Bioregional Herbalism in the West Kootenays of British Columbia

During my formative years as a herbalist I lived in a small community called Harrop-Procter, located in the West Kootenays of British Columbia, Canada, on the shore of Kootenay Lake. I had a clinic and a small manufacturing business in nearby Nelson, and also taught some classes on herbal medicine and nutrition at a local community college. Encompassed by several watersheds, Harrop-Procter is backed by a mostly north-facing slope, and contains an abundance of medicinal plants. While I lived there, I devoted myself to investigating the properties and uses of these plants, incorporating them into my clinical practice, and preparing from them a variety of remedies for the local retail market, including tinctures, powders, teas, and smoking mixtures.

In 1995, the provincial Ministry of Forests (MOF) announced a plan to log the community watersheds of Harrop-Procter, which many residents relied upon as a source of fresh water. In 1996, with great concern over this unilateral decision to put their water at risk, local citizens formed the Harrop-Procter Watershed Protection Society (HPWPS). Rather than engage in the typical "war-in-the-woods" polarity that has traditionally characterized the interaction between industry and environmentalists, the local community chose a third option. With broad support from local citizens, and with the help of the Silva Forest Foundation, the HPWPS developed an ecosystem-based plan to manage the entire 11,000 hectares of watershed. Unlike a conventional timber license that encourages clear-cutting, an ecosystem-based plan rests upon the principles and practices of sustainable forestry, resulting in a reduced level of timber harvest that is offset by promoting economic diversity. Out of this work, the Harrop-Procter Community Co-operative (HPCC) was formed in 1999 to focus on the business of forestry operations and economic development. That same year, the HPCC applied for and was granted a five-year timber license by the provincial Ministry of Forests under a newly created category of Community Forest Pilot Project. This application has since been renewed and was extended as a 25-year timber license.

Both as a community member, and due to my developing expertise in the local flora, I was invited by the HPCC to form part of a multidisciplinary team of professionals, tasked with conducting research into the economic viability and sustainability of harvesting local non-timber forest products (NTFPs), as a way to offset a reduced level of timber harvesting. This team was led by Evan McKenzie, a registered professional biologist with a specialty in vegetation ecology, and apart from myself, included a forestry technician (Ken Foot) and an environmental engineering technologist (Krista Watts). This work resulted in a report entitled *Preliminary Inventory of Medicinal Plants in the Harrop-Procter Community Forest,* prepared for the Harrop-Procter Watershed Protection Society in 2000 (McKenzie and Caldecott 2000). The present work represents a brief summary of this project, and a focus on three medicinal species that were examined in detail.

Study Area

Contained within the traditional territories of the Ktunaxa (Kootenay) and Sinixt (Arrow Lakes) First Nations, the Harrop-Procter watershed is located in the southern Selkirk Mountains along the south shore of the West Arm of Kootenay Lake. Situated about 30 kilometers northeast of the city of Nelson, the watershed consists primarily of heavily forested mountain slopes that mostly have a cool, northerly aspect, rising from the lakeshore up to steep ridges that rise to an elevation of 2350 m. In 1901 much of the watershed was burned leaving a second-growth forest approximately 100 years old, with scattered pockets of old growth that survived the fire mostly found in the valley bottoms. There are five major creeks that drain the watershed, flowing north into the West Arm of Kootenay Lake, including lrvine, Procter, Narrows, Slater, and Harrop Creeks.

Figure 1: Harrop-Procter watershed, British Columbia

Bioclimactic zones

According to the Biogeoclimatic Ecosystem Classification (BEC) used by the provincial Ministry of Forests, the Harrop-Procter watershed can be stratified into two primary biogeoclimatic zones, called the Interior Cedar-Hemlock (ICH) zone, and the Engelmann Spruce-Subalpine Fir (ESSF) zone. The Interior Cedar-Hemlock (ICH) zone occupies the valley floors and mid-slope regions in the watershed, whereas the Engelmann Spruce-Subalpine Fir (ESSF) is found above the ICH, up to the highest elevations in the study area. These primary classifications are further divided into additional subzones and variants that reflect particular features such as aspect (warm, cool, neutral) and slope orientation. From lowest to highest elevation these regions within the Harrop Procter watershed include:

