



Review

Possible similarities between the folk medicine historically used by First Nations and American Indians in North America and the ethnoveterinary knowledge currently used in British Columbia, Canada



Cheryl Lans

IEZ (Institute for Ethnobotany & Zoopharmacognosy), Rijksweg 158, 6573 DG Beek, Netherlands

ARTICLE INFO

Article history:

Received 12 April 2016

Received in revised form

27 June 2016

Accepted 1 July 2016

Available online 6 July 2016

Keywords:

Knowledge transmission

British Columbia

Ethnoveterinary

First Nations

ABSTRACT

Aims of the study: This paper compares sixty-four plants used as ethnoveterinary remedies in British Columbia with First Nations folk medicine.

Materials and methods: In 2003, I conducted semi-structured interviews with 60 participants obtained using a purposive sample. The data was then compared with historical documents on First Nations plant use.

Results: Exact parallels between First Nations/native American folk medicine and ethnoveterinary remedies used for farm animals and horses were *Acer macrophyllum* Pursh, *Epilobium angustifolium* L. and *Lonicera involucrata* (Richardson) Banks ex Spreng., used as stimulants and tonics for goats; *Achlys triphylla* DC. as a fly repellent in barns, *Alnus rubra* Bong., for rabbits' dental care, *Berberis repens* Lindl., *Rumex crispus* L., to treat sores and rashes on horses, *Pinus ponderosa* Douglas ex C. Lawson for stomach problems and *Bovista pila* Berk. and M. A. Curtis and *Dolichousnea longissima* (Ach.) *Articus* used on wounds.

Conclusion: This study revealed the parallel uses between sixty-four plants used as ethnoveterinary medicines in British Columbia and the folk medicines used by the First Nations peoples and by native American groups.

© 2016 Elsevier Ireland Ltd. All rights reserved.

Contents

1. Introduction	53
2. Background and methods	54
2.1. Validation workshop	55
2.2. First Nations people and their folk medicines	55
2.3. Ecoregions in the research area	62
3. Results	62
4. Discussion and conclusion	63
References	65

1. Introduction

Ethnoveterinary research documents and validates traditional veterinary practices (Köhler-Rollefson and Bräunig, 1998). There are many historical records of ethnoveterinary remedies used in North America (Steedman and Teit, 1930; Speck, 1917). Vanilla leaf (*Achlys triphylla* DC.), and strong-smelling plants like big

sagebrush (*Artemisia tridentata* Nutt.), were used as insect repellents (Turner, 2001a). Dogs and horses were often healed with the same plants that British Columbia's Thompson Indians used on themselves (Steedman and Teit, 1930). The Gosiute of Utah used *Galium aparine* L. for horses (Chamberlin, 1911). The Ojibwa treated horses with *Artemisia ludoviciana* Nutt. (Moerman, 1982). Horses with distemper were treated with smoke from *Echinacea angustifolia* DC. (Gilmore, 1991). The Meskwaki used *Artemisia ludoviciana* Nutt., to smoke ponies with distemper (Smith, 1928b). The Apache and Navajo also used plants to treat their horses and the Hidatsa

E-mail address: lans@ethnobotany.nl

used *Artemisia* spp., during the gelding operation. Pregnant mares were given chicory roots (*Cichorium intybus* L.) to encourage them to drink more water and improve their condition (Lawrence, 1996; 1998). Ethnoveterinary remedies include those of the Pawnee, Omaha and Dakota who used a boiled tea of juniper berries and leaves (*Juniperus communis* L.) for coughs in their horses. Indians of the Missouri river region used a leaf and fruit decoction of *Pinus murrayana* Balf., for coughs in horses (Gilmore, 1991). Alder and birch barks (*Alnus incana* (L.) Moench and *Betula nigra* L., were used for skin conditions on horses and people. In British Columbia, the Okanagan used chocolate tips (*Lomatium dissectum* (Nutt.) Mathias & Constance) as a fish poison and an insecticide for livestock.

This paper traces the possible cultural origins of sixty-four plants used as ethnoveterinary remedies in British Columbia (BC) by comparing their uses with First Nations and Native American ethnobotany. The comparison study was undertaken because one respondent claimed to be the originator of the medicinal remedies used for goats in British Columbia. However during the validation process in which a manual was prepared and given to each research participant (Fig. 1), I noticed that I was replicating the already published work of others except in rare cases where an animal had been observed using a plant. During public presentations of the research (Lans and Boepple, 2003; Lans et al., 2004), noted ethnobotanist Professor Nancy Turner of the University of Victoria (who was also the research supervisor), remarked that many of the plant uses originated in First Nations plant lore. Professor Turner also brought a traditionally wrapped vanilla leaf insect repellent (*Achlys triphylla* DC.) to a public discussion in 2003. Her observations predated the concern of Leonti (2011) who wrote that field based studies run the risk of repeating information and knowledge that informants have gleaned from publications.

2. Background and methods

Information on Ethnoveterinary remedies used in British Columbia was collected over a six-month period in 2003. The research area included Vancouver Island as far north as Port Alberni, the Lower Mainland of British Columbia (BC), and areas in the Interior (Armstrong, Chase, Salmon Arm, Kelowna, Cawston and Fauquier). British Columbia's farms are located mainly in the Lower Mainland and the North Okanagan Valley and on Vancouver Island. Fig. 1 is the cover of the manual given to each participant at the end of the research and it includes two maps of the research area. All available literature about livestock farmers and the secondary literature on ethnomedicinal plants, folk medicine and related fields in British Columbia was reviewed.

A purposive sample of livestock farmers was necessary to target key informants with the knowledge sought. The sample size was 60. The sample was obtained from membership lists of organic farmers, horse and dog breeders and trainers, horse stables, sheep, cattle and goat breeders, naturopaths, farm women's networks, meat processors, other specialists in alternative medicine and holistic veterinarians. Of these, nine chicken and turkey and rabbit farmers and three herbalists provided ethnoveterinary remedies used for poultry and rabbits. The poultry farmers were either organic (commercial operations) or farm-gate producers. The researchers saw Asian specialty chicken on one farm. Interviewees with horses comprised one naturopath, four horse breeders/trainers, two herbalists, one farmer and one headmistress with horses at her school (for girls). Seven of the participants had goats and a few had cows. Information on pets came from 2 naturopaths, 10 herbalists, 5 dog trainers, breeders and pet shop owners, 9 holistic veterinarians and 6 of 27 organic farmers.

Two visits were made to each farm or respondent. A draft

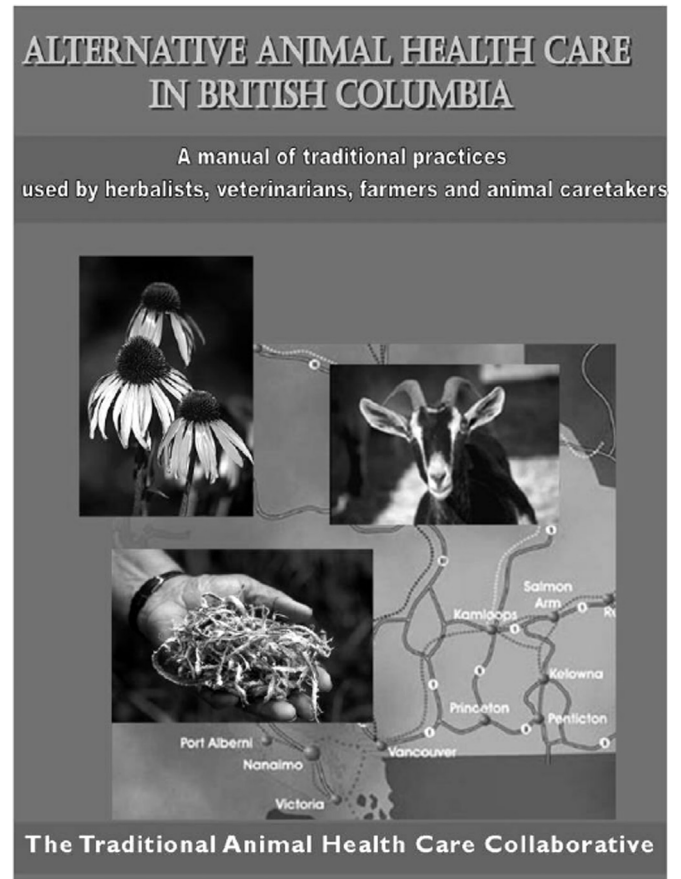


Fig. 1. Manual of Alternative Animal Health Care Practices given to each research participant.

outline of the respondent's ethnoveterinary remedies was delivered and discussed at the second visit in order to establish that dosages were accurately noted, for input on content, and to clarify any points. The respondent-approved drafts were compiled into a draft outline. The draft outline was then posted to the relevant address and a second phone interview or visit confirmed the information collected in the first interview was accurate. Medicinal plant specimens were collected where possible by two student ethnobotanists and two herbalists and were identified and deposited as vouchers in the University of Victoria herbarium (UVIC). Some plants were always used as purchased products and these plants could not be collected. In the cases where purchased products were used by respondents, the species used and active ingredient contents were checked on the product label and confirmed on the using the United States Department of Agriculture (USDA) Natural Resources Conservation Service Plants Database (<http://plants.usda.gov/index.html>) to confirm that their geographical distribution included British Columbia. Some manufacturers use non-native species in their products because the German Commission E monographs provide details on European and well-known Asian species, so it is easier to standardize products based on those species. This paper includes introduced species because they may have obtained new uses in their new locations. For example *Solidago virgaurea* ssp. *minuta* was one of several seeds exchanged at an event in Vancouver (<http://www.agc-bc.ca/archive/2007-seedlist.asp>). There is no physical border between Washington State in the United States and British Columbia in Canada that would prevent seed dispersal.

The plant-based remedies were evaluated for safety and efficacy with a non-experimental method, prior to including them in the draft outline. Published sources such as journal articles and

books and databases on pharmacology and ethnomedicine available on the Internet were searched to identify the plants' chemical compounds and clinically tested physiological effects. Searches were also conducted on the reported folk uses of the plants, and their preparation and administration in North America and Europe. For each species or genus the ethnomedicinal uses in other countries are given; then follows a summary of chemical constituents, in addition to active compounds if known.

