

## Two Important "Root" Foods of the Northwest Coast Indians: Springbank Clover (*Trifolium wormskioldii*) and Pacific Silverweed (*Potentilla anserina* ssp. *pacifica*)<sup>1</sup>

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*Two edible "root" species, springbank clover (Trifolium wormskioldii), and Pacific silverweed (Potentilla anserina ssp. pacifica), are described and their use as food by Northwest Coast Indian peoples documented. Descriptions of traditional harvesting, cooking and serving, and storage techniques for these foods are provided, and their future potential as a food source along the Northwest Coast is discussed.*

... After they have had enough, those who have eaten the long [silverweed] roots and those who have eaten the short roots take in their hands what is left over and take it home to their wives. Then they drink water in their houses . . . The long and the short cinquefoil-roots [i.e., silverweed] are given at great feasts to many tribes, for they are counted when chiefs count their feasts in rivalry (Boas, 1921: 541-542).

Edible roots and other underground parts—rhizomes, bulbs, corms, and tubers—have often been disregarded in discussions on the diets of the Indians of the Northwest Coast of North America. For example, Drucker (1965) notes, under a section on vegetable foods:

The North Pacific Coast, although bountifully endowed with fish and game, was deficient in vegetable foods. Except in the southern inland portion where camas (a plant with edible bulbs) occurred and in the extreme south where edible acorns grew, the flora was poor in starch-rich seeds and tubers. It has been suggested that the cultural stress on oils and fats in part at least may have compensated for the scarcity of starchy foods. The tough fibrous roots of certain ferns, the wiry roots of a kind of clover . . . were eaten by many coastal Indians, but these products were neither abundant nor very tasty (Drucker, 1965:20).

The abundance and variety of fish and other marine foods in the Northwest Coast traditional economy is undeniable, and obviously most of the principal foods in the diet were of animal origin. However, early ethnographic accounts and recollections of contemporary Northwest Coast native people indicate that plant foods, including "roots," also played a significant role in the diet, both in terms of nutritional value and of various aspects of social culture relating to foods. (For the purposes of this paper, "roots" will be used in a general context to denote true roots and other underground parts, i.e., rhizomes, bulbs, corms, and tubers.) For coastal British Columbia, an inventory and description of the various types of plant foods used traditionally by native peoples is given by Turner (1975). A total of almost 100 species, including over 25 with edible "roots" were used by one or more coastal groups.

Two "root" species of particular importance on the central and northern Northwest Coast, from southern Vancouver Island and the surrounding mainland

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Fig. 1-4. Fig. 1 (top left). *Trifolium wormskioldii* Lehm. Fig. 2 (top right). *Potentilla anserina* L. ssp. *pacifica* (Howell) Rousi. Fig. 3 (lower left). Extensive patch of *Potentilla anserina* ssp. *pacifica* on the tidal floodplains of the Cheewhat River, west coast of Vancouver Island, B.C. Fig. 4 (lower right). Patch of *Trifolium wormskioldii* and *Potentilla anserina* ssp. *pacifica*, with associated species, on the estuarine flats of the Bella Coola River.

to coastal Alaska and the Queen Charlotte Islands, were *Trifolium wormskioldii*, known as springbank clover, wild perennial clover, or beach clover, and *Potentilla anserina* ssp. *pacifica*, Pacific silverweed, or cinquefoil (Fig. 1, 2). These 2 types of "roots"—actually rhizomes in clover—were frequently harvested, prepared, and eaten in a similar way, and as they grow in similar habitats on the Northwest Coast, they are almost always discussed together by native people

knowledgeable about their traditional foods. It seems logical, therefore, to treat them together in this paper, as 2 distinct, but similar foods.

It is the purpose of this paper to provide as much information as possible on these 2 food species, including their botanical attributes, the methods used in harvesting, preparing and storing the "roots," the cultural features associated with their use among various Northwest Coast native groups, and their future potential as a food source along the Northwest Coast.

#### BOTANICAL FEATURES

*Trifolium wormskioldii* Lehm., in Fabaceae (Leguminosae), was named after a Danish navigator, Lt. Wormskjold, who presumably collected the seed from which the type specimen was grown (Gillett, 1980: 1439). In many botanical publications (e.g., Hitchcock et al., 1961, Pt. 3:372; Taylor, 1974: 218), the spelling, *T. wormskioldii*, is used, but as pointed out by Gillett (1980: 1439), the spelling with "i" is preferable since it is considered to be an intentional Latinization of the Danish name. A common synonym, seen in some ethnographic publications (e.g., Gunther, 1973: 38), is *T. fimbriatum* Lindl. Other synonyms are shown by Gillett (1980: 1436). A detailed description of the species is given by Gillett (1980: 1436-1437) and a list of over 160 representative herbarium specimens is also provided by him [e.g., Bella Coola, *Calder et al. 20314B* (DAO, NY, US); Vancouver I., Ucluth Peninsula, *Soper et al. 12139* (CAN); Tillamook Co., *Gillett and Taylor 11156* (CAN, DAO)].

*Trifolium wormskioldii* is a glabrous perennial with abundant long, white rhizomes and fibrous roots arising from the rhizome nodes. The stems are few, erect to ascending or decumbent, and up to 0.8 m long (Hitchcock et al., 1961, Pt. 3: 372; Gillett, 1980: 1436). The leaves have 3 leaflets which are exceedingly variable in shape and size, ranging from linear-elliptic to oblong-obovate and the central leaflet averaging about 2.4 cm long on the median and upper leaves and 1.0 cm long on the lower leaves. The margins of the leaflets are spinulose serrate. The petioles of the median leaves are several times longer than the leaflets, those of the upper and lower leaves generally shorter. The stipules are prominent, the upper ones entire to lacerate with long acuminate tips and lobes, the lower ones nearly entire. The flower heads are involucrate, with involucres flared, up to 2 cm broad, sharply toothed, prominently veined, and lobed one-third to one-half the length of the calyx. The heads, at first hemispherical, later globular, with up to about 50 flowers, are usually 1-2.5 cm broad. The flowers are generally magenta to purple, often white-tipped, with glabrous, 5-toothed calyces. The fruit is a 1-5 seeded legume (Gillett, 1980: 1436-1437; Hitchcock et al., 1961, Pt. 3: 372; Taylor, 1974: 218). The species is primarily tetraploid ( $2n = 32$ ), but an isolated diploid component ( $2n = 16$ ) is found in New Mexico (Gillett, 1980: 1439).

This species occupies a variety of wet habitats including saline flats, beaches, meadows, streambanks, and alluvial soils. Its range extends from the southernmost Alaska Panhandle [from at least one location, according to Hult n, 1968: 643, although Gillett (pers. comm., 1981) feels this record may be based on a misidentified specimen] and the Queen Charlotte Islands south to California (with at least one location on the Baja Peninsula, Mexico, according to Gillett, 1980:

1437) and eastward to New Mexico. Distribution maps are provided by Hultén (1968: 643) and Gillett (1980: 1437), the latter being much more detailed. Gillett (1980: 1439) points out that the species "... probably has high potential as a gene source for plant breeding because it is not only able to occupy a large range of habitats, but has broad altitudinal and latitudinal ranges . . . ."