Subzone	**Variant**	**Elevation**
Interior Cedar-Hemlock subzone, dry-warm (ICHdw)	-	lake level (532 m) up to 1000-1100 m on cool aspects; up to 1200-1250 m on warm aspects
-	Interior Cedar-Hemlock subzone, moist-warm, Columbia-Shuswap variant (ICHmw2)	up to a max. of 1450-1550m on cool aspects; 1550-1650 m on warm aspects
-	Engelmann Spruce-Subalpine Fir subzone, wet-cold, Columbia variant (ESSFwc1)	between 1675-1725m on cool aspects; 1725-1775 m on warm aspects
-	Engelmann Spruce-Subalpine Fir subzone, wet-cold, Selkirk variant (ESSFwc4)	up to 2050-2150m on cool aspects; 2250-2275m on warm aspects
Engelmann Spruce-Subalpine Fir subzone, wet-cold parkland (ESSFwcp)	-	up to a maximum elevation of 2350m

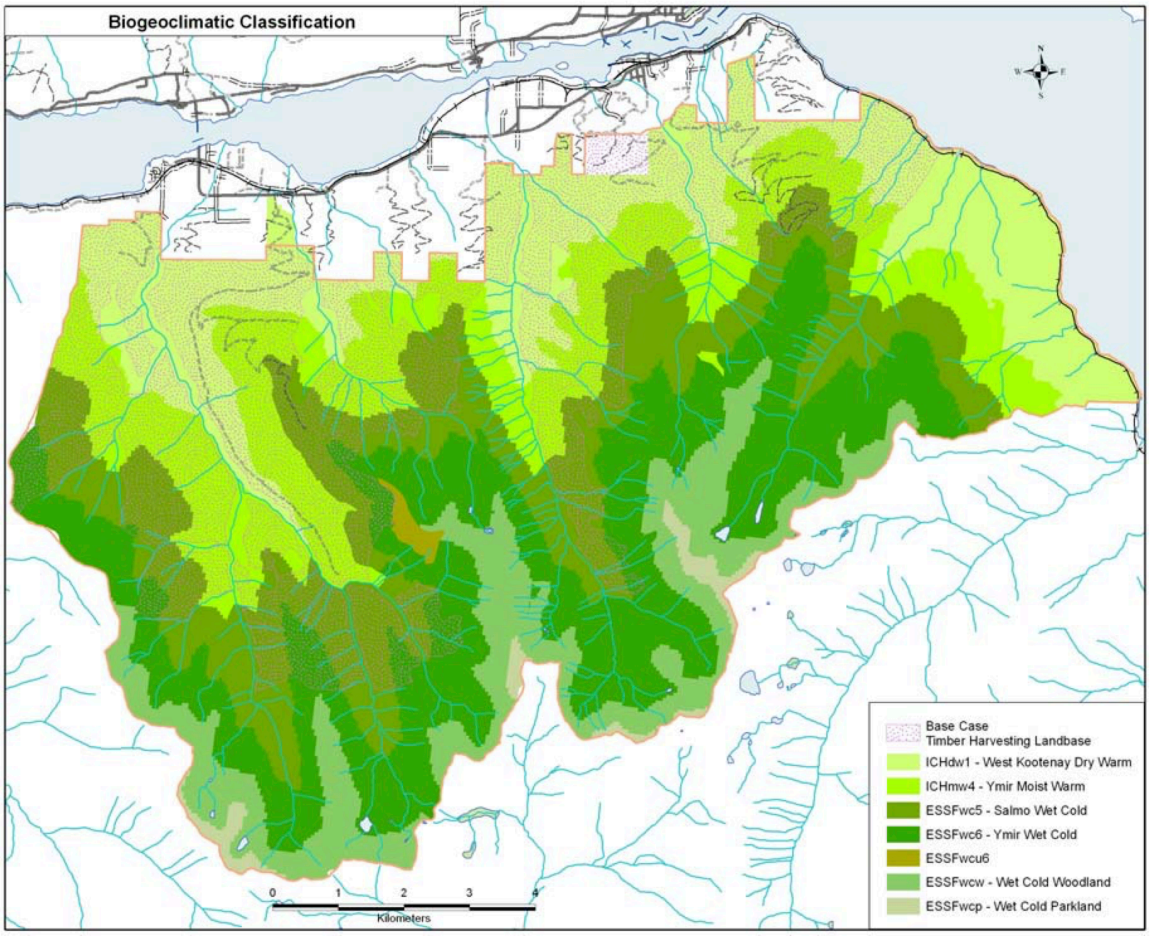

Figure 2: Bioclimactic zones of the Harrop-Procter watershed

Scope of Project

Tasked with examining the economic feasibility of harvesting NTFPs, the project focused on a few key areas, beginning with an inventory of medicinal plants that have potential for commercial harvest and were likely to occur in the Harrop-Procter watershed. This list was compiled by a review of medicinal herb and wildcrafting resources, market data, regional plant field guides, ecosystem and vegetation data, and by communicating with local wildcrafters. Medicinal species that were given a high to moderate rating for this project included western red cedar *(Thuja plicata)*, arnica *(Arnica cordifolia, A. latifolia)*, Canby's lovage *(Ligusticum canbyi)*, bearberry *(Arctostaphylos uva ursi)*, tall Oregon-grape *(Mahonia aquifolium)*, pipsissewa *(Chimaphila umbellata)*, wild sarsaparilla *(Aralia nudicaulis)*, trembling aspen *(Populus tremuloides)*, Sitka valerian *(Valeriana sitchensis)*, paper birch *(Betula papyrifera)*, lodgepole pine *(Pinus contorta* var. *latifolia*), birch-leaved spirea *(Spirea betulifolia)*, western pasqueflower *(Anenome occidentalis)*, willow *(Salix spp.)* and devil's club *(Oplopanax horridus)*.

An analysis was then undertaken to determine where these species were more likely to occur, how much of each species might be available for commercial harvest, and ease of access. This knowledge was then used to formulate a plan for field surveying and sampling, targeting areas where medicinal species were more likely to occur in

abundance. Low elevation sampling in the study area took place in eight target areas that were accessed by vehicle and hiking, whereas high elevation areas accessed by helicopter. The fieldwork involved walking predetermined transects to locate and describe the occurrence of medicinal plants. Distances along these transects were measured with a string machine, marked at regular intervals with flagging tape, and a global positioning system (GPS) unit was used to locate transect stations and sample points. During these surveys, both strip map and vegetation plot data was recorded, describing terrain features, roads, ecosystems, and plant populations along transects.

