ETHNOPHARMACOLOGY OF WESTERN NORTH AMERICAN PLANTS WITH SPECIAL FOCUS ON THE GENUS *ARTEMISIA* L.

by

ALLISON R. McCUTCHEON

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ABSTRACT

This thesis is comprised of a series of investigations into the pharmacological activities of plants from western North America. In the first phase of the research, one hundred methanolic plant extracts were screened for: antibiotic, antifungal, anti-mycobacterial and antiviral activity. Eighty-nine of these extracts exhibited antibiotic activity and eighty-one exhibited antifungal activity. Nineteen extracts also showed anti-mycobacterial activity. There was a correlation (0.945) between anti-mycobacterial activity and strong activity against the fast growing, non-pathogenic *Mycobacterium phlei* which was used in the antibiotic screening. Twelve extracts were each active against one of the seven viruses screened.

Several interesting observations arose from the analyses of the phase one screening results. There was a significant correlation between anti-mycobacterial activity and the specific usage of the plants to treat tuberculosis. Significantly higher percentages of active plants were found among those categorized as potential antibiotics and antifungals based on their traditional usage. There appeared to be correlations between activity and the taxa to which the active plants belonged and the habitats they were collected from. The phase two screening of one hundred eighty-five extracts was designed to further test these apparent correlations.

In these phase two screenings, 77% of the extracts exhibited antibiotic activity. Seventy-five percent (75%) of the plants which were used medicinally were active while only 22% of the non-medicinal plants were active. Of the plants which were classified as potential antibiotics based on their traditional uses, 91% were active. The taxa with the highest percentage of active extracts were the Filicinae and the Gymnospermae.

Fifty-nine percent (59%) of the extracts exhibited significant activity in the phase two antifungal screening. The taxon with the largest percentage of active extracts was the Gymnospermae (100% active). There was a great difference in the percentage of active extracts among the traditional plant medicines (32% active) compared to the non-medicinal plants (5% active). Seventy-five percent (75%) of the plants classified as potential antifungals based on their traditional uses were found to have significant activity.

Throughout these phase one and two screenings, the members of the genus *Artemisia* L. assayed were particularily noteworthy for their broad spectrum of activity. Therefore, this genus was chosen for more extensive research on the anti-infectious properties of 74 additional samples from 30 Artemisa taxa. All of the *Artemisia*

samples exhibited antibiotic and antifungal activity. In the antiviral assays, a total of 18 extracts inhibited the virally induced cytopathic effects. A total of twenty-nine extracts exhibited activity in the anti-mycobacterial assays.

There were representative samples from each of the four *Artemisia* subgenera among the active extracts in each of the four screens, although it was noted that the extracts with the strongest activity in the anti-mycobacterial assays were all members of the subgenera *Dracunculus* and *Tridentatae*. In all of the *Artemisia* assays, there was as much variation in activity among samples of a taxa (species or subspecies) as there was between taxa. Samples of the *Artemisia* species which were most frequently cited in the ethnobotanical literature (*A. dracunculus, A. frigida, A. ludoviciana* and *A. tridentata*) were among the most active extracts in all of the assays.

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Acknowledgements

This research project was based upon the medicinal lore of the North American First Nations peoples published over the last three hundred years. The accumulated wisdom of hundreds of individuals preserved in the historical literature was central to both the selection of the plants to investigate and the ethnopharmacological analyses. I gratefully acknowledge the tremendous contribution of all these people who had so generously shared their knowledge.

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I would like to acknowledge the contributions of my colleague Shona Ellis who was my research partner in the phase one plant collection, extraction and antibiotic testing. This work could not have been accomplished without Shona's tremendous enthusiasm, energy and hard work. I would also like to thank Zyta Abramowski for her technical assistance. I am very grateful for all the efforts of our summer students Cheng-Han Lee, Lehli Pour and Jen Sung who undertook the grinding task of preparing the phase two plant materials.

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Foreword

Portions of chapter two were previously published by the author in the *Journal of Ethnopharmacology*. These papers were all written by the thesis author and the full citations for these publications are as follows:

McCutcheon, A.R., Ellis, S.M., Hancock, R.E.W. and Towers, G.H.N. (1992) Antibiotic screening of medicinal plants of the British Columbian native peoples. *Journal of Ethnopharmacology* 37: 213-233.