*Potentilla anserina* L. ssp. *pacifica* (Howell) Rousi is often recognized as a distinct species, namely *P. pacifica* Howell (Hitchcock et al., 1961, Pt. 3: 151; Taylor, 1973: 120). However, since recent treatments have designated the taxon as a subspecies of the widespread *P. anserina* complex (Taylor and MacBryde, 1977: 368), this usage will be followed here. Scoggan (1978, Pt. 3: 931) and Hultén (1968: 621) have designated *P. anserina* ssp. *pacifica* as a subtaxon of yet another species, *P. egedii* Wormsk. [var. *egedii* according to Scoggan, and ssp. *grandis* (T. & G.) Hult. according to Hultén]. The characteristics distinguishing *P. egedii* from *P. anserina* are similar to those used by other authors to distinguish *P. pacifica* from *P. anserina*. However, as will be discussed later, these characters do not seem to warrant differentiation at the species level. Representative herbarium specimens of *P. anserina* ssp. *pacifica* include: Queen Charlotte Islands, Sandspit, Calder et al. 21135 (DAO); Portland Inlet, Kitsalt Estuary, Blood 13 (V); Vancouver I., Bamfield Inlet, Harwell 62904 (V).

*Potentilla anserina*, as already indicated, is a variable taxon. In Rosaceae, it is an herbaceous perennial with long, jointed stolons, and spreading to upright pinnately compound basal leaves, usually 10–20 cm long. The leaflets are of 2 types: prominent, oblong to obovate, sharply serrate leaflets 1–3.5 cm long; and much smaller, entire to toothed leaflets interspersed with the larger. The flowers are solitary, borne at the nodes of the stolons, on stalks up to 10 cm long. The sepals are triangular, the petals yellow, rounded, and showy. The flower resembles a buttercup at first glance, and, in fact, many Indian people and even ethnographers refer to this plant as a "buttercup." The mature achenes are light brown and laterally flattened (Hitchcock et al., 1961, Pt. 3: 151).

One key difference between *P. anserina* ssp. *pacifica* and the type subspecies, *P. anserina* ssp. *anserina*, is that the leaves (both upper and lower surfaces), stolons, petioles, peduncles, and rachises in the latter are densely to sparsely silky-tomentose, whereas in the former, usually only the lower surface of the leaves is pubescent, with the other parts occasionally having some appressed pubescence. Furthermore, the achenes of ssp. *anserina* are corky or grooved along the back, whereas those of ssp. *pacifica* are smooth (Scoggan, 1978, Pt. 3: 927; Hitchcock et al., 1961, Pt. 3: 128–129). Additionally, the leaves of ssp. *anserina* are said to be spreading, in contrast with those of ssp. *pacifica*, which are usually erect. However, as pointed out by Calder and Taylor (1968: 402), this character seems modified more by environment and is of little diagnostic significance in separating the 2 taxa.

The 2 subspecies are also generally distinguishable on the basis of range: ssp. *pacifica* grows on coastal dunes, beaches, estuarine flats, marsh edges, and streambanks along the Pacific coast, west of the Coast and Cascade ranges, from Alaska to southern California; and ssp. *anserina* occurs in meadowlands, along streambanks, pond margins, and mud flats, particularly on alkaline soil, from Alaska and the Yukon to southern California, inland from the Coast and Cascade mountains, east to the Atlantic Ocean. It is also widespread in Eurasia. A general

distribution map for *P. anserina* is provided by Hultén (1968: 621), who notes that in Alaska, it has been introduced and occurs in waste places, and that it has also been introduced to South America, New Zealand, Australia, Tasmania, and Borneo. On p. 623, Hultén provides a distribution map for *P. egedii* ssp. *grandis* (i.e., *P. anserina* ssp. *pacifica*), the Pacific silverweed. According to Taylor and Mulligan (1968: 81), *P. pacifica* has a chromosome count of  $2n = 28$ . Counts reported for *P. anserina* are  $2n = 28$ , or 42 (Hitchcock et al., 1961, Pt. 3: 131).

The distinguishing characters listed here are used by those who separate the 2 taxa at the species level (i.e., *P. pacifica* and *P. anserina*), but, as the authors themselves observed, intermediate forms can be found that seem to indicate a continuum between them. For example, in at least one locality, along the flood plain of the Cheewat River on the west coast of Vancouver Island, populations of *P. anserina* ssp. *pacifica* with conspicuous silky pubescence on both leaf surfaces are very common [Turner et al., in press, 1981; herb. spec. Ex. Ogilvie, Mersereau, and Turner, 8087-1, 8087-2 (V)]. These "silky" plants were growing in patches interspersed with "normal" populations of ssp. *pacifica* having glabrous upper leaf surfaces. Additionally, occasional populations exhibiting the diagnostic characters associated with "*P. pacifica*" can be found inland (Hitchcock et al., 1961, Pt. 3: 151). *Potentilla anserina* ssp. *pacifica* is illustrated in Fig. 2.

On the Northwest Coast, at least, both of these edible "root" plants, *Trifolium wormskioldii* and *Potentilla anserina* ssp. *pacifica*, typically grow in dense patches along shorelines, tidal flats, and alluvial floodplains (Fig. 3). It is in this type of habitat where native people frequently harvested them.

Both species readily propagate vegetatively, the clover by its rhizomes, and the cinquefoil by stolons. Various other species, such as *Juncus balticus* Willd., *Angelica lucida* L., *Triglochin maritimum* L., and *Fritillaria camschatcensis* (L.) Ker-Gawl (another edible "root" species), are commonly associated with *Trifolium wormskioldii* and *Potentilla anserina* ssp. *pacifica*. However, within certain microhabitats, it is not uncommon to find patches where the leaf coverage of *Potentilla* is virtually 100%, and occasionally, one can find patches of *Trifolium* that are just as dense. It is more usual to find a relatively homogeneous mixture of the 2 species growing together as dominants, with several other associated species (Fig. 4). In one patch of almost pure *Potentilla* (Fig. 5) on the estuarine flats of the Cheewat River, a sample plot, circular and of 1 m diameter, was found to contain 73 mature silverweed plants and 50 immature (i.e., first-yr) plants.

The rhizomes of the clover are whitish in colour, and seldom exceed 2 mm in diameter. They generally range from 10–20 cm in length, with occasional branching and interweaving (Fig. 6). Some native people nowadays refer to them as "Indian spaghetti" (Edwards, 1979), because of their similar appearance, but not their taste. The rhizomes of plants growing in sandy soil are usually relatively long and straight, whereas in gravelly areas they are often gnarled and contorted. For this reason, and because cleaning was easier, native people preferred them from sandy areas. The Nitinaht people on the southwestern coast of Vancouver Island recognized 2 different varieties of edible wild clover: one with larger leaflets, was said to have creamy-coloured "roots"; the other, with smaller leaflets, had white "roots." These 2 varieties were differentiated nomenclaturally in Ni-



Fig. 5-7. Fig. 5 (top left). *Potentilla anserina* ssp. *pacifica* from the Cheewhat River flats, showing density of leaf coverage. Fig. 6 (top right). *Trifolium wormskioldii* plant, with bundle of rhizomes at right. Fig. 7 (bottom). Bundles of *Potentilla* roots and *Trifolium* rhizomes (far right), with relative shape and colour shown by the "roots" laid out in the bottom right corner.

tinahat folk taxonomy (Turner et al., in press, 1981). However, other Northwest Coast groups apparently recognized only one variety, and according to Dr. John M. Gillett (pers. comm., 1981), to date there is little taxonomic evidence to support the recognition of 2 varieties of *T. wormskioldii* on the Northwest Coast. Possibly the Nitinahat distinction relates to different growth stages of the plant.