Data collection

Based on analysis of the data three species were chosen for further study to examine the impact of harvesting. These three species were pipsissewa *(Chimaphila umbellata)*, devil's club *(Oplopanax horridus)*, and wild sarsaparilla *(Aralia nudicaulis)*. Plant populations of each were sampled in several 400 m^2 (20x20 m) plots located in selected regions of the watershed. Information collected at these plots included a brief description of site and soil characteristics, terrain, ecosystem classification, and associated vegetation. Harvesting trials were then established by creating four, one square meter sub-plots, each randomly located at a distance of between 1 and 10 m on a line running along one of the four cardinal directions (N, E, S, W) from the center of the 400 m^2 plot. Each sub-plot was then divided into four quadrants, and counting the number of specimens as well as recording the percent cover, different levels of harvest were applied to each quadrant, i.e. 100% (all), 50% (half), 25% (one-quarter), and control (none). After harvest, the fresh plant material was weighed and a rough estimate of the species by weight/area was determined.

Chimaphila umbellata, Ericaceae

Chimaphila umbellata (pipsissewa, prince's pine) is a stout, slightly woody, small evergreen shrub, 10-35 cm in height, arising from a creeping, yellowish rhizome. The stems are simple or occasionally branched, with dark green leaves on short petioles generally arranged in whorls, leathery, narrowly oblong with sharply toothed edges, with central venation. The flowers number between 3-10, arising as little nodding clusters above the whorl of leaves, saucer shaped, with five whitish-pink, waxy petals that surround a plump, sticky green ovary and ten reddish stamens. The fruits are 5-valved spherical brown capsules, with numerous seeds (Parish et al 1996, 98; Lyons CP 1952, 128)

Pipsissewa is common at low to sub-alpine elevations in British Columbia, found in mossy, well-drained soils, in open coniferous forests and clearings, preferring dry forests in moist, cool climates. It is often found growing in association with pink wintergreen *(Pyrola asarifolia)*, and both plants derive a significant portion of their nutrition from soil fungi (myco-heterotrophic) (Tedersoo and Pellet 2007). Within the Harrop-Procter watershed study area, pipsissewa is widespread and common at low to subalpine elevations, found within the ICHdw to ESSFwc4 bioclimactic zones.


