and Wishram, and certain Salishan-speakers also relied on lomatiums as staples (Marshall, 1977; Turner, 1973; Turner, Bouchard, and Kennedy, 1980), but space precludes their consideration here. Following Rigsby (1965), we recognize 15 dialects of three major groups within the Sahaptin language: the Northwest dialect cluster includes Kittitas, Yakima, Upper Nisqually (extinct), Upper Cowlitz, and Klickitat; the Columbia River cluster includes Tenino, Tygh, Celilo, Rock Creek, John Day, and Umatilla; and the Northeast cluster includes Walla Walla, Snake River, Palouse, and Priest Rapids.[1] The Sahaptin life range may be defined as that region habitually traversed by Sahaptin-speakers in their annual food quest. Ethnographic reports indicate that this range consisted of a core of some 60,000 sq km clearly controlled by Sahaptin-speaking village groups and a peripheral area of some 50,000 sq km used jointly with people of adjacent language groups (Ray *et al.*, 1938; Spier, 1936; Indian Claims Commission, 1974). To calculate a density figure for the region, it is necessary to adjust for the sharing of resources with other groups in the peripheral area of the Sahaptin life range. We here assume that on average one-third of the resources of the peripheral portion of the range was available to Sahaptin speakers. Thus, the estimated pre-contact Sahaptin-speaking population of 14,500 (Mooney, 1928) had an overall density of about one person per 5 sq km. Such a density is considerably greater than that estimated for interior foraging groups immediately north and south of the Columbia Plateau (Kroeber, 1938).

This relatively dense population was supported by a rich anadromous fishery, a

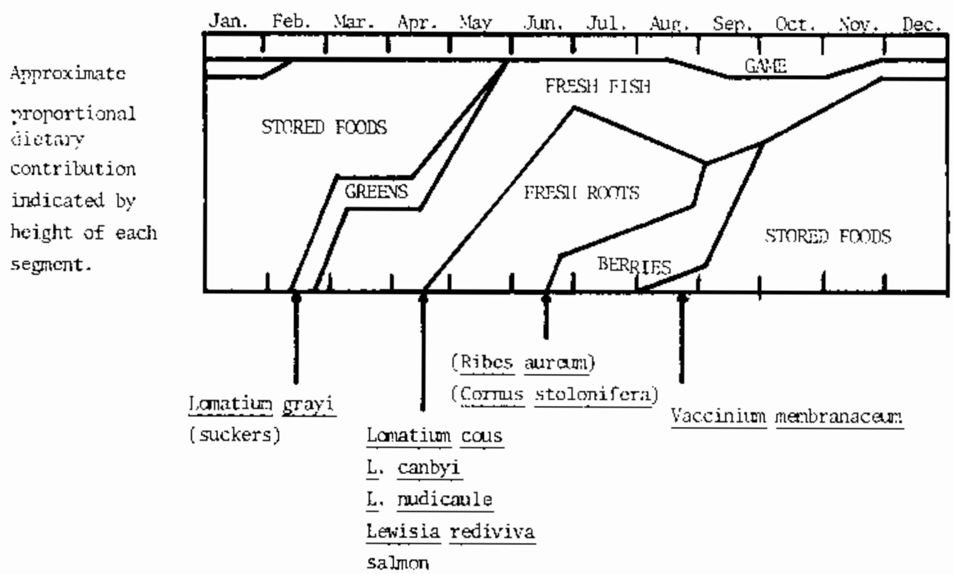

Figure 1. Schematic representation of seasonal patterns of food utilization by Sahaptin-speaking people of the middle Columbia Plateau. Species indicated below the diagram are those honored at first food feasts. Species in parentheses are feasted in a minority of contemporary communities.

[1]The orthography used here follows: obstruents, plain stops, and affricates / p, t, c, ƛ, č, k, kʷ, q, qʷ /; glottalized stops and affricates / p', t', c', ƛ', č', k', kʷ', q', qʷ' /; and spirants / s, ł, š, x, xʷ, x̣, x̣ʷ /, sonorants /m, n, l, w, y, /, laryngeals / h, ʔ /, and vowels / i, ii, ɨ, u, uu, a, aa / (Rigsby, n. d.).