McCutcheon, A.R., Ellis, S.M., Hancock, R.E.W. and Towers, G.H.N. (1994) Antifungal screening of medicinal plants of the British Columbian native peoples. *Journal of Ethnopharmacology* 44: 157-169.

McCutcheon, A.R., Roberts, T.E., Gibbons, E., Ellis, S.M., Hancock, R.E.W. and Towers, G.H.N. (1995) Antiviral screening of British Columbian medicinal plants. *Journal of Ethnopharmacology* 49: 101-110.

McCutcheon, A.R., Stokes, R.W., Thorson, L.M., Ellis, S.M., Hancock, R.E.W. and Towers, G.H.N. (1996) Anti-mycobacterial screening of British Columbian medicinal plants. Manuscript prepared for publication, unsubmitted as of the date of this writing (February 5, 1996).

Co-author S.M. Ellis was an equal partner in the plant collection and extract preparation for the research cited above. Ms. Ellis was also a research partner in the screening of these extracts for antibiotic activity. The thesis author was entirely responsible for the analyses of the antibiotic screening results. The antifungal screening of the extracts and the analyses of the results were conducted by the thesis author alone.

The screening of the extracts for antiviral activity was performed by T.E. Roberts and E. Gibbons in the research facilities of L. Babiuk at the Veterinary Infectious Diseases Organization (VIDO) in Saskatoon. The screening methods and raw data were supplied by T.E. Roberts. T.E. Roberts and L. Babiuk both contributed to the editing of the antiviral manuscript.

DEDICATION

This theses is dedicated to the North American First Nations peoples and

to Klaus, for his extraordinary patience.

1.0 General introduction

In recent years, there has been a groundswell of public interest in ethnopharmacology. The Aryuvedic, Chinese and European systems of traditional medicine from the Old World are the most well known and have been the focus of most ethnopharmacological research to date. Of the New World traditional medicines, the attention of both the public and the scientific community has been captured by the exotic appeal of South America's indigenous peoples and their threatened flora which still holds many unexplored mysteries.

Perhaps due to the historical devaluation of the North American First Nations cultures, relatively little attention has been directed toward their equally rich and endangered cultural heritages, in spite of the significant benefits humankind has already reaped from the few native plants which have been investigated. By far the greatest bulk of the work done on the North American flora has been screens for potential cancer drugs which have already yielded three new therapeutic agents: etoposide derived from the mayapple, *Podophyllum peltatum*; taxol, isolated from the yew tree, *Taxus brevifolia*; and betulinic acid from the birch tree, *Betula alba*. Even though the example set by these cancer screens is extremely positive, there has only been a handful of other types of pharmacological screenings conducted.

The ethnopharmacological screenings which comprise the first half of this thesis are the first comprehensive evaluations of the anti-infectious properties of traditional plant medicines from western North America. This work barely scratches the surface of the large pharmacopeia of the First Nations peoples and many other types of pharmacological activities have yet to be investigated as only antibiotic, antifungal, anti-*Mycobacterium* and antiviral assays were conducted. Nonetheless, this research represents a positive step forward in the efforts to recognize and assess some of the important contributions of native cultures in the context of western knowledge.

These screenings not only validate the efficacy of First Nations' traditional medicines and provide new leads for clinical therapeutics, they also give insights into some of the factors which may influence pharmacological activity and hence the means to improve the effectiveness of future screenings. The first phase screening of one hundred extracts pointed to several different factors which may correlate with pharmacological activity. Therefore, the second phase screening was designed to obtain the necessary data to evaluate the impact of factors such as medicinal versus non-medicinal plants, the specific traditional medicinal uses, plant habitat, and the higher plant taxa.

Throughout all of the screenings, the members of the genus *Artemisia* assayed were particularily outstanding for their potent and broad spectrum anti-infectious activity. A review of the North American ethnopharmacological literature on *Artemisia* revealed the significant role these plants had in native medicine. The treatment of infectious diseases and infectious disease symptoms figured prominently among the traditional usages of *Artemisia* species by First Nations peoples throughout North America. These two factors made this group an obvious selection for more intensive research. Therefore, the second half of this thesis is devoted to a more in depth investigation of the genus, focused on the antibiotic, antifungal, anti-mycobacterial and antiviral activities of *Artemisia* species.