2.1. Validation workshop

A participatory workshop held in October 2003 involved group discussion of the previously recorded ethnoveterinary remedies. Ten participants with experience in traditional human and ethnoveterinary medicine took part in the participatory five-day-long workshop hosted by the first author and a German ethnoveterinary consultant. In the workshop the facilitators asked participants very specific questions in a supportive environment about the medicinal plants used (Mundy and Mathias, 1997). Each animal/livestock species was covered in a morning or afternoon session. At each session the participants introduced themselves and their work and were acquainted with the participatory workshop method. The participants discussed the previously produced poultry/pets/ruminant/horse section of the research information. There were two editorial assistants/facilitators in attendance. After the discussions, the information on each species was edited. Two herbalists in the Vancouver Island community of Port Alberni were visited by the consultant and the first author and the edited information on poultry and pets was discussed with them.

None of the respondents was of native or non-European origin. The 2006 census puts the number of British immigrants in British Columbia at 12.3% (137,455) and those from Western Europe at 7.1% (79,975). The 2001 census of BC (2001) revealed that German was spoken by 8.5% (84,605) of British Columbia residents, French by 85.5%, Spanish and Italian by 2.8% each and Dutch by 2.7%. Other languages spoken by more than 1% of the European-origin populations are Polish, Russian, Portuguese and Ukrainian.

The author noted on many visits that informants possessed one or more of the works of Professor Nancy Turner of the University of Victoria, British Columbia. Additional field guides of native plants and occasionally books on ethnoveterinary medicine were also observed on bookshelves.

Literature searches for parallel uses of ethnoveterinary plants used in BC by First Nations and Native American tribes (using all of their alternate names) close to the Canadian border began in 2003 and ended in December 2012, after which a previous version of this paper was uploaded to ResearchGate as a dataset (Lans, 2013). Blocks of time were set aside during this period (2008–2011) to search online databases and digitized books for plant uses. The Hathi Trust Digital Library, Google Books, the Biodiversity Heritage Library, Internet Archive, JSTOR and Project MUSE were the chief sources of information. A Database of Foods, Drugs, Dyes and Fibers of Native American Peoples, Derived from Plants' at <http://naeb.brit.org/>, was used in 2016. The functionality of this last database has been improved recently so that a search of primary documents (requiring funding to visit libraries) is no longer necessary for this review paper and it can be published. Some Native American groups have had no anthropological or ethnobotanical research conducted on them or have yet to be included in the database for other reasons.

2.2. First Nations people and their folk medicines

Recent genetic research has suggested that all present-day Native Americans, including Amerindians and Athabascans, migrated to North America from Siberia in one to three migration

waves approximately 23 thousand years ago (Reich et al., 2012; Raghavan et al., 2015; Skoglund et al., 2015). In addition to this group that came from or through Siberia, there are some genetic links to a founding population linked to indigenous groups in Australia, Melanesia, and island Southeast Asia (Skoglund et al., 2015). Once in North America, ancestral Native Americans diversified into two main genetic branches about 13 thousand years ago. One of these groups is now dispersed across North and South America and the other is only found in North America (Raghavan et al., 2015). In this paper I treat First Nations and Native Americans as one group of people with different names on both sides of the border. First Nations are located in Canada and Native Americans in the United States of America. Some tribal groups lived on both sides of the border and have different names on each side. Some tribes are descended from and aligned to larger groups such as the Sioux or Delewares. In addition, tribes defeated in various Wars were assimilated into other tribes or moved to different territories, presumably taking their plant knowledge with them.

British Columbia is divided into Culture Areas with common archeological features. British Columbia's and Washington's coastal peoples belong to the Northwest Coast Culture Area and lived close to water (Turner, 1973, 1995, 2001a). They also established camping sites close to *Acer* spp. and/or *Betula* spp. and other food sources (Turner et al., 2003). Neighboring groups such as the Comox and Stait's Salish shared ethnobotanical traditions (Turner, 1995). The Nuxalk (Salish speaking) shared the plant

technology of their neighbors the Haisla, Heiltsuk and Kwakwaka'wakwe. Bella Coola is a Salishan language but at least 11 plant names are taken from the Kakiutl language suggesting a high degree of trade and other connections (Turner, 1973).

The Plateau Culture Area includes the Salishan peoples of the Interior Plateau and the Ktunaxa of eastern BC. The Subarctic Culture Area includes the Athapaskan groups of central and northern BC. The interior groups bordering the coastal area –the Lower Stl'at'imx, Lower Nlaka'pamux, Inland Tlingit, Gitksan and Nisga'a share many cultural features of the Northwest Coast Culture Area (Turner, 2001a). The coastal groups used interior plant products, and had exclusive access to coastal plant materials.

The Potawatomi, Ojibwe and Ottawa Indians are descendants of the Delewares. They lived in Ontario or in the Eastern US until they were driven to Wisconsin by the Iroquois (Smith, 1933). The ancestral lands of the Cree extended across Saskatchewan and Alberta (Mandelbaum, 1979). This brief introduction cannot include all of the First Nations and Native American groups whose knowledge appears in Tables 1 and 2.

Several plants of economic value were transplanted across North America (Smith, 2011). Turner and Loewen (1998) recorded that many plants were traded by First Nations groups and presumably with early settlers as well, but secret medicinal plant treatments did not become public knowledge until their success (or dangerous attributes) led to their notoriety; for example the use of cascara bark (*Frangula purshiana* Cooper) as a laxative.

Maps of the Native American and First Nation groups at the time of European contact are provided as Figs. 2–5.

Archeological records show that *Echinacea pallida* (Nutt.) Nutt. var. *angustifolia* DC., *Echinacea tenesseeensis* (Beadle) Small, *Portulaca oleracea* L., and *Urtica dioica* L., were used by Native Americans before the arrival of the Europeans (Small and Catling, 2000). The following plants were found in Native American middens and growing adjacent to Native American settlements: kelp (*Fucus vesiculosus* L.), salmonberry (*Rubus spectabilis* Pursh), blackberry and dewberry (*Rubus* spp.), blueberry and cranberry (*Vaccinium* species), *Acer circinatum* Pursh, *Sambucus racemosa* Linn., red-cedar (*Thuja plicata* Donn ex D. Don), salal (*Gaultheria shallon* Gr.), thimble berry (*Rubus odoratus* L.), wild strawberry (*Fragaria virginiana* Mill.), and bearberry (*Arctostaphylos uva-ursi* (L.) Spreng.) (Reagan, 1934; Smith, 2011).

Table 1
Ethnoveterinary remedies in BC used for pets that are similar to First Nations folk medicine.

Scientific name, botanical family, voucher no.	Ethnoveterinary use	First Nations ethnobotany use	Reference
<i>Achillea millefolium</i> L. (Compositae) JS041	Diarrhea, colds and flu, ear problems, detox blood	<i>Achillea lanulosa</i> plant infusion was used for coughs. The leaf tea was used for colds by the Cheyenne. The Mohegans used a leaf infusion for stomach problems, kidney disorders, liver problems	Grinnell, 1962; Tantaquidgeon et al., 1972
<i>Achillea millefolium</i> L. (Compositae) JS041	Diarrhea, colds and flu, ear problems, detox blood	The Bella Coola used chewed leaves of <i>Achillea millefolium</i> on burns. The Southern Carrier used the plant top decoction for colds. The Gitksan used the young plant top decoction in June and July for sore throats and the roots in other seasons. Makah chewed leaves as a blood purifier.	Smith, 1928a, 1928b; Gunther, 1973
<i>Arctium lappa</i> L. (Compositae) JB32	Skin conditions, rheumatism and joint pain, inhalent atopic dermatitis, seasonal allergies	The Forest Potawatomi used a tea from the root of <i>Arctium minus</i> as a general tonic and blood purifier. The Mohegans used <i>Arctium minus</i> Bernh., for rheumatism and winter colds	Smith, 1933; Tantaquidgeon et al., 1972
<i>Arctostaphylos uva-ursi</i> (L.) Spreng. (Ericaceae) JBCL6	A commercial formula of uva ursi/bearberry (<i>Arctostaphylos uva-ursi</i>), bilberry (<i>Vaccinium myrtillus</i>) and juniper berries (<i>Juniperus communis</i>) is used for urinary problems in pets	Berries were eaten for kidney disorders. A decoction of leaves and stems was taken as a tonic for kidneys by the Okanagan, Thompson, Okanagan-Colville	Moerman, 1998; Turner et al., 1990
<i>Crataegus rhipidophylla</i> Gand. (Rosaceae) not collected	Blood pressure, viral problems	The Forest Potawatomi used the <i>Crataegus rotundifolia</i> fruit for stomach complaints.	Smith, 1933
<i>Echinacea purpurea</i> (L.) Moench (Compositae) JBCL 07	snakebite	Used for snakebites by Native Americans. Used for poisons by the Dakota. Also <i>Echinacea angustifolia</i> DC and <i>Echinacea pallida</i> (Nutt.) Nutt	Moerman, 1982; Gilmore, 1991
<i>Equisetum palustre</i> L. (Equisetaceae) JB60	<i>Equisetum arvense</i> was a component of a blood pressure and kidney tea used for dogs	<i>Equisetum arvense</i> whole plant tea was used for kidney and bladder troubles by the Forest Potawatomi. The Menominis used horsetail tea for kidney troubles.	Smith, 1933; Kindscher, 1992
<i>Frangula purshiana</i> Cooper	Cascara bark is used for chronic constipation in cats	Coastal First Nations used cascara as a laxative.	Turner, 1973; Turner, 1995
<i>Frangula purshiana</i> Cooper (Rhamnaceae) not collected	Megacolon, constipation, cancer	The Forest Potawatomi used the inner bark of <i>Rhamnus alnifolia</i> L' Hér. for a physic.	Smith, 1933
<i>Gentiana lutea</i> L. (Gentianaceae) purchased product	worms, ear infections	<i>Gentiana flavida</i> root was used by the Forest Potawatomi to make a tea considered alternative (no purging or vomiting).	Smith, 1933
<i>Juniperus communis</i> L.	diarrhea	A decoction of roots, leaves, branches and bark of <i>Juniperus communis</i> was used for stomach pain and as a tonic by the Bella Coola; also by tribes in Nevada.	Teit and Steedman, 1986; Teit et al., 1900; Smith, 1928a, 1928b; Train, 1957
<i>Juniperus communis</i> L. (Cupressaceae) not collected	diarrhea	A compound decoction of <i>Juniperus communis</i> berries was used for diarrhea by the Kwakiutl. Debarked stem tea was used for diarrhea by the Woods Cree	Moerman, 1998; Marles et al., 2000
<i>Pinus contorta</i> Douglas ex Loudon (Pinaceae)	ditto	Pine tops of any pine species were used for colds, flu and pneumonia by the Lumbee. <i>Pinus strobus</i> plant was used for colds, cough, grippe, flu and scurvy by the Maritime, Micmac, Malécite, Mohegan, Montagnai.	Duke, 1986
<i>Pinus contorta</i> Douglas ex Loudon (Pinaceae)	ditto	<i>Pinus resinosa</i> inner bark was placed on the stomach for colds by the Tete-de-Boule. <i>Pinus contorta</i> and <i>Pinus banksiana</i> gum were chewed as cold medicine by the Cree.	Duke, 1986; Marles et al., 2000
<i>Pinus contorta</i> Douglas ex Loudon (Pinaceae)	ditto	<i>Pinus contorta</i> infusion of twigs with needles attached was used for influenza by the Thompson	Turner, 1990
<i>Pinus contorta</i> Douglas ex Loudon (Pinaceae)	Respiratory problems, heart problems	The Southern Carrier boiled new shoots and drank the decoction for stomach pains. The pith of <i>Pinus contorta</i> was chewed and the saliva swallowed for a cough by the Sikani. The Northern Carrier boiled needle tips of <i>Pinus contorta</i> with other plants for constitutional weakness.	Smith, 1928a, 1928b
<i>Pinus ponderosa</i> Douglas ex Lawson (Pinaceae) JB98	Respiratory problems, heart problems	The pitch of <i>Pinus banksiana</i> and <i>Pinus trobus</i> from the wood and bark were used by the Forest Potawatomi as ointments. The leaves were used as a fumigant, and to clear the lungs of congestion. They used the leaves of <i>Pinus resinosa</i> as a reviver.	Smith, 1933;
<i>Rubus ursinus</i> Cham. & Shlecht. JS115 JS115 and <i>Rubus laciniatus</i> Willd. (Rosaceae)	Pregnancy, digestive problems, wound wash	The Forest Potawatomi used <i>Rubus idaeus</i> decoction of the leaves or flowers for diarrhea, dysentery and cholera. The leaves were also used as a wash for leucorrhoea, gonorrhoea and prolapsed uterus.	Smith, 1933