Figure 3: *Chimaphila umbellata*

Constituents of *Chimaphila umbellata*

Duke and Moore mention a number of quinone glycosides in pipsissewa, including chimaphilin (2,7-dimethyl-1,4-napthoquinone), ericolin and isohomoarbutin. A recent study identified a new naphthalene glycoside in pipsissewa identified as 2,7-dimethyl-1,4-dihydroxynaphthalene-1-O-β-D-glucopyranoside (DMDHNG). The iridoid glycoside monotropein has also been identified, as well as the steroidal saponin taraxsterol, and the flavonoids quercitrin, isoquercitrin, and myricacitrin. Pipsissewa also contains tannin; a volatile oil; ursolic, malic and gallic acids; and a gum (Shin et al. 2015; Duke 1992; Moore 1979, 127; Veitch and Welton 1951; Trubachev and Batyuk 1969 ; Walewska and Thieme 1969; Zellnig et al. 1996)

Medical Research on *Chimaphila umbellata*

There is little in the way of published research on pipsissewa, but based on its documented arbutin content it can reasonably be inferred that pipsissewa shares similar antimicrobial and anti-inflammatory properties with other arbutin-containing plants that have been better studied, such as uva ursi leaf *(Arctostaphylos uva ursi)*. Within the urinary tract, arbutin is hydrolyzed into hydroquinone where it exerts an antimicrobial effect. The impetus for this conversion is a relatively alkaline urine tract, and thus in urinary tract infections characterized by alkaline-loving, urea-splitting bacteria and fungi, arbutin-containing herbs such as pipsissewa should be active. In cases of infection with non urea-splitting organisms, however, the alkalization of the urine is required for biological activity, and can be achieved by the co-administration of a buffering agent such as sodium bicarbonate, along with a commensurate reduction in animal protein consumption (Mills and Bone 2000, 282). Apart from arbutin, the napththalene glycoside DMDHNG was shown to inhibit RANKL-induced osteoclast differentiation in mouse macrophage cell lines, suggesting that it may be effective in the treatment of osteoporosis (Shin et al. 2015).

Medicinal uses of *Chimaphila umbellata*

Pipsissewa was widely used by all the First Nations people of North America that lived within its range of distribution, including by the Ktunaxa and Sinixt peoples that claim

the Harrop-Procter watershed as part of their traditional territory. The name 'pipsissewa' comes from the Cree name 'pipisisikewu,' which mean 'break-into-small-pieces,' referring to its reputed ability to dissolve kidney stones (Parish et al 1996, 98). The genus name *Chimaphila* is derived from two Greek words meaning 'winter' and 'loving.' Pipsissewa root was at one time used as an ingredient in the preparation 'root beer.' Although once plentiful in Europe, it is currently a protected species in many countries. Felter and Lloyd state that the primary indication for Pipsissewa are atonic and debilitated states of the urinary organs, which often give rise to lingering disorders, characterized by decreased urine output, with mucus, muco-pus, or bloody muco-pus (1893). There will often be burning sensation or a low-grade irritability of the urethra and prostate. Pipsissewa has an antiseptic and astringent effect upon the membranes of the urinary system, although it's astringent action, according to Michael Moore "is much less…than uva ursi, with a stronger diuretic action and less irritation of the intestinal linings" (1979, 127). Like Felter and Lloyd, Moore considers it an "almost perfect remedy for kidney weakness or chronic mild nephritis" (1979, 127). Felter adds that pipsissewa "seems to favour digestion, and has a good influence upon the processes of nutrition." Like Moore, Felter indicates that pipsissewa is a long-term remedy, and one that should not be expect too much of in confirmed cases of nephritis. As an alterative remedy pipsissewa was commonly used in the treatment of gout and rheumatic complaints, as its name 'Rheumatism Weed' suggests, and is even used by professional athletes to heal damaged tissues and prevent injury. Pipsissewa is an important remedy in skin and lung disease, acting upon liver and kidneys to eliminate wastes. Pipsissewa was used by First Nations such as the Cherokee, Delaware and Cree peoples as a musculoskeletal and cardiac analgesic, and as an expectorant and antihemorrhagic agent (Leighton 1985; Hamel and Chiltoskey 1975; Tantaquidgeon 1972). Chimaphila is also mentioned in the ethnobotanical literature as a cancer aid (Herrick 1977; Hamel and Chiltoskey 1975), and was considered by eclectic physician Eli G. Jones to be specific in the treatment of breast cancer (1911).

Toxicity and contraindications of *Chimaphila umbellata*

One toxicological study clearly indicated that arbutin has no mutagenic property (Mills and Bone 2000, 282). Under certain conditions however, such as an alkaline environment or through bacterial enzymatic conversion, arbutin will hydrolyze into the antimicrobial and potentially toxic hydroquinone. The amount of free hydroquinone excreted however has only been found in trace amounts (Mills and Bone 2000, 282). Hausen and Schiedermair indicate that chimaphilin is a moderate contact sensitizer (1988). Pipsissewa is generally contraindicated during pregnancy and lactation, although it is generally milder in effect that uva ursi *(Arctostaphylos uva ursi),* and much less likely to cause side-effects such as dryness and irritation, and thus can used with care in such situations.