2.0 Introduction to phase one screenings

There is an increasingly urgent need for novel antibiotic compounds as drug resistance is rapidly becoming a major obstacle in the treatment of bacterial infections. Until recently, the search for antibiotic compounds was focused on soil microrganisms. Now that the most promising leads from this source have been investigated, some researchers have once again turned their focus to the plants which were human's primary antibacterial agent before the advent of modern antibiotics. Considering the many other types of therapeutic compounds that scientists have derived from traditional medicines, ethnopharmacological screenings provide a rational approach to the search for new antibiotic compounds.

Based on this rationale, this research project was originally conceived of as an antibiotic screening of traditional medicines of the British Columbian First Nations peoples to identify new leads on antibacterial therapeutics. It was due to the very encouraging results of this initial antibiotic screen that the project was subsequently expanded to include other types of infectious organisms for which new drugs are also urgently needed. The increasing numbers of immunosuppressed and immunocompromised patients stricken with life threatening fungal infections has resulted in a dramatic increase in the demand for systemic antifungals. Drug resistance has also begun to be an obstacle to the successful treatment of these patients, underscoring the need for novel chemical structures which can successfully be administered as therapeutics. Exploring traditional treatments for fungal infections provides one promising route to the discovery of such drugs.

Similarly, tuberculosis, an ancient disease which most people believed had been conquered by modern antibiotics, has staged a resurgence in recent years due to the emergence of multiple drug-resistant strains. In western countries, the impact of this resurgence has been greatly heightened by the large pool of super-susceptible immunocompromised patients facilitating the dissemination of the multiple drug resistant strains. In order to stave off this potentially epidemic situation, new anti-mycobacterial drugs are desperately required. Again, investigating the many plant medicines which were formerly used to treat this disease may provide the needed solutions.

Pharmacologists have recorded the fewest successes in the field of antiviral development. Until recently, there was little impetus for antiviral research because few people in western countries died from viral infections and it was believed that the great similarities in viral and human biochemistry were prohibitive to the development of safe therapeutics. Antiviral research has been greatly accelerated in the face of the current AIDS epidemic. However there are still relatively few drugs available and viral resistance to these compounds has already become a serious obstacle to treatment. Ethnopharmacological screening presents one promising avenue of approach to the discovery of new antivirals as there are hundreds, if not thousands, of traditional remedies which have yet to be investigated for their therapeutic potential in modern medicine.

The traditional medicines of the British Columbian First Nations peoples in particular had not been scientifically investigated for any type of pharmacological activity prior to this study. There was a substantial body of literature on their medicinal uses of plants, largely due to the research of the preeminent British Columbian ethnobotanist Dr. N.J. Turner. This literature provided the basis for the selection of the medicinal plant species examined in this study. A list of those plants used medicinally by the native peoples of this province was compiled from Dr. Turner's reports for use in the field as a selection guide for the plant species and type of material to be collected. The main focus of the plant collection was on plants whose traditional uses suggested that they may have been used to treat infections, although a few plants with other uses such as general tonics were also collected. Out of the hundreds of medicinal plants referred to in *Thompson Ethnobotany* (Turner, 1990), *Ethnobotany of the Okanagan-Colville Indians* (Turner, 1980) and *Plant Taxonomy and Systematics of Three Contemporary Indian Groups of the Pacific Northwest* (Turner, 1974), one hundred plant samples were collected. A list of the botanical names of the plant species collected and collection details for each plant is given in Appendix 1.

Methanolic extracts of these plant samples were prepared and then subjected to the antibiotic, antifungal, anti-mycobacterial and antiviral screens which are reported in the following chapters.

For each screening, an ethnopharmacological analysis was also conducted, based on the abbreviated summaries of the traditional medicinal uses of these plants compiled in Appendix 6. These summaries were based on an extensive review of all the available ethnobotanical literature.

2.0.1 Methods

Plant collection

The plant collecting was carried out from May-July 1991, in five areas of the province: the Wyndel region in the Kootenay mountains, the Princeton-Penticton region in the interior, Haida Gwaii (the Queen Charlotte Islands), the Fraser River canyon, and the Lower Mainland. From the several hundred plant species on the ethnobotanical list, 100 samples were collected. In order to ensure accurate botanical identifications, only plants which were in flower were collected, introducing a seasonal bias into the selection. A voucher specimen was made for each collection and these vouchers have been filed in the University of British Columbia Herbarium, U.B.C.. See Appendix 1 for a complete listing.