Table 1 (continued)

Scientific name, botanical family, voucher no.	Ethnoveterinary use	First Nations ethnobotany use	Reference
<i>Rubus ursinus</i> <i>Rubus laciniatus</i>	Pregnancy, digestive problems, wound wash	The Bella Coola drank the root bark of <i>Rubus spectabilis</i> for stomach problems. <i>Rubus chamaemorus</i> root and stem decoction was used by the Woods Cree to remedy barrenness or aid a woman in hard labor.	Smith, 1928a, 1928b; Marles et al., 2000
<i>Rumex acetosella</i> L. JS047, <i>Rumex crispus</i> L. (Polygonaceae) JS116	Skin problems, liver problems, urinary problems, constipation, diarrhea	<i>Rumex britannica</i> root was used by the Forest Potawatomi as a blood purifier. The Shoshone used <i>Rumex venosus</i> as a physic. Mohegan used <i>Rumex hispidus</i> L. juice for dysentery, chewed leaves for stomach problems, cooked <i>Rumex crispus</i> L., leaves to purify the blood and make a tonic.	Smith, 1933; Murphey, 1959; Tantaquidgeon et al., 1972
<i>Rumex acetosella</i> , <i>Rumex crispus</i>	Skin problems, liver problems, urinary problems, constipation, diarrhea	<i>Rumex altissimus</i> was used by the Lakota for stomach cramps and diarrhea. The Omaha used it as a poultice on boils. <i>Rumex mexicanus</i> decoction was used by the Blackfeet for swellings. <i>Rumex hymenosepalus</i> root was used by the Pawnee for diarrhea.	Kindscher, 1992
<i>Salix lucida</i> Muhl. (Salicaceae) not collected	Inflammation, pain, articular cartilage injury, detoxification,	The Forest Potawatomi used <i>Salix discolor</i> bark and <i>Salix petiolaris</i> as universal remedies. The Bella Coola drank <i>Salix lasiandra</i> branch ashes in water for diarrhea and the inner bark for wounds. They also used <i>Salix scouleriana</i> for wounds. The roasted crushed roots of <i>Rumex occidentalis</i> were used for poultices by the Bella Coola. The leaves were used in sweat baths for rheumatism.	Smith, 1933; 1928a, 1928b
<i>Solidago virgaurea</i> L., (Compositae) not collected	Part of a blood pressure and kidney tea used for dogs	<i>Solidago canadensis</i> leaves and stems were boiled and used for kidney and bladder problems by the Dene.	Marles et al., 2000
<i>Thuja occidentalis</i> L. (Cupressaceae) not collected	Skin conditions	<i>Thuja occidentalis</i> leaves were made into a poultice by the Forest Potawatomi.	Smith, 1933
<i>Urtica dioica</i> L. (Urticaceae) JS023	Detoxification, kidney tonic, malformed kidneys, urinary problems	The Gitksan drank a decoction of the entire plant for many ailments including hemorrhage and bladder troubles.	Smith, 1928a, 1928b
<i>Urtica dioica</i> L. (Urticaceae) JS023	Detoxification, kidney tonic, malformed kidneys, urinary problems	The stem or root decoction was taken by men of the Northern Cree who have trouble urinating.	Marles et al., 2000
<i>Urtica dioica</i> L. (Urticaceae) JS023	Detoxification, kidney tonic, malformed kidneys, urinary problems digestive problems, rheumatism, joint pain, articular cartilage injury	<i>Urtica lyallii</i> leaf or root tea was used by the Forest Potawatomi to make a tea to treat fevers. The Bella Coola used <i>Urtica lyallii</i> to sting paralysed limbs. They also used it in sweat baths for rheumatism as a second choice to <i>Rumex occidentalis</i> . The roots are used by the Northern Cree to treat severe back pain.	Smith, 1928; 1933; Marles et al., 2000
<i>Vaccinium parvifolium</i> Sm. (Ericaceae) JS045	Urinary problems, conjunctivitis	<i>Vaccinium vitis-idaea</i> berries were used to “clean out the stomach”, and the root and stem decoction was used for bladder problems by the Cree and Dene.	Marles et al., 2000
<i>Vaccinium parvifolium</i> Sm. (Ericaceae) JS045	Urinary problems, conjunctivitis	The Forest Potawatomi used the root bark of <i>Vaccinium canadense</i> as a medicine.	Smith, 1933
<i>Valeriana officinalis</i> L. (Caprifoliaceae) JS008	Urinary problems, heart problems	A decoction of roots from a young valerian plant was used as a tonic by the Cree for someone who felt bad. <i>Valeriana dioica</i> root was kept in the mouth or chewed to treat severe heart trouble by the Cree.	Marles et al., 2000

Elders of the Saanich and Cowichan Coast Salish people of southern Vancouver Island treat, or have treated in the recent past, many ailments with bark preparations (Turner and Hebda, 1990). Respiratory ailments were treated with bark of *Abies grandis* Douglas ex D. Don, *Arbutus menziesii* Pursh, *Cornus nuttallii* Audubon ex Torr. & A. Gray, *Prunus emarginata* (Douglas ex Hook.) Walp, *Pseudotsuga menziesii* (Mirb.) Franco and *Quercus garryana* Douglas ex Hook. Digestive tract ailments were treated with the bark of *Abies grandis*, *Alnus rubra* Bong., *Arbutus menziesii*, *Malus fusca* (Raf.) C. K. Schneid., *Oemleria cerasiformis* (Torr. & A. Gray ex Hook. & Arn.) J. W. Landon, *Populus tremuloides* Michx., *Pseudotsuga menziesii*, *Frangula purshiana* Cooper and *Rubus spectabilis* Pursh. Gynecological problems were treated with the bark of *Abies*

grandis, *Arbutus menziesii*, *Populus tremuloides*, *Prunus emarginata*, *Pseudotsuga menziesii* and *Sambucus racemosa* L. Dermatological complaints were treated with the bark of *Mahonia* spp., *Rubus spectabilis*, and *Symphoricarpos albus* (L.) S. F. Blake. One Nation used medicinal preparations from *Arbutus menziesii* bark and leaves for colds, stomach problems, as a post-childbirth contraceptive, and in a ten-ingredient bark medicine for tuberculosis and spitting up blood (Turner and Hebda, 1990). Tree barks have also been used to treat fevers, diabetes, kidney problems, sore eyes, and hemorrhaging, and also used as general tonics. In most cases, infusions or decoctions of barks are used in First Nations ethnomedicines. The medicines are drunk or applied externally as a wash.

Table 2

Ethnoveterinary remedies in BC used for ruminants, poultry, rabbits and horses that are compared to First Nations folk medicine.