Pharmacy and dosage for *Chimaphila umbellata*

- fresh plant tincture (leaf, 1:2, 95% alcohol): 1-3 mL bid-qid
- dry plant tincture (leaf, 1:3, 50% alcohol): 1-3 mL bid-qid
- decoction (leaf, 1:20): 100-200 mL bid-qid

Oplopanax horridus, Araliaceae

Oplopanax horridus (devil's club) is an erect to prostate, often sprawling deciduous shrub between 1-3 m in height, with light-brown colored stems armed with prominent spines, 5-10 mm in length. The stems are mostly unbranched but often intertwined with other stems to form thickets, the decumbent stems often covered in moss. The large, maple-leaf shaped leaves are clustered near the end branches on long stalks, with seven to nine lobes, up to 35 cm broad, armed with spikes, the leaf margins irregularly to sharply serrate. The flowers are greenish-white, arranged in dense, pyramidal clusters at the ends of the stems, up to 20 cm long, giving way to green inedible fruits that turn scarlet-colored when ripe (Parish et al 1996, 73; Lyons CP 1952, 97)

Devil's club is widespread and common at low to subalpine elevations in moist to wet, well-drained seepage sites, and along streams and in gullies, ranging from coastal Alaska southward to central Oregon, and eastward from the Yukon Territories and Rocky Mountains, into northwestern Alberta, Montana, and Idaho (Lantz et al 2004). It is shade tolerant and occurs as the understory of many forest types, often under the canopy of western red cedar *(Thuja plicata)* and western hemlock *(Tsuga heterophylla)*. Given the low light habitat preferred by devil's club, seedling survival is diminished, and instead it relies upon vegetative reproduction by forming clonal colonies. Thus what appear to be several different plants in stand often arise from a single specimen, with the clones detaching themselves after laying down new roots (Lantz and Antos 2002). Within the Harrop-Procter watershed study area devil's club is widespread and common at low to subalpine elevations, found within the ICHdw to ESSFwc4 bioclimactic zones.

Figure 4: *Oplopanax horridus*

Constituents of *Oplopanax horridus*

Phytochemical investigations on *Oplopanax horridus* have yielded a variety of compounds that are identical or similar to other *Oplopanax* species (including *O. elatus, O. japonicus*), as well as other members of the Ginseng family (Araliacea). Despite the adaptogenic properties attributed to devil's club, the ginsenosides linked to these benefits in *Panax* species have not been found in devil's club. Important constituents isolated in devil's club include volatile oils (e.g. nerolidol, cadinol, falcarinol), lupane-type

triterpenopid saponins, phenolic glycosides (e.g. oplopanpheside A, B, C), polyynes (e.g. falcarinol, falcarindiol, oplopantriol A and B), phenylpropanoids (e.g. ferulic acid, 3-acetylcaffeic acid, caffeic acid), coumarins (e.g. scopoletin, esculetin), polyene (nerolidol), sesquiterpenes (e.g. equinopanacene, alpha-cubebene, transnerolidol, oplopanone, spatulenol, neroplomacrol, neroplofurol), sesquiterpene alcohols (e.g. equinopanacol), sterols, and lignans (e.g. sesamin) (Cheung et al 2015; Huang et al 2015; Huang et al 2014a, Huang et al 2014b Shao et al 2014; Zhang et al 2014; Qiu et al 2013, Huang et al 2011; Liu et al 2010; Bloxton et al 2002; Kobaisy et al 1997; Kariyone and Morotomi 1927)