Pacific silverweed roots are light to dark brown in colour and typically grow slightly angled or almost vertically down from the root crown, in clusters of 2-6

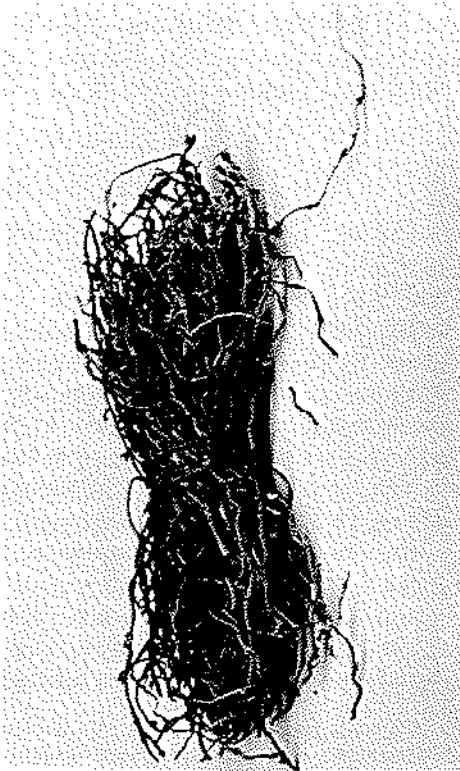


Fig. 8-10. Fig. 8 (top). About 2.5 kg of *Potentilla* roots, dug from an island near the mouth of the San Juan River, Vancouver Island. Fig. 9 (lower left). John Thomas, a Nitinaht Indian originally from the Cheewhat River area on Vancouver Island, holds a digging stick of traditional Nitinaht design, which he carved from the wood of western yew (*Taxus brevifolia*). Fig. 10 (lower right). Bundle of dried *Trifolium* rhizomes from Bella Coola (Coll. No. 2346, Ethnology Div., British Columbia Provincial Museum; originally collected ca. 1913 by C. F. Newcombe).



per plant. The current year's roots are easily distinguishable from the previous year's; the former are firm and light-coloured, whereas the latter are softer and dark brown to almost grey. Only the younger roots were harvested as food; the older ones were discarded. All roots have distinctive longitudinal brownish striations that make them readily distinguishable from the roots of other plant species growing with them. In a good site, silverweed roots grow up to 7 mm or more in diameter, tapering off towards the upper and lower ends (Fig. 7, 8). However, most of the roots dug by the authors were 3–5 mm in diameter and of more-or-less even thickness along the length. The roots can grow up to 40 cm long, but as they are very brittle, it is difficult to harvest them longer than 20–30 cm, especially if the soil is rocky or peaty. Native people often recognize and distinguish at least 2 kinds of silverweed roots: short, curly ones and long, straight ones. The Southern Kwakiutl people were particularly conscious of these 2 types, and according to tradition, the longer ones were usually reserved for the chiefs and high-class people at feasts, whereas the common people ate the short ones (Boas, 1921:541).

After digging silverweed roots in different localities and habitats, the authors also noted considerable variation in the size and length of the roots, as well as the ease with which they could be dug out. The longest, thickest roots came from areas that were damp and quite shady, but where the soil was high in sand content. These same habitats also yielded the largest, most robust top-growth of the plants; some were over 50 cm high.

#### TRADITIONAL USE OF CLOVER AND SILVERWEED "ROOTS"

The use of *Trifolium wormskioldii* and *Potentilla anserina* ssp. *pacifica* by Northwest Coast Indian groups is summarized in Tables 1 and 2 respectively, and is shown on the maps in Fig. 11 and 12. In addition, as noted by Chesnut (1902: 362), the leaves and flowers of *T. wormskioldii* were eaten, along with those of several other *Trifolium* species, by the Yuki and Pomo Indians of Mendocino County, California, especially in Round Valley. They were gathered and eaten fresh in the spring, and, according to Chesnut, *T. wormskioldii* was the only species gathered and eaten in large quantities towards the end of the season, in late June. Chesnut (1902: 362) includes a photograph of a woman eating greens of this clover. However, no mention of the rhizomes being eaten is made.

The use of the roots of *Potentilla anserina* ssp. *anserina* is also shown in Table 2 and Fig. 8. In addition to the use of the species by the Indians in western North America, *P. anserina* was used in other parts of the world. For example, in some of the Hebrides, the roots were said to have been the major source of food for the inhabitants for months at a time (Hedrick, 1972: 451). Mabey (1972: 68) notes:

The roots were cultivated as a crop from late prehistoric times. In the upland areas of Great Britain they were used right up until the introduction of the potato—and later, in times of famine.

The roots were boiled or baked or even eaten raw . . . they were also dried and ground into flour for bread and gruel.

The indigenous peoples of Tibet also used the roots as food, according to Eugene Anderson (Dept. Anthropol., Univ. California at Riverside, pers. comm., 1981).



TABLE 1. INDIAN GROUPS KNOWN TO HAVE EATEN *Trifolium wormskioeldii* RHIZOMES.<sup>a</sup>

Indian group (dialect) (Language family)	Native name <sup>b</sup>	References
Haida ( <i>Skidegate</i> ) (Haida)	náʔa	Turner and Levine, 1972a: 14
Bella Coola (Salish)	ʔxwsus	Turner, 1973: 205
Southern Kwakiutl (Wakashan)	ʔexwsús	Turner and Bell, 1973: 283
Nootka ( <i>Hesquiat, Manhousat</i> ) (Wakashan)	ʔáʔ-éu	Turner and Efrat, 1981; Ellis and Turner, 1976: 10
Nitinah (Wakashan)	ʔe:ciy (large-lvd var.) naxu (small-lvd var.)	Turner et al., 1981
Makah (Wakashan)	klóxtap	Gunther, 1973: 38
Comox ( <i>Mainland</i> ) (Salish)	chichelisiji <sup>c</sup>	Bouchard, 1976: 7
Sechelt (Salish)	peʔshen	Turner and Timmers, 1972; Newcombe, 1903
Straits (Salish)	kʔáʔsən	Suttles, 1951; Turner and Bell, 1971: 85
Quinault (Salish)	kwiʔitsap	Olson, 1936: 54

<sup>a</sup> Confirmed references only. Other groups which probably used clover rhizomes but for which no reference was available include: Haida and Heiltsuk (Wakashan family), and possibly some Halkomelem peoples (Salish). The plants apparently do not commonly occur in Tlingit or Tsimshian territory.

<sup>b</sup> Orthographies used are those given in original reference, except in Nootka and Nitinah, where the pharyngeal symbol "ʔ" is used.

<sup>c</sup> This term was actually applied to *T. repens* L., an introduced clover, but probably originally referred to *T. wormskioeldii*. Contemporary Comox speakers did not actually recall a use for the plant, but the existence of a native name is a good indication that it was used.