Scientific name, botanical family, voucher specimen code	Part (s) used	Animal species	Ethnoveterinary use	Preparation/administration	First Nations/Native American ethnobotany use	Nation	Reference
<i>Abies grandis</i> (Dougl. Ex D. Don) Lindl. (Pinaceae) (not collected)	branch	goat	body heat	fed, browse	<i>Abies balsamea</i> and <i>Abies lasiocarpa</i> inner bark decoction was used for colds and the sap decoction was a cure all. Cough medicine, tonic and laxative for the Kwakiutl.	Cree, Dene; Bella Coola	Marles et al., 2000; Turner and Bell, 1973; Turner, 1990
<i>Abies grandis</i> (Dougl. Ex D. Don) Lindl. (Pinaceae) (not collected)	branch	goat	body heat	fed, browse	Balsam gum was eaten for colds and the Paiute and Washoe in Nevada ate the resin for tuberculosis or colds.	Potawatomi, Ojibwa, Menominee; Thompson	Moerman, 1982; Smith, 1933; Turner, 1990
<i>Abies grandis</i> (Dougl. Ex D. Don) Lindl. (Pinaceae) (not collected)	branch	goat	body heat	fed, browse	<i>Abies lasiocarpa</i> inner bark was eaten. The inner bark of <i>Abies grandis</i> was eaten; bark infusion taken as an anti-aging tonic.	Thompson	Turner, 1990; Teit and Steedman, 1986; Teit et al., 1900
<i>Acer macrophyllum</i>	6-inch sticks	rabbit	tooth health	fed	<i>Acer rubrum</i> inner bark was used as a stimulant. A hair tonics for the Kwakiutl	Appalachia	Bolyard, 1981; Turner and Bell, 1973
<i>Acer macrophyllum</i> Pursh, (Sapindaceae) JB26	inner bark	goat	body heat	browse	<i>Acer macrophyllum</i> young shoots were eaten raw in spring.	Thompson	Turner, 1990
<i>Achillea millefolium</i> L. (Compositae) JS041	Aerial parts	horse	fever	paste	Leaves chewed to produce sweating at childbirth, for sore chest and stomach problems. Root decoction as a cold remedy	Makah, Cowlitz	Gunther, 1973; Ray, 1932
<i>Achlys triphylla</i> DC. (Berberidaceae) JS018	leaves	ruminants	insect repellent	hung	<i>Achlys triphylla</i> DC., leaves were used as an insecticide and a leaf decoction was used for lice.	Saanich, N; Iaka'pamux, Thompson	Turner, 1979; Turner and Loewen, 1998
<i>Alnus rubra</i> Bong. (Betulaceae) JB108	6-inch sticks	rabbit	tooth health	fed	Teeth were cleaned with burnt ashes of alder and birch, <i>Alnus rubra</i> , <i>Alnus tenuifolia</i> , <i>Alnus crispa</i> ssp. <i>sinuata</i> . The roots of <i>Alnus rugosa</i> were used for toothache.	Okanagan; Algonquin	Turner and Loewen, 1998; Turner and Bell, 1973; Duke, 1986
<i>Alnus rubra</i> Bong. (Betulaceae) JB108	branch	goat	body heat	fed, browse	The bark was held in the mouth for blood spitting by the Kwakiutl. Rotten wood rubbed on body for aching bones.	Okanagan	Turner and Loewen, 1998; Turner and Bell, 1973; Gunther, 1973
<i>Arbutus menziesii</i> Pursh (Ericaceae) JB24	fresh & dried leaves	goat	body heat	fed, browse	<i>Arbutus menziesii</i> leaves were chewed for strength.	Halkomelem	Turner, 1990
<i>Arctostaphylos uva ursi</i> (L.) Spreng. (Ericaceae) JBCL6	aerial parts	horses	urinary problems	fed	<i>Arctostaphylos uva ursi</i> upper parts were made into an infusion for "back pain" or "disordered kidneys".	Cheyenne	Grinnell, 1962
<i>Artemisia dracuncululus</i> L. (Compositae) JS025	aerial parts	large animals and poultry.	endoparasites	fed	<i>Artemisia</i> spp., and <i>Artemisia nova</i> teas are used as a physic. Various infusions of stem, seed pods and leaves of <i>Artemisia tridentata</i> Nutt., were taken as a laxative.	Paiute; Sanpoil	Murphey, 1959; Ray, 1932
<i>Berberis aquifolium</i> Pursh (Berberidaceae) JB79	root	horses	abscesses	infusion	<i>Berberis repens</i> root infusion was used on sores on horses.	Blackfeet	Hellson, 1974
<i>Berberis aquifolium</i> Pursh (Berberidaceae) JB79	Root	goat	abscess	decoction	<i>Mahonia aquifolium</i> was used as a tonic for the blood. Shredded bark used as an antihemorrhagic	Thompson; Okanagan-Colville; Kwakiutl	Turner, 1990; Turner et al., 1980; Turner and Bell, 1973
<i>Berberis aquifolium</i> Pursh (Berberidaceae) JB79					Dermatological complaints are treated with the bark of <i>Mahonia</i> spp.	Salish	Turner and Hebda, 1990
<i>Blechnum spicant</i> (L.) Sm. (Blechnaceae) not collected	fronds	goat	magnesium supplement	browse	<i>Blechnum spicant</i> was eaten to relieve hunger when lost, for stomach distress and as a tonic. The Kwakiutl used a root decoction for diarrhea.	Makah, Nootka, Nitinaht	Turner, 1983; Turner and Bell, 1973; Gunther, 1973
<i>Bovista pila</i> Berk. & M. A. Curtis (Agaricaceae) JB1	gleba	goat	wound dressing	poultice	Prairie mushrooms were gathered and kept for use as a styptic for any wounds, Spores of <i>Bovista pila</i> Berk. & M. A. Curtis were used on wounds	Pawnee, Dakota, Ponca, Omaha; Bella Coola	Gilmore, 1991; Smith, 1928a, 1928b; Marles et al., 2000

<i>Bovista pila</i> Berk. & M. A. Curtis (Agaricaceae) JB1					The closely related <i>Lycoperdon</i> spp., also referred to as puffballs were used to stop bleeding cuts and wounds.	Blackfeet, Kiowas	Weiner, 1972
<i>Dolichousnea longissima</i> (Ach.) Articus (Parmeliaceae) JB2a	branch	goat	wound dressing	poultice	<i>Dolichousnea longissima</i> (Ach.) Articus is used as a wound dressing.	Nitinaht	Turner, 1983
<i>Epilobium angustifolium</i> L. (Onagraceae) not collected	plant	goat	winter feed	browse	<i>Epilobium angustifolium</i> young shoots and stalks were eaten raw	Okanagon, Bella Coola, Thompson	Turner, 1973; Turner, 1990
<i>Epilobium angustifolium</i> L. (Onagraceae) not collected					<i>Epilobium angustifolium</i> was thought to be good food for horses and deer.	Okanagan-Colville	Turner et al., 1980
<i>Equisetum palustre</i> L. (Equisetaceae) JB60	aerial parts	horse	arthritis	feed	<i>Equisetum arvense</i> powdered stems are given to horses to perk them up.	Blackfeet	Hellson, 1974
<i>Frangula purshiana</i> Cooper, (Rhamnaceae)	bark	goat	A laxative for pets including rabbits.	laxative	Tincture; decoction of bark as a cathartic	Quillayute, Kwakiutl; Sanpoil	Reagan, 1934; Turner and Bell, 1973; Ray, 1932
<i>Gaultheria shallon</i> Pursh (Ericaceae) JS100	plant	goat	ruminant stimulant	fed	<i>Gaultheria procumbens</i> leaves were chewed to alleviate hunger and were considered to be good for the blood and for overall health.	Nitinaht; Kwakiutl	Turner, 1983; Fenn et al., 1978; Turner and Bell, 1973
<i>Gaultheria shallon</i> Pursh (Ericaceae) JS100					A tea of <i>Gaultheria procumbens</i> was drunk to feel good and as a panacea.	Ojibwa, Delaware, Ir-quois, Tete-de-Boule	Duke, 1986
<i>Gaultheria shallon</i> Pursh (Ericaceae) JS100					Deer chewed leaves of <i>Gaultheria shallon</i> and used them on bullet wounds. A leaf tea of <i>Gaultheria procumbens</i> was used for fevers and contains methyl salicylate.	First Nations; Forest Potawatomi, Bella Coola	Turner, 1997; Smith, 1933; 1928a, 1928b
<i>Glycyrrhiza glabra</i> L. (Fabaceae) not collected	root	horse	muscle soreness	tea or hot mash	<i>Glycyrrhiza lepidota</i> root was used to treat windgalls in horses (a tumor or swelling on the fetlock joint).	Blackfeet	Hellson, 1974
<i>Juniperus communis</i> L. (Cupressaceae)	branch	goat	endoparasites	fed	A strong decoction of cones of <i>Juniperus scopulorum</i> was used to kill horse ticks. Berry decoction for diarrhea and wood& bark decoction as a blood purifier	Nlaka'pamux; Kwakiutl	Turner and Loewen, 1998; Steedman and Teit, 1930; Turner and Bell, 1973
<i>Juniperus communis</i> L. (Cupressaceae)	branch	goat	endoparasite	fed	decoction fruits and leaves of <i>Juniperus virginiana</i> L., given to horses for coughs	Dakota	Gilmore, 1991
<i>Lonicera caprifolium</i> L. (Caprifoliaceae) not collected	plant	goat	winter feed	browse	<i>Lonicera involucrate</i> buds were eaten as a tonic. Plant was used in sweatbaths for arthritis and rheumatism	Nitinaht; Kwakiutl	Turner, 1983; Turner and Bell, 1973
<i>Lonicera caprifolium</i> L. (Caprifoliaceae) not collected					<i>Lonicera canadensis</i> vine decoction was used as a diuretic.	Montagnai, Potawatomi	Duke, 1986
<i>Lupinus</i> spp. (Fabaceae) JBCL12	Plant	goat	endoparasites	self-medication	Horses self medicate with <i>Lupinus polyphyllus</i> . Deer feed on <i>Lupinus</i> spp., and it was favored by horses and less so by cattle.	Thompson	Turner, 1990; Steedman and Teit, 1930
<i>Pinus contorta</i> Dougl. Ex Loud. var. <i>latifolia</i> Engelm. (Pinaceae) not collected	needles and young bark	pet	colds	infusion	The cambium of <i>Pinus ponderosa</i> was used for stomach problems and food.	Okanagan-Colville; Coeur d'Alene	Turner et al., 1980; Teit and Steedman, 1928
<i>Pinus ponderosa</i> Douglas ex C. Lawson (Pinaceae) JB98	branches	goat	diarrhea	fed	Cambium layer and nuts were food	Sanpoil; Coeur d'Alene	Ray, 1932; Teit and Steedman, 1928
<i>Polystichum munitum</i> (Kaulf.) C. Presl (Polypodiaceae) JS47	aerial parts	goats	stimulate digestion	fed	<i>Polystichum acrostichoides</i> cold root infusion was used for dyspepsia.	Cherokee	Duke, 1986
<i>Potentilla recta</i> L. (Rosaceae) JB93	plant	goat	diarrhea and loss of appetite	self-medication	<i>Potentilla simplex</i> was used for debility, acute diseases and fever.	Cherokee	Duke, 1986
<i>Potentilla recta</i> L. (Rosaceae) JB93	plant	goat	diarrhea, appetite loss	self-medication	<i>Potentilla norvegica</i> was used as a cold infusion for pain.	Navajo	Duke, 1986
<i>Potentilla recta</i> L. (Rosaceae) JB93	plant	goat	diarrhea, appetite loss	self-medication	Ground Cinquefoil root decoction is taken for blood in the stool.	Chiricahua Apache	Opler, 1959
<i>Potentilla recta</i> L. (Rosaceae) JB93	plant	goat	diarrhea, appetite loss	self-medication	<i>Potentilla glandulosa</i> decoction or infusion of whole plant or leaves was drunk as a stimulant and tonic.	Okanagon, Thompson	Steedman and Teit, 1930
<i>Potentilla recta</i> L. (Rosaceae) JB93	plant	goat	diarrhea, loss of appetite	self-medication	<i>Potentilla fruticosa</i> was used as an emetic for stomach disorders.	Blackfeet	Kindscher, 1992
<i>Potentilla recta</i> L. (Rosaceae) JB93	plant	goat	diarrhea, loss of appetite	self-medication	Northwest cinquefoil pounded root infusion was used for diarrhea.	Okanagan-Colville	Moerman, 1998