"displaced piece of the Pacific Ocean," as it were, and by the systematic exploitation of vegetable products in season. The traditional economy was planned at the household level to take advantage of seasonal patterns of food availability. First food feasts, still celebrated today, ritually marked the key phases of this seasonal cycle, as illustrated schematically in Figure 1. One may recognize two major productive phases with respect to plant foods in this seasonal round, a "root"-digging phase and a "fruit"-picking phase. The "root" phase is marked by a minor feast at the onset and a major feast at the peak of root maturation. The "fruit" phase is ritually marked likewise. The Sahaptin classification of plant products also reflects this major seasonal division in the distinction between *x̣nit* 'foods which are dug,' including primarily roots harvested in spring, and *tmaanit* 'foods which are picked,' including primarily fruits harvested in fall. The latter are dominated by species of the genus *Vaccinium*, huckleberries and their relatives, of which at least six are nomenclaturally differentiated, while the former are dominated by *Lomatium* species, with 14 distinct folk taxa given recognition. The 10 lomatiums which were eaten represent nearly 30 percent of all Sahaptin edible root species.

The genus *Lomatium* has its greatest diversity in the Columbia Plateau area (Mathias, 1965). A typical edible *Lomatium* survives on scattered, barren patches of lithosol habitat by means of nutrients stored in a thickened root. The Indians call these lithosol patches *šám* and systematically utilize them as prime root digging sites.

Of the 29 *Lomatium* species known to occur in some part of the Sahaptin range, three have not yet been shown to Sahaptin speakers, and four others have not been shown to Sahaptin speakers familiar with the areas where the species are found. Ten others were clearly recognized as familiar but were not formally named. These 17 species are all rare, of very local occurrence, or marginal to the area.[2] The 12 remaining species are classified into 14 coordinate Sahaptin folk taxa as in Table 1.

Methods

The primary data of our research are *identifications* of individual plant specimens (fresh or dried) by knowledgeable native speakers of Sahaptin. Secondary data consist of knowledgeable native consultants' responses to ethnographic queries about native concepts phrased as far as possible in native terms (Berlin, Breedlove, and Raven, 1974; Hunn, 1977) and through direct observation of native plant-related activities. During the past 25 years, we have confronted 31 native speakers (representing 9 of the 15 Sahaptin dialects) with 161 specimens representing 26 of the 29 *Lomatium* species known from the Sahaptin home range. Since most specimens were identified by multiple consultants, the total number of identifications supporting the present analysis is 367.

Responses in the primary identification task may range from no recognition of the plant to immediate, confident recognition and naming of the specimen, a *positive naming response* (PNR). Intermediate categories of response range from recognition without knowledge or recollection of the native term, to uncertainty as to recognition or

[2]The unnamed species are: *L. ambiguum* (Nutt.) C. & R., *L. bicolor* (S. Wats.) C. & R., (*L. leptocarpum* C. & R.) (possibly named), *L. brandegei* (C. & R.) Macbr., *L. cuspidatum* M. & C., *L. donnellii* C. & R., *L. geyeri* (S. Wats.) C. & R., *L. hendersonii* C. & R., *L. laevigatum* (Nutt.) C. & R. *L. martindalei* C. & R., *L. nevadense* (S. Wats.) C. & R., *L. quintuplex* Schlessman & Constance, *L. salmoniflorum* (C. & R.) M. & C., *L. simplex* (Nutt.) Macbr., *L. suksdorfii* (S. Wats.) C. & R., *L. tuberosum* Hoover, *L. vaginatum* C. & R., *L. watsonii* C. & R.