#### HARVESTING CLOVER AND SILVERWEED "ROOTS"

On the Northwest Coast, the procedures for harvesting and preparing clover and silverweed "roots" were generally similar among the different groups using them. Furthermore, as already mentioned, the same basic methods were used for both types of edible "roots." The usual harvesting time was after the leaves had turned orange or brown and died back for the winter. This varied with latitude, but usually it was some time in October or early November. From this time on, until the first new leaves started to appear in spring, usually around March, the "roots" were considered good for digging. From a practical point of view, however, it was easier to find the "roots" in fall because the leaves were still readily visible. When the "roots" were dug in spring, the harvester needed to know exactly where the plants had been growing the previous year or it would be impossible to locate them. "Roots" dug in the summer were generally considered too small, tough, and woody (Edwards, 1979:5). Notably, however, the Hesquiat and other Nootkan peoples were said to have dug silverweed roots in mid-July (Turner and Efrat, in press, 1981).

As with the harvesting of most plant foods, women were almost always responsible for digging these "roots." A digging stick, usually of yew-wood (*Taxus brevifolia* Nutt.) or, among some groups, sometimes of Pacific crabapple (*Pyrus fusca* Raf.) or "ironwood" [*Holodiscus discolor* (Pursh) Maxim.], was used for this task. It varied in shape depending on the group, and its length might be determined by the height of the person who would use it. Most, however, were

TABLE 2. INDIAN GROUPS KNOWN TO HAVE EATEN *Potentilla anserina* ROOTS.<sup>a</sup>

Indian group ( <i>dialect</i> ) (Language family)	Native name <sup>b</sup>	References
<i>A. Potentilla anserina</i> ssp. <i>pacifica</i>		
Haida ( <i>Kaigani</i> ) (Haida)	xit ts'aaláay	Norton, 1981: 442
Haida ( <i>Masset</i> ) (Haida)	ts'al	Turner and Levine, 1972b: 19
Haida ( <i>Skidegate</i> ) (Haida)	ts'í'ál	Turner and Levine, 1972a: 15
Bella Coola (Salish)	uk'al	Turner, 1973: 209
Southern Kwakiutl (Wakashan)	díeysem	Turner and Bell, 1973: 289
Nootka ( <i>Hesquiat, Munhousat</i> ) (Wakashan)	áeyup	Turner and Efrat, 1981: Ellis and Turner, 1976: 10
Nitinaht (Wakashan)	áiesap	Turner et al., 1981
Makah (Wakashan)	ki'chapi	Densmore, 1939: 320 <sup>c</sup>
Comox ( <i>Mainland</i> ) (Salish)	ch'in'ay	Bouchard, 1973: (Dec.) 13
Sechelt (Salish)	sxwúxwt'shín	Turner and Timmers, 1972: 13
Straits (Salish)	(not recalled)	Turner and Bell, 1971: 87
Quileute (Chimakum)	g'xéwa'atsod, or k'lik'li-'cií	Gunther, 1973: 37
Chinook ( <i>Lower</i> ) (Chinookan)	ik!Ená'tan	Boas, 1911: 657 <sup>d</sup>
<i>B. Potentilla anserina</i> ssp. <i>anserina</i>		
Chilcotin (Athapaskan)	tšInstæt	Tyhurst, 1975
Carrier (Athapaskan)	? əsrənh ("a long tuber"—identity questionable)	Morice, 1893: 116
Shuswap (Salish)	xilxel	Palmer, 1975: 66
Thompson (Salish)	xilxəl	Turner et al., in prep.
Lillooet ( <i>Fraser River</i> ) (Salish)	xilxel	Turner, 1972: 25
Okanagan-Colville (Salish)	xilxel	Turner et al., 1980: 126
Blackfoot (Algonkian)	kita-kop-sím, or pashí	Johnston, 1970: 313; Kerik, n.d.: 25

<sup>a</sup> Confirmed references only. Other groups which probably used silverweed roots but for which no reference was available include: Tlingit (Athapaskan family); Coast Tsimshian, Nisgha, and Gitksan (Tsimshian family); Haisla and Heiltsuk (Wakashan family); and Squamish, Halkomelem, Quinault, and Lower Chehalis (Salish family).

<sup>b</sup> Orthographies used are those given in original reference.

<sup>c</sup> Gunther (1973: 29) erroneously identifies the plant called "klic'sap" as buttercup (*Ranunculus reptans* L.).

<sup>d</sup> Curtis (1911: 200) gives a similar name in Chinook for "buttercup roots," undoubtedly this species. Use of *Potentilla* roots by Lower Chinook is also implied by Swan (1972: 88), but no native name is given.

about 1–1.3 m long, pointed and often somewhat flattened and curved at the digging end, with a handle or grip at the upper end (Fig. 9). The digger would thrust the stick into the ground next to a clump of plants whose "roots" were to be dug, push down on the top, and pry upwards. This process would be repeated several times around the circumference of the clump, and then the entire mass would be pulled out and shaken or hit against the ground or digging stick to remove any soil from the "roots." The tops would be removed and the "roots" placed into a pack-basket. From our experience, root-digging is time consuming.