Table 2 (continued)

Scientific name, botanical family, voucher specimen code	Part (s) used	Animal species	Ethnoveterinary use	Preparation/administration	First Nations/Native American ethnobotany use	Nation	Reference
<i>Potentilla recta</i> L. (Rosaceae) JB93	plant	goat	diarrhea, loss of appetite	self-medication	<i>Potentilla monspeliensis</i> was used as a medicine. The roots of <i>Potentilla glandulosa</i> were used internally.	Forest Potawatomi, Go-siute of Utah	Smith, 1933; Chamberlin, 1911
<i>Potentilla recta</i> L. (Rosaceae) JB93	plant	goat	Diarrhea, loss of appetite	self-medication	The whole cooked plant of <i>Potentilla</i> spp., was used as a laxative.	Paiutes	Murphey, 1959
<i>Pseudotsuga menziesii</i> (Mirb.) Franco (Pinaceae)	branch	goat	endoparasites	fed	<i>Pseudotsuga menziesii</i> decoction of first-year growth and shoots are used as a tonic, and emetic for anemia and high fever.	Okanagan- Colville, Thompson	Turner et al., 1980; Steedman and Teit, 1930
<i>Pseudotsuga menziesii</i> (Mirb.) Franco (Pinaceae) JS049	branch	goat	coccidia	fed	A gum decoction of <i>Pseudotsuga taxifolia</i> was used as a diuretic for gonorrhoea and stomach problems. <i>Pseudotsuga menziesii</i> gum was used for intestinal pains and diarrhea. Digestive tract ailments were treated with <i>Pseudotsuga menziesii</i> bark.	Bella Coola, Salish; Kwakiutl	Smith, 1928a, 1928b; Turner, 1973; Turner and Hebda, 1990; Turner and Bell, 1973
<i>Rubus idaeus</i> L. (Rosaceae) not collected	leaves	goat	Pregnancy feed	fed fresh or dry	<i>Rubus occidentalis</i> was used for female weakness and stomachache. <i>Rubus pensylvanicus</i> root decoction was used for dysmenorrhoea.	Chippewa, Ojibwa	Duke, 1986
<i>Rubus idaeus</i> L. (Rosaceae) not collected					Leaf tea of <i>Rubus idaeus</i> was given to women giving birth and postpartum. <i>Rubus idaeus</i> astringent was used on displaced wombs. The dried pounded root was used as a wound poultice	Cree, Dene, Woods Cree; Cheyenne	Duke, 1986; Marles, 2000; Grinnell, 1962
<i>Rubus idaeus</i> L. (Rosaceae) not collected					A tea of boiled branches of <i>Rubus idaeus</i> was drunk as a physic and for diarrhea.	Okanagan-Colville	Turner et al., 1980
<i>Rubus parviflorus</i> Nutt. (Rosaceae) JB25, <i>Rubus discolor</i> Weihe & Nees JS028, <i>Rubus ursinus</i> Cham. & Schlecht. JS115, <i>Rubus laciniatus</i> Willd. (Rosaceae) JB55, <i>Rubus spectabilis</i> Pursh (Rosaceae) JB 038	plant	goat	winter feed	browse	<i>Rubus allegheniensis</i> was used for diarrhea, and the root for stomach upsets.	Delaware, Fox	Duke, 1986
<i>Rubus urisinus</i> JS115 and <i>R. laciniatus</i> , (Rosaceae) JB 55	leaves	horse	colic	fed fresh or dry	<i>Rubus allegheniensis</i> stalk decoction was taken as a diuretic. The root decoction was antidiarrheal and was used if the pregnancy was threatened.	Ojibwa	Duke, 1986
<i>Rubus ursinus</i> Cham. & Schlttdl. (Rosaceae) JS115					Children with bowel trouble were given the boiled root of black raspberry.	Omaha, Osages	Kindscher, 1992
<i>Rubus ursinus</i> Cham. & Schlttdl. (Rosaceae) JS115					Blackberry root tea was used for diarrhea and stomach pains.	Kiowa-Apache	Kindscher, 1992
<i>Rumex crispus</i> L. (Polygonaceae) JS116	leaves	horses	skin rashes	topical	The pounded root was applied to saddle sores in Nevada. Poultice of green leaves of <i>Rumex altissimus</i> applied to boils.	Pawia was used in Smoky Valley, Nevada. Dakota	Murphey, 1959; Gilmore, 1991
<i>Salix alba</i> L., <i>Salix scouleriana</i> Barratt ex Hook., <i>Salix lucida</i> Muhl. (Salicaceae)	powdered bark	horse	muscle soreness	decoction	<i>Salix lucida</i> and <i>Salix amygdaloides</i> branch tip decoctions are used for cramps in legs and feet.	Okanagan-Colville	Turner et al., 1980
<i>Salix alba</i> , Scoulers <i>Salix scouleriana</i> , Pacific <i>Salix lucida</i> Muhl. (Salicaceae)	branches	goat, horses	arthritis and pain	fed, self-medication	"Dwarf willow with yellow catkins" (a plant not identified to Species level, pg. 471) was used hot as a wash for the body or for sitting in to subdue pain and reduce swellings.	Thompson	Steedman and Teit, 1930
<i>Salix</i> spp.	6-inch sticks	rabbit	tooth health	fed	Willow sticks were used to clean the teeth daily.	Okanagan-Colville	Turner et al. 1980
<i>Sambucus racemosa</i> L. (Adoxaceae)	plant	goats	feed	browse	A root bark decoction of <i>Sambucus racemosa</i> was used for stomach problems. The root or bark decoction was used as a	Bella Coola, The Southern and Northern Carrier, Si-kani, Gitksan, Forest	Smith, 1928; 1933

<i>Sambucus racemosa</i> L. (Adoxaceae)	plant	goats	fed	browse	purgative. The Forest Potawatomi used the inner bark of <i>Sambucus racemosa</i> as a physic with some fatalities.	Potawatomi	
					The Mohegans used elder (<i>Sambucus nigra</i> ssp. <i>canadensis</i> (L.) R. Bolli) for colic and as an emetic, the Menominees drank the flower tea for fevers and the Houma used a bark decoction for inflammations.	Various groupps	Weiner, 1972 ; Reagan, 1934 ; Tantaquidgeon et al., 1972
<i>Symphoricarpos albus</i> (L.) S. F. Blake (Caprifoliaceae) JS037				browse	<i>Sambucus callicarpa</i> Greene bark or root tea was given to women in confinement by the Hoh and Quileutes.	Okanagan-Colville	Turner et al., 1980
<i>Symphoricarpos albus</i> (L.) S. F. Blake (Caprifoliaceae) JS037	branch	sheep	endoparasites	fed	The entire plant of <i>Symphoricarpos albus</i> was brewed and drunk as a physic to clean out the system.	Okanagan-Colville; Thompson; Sanpoil	Turner et al., 1980 ; Turner, 1990 ; Teit and Steedman, 1986 ; Teit et al., 1900 ; Ray, 1932
<i>Taxus canadensis</i> Marshall or <i>T. brevifolia</i> Nutt. (Taxaceae)	branches	goat	feed	browse	The sap of young shoots of <i>Symphoricarpos albus</i> was used as a laxative and for stomach aches. Decoction of roots used for illness.	Thompson	Turner, 1990
<i>Thuja plicata</i> Donn ex D. Don (Cupressaceae) JBR 21	Branch; inner bark & fronds	goat	Endoparasites, body heat	fed, browse	<i>Taxus brevifolia</i> bark decoction was used for "any illness"	Coast Salish	Turner, 1995
<i>Tsuga heterophylla</i> (Raf.) Sarg. (Pinaceae) JB113	branch	goat	pregnancy feed	fed, browse	The cambium of <i>Tsuga heterophylla</i> was used as food.	Thompson; Nitinaht	Turner, 1990, 1983
<i>Tsuga</i> sp. (Pinaceae)	branch	goat	body heat	browse	The bark decoction of <i>Tsuga heterophylla</i> was used for colds and influenza. The young tips of <i>Tsuga heterophylla</i> branches were chewed to alleviate hunger.	Forest Potawatomi, Menominees	Weiner, 1972
<i>Tsuga</i> sp. (Pinaceae)					A tea of the inner bark was drunk to induce sweating and relieve colds and fevers. Hunters woke refreshed from beds of hemlock boughs.	Bella Coola, Gitksan, Haisla, coast Salish	Moerman, 1998
<i>Zanthoxylum americanum</i> Mill. (Rutaceae) not collected	bark	horses	remove lactic acid from muscles	fed	<i>Tsuga heterophylla</i> inner bark was eaten in winter.	Pawnee; Mohegan	Moerman, 1982 ; Tantaquidgeon et al., 1972
					Prickly ash berries were used as a diuretic for horses. Bark infusion for heart problems.		