TABLE 1. *Lomatium* species clearly named by Sahaptin speakers. Indian language orthography follows Rigsby (in press).[1] Distribution of native terms coded as follows: NW, Northwest dialect cluster; CR, Columbia River dialect cluster; NE, Northeast dialect cluster; jd, John Day dialect; te, Tenino dialect; ty, Tygh dialect; um, Umatilla dialect; yk, Yakima dialect. Uses and habitats cited are the most typical only. Information on uses by Salish and Nez Perce Indians is from Marshall (1977), Turner (1973), and Turner, Bouchard, and Kennedy (1980). Plant nomenclature follows Hitchcock *et al.* (1961).

Scientific name	(PNRR*)	Sahaptin name/s	Uses	Distribution
L. canbyi C. & R. Type A	(38/39)	*sikáywa, sikáwiya* (NW) *lúkš* (CR) *lamúš* (NE)	Staple, tuber eaten, boiled or dried whole or as "finger cakes."	Lithosols, n. w. Nev. n. to Douglas Co., Wash., where overlaps Type B.
Type B		*škúlkul* (NW, CR, NE)	Staple, tuber eaten, baked underground.	Lithosols, Douglas to Spokane Cos., Wash.
L. columbianum M. & C.	(0/17*)	*axula* (yk)	Plant avoided.	Talus slopes, locally, Yakima Co., Wash., to Hood River Co., Oreg.
L. cous (S. Wats.) C. & R.	(16/16)	*xáwš* (NW, CR, NE)	Staple, tuber eaten, boiled or dried whole or as "finger cakes."	Lithosols, Whitman Co., Wash., s. and w. through Blue Mtns. to e. base Oregon Cascades.
L. dissectum (Nutt.) M. & C.	(12/15)	*čalúkš* (NW, CR, NE)	Medicine for people and horses, fish stupefactant, hide tanning agent, shoots and young roots eaten by Salish and Nez Perce Indians.	Talus slopes, throughout.
L. farinosum (Geyer ex Hook.) C. & R.		*nikaptát* (NE)	Tubers eaten.	Lithosols, c. Columbia basin of Wash. e.
var. *farinosum*	(0/0*)			
var. *hambleniae* (M. & C.) Schlessman	(2/14)	*maxíli, maxíni* (NE)	Tubers eaten.	Lithosols, w. of var. *farinosum* to e. base Wash. Cascades s. to Yakima Co., local, Wasco Co., Oreg.
L. gormanii (Howell) C. & R.	(4/13)	*sasamit'a, sasamit'aya, tatamit'a* (NW, CR, NE)	Tubers eaten (NW) or avoided (CR).	Lithosols, e. c. Wash. w. rarely to e. slope Cascade Mtns., rare, n. Oreg.
L. grayi C. & R.	(16/21)	*xásya* (NW) *latitlatit* (CR) *atuná* (NE)	Sprouts are the first "Indian celery" available in late winter, root eaten formerly.	Talus slopes, throughout.
L. macrocarpum (H. & A.) C. & R.	(26/33)	*púta* (NW, CR, NE)	Tuber eaten formerly.	Lithosols and slopes, throughout.
L. minus (Rose) M. & C.	(4/6)	*nak'unk* (jd, um)	Tuber eaten formerly, boiled.	Basalt drainage channels, n. c. Oreg.
L. nudicaule (Pursh) C. & R.	(28/30)	*xamsi* (NW, CR, NE)	Peduncles and leaf shoots eaten fresh, seeds used as insect repellent, perfume, and medicine.	Dry open areas, throughout.
L. piperi C. & R.	(28/31)	*mámin, mámils* (NW, CR, NE)	Favorite, tuber eaten, mixed with *cous* or *canbyi* to make "finger cakes."	Lithosols, e. slope Cascade Mtns.
L. triternatum (Pursh) C. & R.	(4/30)	*táqimaš* (te, ty)	Formerly used as food and medicine, ignored by other Sahaptin speakers.	Dry open areas, throughout.