Medical Research on *Oplopanax horridus*

Despite being an important ethnobotanical, there is very little in the way of published clinical research on devil's club, with most research limited to preliminary investigations. There is a substantial body of evidence that devil's club has potent antimicrobial properties, with whole plant extracts and isolated constituents (e.g. polyacetylenes) demonstrating activity against organisms including *Staphylococcus aureus, Bacillus subtilis, Pseudomonas aeruginosa, Escherichia coli*, *Candida albicans*, *Mycobacterium tuberculosis*, and *Mycobacterium avium* (Lantz et al 2004; Kobaisy et al 1997). An extract of devil's club has also been shown to partially inhibit the respiratory syncytial virus (McCutcheon et al 1995). Apart from its antimicrobial effects, there is significant interest in the potential use of devil's club as an antiproliferative agent, and has been observed by itself or in combination with chemotherapeutic drugs (e.g. cisplatin, gemcitabine, paclitaxel) to be active in a range of human cancer lines, including leukemia, pancreatic, ovarian, breast and colon cancer cells (Cheung et al 2015; Tai et al 2014). Some research has shown that some constituents in devil's club act through targeting the intrinsic mitochondrial apoptosis pathway, making it a potentially useful adjunct therapy for cancers that develop resistance to conventional chemotherapeutic drugs (Cheung et al 2015). In one study an extract of devil's club root bark was shown to decrease the viability of four different anti-myeloid leukemia (AML) cell lines, inhibiting tyrosine kinase independent of any antioxidant effect, and in mice grafted with AML (C1498) cells significantly increased survival (McGill et al 2014).

Medicinal uses of *Oplopanax horridus*

Within its habitat in the Pacific Northwest, devil's club is perhaps the important medicinal plant to First Nations peoples, used not only as medicine but also as a spiritual aid. Over 38 different First Nations groups have been documented using devil's club in the treatment of disease or as a spiritual medicine, including the Coast Salish (e.g. Squamish, Tsleil-Waututh, Musqueam), Nuu-chah-nulth, Kwakwaka'wakw, Oweekeno, Nuxalk, Heiltsuk, Haida, Haisla, Tsimshian, Nisga'a, Gitxsan, and Tlingit. Within the southern interior regions of British Columbia, devil's club was used by Nlaka'pamux, Secwepemc, and Okanagon peoples, and within the Harrop-Procter watershed, was used by the Ktunaxa and Sinixt peoples (Lantz et al 2004; Turner 1982).

Prepared as an infusion or decoction of the inner bark, devil's club has a wide range of traditional applications, used as an appetite stimulant, emetic, laxative, purgative, analgesic, parturient, emmenagogue, anti-infective, antihemorrhagic, and blood purifier.

Applied internally, an infusion or decoction of the inner bark was used to treat conditions including fever, coughs, colds, pneumonia, tuberculosis, colic, ulcers, gall stones, dysmenorrhea, venereal disease, arthritis, broken bones, hemorrhage, diabetes, and cancer. Devil's club is an important gynecological agent, used by post-partum to expel the afterbirth, to reestablish menstruation, to alleviate menstrual cramping, and as a form of birth control (Lantz et al 2004; Turner 1982).

Applied topically the inner bark of devil's club has significant analgesic properties, applied as a spit poultice to wounds and as a remedy for toothache. The inner bark is used as an infusion or decoction in the treatment of wounds, infection, skin disease (e.g. acne), venereal disease, and febrile disorders (e.g. measles, diphtheria). As a counter-irritant an infusion or decoction of the inner bark was used as a bath, the pounded leaves applied as a poultice, used in the treatment of arthritis and rheumatism. In a similar fashion, the stimulating effects of devil's club are applied as an inhalant and topical remedy, as a steam bath in the treatment of respiratory disorders such as pneumonia, and as an analgesic and stimulant in arthritis and rheumatism. Devil's club is an important medicine for eye problems including blindness, an infusion of the inner bark taken internally, and used as an eyewash to reverse the effects of cataracts. Apart from the inner bark, the berries are also used medicinally, pounded into a paste and taken internally in the treatment of heart disease and digestive disorders, and applied topically in the lice (external) and dandruff (external) (Lantz et al 2004; Turner 1982).

Apart from its use as a medicinal agent, all First Nations peoples considered devil's club to be an important spiritual medicine, mentioned in many stories and legends that attribute great spiritual potency to this herb. Employing a notion similar to the European concept of the 'Doctrine of Signatures,' this property can be inferred by the sharp spines of devil's club, which suggest a protective quality; its penetrating and lingering aroma; and its habit, in which it forms tenacious thickets in primeval, old-growth, forests. Mirroring its medicinal usage as emetic, purgative, and blood-purifier, devil's club was used for spiritual cleansing and purification, to ward off negative influences and protect against bad luck. The inner bark of devil's club was used topically as a bath or steam bath to drive off evil spirits, the burning smoke used to purify a dwelling after illness or death, and when reduced to an ash, the charcoal applied as face paint. A piece of the inner bark might be kept on the body or sewn into clothing as a protective talisman. Shamans would consume the juice obtained from the inner bark to obtain great strength, and fashioned small structures from the peeled wood, which becomes served as meditation huts to accumulate spiritual power. Devil's club was also used to bring good luck to hunting and fishing, the inner bark prepared as an infusion to wash down fishing boats, fishnets, and hunting gear (Lantz et al 2004; Turner 1982).