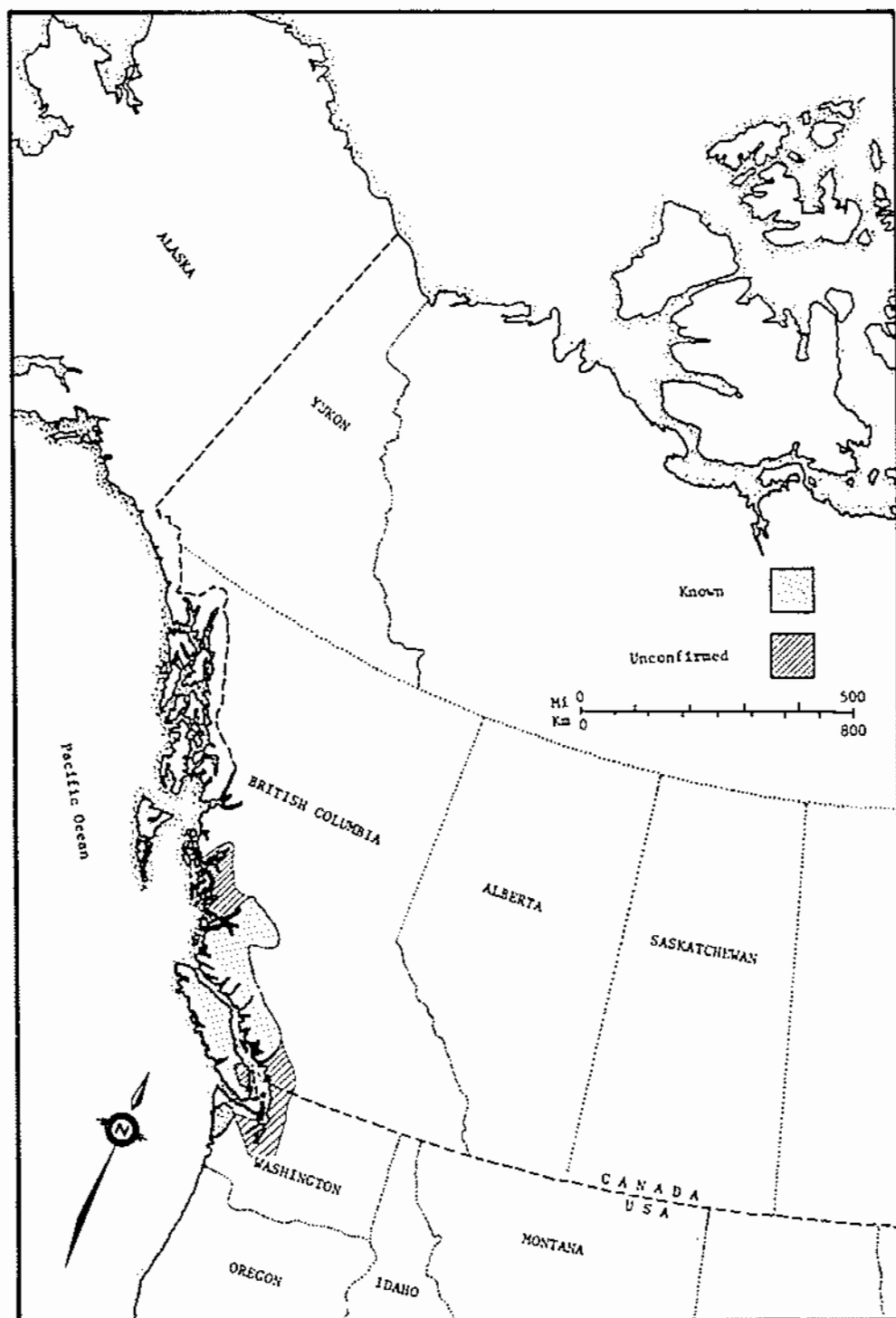


Fig. 11. The extent of traditional use of *Trifolium wormskioldii* rhizomes by native peoples of northwestern North America.

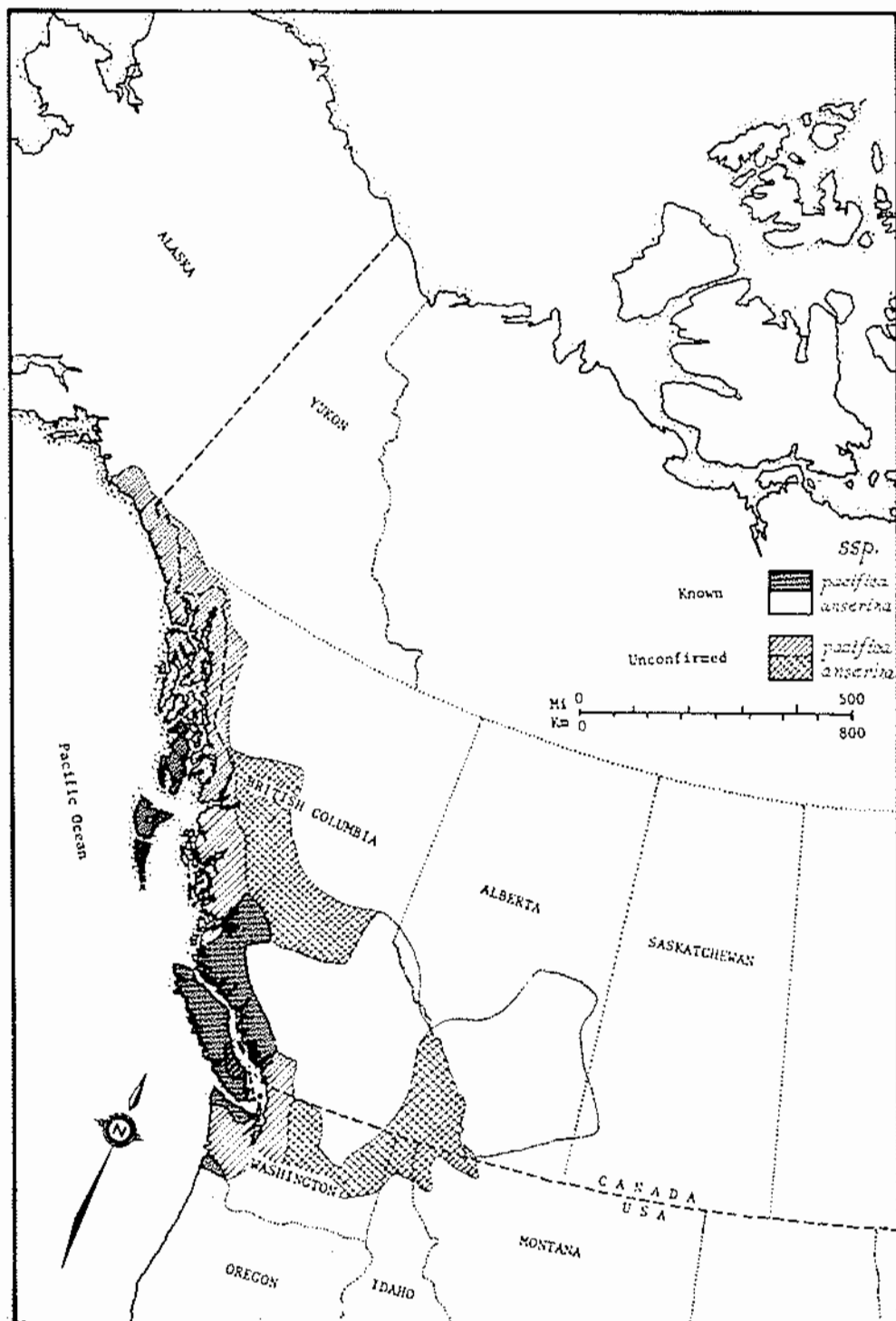


Fig. 12. The extent of traditional use of *Potentilla anserina* roots by native peoples of northwestern North America.

Working quickly, one might be able to dig 500 g–1 kg in an hour in a good site. Formerly, a native woman would have to dig for many days to obtain the desired quantity of "roots" for the family winter food stores (Ida Jones, Port Renfrew, B.C., pers. comm., 1980). Edwards (1979: 5) reported that recently Margaret Siwallace of Bella Coola (originally from Kimsquit) had to dig for 5 h to obtain enough clover "roots" for 3 (large) servings.

Today, few native people dig clover and silverweed "roots." Formerly, certain sites where these plants grew were frequented year after year, and as the soil was constantly cultivated by the digging process, it is likely that the "roots" in these sites were easier to dig, and probably larger and more plentiful, than those from entirely natural areas. These sites were often called "gardens" (Boas, 1921: 186–189) and were frequently marked out and kept under ownership by individuals or families, being passed down from one generation to the next (Boas, 1921: 186–189; Drucker, 1951: 57; Edwards, 1979: 6). Mrs. Ida Jones, cited previously, recalled that a certain large patch of silverweed along the banks of the San Juan River at Port Renfrew on Vancouver Island was owned by the local chief, who jealously guarded it from poachers by posting 6–10 slaves around its perimeter. Finally, when the roots were ready to be harvested, he had his slaves dig them for him (Mrs. Jones implied these slaves were male; one example, at least, of men harvesting the roots) (Turner et al., in press, 1981). Boas (1934) provides maps of some of the hereditary clover and cinquefoil (silverweed) gardens of the Southern Kwakiutl along the Nimpkish River on northeastern Vancouver Island.