*PNRR = Positive Naming Response Ratio. This is the ratio of instances of confident recognition and naming of individual specimens by individual informants to all instances in which an informant was shown a specimen of *Lomatium*. In cases citing no positive naming responses, the referential range of the Sahaptin term is inferred from secondary data.

naming, to misidentifications. One hundred seventy-nine positive naming responses here establish the correspondence of Sahaptin categories to scientific species or subsets of species of the genus *Lomatium*. Two additional Sahaptin categories are defined on the basis of verbal descriptions and secondary data. We indicate in Table 1 ratios of positive naming responses to total identifications (PNR ratios) as an index of the confidence and generality of our Sahaptin-Latin nomenclatural equations.

Secondary data include notes on each species' use as food or medicine, when and where each was harvested, and how each was prepared for consumption or storage. We have recorded native language descriptions of morphological characteristics of plants relevant to their classification and recognition. In addition, we have personally observed contemporary root digging activities, food preparation techniques, and ceremonial feasts.

Hunn has initiated an investigation of the patterns of abundance of each species within the Sahaptin range and of likely rates of harvest under traditional technological constraints. This study has involved transect censuses of populations of several staple species at traditional digging sites to estimate maximal levels of abundance. Densities were sampled along a 50 x 0.2 m transect counted at 1 m intervals. Each transect is thus a sample of fifty 0.2 sq m rectangles oriented randomly with respect to patterns of plant dispersion. All plants were counted regardless of size. Harvest rates were measured by counting the roots dug by an expert Indian woman in five minute intervals at a normal working pace. These calculated rates may be extrapolated on the basis of eight hours work per day and then compared with ethnographic estimates of daily harvest yields. These two independent estimates of daily harvest are in close agreement on an average figure of approximately 30 kg/day (Hunn, 1981).

Discussion and Results

The cultural significance of the lomatiums is clearly expressed in the native terminological distinctions. All the common, widespread species, as well as two of restricted range, are well known and differentiated at or below the scientific species level. This expression is remarkable in that the genus is considered "notoriously difficult" by botanical systematists (Hitchcock *et al.*, 1961). Ten *Lomatium* species of the folk system precisely correspond to scientific species. Two scientific species are "split" by the native taxonomists, and two other species, "lumped" by the authoritative regional flora (Hitchcock *et al.*, 1961), are differentiated in the Sahaptin system. These differences do not indicate a fundamental divergence between folk and scientific approaches to classification of natural discontinuities (cf. Berlin, Breedlove, and Raven, 1966); rather, they prove the basic equivalence of those approaches to recognition of species. *Lomatium farinosum* (Geyer ex Hook.) C. & R. is split in the folk system, but precisely along the lines of varietal difference recognized in the most recent scientific treatment (Schlessman, 1978). The differentiation of *L. gormanii* (Howell) C. & R. and *L. piperi* C. & R. by Sahaptin speakers accords with one scientific opinion in an ongoing taxonomic debate (Mathias, 1938). Although the differentiation of *L. farinosum* var. *farinosum* from var. *hambleniae* (M. & C.) Schlessman is based on flower color, an obvious and relatively superficial distinction, the differentiation of *L. gormanii* from *L. piperi* is based on multiple aspects of morphology, habitat preference, and taste. Similar multiple criteria are involved in the final instance of folk hyper-differentiation of *Lomatium* species, the Northeast Sahaptin distinction between *lamúš* and *šk'úlkul*, two forms of *L. canbyi* C.

& R., which is unique in that no formal scientific correlate for the distinction is yet known. Clearly, Sahaptin speakers are intensely interested in the lomatiums and are careful observers of *Lomatium* morphology and natural history.