Fig. 2. Languages of British Columbia First Nations. Prepared by Turner (1997).

2.3. Ecoregions in the research area

The Lower Mainland ecoregion includes the Cascade Range, the Fraser River delta and the Georgia Lowland (Environment Canada, n.d). The mean annual temperature ranges from 3.5 °C to 15 °C. Mean annual precipitation ranges from 850 mm to 2000 mm at higher elevations and in winter (rain). Native vegetation is typically Douglas-fir (*Pseudotsuga menziesii*) with an understory of salal (*Gaultheria shallon* Pursh), Oregon grape (*Berberis nervosa* Pursh), and mosses (*Eurhynchium oreganum* (Sull.) A. Jaeger, *Leucopis acanthoneuron* (Schwägr.) Lindb., *Rhytidiadelphus triquetrus* (Hedw.) Warnst.). Drier areas contain Douglas-fir, western hemlock (*Tsuga heterophylla* (Raf.) Sarg.), dogwood (*Cornus sericea* L.), red alder (*Alnus rubra*) and arbutus (*Arbutus menziesii*). Wet sites support western red cedar (*Thuja plicata*). Lower elevations contain alder (*Alnus rubra* Bong.), cedar, fir (*Abies grandis*) and big leaf maple (*Acer macrophyllum*). Wet areas contain *Salix* species. Douglas fir also grows together with Scouler willow (*Salix scouleriana* Barratt ex Hook.) and huckleberry (*Vaccinium parvifolium* Sm.) (Ray, 1938; Turner et al., 2003).

The Thompson–Okanagan ecoregion is one of the warmest and driest ecoregions in Canada. It includes the valley systems of the

Okanagan, Thompson and Nicola rivers. The mean annual temperature of the major valleys is approximately 6 °C with a summer mean of 15 °C (high of 27.2 °C) and a winter mean of –3.5 °C. The mean annual precipitation ranges 250–300 mm in the major valleys, plateau regions receive 400–600 mm and more than 1000 mm falls in subalpine and alpine areas. Engelmann spruce (*Picea engelmannii* Parry ex Engelm.), subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.), and lodgepole pine (*Pinus contorta* Douglas ex Loudon) grow in subalpine areas. Lower elevations contain aspen (*Populus tremuloides* Michx.), white spruce (*Picea glauca* (Moench) Voss), and Douglas-fir. *Artemisia tridentata* Nutt, and several other sagesworts and wormwoods cover large areas.

3. Results

Seven of the participants had goats, five had poultry (chickens, turkeys), a few had cows, seven had horses, four either bred dogs or sold products for dogs, thirteen were holistic practitioners or herbalists and ten were small animal veterinarians using standardised products. One of the organic farmers ran a historical farm open to visitors in the summer and one herbalist taught short

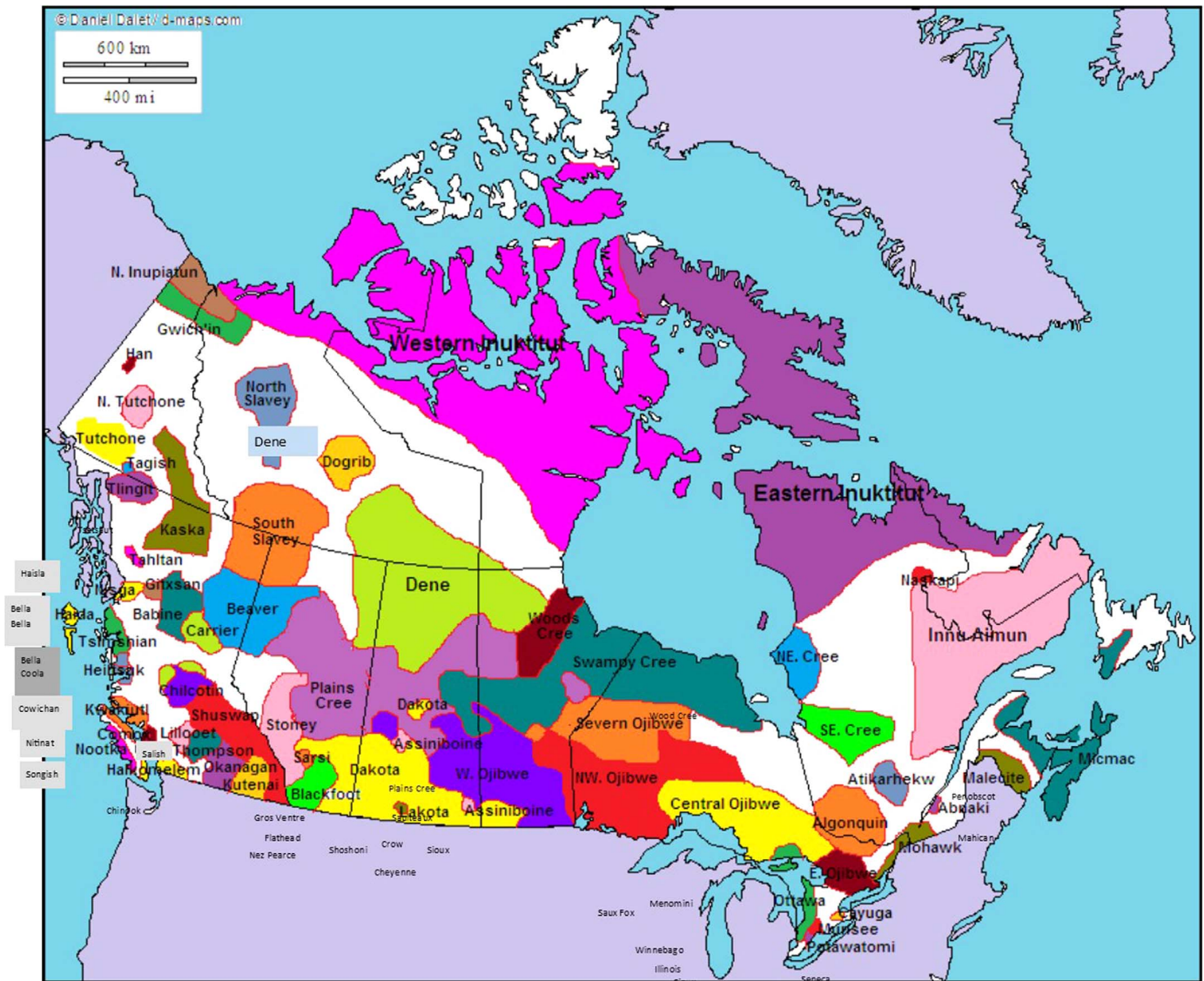


Fig. 3. Canada First Nations. 7.

Source: Handbook of North American Indians, Vol.

courses in herbal medicine. One respondent lived in humble circumstances and had Internet access and books from the public library. One hundred and twenty eight plants were used for ruminants. Nineteen plants from 12 plant families were used for poultry parasite control, and 11 plants from eight families were used for parasite control in rabbits. Ninety-seven plants were used to treat horses. Respondents with horses used purchased standardized horse-specific products while goats and sheep were medicated or self-medicated with the Pinaceae,

Cupressaceae and Ericaceae. Six plants were used to replace antibiotics in pets. Ten plants were used to treat cardiac problems in pets. Sixteen plants were used to treat stomach problems in pets. Eleven plants were used to treat pets with seasonal allergies, inhalant atopic dermatitis and asthma. Twenty-one plants were used to treat pets with viral infections. Thirty-one plants were used to make the lives of pets (mostly dogs) with cancer more comfortable. Eighteen plants were used for respiratory conditions of pets. Twenty two plants were used for digestive problems in pets. Fifteen plants were used to treat endoparasites in pets. Five plants were used for reproductive health in pets. Thirty plants were used for kidney, liver and urinary problems in pets.

In Tables 1 and 2, plants with more than one ethnoveterinary

use have multiple table cells to make the comparisons between current and historical uses easier. In other cases multiple table cells represent multiple First Nations and Native American uses that are similar but not an exact match to ethnoveterinary uses in British Columbia. In Table 1 the ethnoveterinary remedies used for pets in BC is presented in column 2 and compared to First Nations/ Native American ethnobotany uses in column 3. In Table 2 the ethnoveterinary remedies used for larger species such as horses and ruminants is detailed in columns 2 – 5 and the comparable First Nations/Native American use is documented in column 6.

Table 1 compares the plants used for pets (dogs, cats, one raccoon) to historical North American plant uses. The discussion is grouped by plant use, not on a geographical or tribal basis.

Table 2 lists the ethnoveterinary remedies used for large animals, rabbits and poultry that are compared to historical North American ethnobotany.