At some point, apparently within the last century or so, the growing of clover "roots" in the Bella Coola region actually did evolve into agriculture, with the "roots" being transplanted and plants tended as in a true garden. The procedure is described by Felicity Walkus of Bella Coola (formerly from South Bentinck Arm):

The late Mrs. Joshua Moody, she used to do that [clover gardening] in the 1920s, in that little island here at Bella Coola where the tide comes in. She used to chose a place . . . where there's soft sand. I hear she's got quite a bit of it because she was looking after it. The more you soften it the more they grow in there. She picked the roots and planted them, early in the spring, like April . . . she used that wooden digging stick . . . They have to have it where the tide comes in. It's got no flavour when you try to do it inland . . . It wasn't very big what she used to have [about 8 by 9 m]. They used to have it fenced up so the people knew that it belonged to somebody. She just had a wooden fence. Nobody would touch it (Edwards, 1979: 6).

Further details of the harvesting of clover and silverweed "roots" are provided by Boas (1921: 186–194), Turner et al. (in press, 1981), and Edwards (1979: 6).

#### COOKING AND SERVING CLOVER AND SILVERWEED "ROOTS"

Clover and silverweed "roots" were sometimes eaten raw by women who became hungry while they were digging (Boas, 1921: 534); otherwise they were almost always cooked before being eaten. One traditional way of cooking large quantities of the "roots" was by means of steaming in an underground pit. The general procedure for the construction and use of the pit was as follows (based on descriptions by Ida Jones and Chief Charlie Jones of Port Renfrew, both native Nitinaht speakers): A large hole was dug in sandy soil, often on a nearby beach. The size of the hole depended on the quantity of "roots" or other food to be

cooked. Frequently, a communal cooking pit was used, with many women cooking their harvest at the same time. In this case, the pit would be relatively large, perhaps 2 m wide, 4 m long, and 1 m deep. For the food of only one family, a considerably smaller pit would be used.

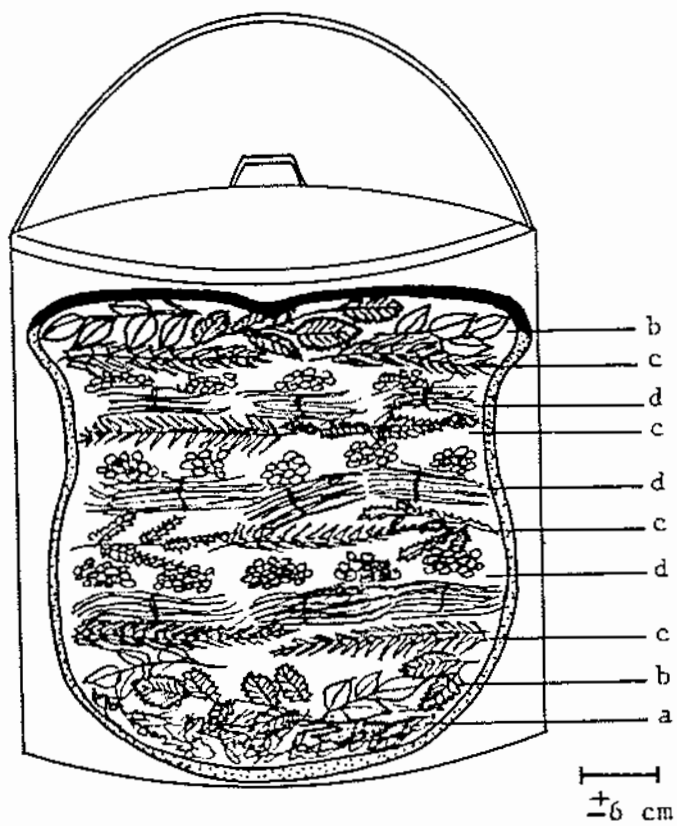
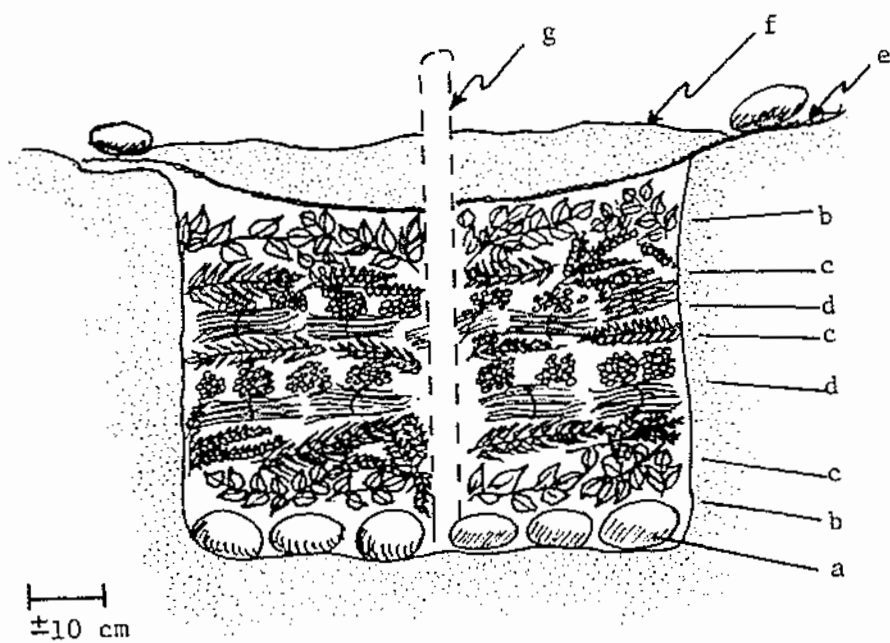
The bottom of the pit was lined with round beach rocks averaging 8–10 cm across. Then a hot fire was kindled in the bottom and allowed to burn, usually for several hours, until the rocks were glowing red-hot. Excess ashes were removed, a little soil or sand was sprinkled over the rocks, and then a thick layer of vegetation, such as salal branches (*Gaultheria shallon* Pursh) or red alder (*Alnus rubra* Bong.), was placed in the pit. Often fern fronds, such as those of bracken [*Pteridium aquilinum* (L.) Kuhn.] and sword fern [*Polystichum munitum* (Kaulf.) Presl.], were laid ovetop, followed by the "roots" (or other food) to be cooked. The clover and silverweed "roots" were usually tied in fist-sized bundles before being placed in the pit. The "roots" themselves were used as ties, and, at least among the Nitinaht, each woman had her own special knot she used to tie her "roots", enabling her to recognize her own "roots" after they were cooked (Turner et al., in press, 1981). The bundles were laid side by side in layers alternating in direction, interspersed with layers of fern fronds, until the pit was filled or there were no more "roots" to be cooked. Usually a post or pole was left standing in the centre of the pit while the food was being placed in it. Another thick layer of vegetation, such as salal or alder branches, was placed at the top of the pit, over the "root" bundles, and an old mat of cedar-bark or tule—or in modern times, a piece of canvas or burlap—was laid over the branches. At the last minute, this was lifted up, the central post removed, and enough water to generate clouds of hot steam was poured down the hole where the post had been. When it struck the red-hot rocks at the bottom, there was much crackling and hissing, and the mat at the top was replaced immediately to prevent loss of steam from the pit. The mat was weighted down at the edges, then covered with sand or soil. The pit (Fig. 13) was usually left at least overnight, sometimes for 12 h or more. The pit was then carefully opened and the food taken out, by that time cold, or only slightly warm. Each woman collected her own "roots" and took them home to eat immediately or to dry and store for winter. Sometimes other foods were cooked together with the clover and silverweed. For example, the Nitinaht people often cooked camas bulbs (*Camassia* spp.) in the same pit [these were obtained by trade as they were not indigenous to Nitinaht territory (Turner et al., in press, 1981)].