In clinical practice, devil's club has a range of uses that reflects its traditional use not just as medicinal herb but also as a spiritual remedy. It is a warming, stimulating medicine that makes it useful to overcome the inertia of chronic disease, resolving respiratory congestion, promoting circulation, and overcoming metabolic dysregulation. Devil's club is an excellent remedy for arthritis and rheumatism, although as a heating remedy it may be contraindicated in active inflammation, and in autoimmune disorders, may be a better

choice during the remissive rather than relapsing phase of disease. Devil's club has a definite ability to lower blood sugar and along with a low carbohydrate diet can be an effective agent to manage adult-onset diabetes mellitus. As a spiritual medication, devil's club can be an important remedy to help ground the patient, ward off negative influences, and provide the user with an aura of self-protection.

Toxicity and contraindications

Aromatic and pungent phytochemicals in devil's club can cause a burning sensation in the oral mucosa and promote a transient inflammatory reaction in sensitive people. In large doses devil's club may be an emetic or purgative (Turner 1982). While some research suggests that the blood sugar-lowering properties of devil's club are negligible (Thommasen 1990), clinical experience has shown that in asthenic conditions especially it can lower the blood sugar too dramatically. The spines on the stem and even leaves can readily break off in the skin and leave deep, festering wound if they are not removed promptly. Devil's club is generally contraindicated during pregnancy and lactation.

Pharmacy and dosage

- fresh plant tincture (inner root/stem bark, 1:2, 95% alcohol): 1-3 mL bid-qid
- dry plant tincture (inner root/stem bark, 1:3, 50% alcohol): 1-3 mL bid-qid
- hot infusion (inner root/stem bark, 1:20): 75-150 mL bid-qid
- decoction (inner root/stem bark, 1:20): 75-150 mL bid-qid

Aralia nudicaulis, Araliaceae

Aralia nudicaulis (wild sarsaparilla) is a stoloniferous perennial with a long, slender, underground rhizome that has a thin, delicate bark. Growing just under the duff, the rhizome zig-zags across on the forest floor, giving rise to a short woody caudex that sprouts at regular intervals. From this arises a solitary compound leaf, the long stem branching into three segments, which in turn, divides into three to five, finely-toothed leaflets. The flower stalk is also elongated but shorter than the stem, bearing an umbellate inflorescence of small greenish-white flowers that give rise to dark purple, plump fruits. In late summer to early fall the leaf abscises and leaves a distinct scar on the stem that can be used to determine the age of the plant (Parish et al 1996, 230; Lyons CP 1952, 169)

Wild sarsaparilla is widespread throughout many temperate regions across North America, in a broad range of forest habitats and soil conditions, more often in deciduous rather coniferous forests, in moist to dry soils. In the interior region of southern British Columbia, wild sarsaparilla is more common at low to mid elevations, in moist, semi-open to open forest and floodplains, and is generally absent from arid regions. Similar to devil's club wild sarsaparilla forms as clonal colonies, and thus a large stand of *Aralia* is often a single individual. Within the Harrop-Procter watershed study area, devil's club was widespread and common on medium to rich sites, at low to middle elevations, found within the ICHdw to ICHmw2 bioclimactic zones. It is often found in concentrated patches that diffuse outward into the surrounding flora.


Figure 5: *Aralia nudicaulis*

Constituents

Although there is very little data on the phytochemistry of *Aralia nudicaulis*, investigation of mostly Asian *Aralia* species has yielded an interesting array of constituents, including triterpenoid saponins, sterols, diterpenoids, and acetylenic lipids (Clement and Clement 2015). In 2012, Canadian researchers isolated a pair of bitter-tasting polyacetylenes (falcarinol and panaxydol) from wild sarsaparilla, comprising 0.33% and 0.32% of the dry weight of the rhizome, respectively (Li et al 2012).

Medical Research

The two polyacetylenes (falcarinol and panaxydol) isolated from *Aralia nudicaulis* were shown to exhibit significant antimycobacterial activities against the avirulent strain of *Mycobacterium tuberculosis*, in a microplate resazurin assay (MRA). While falcarinol had already demonstrated to possess this activity, it was the first report of an antimycobacterial activity for panaxydol (Li et al 2012). *Aralia nudicaulis* is also unique in that it is a particularly rich source of falcarinol and other C17 diynes, much higher levels than either carrot (0.004%) or ginseng (0.07%). These polyyenes provide for the bitter flavor of both ginseng and carrot, and serve as a natural pesticide to protect the root from fungal disease. Experimental research on falcarinol specifically has shown that it may have a protective effect against colon cancer (Kobaek-Larsen et al 2005). Research on related *Aralia* species has demonstrated antiproliferative, antitumor, antiasthmatic, anti-inflammatory, and hypoglycemic activities (Li et al 2012).