4. Discussion and conclusion

Exact parallels between ethnoveterinary medicine and folk medicine were found and the many comparable uses are

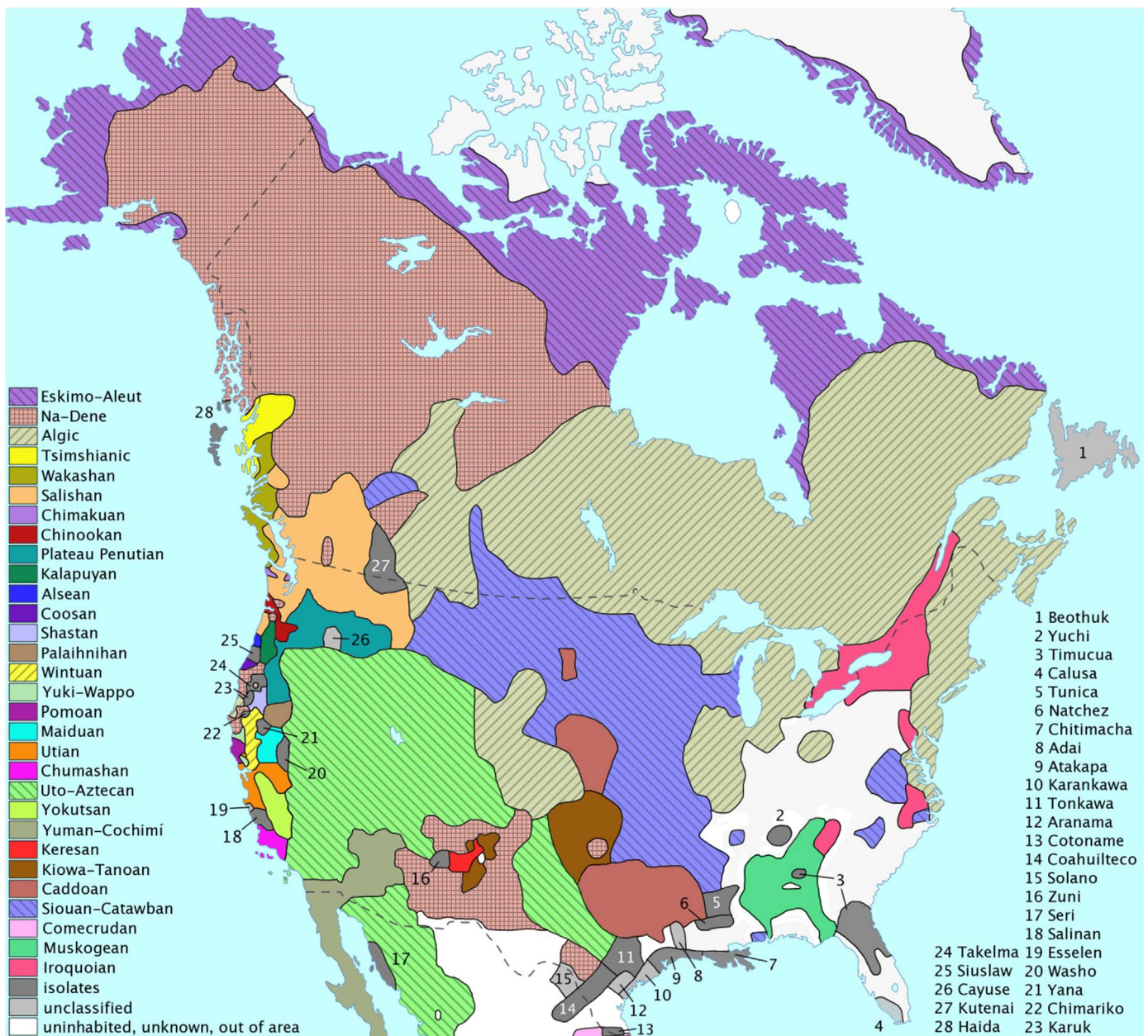


Fig. 4. Tribal distributions in and near Canada at time of contact, Canada's First Nations – A history of Founding Peoples from Earliest Times, O. Dickason, McClelland & Stewart Inc. 1992. Author: Nettheim, Garth. download date July 1, 2012.

considered to be indications of borrowings and adaptations (Tables 1 and 2). Some of the plants used for pets that have exact parallels in First Nations/Native American ethnobotany are *Achillea millefolium* L., for colds, the plants used for urinary problems - *Arctostaphylos uva-ursi* (L.) Spreng., (also used for large animals), *Vaccinium parvifolium* Sm., and *Solidago virgaurea* L., for urinary problems, *Frangula purshiana* Cooper, as a laxative, *Echinacea purpurea* (L.) Moench for snakebites, *Juniperus communis* L., and *Rumex crispus* L., for diarrhea, *Pinus contorta* Douglas ex Loudon and *Pinus ponderosa* Douglas ex C. Lawson for respiratory problems, various *Rubus* species for healthy pregnancies in large and small animals, and *Valeriana officinalis* L., for heart problems.

Parallels between First Nations/native American folk medicine and ethnoveterinary remedies used for farm animals and horses were *Acer macrophyllum*, *Epilobium angustifolium* and *Lonicera caprifolium* used as stimulants and tonics for goats; *Achlys triphylla* as a fly repellent in barns, *Alnus rubra* for rabbit dental care,

Berberis aquifolium and *Rumex crispus* to treat sores and rashes on horses, *Pinus ponderosa* for stomach problems and *Bovista pila* and *Dolichousnea longissima* used on wounds. *Berberis aquifolium* was used on abscesses on horses – a medicine for horses taken from the Blackfeet (Helson, 1974).

Epilobium angustifolium whole plant decoction was used to bathe invalids by the.

Swinomish, this is the closest match to a goat tonic (Gunther, 1973). *Epilobium angustifolium* root infusion was used by the Snohomish for sore throats and by the Skokomish for tuberculosis (Gunther, 1992). *Epilobium* species were also used medicinally in Europe but for stomach and urinary complaints (Small and Catling, 2000).

The Southern Carrier boiled new shoots and drank the decoction of *Pinus contorta* for stomach pains, the closest match to the ethnoveterinary use of *Pinus ponderosa* for stomach problems (Smith, 1929). The Northern Carrier boiled *Pinus contorta* needle



Fig. 5. More detailed map of Native Americans at time of contact.

tips with the inside bark of *Ribes* sp., the bark of *Cornus stolonifera*, the inside pulp of *Rubus* sp., stems of *Lonicera involucrata* and the inner bark of *Rosa* sp., and took two tablespoonfuls of the decoction twice a day for constitutional weakness, body sores or paralysis (Smith, 1929). Indians of the Missouri river region used a leaf and fruit decoction of *Pinus murrayana* Balf., for coughs in horses (Gilmore, 1991). This is the closest match to the ethnoveterinary use of *Pinus contorta* to treat colds in pets in British Columbia.

Goats ate salal (*Gaultheria shallon*) as a rumen stimulant. The Quinault chewed salal leaves to relieve heartburn and colic while the Skagit drank a weak infusion as a tonic (Gunther 1992). The Klallam used *Achillea millefolium* infusion for colds and the Cowlitz, Skagit, Snohomish and Squaxin drank it for diarrhea (Gunther 1992). The ethnoveterinary uses of *Achillea millefolium* for pets were for diarrhea, colds and flu and ear problems. The Winnebagos used an infusion of *Achillea millefolium* to treat earaches, the Montagnais and Micmacs used it a tea or a sweat herb for colds and fever. The Meskwakis used *Achillea lanulosa* for fevers and ague (Smith, 1928b).

Examples of Native American ethnoveterinary remedies that include juniper are those of the Pawnee, Omaha and Dakota who used a boiled tea of berries and leaves for coughs in their horses (Vogel, 1970). In British Columbia *Juniperus communis* L., is used for endoparasites in goats and stomach problems in pets.

Differentiating the origin, transmission and rationale of plant use by humans for themselves and for their animals is important according to Leonti (2011). In a theoretical scenario in which patents were sought for the knowledge presented in this paper, they should not be granted because of the parallel historical uses in North America ethnomedicine presented in the tables. Another consideration is that some researchers like Smith (1933) admitted to collecting information from only six main informants, and this work continues to influence ethnoveterinary medicine today.

Turner (2001b) noted that Elsie Steedman's compilation of James Teit's field notes, *Ethnobotany of the Thompson Indians of British Columbia* (1930) and the ethnobotanical notes of Franz Boas (1909, 1921), were taught during her undergraduate days. This paper shows that the influence of those scholars continues.

There are parallel uses between sixty-four plants currently used as ethnoveterinary medicines in British Columbia and the

folk medicines historically used by the First Nations peoples and by Native American groups. Already published work on ethnobotanical knowledge in North America is being incorporated into current farming and pet health practices. This probably represents a continuation of indigenous traditions as part of a need for organic or natural methods of healing, rather than a deliberate cultural appropriation. It indicates that North America's indigenous knowledge is not dying out but is being adapted for modern uses from anthropological and other records.

Undisputed transfers from Native American uses to ethnoveterinary uses are *Achlys triphylla* as a fly repellent and *Bovista pila* and *Dolichousnea longissima* for wounds; these are three of the ethnoveterinary uses that were claimed to be the inventions of the respondent who inspired this review. While recognizing the creativity involved in the transfer of this knowledge to animal health care it is also important to recognize that the original sources of the ethnoveterinary remedies used in British Columbia were First Nations and Native Americans. In the future ethnoveterinary researchers need to distinguish between what plants are being chosen by animals, which plant uses are the result of new experimentation by animal owners and which plant uses are new ways of using the previously published cultural traditions of specific groups.

References

- Boas, F., 1909. *The Kwakiutl of Vancouver Island*. E. J. Brill., Leiden.
- Boas, F., 1921. *Ethnology of the Kwakiutl: Based on Data Collected by George Hunt*. Government Printing Office., Washington.
- Bolyard, J.L., 1981. *Medicinal plants and home remedies of Appalachia*. Thomas, Springfield, Ill.
- BC Stats. 2001; 2006. *Census profiles*. Available at: http://www.bcstats.gov.bc.ca/data/cen01/profiles/csd_txt.asp <http://www.bcstats.gov.bc.ca/data/cen06/topics/topics.asp>.
- Chamberlin, R.V., 1911. *The ethno-botany of the Gosiute Indians of Utah*. The New Era Printing Company, Lancaster, PA.
- Duke, J.A., 1986. *Handbook of northeastern Indian medicinal plants*. Quarterman Publications, Lincoln, Mass.
- Environment Canada, n.d. *Ecoregions of Canada – Lower Mainland*. Ecological Framework of Canada. (<http://www.statcan.gc.ca/pub/16-002-x/2009004/article/11031-eng.htm>) Retrieved On: 2012-07-02.
- Fenn, L.A., Norris, M.A., Turner, N.J., 1978. *Uses of Plants by Native Peoples of the Pacific Rim National Park Area*. Unpublished report to Parks Canada, Western Region, Calgary, Alberta.
- Gilmore, M.R., 1991. *Uses of Plants by the Indians of the Missouri River Region*.