Hewes, in an influential analysis of the native resource base in the Pacific salmon area, claims that the "satisfaction of food energy demand must have been largely up to the fisheries. . . , since *other natural foods available in the area in quantity are notoriously low in fuel value*," (emphasis added) (Hewes, 1973). This key assumption may be more nearly correct for the coastal portion of the Pacific salmon area (Suttles, 1968), but it is clearly false for the interior. The role of the tuberous *Lomatium* species, especially of the staples, *L. canbyi* and *L. cous* (S. Wats.) C. & R., as a source of food energy is clear. *L. canbyi* tubers average about 11.0 g (N = 52) and have been found at densities up to 33 plants/sq m. A kilogram of fresh *L. canbyi* tubers provides 1080 KCal (Benson *et al.*, 1973). *L. cous* tubers average 10.5 g (N = 100), were found at densities up to 32/sq m, and provide 1270 KCal/kg fresh. Thus, both *L. canbyi* and *L. cous* could yield about 4,000,000 KCal/ha at peak densities and at 100 percent utilization.

The native foraging strategy involves selecting plants with well developed "tops," since the plants are perennial and the tubers enlarge progressively with age. Digging is also restricted by preference to zones of high density. Such selective practices suggest a conservative harvest rate in the neighborhood of 10 percent. At that rate, 263 sq km of productive habitat or 0.35 percent of the Sahaptin range could have provided the annual caloric requirement of the entire estimated pre-contact Sahaptin population. Since lithosols characterize a "considerable area" within the region (Daubenmire, 1970), the availability of food energy from native plants was not likely a limiting factor.

More likely limiting was the availability of labor. At an estimated harvest rate for roots of near 4 kg/hr, a woman could harvest a year's supply of *Lomatium* tubers for herself and her family (assuming one root digger per family of four) in 400 hours, or ten 40 hour weeks, a period approximately that of the early April to late June period during which most roots are available, with time out for the spring Chinook salmon harvest. Such a schedule might have left just enough time for cleaning, drying, and cooking these and other foods, and for movements between digging sites.

Additional plant food resources provided options, while others extended the harvest season. Bitterroot, *Lewisia rediviva* Pursh, for example, yields calories at a rate nearly equal to the staple lomatiums, i.e., 3.8 kg/hr at 900 KCal/kg. (Benson *et al.*, 1973); but was harvested at the same times and places as the lomatiums. Camas, *Camassia quamash* (Pursh) Greene, the most important plant of the Liliaceae in the region, was harvested most often in early summer or fall. Camas was highly localized in its distribution. However, rich camas meadows were exploited in common by people from a wide surrounding area. The caloric value of camas is comparable to that of *Lomatium* tubers and bitterroot (Konlande and Robson, 1972). Fruits were available after the root harvest season, but their caloric yields were considerably less than for roots (Watt and Merrill, 1963). For example, we estimate that huckleberries, *Vaccinium membranaceum* Dougl. ex Hook., yield less than 1000 KCal/hr compared to about 4700 KCal/hr for *L. canbyi* and *L. cous*.

The significance of *Lomatium* species for the Sahaptin cultures was not limited to calories. *L. grayi* C. & R. and *L. nudicaule* (Pursh) C. & R. were eaten fresh in late winter and early spring by Sahaptin speakers, as were *L. salmoniflorum* (C. & R.) H. & C. and *L. dissectum* (Nutt.) M. & C. in adjacent areas of the Columbia basin (Marshall, 1977; Palmer, 1975b; Turner, 1973; Turner, Bouchard, and Kennedy, 1980). Nutritional analysis has shown the young stems of *L. nudicaule* to contain 66 mg of ascorbic acid per 100 gm portion (56 cut stems = 100 gms) (Benson *et al.*, 1973). Though the other species cited have not yet been analyzed for this vitamin, their young vegetative growth is quite likely also a rich source.

Conclusion

Ethnobotanical data provided by contemporary Sahaptin speakers and summarized here clearly indicate that the genus *Lomatium*—largely unnoted in the published ethnography of the Columbia Plateau—was a primary resource for native subsistence here, as both a staple providing food energy to balance the rich protein yield of the native salmon fishery and as a source of at least one essential vitamin at a critical stage of the seasonal cycle. This resource, processed by women, has strong cultural recognition, based on the Sahaptins' past and ongoing empirical observations.

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