Sometimes, no pit was dug for large-scale steaming (Edwards, 1979: 8; Drucker,

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Fig. 13–14. Fig. 13 (above). Diagrammatic representation of a steam-cooking pit of the type used traditionally for clover and silverweed "roots" (Nitinaht): a. red-hot rocks (rounded, from the beach); b. salal (*Gaultheria shallon*) branches; c. fern fronds (bracken—*Pteridium aquilinum*, and sword fern—*Polystichum munitum*); d. edible "roots," in criss-crossed bundles; e. old mat, or canvas or burlap sheet; f. sand; g. central post (removed to allow channel for water). Fig. 14 (below). Diagrammatic representation of (relatively modern) kettle steam-cooking of clover and silverweed "roots" (Nitinaht): a. dried grass (covered by water); b. salal (*Gaultheria shallon*) and red alder (*Alnus rubra*) branches; c. fern fronds (e.g., sword fern—*Polystichum munitum*); d. edible "roots," in criss-crossed bundles.





1951: 62). Rather, the fire was built and rocks heated at ground level, then layers of seaweed, branches, and food to be cooked were piled overtop. Drucker (1951:62) notes that among the Nootka, ". . . tales of famous feasts speak of young men having to go up on the roof of the house to pour water to make steam, so high were the piles of clover roots [being cooked]."

Besides the steaming pit, various other cooking methods were used for these "roots." The Kwakiutl, and probably the Nootka and other groups as well, often steamed them in tall boxes of kerfed, bent red-cedar wood (*Thuja plicata* Donn.) (Turner, 1979: 87). This process, used in cooking clover and silverweed for a feast, is described in detail by Boas (1921: 527-531, 535-542). A grid was placed in the bottom of the box, water was added, and red-hot stones put in to generate steam. Then baskets of the "roots" were placed into the boxes, above the water level, and allowed to steam, being covered with mats, for a short time. Among the Kwakiutl, men would often cook the "roots" that were to be served at a feast. The "roots" could also be wrapped in skunk-cabbage leaves [*Lysichiton americanum* Hult. & St. John] and baked in hot ashes, "when the woman and her husband have nothing [with them] to eat and they have no kettle, when they are camping out in bad weather and their [prepared] food is all gone . . ." (Boas, 1921: 533). The Quinault also wrapped their clover "roots" in leaves of skunk cabbage or thimbleberry (*Rubus parviflorus* Nutt.) for cooking (Olson, 1936: 54).

In historic times, large cast-iron kettles and stoves largely replaced the traditional steaming pits and cooking boxes. The "roots" could be cooked quickly in a kettle—in 15-30 min—as compared with overnight or up to 12 h normally required for the pit-cooking method. The general techniques remained the same, however. As described by Ida Jones (Turner et al., in press, 1981), dried grass, salal branches, and alder branches were placed in the bottom of the kettle, along with a little water. Then a layer of fern fronds was added, followed by layers of bundled "roots" interspersed with more fern fronds, and topped with more salal (Fig. 14). The kettle was covered, and the water brought to a boil, then the heat reduced, allowing the "roots" to steam until soft enough for a fork to pass through them easily, as with cooking potatoes. Boas (1921: 531-533) describes a kettle-steaming method used by the Southern Kwakiutl for cooking clover "roots." A small kettle was lined with a grid of split cedar sticks. A quantity of freshly washed clover "roots" was placed loosely in the kettle and covered with a piece of dampened cedar bark, which was tucked around the edges. A small amount of water, perhaps half a teacupful, was poured into the kettle and it was placed over the fire until the water came to a boil. After a short time the kettle was lifted off, placed on the floor, and left until it had stopped steaming. Then the cover was removed and the "roots" taken out and served, with oil, to the family. Kettle-steamed clover "roots" were not served at large feasts (Boas, 1921: 533).

The cooking techniques, especially the pit-cooking, required a great deal of skill and expertise. From the authors' own experience, the type of soil, the number of rocks used, the amount of water added, and the placement of the food in the pit are all crucial in determining whether the cooking will be successful. Too many rocks and too little water can result in a burned or over-cooked product, whereas too few rocks and too much water will not cook the food adequately. Due to the variability in pit size, these factors could not have been standardized; experience would have been the main criterion for successful pit-cooking.

The "roots" were usually eaten as an accompaniment to other foods, such as dried salmon. Sometimes they were cooked in a "stew," such as that described by Edwards (1979: 7), made by the Bella Coola. Ingredients for this dish included: clover "roots," fermented dog-salmon eggs, oolachen grease or seal oil, sugar (recent), and, optionally, silverweed roots, kinnikinnick berries [*Arctostaphylos uva-ursi* (L.) Spreng.], fern rootstocks [*Dryopteris filix-mas* (L.) Schott. (?)], and flour (recent). Often, however, the "roots" were served whole and cold and were eaten with the fingers. Almost always they were dipped in a condiment of oil, either of fish, such as oolachen, or whale or seal oil. Recently, these indigenous oils have been largely replaced by commercial vegetable oils, such as corn oil, and sometimes "roots" were sprinkled with sugar before being eaten.

As indicated in the introductory quotation, clover and silverweed "roots" were frequently served traditionally at large feasts. As described by Boas (1921: 527-531; 535-542), there were, especially among the Kwakiutl, standard rules of etiquette involving the serving and eating of the "roots." For example, as already mentioned, only chiefs were served long silverweed (cinquefoil) roots; commoners ate the short, curly ones. At a clover-"root" feast, the guests were expected to finish all of the "roots" that were in front of them; "Those who eat steamed clover always try to eat it all." (Boas, 1921: 531). At silverweed feasts, the guests could take leftovers home to their wives.

For winter storage, the "roots" were usually dried (Fig. 10), apparently after cooking, although some may have been dried while still raw. In the Nitinaht area "roots" to be dried were spread out on scaffolding or on rocks or mats in the sun. The dehydrating process might take several days. The bundled, dried "roots" were then stored away in large, open-work baskets interspersed with dried grass to allow circulation of air. The baskets were stowed on scaffolding around the upper walls of the houses, where they would remain relatively warm and dry. In winter, when required, they were taken out, sprinkled with water and left overnight to be reconstituted, then steamed for a short time and eaten like the freshly cooked "roots" (Turner et al., in press, 1981).

Bella Coola people, and perhaps other groups as well, sometimes stored both clover and silverweed "roots" raw and fresh in boxes of soil in root-type cellars (Edwards, 1979: 6). Throughout the winter, whenever they were required, the "roots" were simply dug out and cooked in the usual way.