- University Of Nebraska Press, Lincoln.
- Grinnell, G.B., 1962. *The Cheyenne Indians, Their History and Ways of Life*. Cooper Square Publishers, New York.
- Hellson, J.C., 1974. *Ethnobotany of the Blackfoot Indians*. National Museums of Canada, Ottawa.
- Kindscher, K., 1992. *Medicinal Wild Plants of the Prairie: An Ethnobotanical Guide*. University Press Of Kansas, Lawrence.
- Köhler-Rollefson, Ilse, Bräunig, Juliane, 1998. Anthropological Veterinary Medicine: The Need for Indigenizing the Curriculum. Paper presented at the 9th AITVM Conference in Harare, 14–18 September 1998.
- Lans, C., Boepple, W., 2003. Medicinal plants used for animal health in British Columbia. Health Informatics Graduate Seminar Series (HINF 580), University of Victoria, B.C., Sept–Dec 2003; September 19, 2003.
- Lans C, Turner N, Brauer G, Beckenridge J, Boepple W, Ross C., 2004. Similarities between folk medicine of First Nations and ethnoveterinary knowledge in British Columbia. Paper co-presented with Prof. Nancy Turner at the 27th Annual Conference of the Society of Ethnobiology, March 24 – 27, 2004, (the University of California at Davis).
- Lans, C., 2013. Reflections of First Nations and Native Americans traditions in the ethnoveterinary knowledge used in British Columbia. Dataset. https://www.researchgate.net/publication/236003538_Reflections.
- Lawrence, E.A., 1996. I stand for my horse: equine husbandry and healthcare among some North American Indians. In: McCorkle, C.M., Mathias, E., Schillhorn van Veen, T.W. (Eds.), *Ethnoveterinary Research & Development*. Intermediate Technology Publications, London.
- Lawrence, E.A., 1998. Human and horse medicine among some native American groups. *Agric. Hum. Values* 15, 133–138.
- Leonti, M., 2011. The future is written: impact of scripts on the cognition, selection, knowledge and transmission of medicinal plant use and its implications for ethnobotany and ethnopharmacology. *J. Ethnopharmacol.* 134 (3), 542–555.
- Mandelbaum, D.G., 1979. *The Plains Cree: an ethnographic, historical, and comparative study*. Canadian Plains Research Center, University of Regina, Regina, Saskatchewan.
- Marles, R.J., et al., 2000. *Canadian Forest, S., Canada, Aboriginal Plant Use in Canada's Northwest Boreal Forest*. UBC Press, Vancouver.
- Moerman, D.E., 1982. *Geraniums for the Iroquois: a Field Guide to American Indian Medicinal Plants*. Reference Publications, Algonac, Michigan.
- Moerman, D.E., 1998. *Native American Ethnobotany*. Timber Press, Portland, Oregon.
- Mundy, P., Mathias, E., 1997. Participatory workshops to produce information materials on ethnoveterinary medicine. In: *Proceedings of the International Conference on Ethnoveterinary Medicine: Alternatives for Livestock Development*, Pune, India, 4–6 November 1997.
- Murphey, E.V.A., 1959. *Indian uses of native plants*. Mendocino County Historical Society, California.
- Opler, M.E., 1959. *An Apache life-way; the economic, social, and religious institutions of the Chiricahua Indians*, [Ann Arbor, Mich.
- Raghavan, M., Steinrucken, M., Harris, K., Schifffels, S., Rasmussen, S., DeGiorgio, M., Albrechtsen, A., Willerslev, E., 2015. Genomic evidence for the Pleistocene and recent population history of Native Americans. *Science* 349 (6250), aab3884.
- Ray, Verne, 1938. *Lower Chinook Ethnographic Notes*. Univ. Wash. Publ. Anthropol. 7 (2), 29–165.
- Ray, V.F., 1932. *The Sanpoil and Nespelem: Salishan Peoples of Northeastern Washington*. University of Washington Press, Seattle, Washington.
- Reagan, A.B., 1934. *Plants Used by the Hoh and Quileute Indians*. Transactions of the Kansas Academy of Science (1903–) 37, 55–70.
- Reich, D., Patterson, N., Campbell, D., Tandon, A., Mazieres, S., Ray, N., Parra, M.V., et al., 2012. Reconstructing Native American population history. *Nature* 488 (7411), 370–374.
- Skoglund, P., Mallick, S., Bortolini, M.C., Chennagiri, N., Hünemeier, T., Petzl-Erler, M.L., Salzano, F.M., Reich, D., 2015. Genetic evidence for two founding populations of the Americas. *Nature* 525 (7567), 104–108.
- Small, E., Catling, P., 2000. *Canadian Medicinal Crops*. National Research Council Press, Ottawa.
- Smith, H., 1928a. *Materia medica of the Bella Coola and neighbouring tribes of British Columbia*. National Museum of Canada Bulletin, No. 56, King's Printers, Ottawa, Ontario.
- Smith, Huron H., 1928b. *Ethnobotany of the Meskwaki Indians*, Bulletin of the Public Museum of the City of Milwaukee, Wisconsin: Cannon.
- Smith, H.I., 1929. *Materia Medica of the Bella Coola and Neighbouring Tribes of British Columbia*. F.A. Acland, Printer To The King's Most Excellent Majesty, Ottawa.
- Smith, H.H., 1933. *Ethnobotany of the forest Potawatomi Indians*. Published by order of the Board of Trustees, Milwaukee, Wisconsin.
- Smith, B.D., 2011. General patterns of niche construction and the management of 'wild' plant and animal resources by small-scale pre-industrial societies. *Philos. Trans. R. Soc. Lond. Ser. B, Biol. Sci.* 366 (1566), 836–848.
- Speck, Frank G., 1917. *Medicine Practices of the Northeastern Algonquians*, in: *Proceedings of the 19th International Congress of Americanists*.
- Steedman, E.V., Teit, J.A., 1930. *Ethnobotany of the Thompson Indians of British Columbia*. Based on field notes by James A. Teit. Washington.
- Tantaquidgeon, G., Tantaquidgeon, G., Historical, Pennsylvania, Commission, Museum, 1972. *Folk medicine of the Delaware and related Algonkian Indians*. Pennsylvania Historical and Museum Commission, Harrisburg.
- Teit, J.A., Steedman, E.V., 1928. *Ethnobotany of the Thompson Indians of British Columbia*. Annual Report of the Bureau of American Ethnology to the Secretary of the Smithsonian Institution.
- Teit, J.A., Steedman, E.V., 1986. *Ethnobotany of the Thompson Indians of British Columbia*. Shorey's Bookstore.
- Teit, James Alexander, Boas, Franz, Jesup North Pacific Expedition (1897–1903), American Museum of Natural History, 1900. *The Thompson Indians of British Columbia*. New York.
- Teit, J. A., Boas, F., 1930. *The Salishan tribes of the western plateaus*. Annual Report of the Bureau of American Ethnology to the Secretary of the Smithsonian Institution, 1927–1928.
- Train, P., 1957. *Medicinal uses of plants by Indian tribes of Nevada*. U.S. Dept. of Agriculture, Plant Industry Station, Beltsville, MD.
- Turner, N.J., 1979. *Plants in British Columbia Indian technology*. British Columbia Provincial Museum, Victoria.
- Turner, N.J., 1973. *The ethnobotany of the Bella Coola Indians of British Columbia*. *Syesis* 6, 193–220.
- Turner, N.J., 1983. *Ethnobotany of the Nitinaht Indians of Vancouver Island*. Province of British Columbia, Ministry of Provincial Secretary and Govt. Services, Provincial Secretary: Govt. of Canada, Parks Canada, Western Region, (Victoria, B.C.).
- Turner, N.J., Royal British Columbia, M., 1990. *Thompson Ethnobotany: Knowledge and Usage of Plants by the Thompson Indians of British Columbia*. Royal British Columbia Museum, Victoria.
- Turner, N.J., 1995. *Food Plants of Coastal First Peoples*. UBC Press, Vancouver.
- Turner, Nancy J., 1997. *rapports entre les plantes et les animaux das les langues et les cultures amérindiennes de la Côte-Ouest*. *Recherches Amérindiennes au Québec* 27. "Le Fruit De L'Ours", Les, pp. 3–4.
- Turner, Nancy J., 2001a. *Plant technology of first peoples in British Columbia*. UBC Press, Vancouver.
- Turner, Nancy J., 2001b. *Pieces into Patterns: Botany of British Columbia Cultures and Influences of Society of Ethnobiology Members*, Pp. 163–174 ((Chapter 9)). *Ethnobotany at the Millennium. Past Promise and Future Prospects*. Ann Arbor: Anthropological Papers, Museum of Anthropology. 1. University Of Michigan.
- Turner, N.J., Hebda, R.J., 1990. *Contemporary use of bark for medicine by two Salishan native elders of southeast Vancouver Island, Canada*. *J. Ethnopharmacol.* 29, 59–72.
- Turner, Nancy Chapman, Bell, M.A., 1973. *The ethnobotany of the Southern Kwakiutl Indians of British Columbia*. *Econ. Bot.* 27, 257–310.
- Turner, N.J., Loewen, D.C., 1998. *The original "Free Trade": exchange of botanical products and associated plant knowledge in northwestern North America*. *Anthropologica* XL, 49–70.
- Turner, N.J., Davidson-Hunt, I.J., O'Flaherty, M., 2003. *Living on the edge: ecological and cultural edges as sources of diversity for social-ecological resilience*. *Hum. Ecol.* 31 (3), 439–463.
- Vogel, Virgil, 1970. *American Indian, Medicine*. University Of Oklahoma Press, Norman.
- Weiner, M.A., 1972. *Earth Medicine—Earth Foods; Plant Remedies Drugs, and Natural Foods of the North American Indians*. Macmillan, New York.