Medicinal uses

Wild sarsaparilla was widely used by First Nations peoples across North America for a variety of purposes, and in the Harrop-Procter watershed, was among the more important plants used by the Ktunaxa peoples. Also referred to at one time as “false sarsaparilla”, *Aralia nudicaulis* was identified by colonial physicians and herbalists as a remedy similar to *Smilax* species, used as a blood purifier in the treatment of skin disease. This use is a reflection of traditional First Nations practices, such as those of the Ojibwa, Cherokee, and Iroquois, who used the rhizome internally for skin disease, and also externally, as a wash for sore eyes, as a poultice for cuts, sores and ulcers, and as a salve to treat venereal disease (Herrick 1994, 393). Similarly, its common use among herbalists today as a

remedy for pulmonary afflictions is a derivation of traditional First Nations practices, such as the Algonquin peoples who used wild sarsaparilla in the treatment of cough (Erichsen-Brown 1989), and the Iroquois who used it in the treatment of tuberculosis (Herrick 1994, 393). The Kwakiutl peoples also used wild sarsaparilla for respiratory problems, roasting the roots and mixing them with grease in the treatment of cough and spitting up blood (Turner and Bell 1973).

Many First Nations groups including the Ktunaxa peoples consumed wild sarsaparilla as an emergency food. The aromatic, sweet-earthy flavor of wild sarsaprilla makes for a flavorable beverage, used by the Bella Coola and other traditional peoples as treatment for digestive disorders (Turner 1973). As a member of the Ginseng family, it is perhaps no surprise that wild sarsaparilla was also widely used as an adaptogen. Many First Nations groups including the Cree, Algonquian, and Thomson peoples used the decoction of the rhizome in the treatment of weakness and deficiency (Speck 1917; Steedman 1928; Smith 1928), used by the Ojibwa in fainting disorders (Reagan 1928), and by the Iroquois in the management of debilitating diseases such as cancer (Herrick 1994). In a similar fashion, wild sarsaparilla was used to calm and balance the nervous system, reflected in its traditional Ojibwa use as an anticonvulsive remedy (Reagan 1928), and by the Cree as a remedy to treat teething problems in children (Leighton 1985). Similar to other members of the Araliaceae including American ginseng *(Panax quinquefolius)* and devil's club, wild sarasaparilla was used by groups such as the Iroquois as a remedy to control blood sugar in the treatment of diabetes (Herrick 1994). While the ethnobotanical use of wild sarsaparilla as an adaptogen is clearly documented, there seems to be a difference of opinion on this issue between herbalists that live on the East coast versus those from the West coast. With scant mention of wild sarsaparilla's adaptogenic properties are found in the Physiomedicalist and Eclectic literature, the late herbalist Michael Moore speculated that there was a distinct difference between wild sarsaparilla on the East and West coast, and that the Western variety has a more pungent flavor, which may very well be a reflection of a different chemotype.

In clinical practice, wild sarsaparilla is a warming remedy with stimulating, nourishing properties that is better suited to chronic rather than acute conditions. Consumed as a kind of food, wild sarsaparilla is a gentle herb, and a useful adaptogen to mediate the effects of chronic stress and debilitating diseases, with alterative properties that make it helpful in chronic skin disorders. It serves as a useful expectorant with mildly stimulating properties, excellent for chronic cough and lung congestion due to coldness, weakness, and deficiency.

Toxicity and contraindications

The consumption of wild sarsaparilla in patients or consumers with a pre-existing sensitivity to carrots may result in allergic reactions. Falcarinol acts as a covalent cannabinoid receptor type 1 inverse agonist and blocks the effect of anandamide in keratinocytes, resulting in an allergic response (Leonti et al 2010).

Pharmacy and dosage

- fresh plant tincture (fresh rhizome, 1:2, 95% alcohol): 1-5 mL bid-qid

- dry plant tincture (dried rhizome, 1:5, 50% alcohol): 1-5 mL bid-qid
- hot infusion (dried rhizome, 1:20): 100-250 mL bid-qid

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