It is difficult to obtain estimates of the quantities of "roots" eaten in precontact times, or even within the last century. Drucker (1951: 63) estimates that the Nootka may have eaten only about a dozen or two meals of "roots" in a year. However, recollections of contemporary native people, including Ida Jones of Port Renfrew and Margaret Siwallace of Bella Coola, indicate a much higher consumption. According to Mrs. Jones, who recalls the use of these "roots" from her childhood, some 80 yr ago, at least some "root" food was eaten several times per week throughout most of the year, and clover and silverweed were predominant among the "roots" that were used.

These "roots" were fondly remembered by all those native elders we talked to who had eaten them. In taste and appearance, the clover "roots" were described by native women as resembling cooked beansprouts. Silverweed roots were comparable to sweet potato. From our own experience, we found both "roots," when properly prepared, to be agreeable in flavour and texture. The

clover "roots" were sweet tasting and had a flavour not unlike that of young green peas or bean sprouts. Silverweed roots were also found to taste pleasant, although it was noted that some of the roots were decidedly bitter, whereas others were not at all bitter. The bitterness did not seem to relate to the size of the roots, nor to how well-done they were. We could only conclude that certain strains or local populations of silverweed had bitter-tasting roots while others did not. Presumably, native people would have selected areas for harvesting the roots where bitter-tasting populations were at a minimum. Both clover and silverweed "roots," after they had been cooked, were eaten by several native people and were found to be flavourful and acceptable foods.

The content of several nutrients in these 2 "root" foods was determined and the results are described in detail by Kuhnlein et al. (in press, 1982). Of those nutrients evaluated to date, it was found that the contents of calcium, magnesium, iron, copper, and zinc were consistently higher in the silverweed and clover "roots" than in the common potato (cooked and unpeeled).

Clover and silverweed "roots" are also known to be a favourite food of various kinds of ducks and geese. Several different variations of a myth, recorded from different areas of the Northwest Coast, reflect the native peoples' association of waterfowl with these roots. The basic theme of the myth is as follows: One or more blind little old women are encountered digging and eating either clover, or in some cases, silverweed "roots" by the hero of the story, usually a young man. The blind women generally give some sort of supernatural help to the hero. He, in turn, restores their sight, in at least one case by rubbing the clover "roots" into their eyes, then changes the women into their present-day forms, either mallard ducks or geese, depending on the account (Boas and Hunt, 1905: 95; McIlwraith, 1948, Pt. II: 475). At Bella Coola, and probably in other areas as well, clover rhizomes were formerly used by native duck hunters as bait, to entice the birds to a place where the hunters would be waiting to shoot or entrap them with screens or leg-hold traps. This procedure is described in detail by Edwards (1979: 8-11). Canada geese are said to prefer silverweed roots, whereas mallard ducks seek the clover (Edwards, 1979: 11).

#### FUTURE POTENTIAL OF CLOVER AND SILVERWEED "ROOTS" IN NATIVE DIET

It is highly unlikely that clover and silverweed "roots," or any other indigenous plant foods on the Northwest Coast, will ever regain their past importance in the economy of native peoples. The overwhelming convenience of commercial foods and standard garden vegetables in comparison with the time and effort required to harvest and prepare wild vegetables is an obvious reason why this is the case. However, there would be a number of advantages if these "roots" and other native plant foods were reinstated to some extent (Turner, 1981). These foods are an important part of the cultural heritage of native peoples; when the use of them ceases so does part of the original native culture. Within the last decade or so, there has been a movement towards the preservation of cultural values among native groups on the Northwest Coast and elsewhere. Language teaching programs have been initiated, local cultural museums have been established, and courses in carving, basket-making, and other skills have been offered in many native communities. Part of this movement has involved a rekindled interest in

traditional foods. For example, programs are underway at Alert Bay among the Southern Kwakiutl people, and at Bella Coola, to document native foods and to educate members of the younger generation of their use (Margaret Sirois, Nimpkish Health Board, Alert Bay, B.C., pers. comm., 1981; Sandy Moody, Bella Coola Band Health Unit, pers. comm., 1981).

The potential of clover and silverweed "roots" to meet human nutritional needs when used with other foods is apparently good. Not only do they contain the basic energy-contributing nutrients at levels reasonable for plant root foods, but they would contribute considerable fibre, vitamins and minerals, as well. The increased use of clover and silverweed "roots" would enhance the diversity of foods used in the native diet. Not only does dietary diversity have nutritional benefits, but there are benefits culturally, in prevention of overload of toxins from any one food, and in keeping food costs down (Kuhnlein, 1981). The concern to improve food diversity in native rural communities is especially pressing in areas where there is limited access to the usual array of marketed foods found in urban centers.

Availability of a food is important in determining its potential. Given that both clover and silverweed "roots" were formerly harvested in large quantities on a sustained yield basis from locations relatively close to village sites, namely along the coast, on river estuaries, on flood plains, and in saline marshes, it seems reasonable to assume that they could once again be harvested, with proper care and attention to conservation, without detriment to the long-term survival of the species populations. From available evidence in this and other areas, the digging and cultivation of the soil accompanying the harvesting of "root" crops may actually have promoted the growth of these plants rather than being detrimental (Turner, 1981; Robert A. Bye, Dept. Environmental, Population and Organismic Biology, Univ. Colorado, pers. comm., 1981). One could expect regeneration of clover and silverweed from small fragments of rhizomes, stolons, or even roots left after digging. There is some evidence that in the past, fragments of the "roots" were intentionally left or replaced in the ground to grow plants for the next year (Turner and Efrat, in press, 1981; Edwards, 1979: 6); the same procedure could be followed in the future. Dr. John M. Gillett (pers. comm., 1981) points out that the rhizomes of *Trifolium wormskioldii* can be easily propagated by cutting into short lengths and replanting. He has also found that stem cuttings root easily in water or damp sand.

At present, in some areas along the coast, such as along the San Juan River near Port Renfrew, some of the prime patches of clover and silverweed are in jeopardy from trampling and overgrazing by cattle and horses. If they were to be used again as a food source, they would have to be protected from such encroachment. Other than use for livestock, the type of habitat where clover and silverweed grow on the Northwest Coast is generally unsuitable for agriculture as the ground is occasionally inundated with salt water. Hence, there would be no competition with the production of conventional vegetables from the reestablishment of clover and silverweed "gardens."

The harvesting and use of wild foods can be socially and aesthetically pleasing. In the past, although "root"-digging was laborious, it was often an occasion for social interchange, where women and children of all ages could talk and learn from each other (Ida Jones, pers. comm., 1980). The authors' experiences in

involving the elders and younger people in "root" harvesting at Bella Coola was positive. It was found that as a result of this project and others involving traditional Bella Coola foods, there has been a renewed interest in them among many members of the Bella Coola community. It is likely that the harvesting and eating of these "roots" will become an annual event for some people, including some who had never before tasted them.

The status of clover and silverweed "roots" is summarized in the words of Ida Jones, translated from the Nitinaht language by her son, John Thomas:

... That's how we used to do it. Maybe we still could gather [roots] that way, but we don't get a chance to gather because now we have white man's food so easily. We only have to go to the store and buy it, just as, long ago, the people used silverweed [and] fern roots. They were very prosperous because they ate the silverweed and fern [and clover] roots, ate them with oil . . . . We don't bother with them now at this time. We stopped gathering them; we only see where they used to gather them. I guess we could again gather it if we wanted to . . . (Turner et al., in press, 1981, Appendix 6A).

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