Extract preparation

The plant material was air dried and then ground in a Wiley grinder with a 2-mm diameter mesh. Twenty g of the ground material were extracted in 100 ml of methanol with three washes of 100 ml, over 24 hours. The crude methanolic extract was first filtered through cheesecloth and cotton wool, then through a Büchner funnel with a No. 4 paper filter. The filtrate was rotoevaporated to dryness and then reconstituted with 10 ml of methanol. The prepared extracts were refrigerated up until the time they were used.

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I would like to acknowledge the contributions of my colleague Shona Ellis who was my research partner in the plant collection and extraction.

References

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Turner, N.J. (1974) *Plant Taxonomy and Systematics of Three Contemporary Indian Groups of the Pacific Northwest.* Ph.D. Thesis, University of British Columbia.

2.1 Phase one antibiotic screening

Abstract

One hundred methanolic plant extracts were screened for antibiotic activity against 11 bacterial strains. Eighty-nine per cent were found to have significant antibiotic activity. Ninety-four per cent of the plants categorized as potential antibiotics based on their traditional usage were found to exhibit significant antibiotic activity. Seventy-five were found to be active against methicillin resistant *Staphylococcus aureus*, 46 were active against an antibiotic supersusceptible strain of *Pseudomonas aeruginosa* and 18 of these were also active against a wild type strain. The extracts with the broadest spectra of activity were prepared from: *Alnus rubra* bark and catkins, *Fragaria chiloensis* leaves, *Moneses uniflora* aerial parts, and *Rhus glabra* branches.

2.1.1 Introduction

The First Nations peoples used plants extensively in their medical practice. Several hundred of these medicinal plants have been identified and their usage documented in the ethnobotanical literature (see Appendix 6). However, only in a few cases have the pharmacological properties of these traditional remedies been investigated. This study constitutes the first antibiotic screening of British Columbian medicinal plants as well as the initial attempt at an ethnopharmacological analysis of the results. In screening these plants for antibiotic activity, it is hoped that the data obtained will not only provide useful leads towards the discovery of new antibiotics but also encourage further interest and research in North American ethnobotany and ethnopharmacology.

2.1.2 Methods

Microorganisms

Eleven bacterial strains were used in the screening: *Bacillus subtilis*, *Enterobacter aerogenes*, *Escherichia coli* DC2, *Klebsiella pneumoniae*, *Mycobacterium phlei*, *Pseudomonas aeruginosa* Z61, *Pseudomonas aeruginosa* K799, *Serratia marcescens*, *Staphylococcus aureus* meth^S, *Staphylococcus aureus* meth^R P00017, and *Salmonella typhimurium* TA98. The two *P. aeruginosa* strains were obtained from the laboratory of R.E.W. Hancock. The Z61 strain is an antibiotic supersusceptible strain and the K799 strain is a wild type strain. The methicillin resistant strain of *S. aureus* was provided by Dr. A. Chow, Department of Medical Microbiology, U.B.C. The remaining bacterial cultures were those from the collection of G.H.N. Towers.

An inoculum of each bacterial strain was suspended in 3 ml of nutrient broth and incubated overnight at 37^0C. The overnight cultures were diluted 1/10 with nutrient broth before use. To ensure that the density of the diluted cultures were all within the range of $10^{7\text{-}8}$ CFU/ml, serial dilution plate counts were also made for each culture.

Antibiotic assays

The disc diffusion assay (Lennette, 1985) was used to screen for antibiotic activity. Paper discs (1/4") were impregnated with 20 μl of extract, the equivalent of 40 mg of dried plant material, and the solvent allowed to evaporate at room temperature. One hundred μl of the diluted bacterial culture was spread on sterile Mueller-Hinton agar plates before placing the extract impregnated paper discs on the plates. For each extract, three replicate trials were made against each bacteria screened. Gentamicin was used as a positive control and methanol as a negative control. The plates were incubated for 18 h at 37^0C, with the exception of *M. phlei* which was incubated for 36 h. The diameter of the zone of inhibition around each disc was measured and recorded at the end of the incubation period.

Data analysis

The average zone of inhibition was calculated for the 3 replicates. A clearing zone of 8 mm or greater was used as the criteria for designating significant antibiotic activity. The overall trial average for each assay was used for the classification of results in Table 1.

For each of the major taxonomic divisions (Eumycota, Thallophyta, Bryopsida, Sphenopsida, Lycopsida, Filicinae, Gymnospermae and Angiospermae), the total number and percentage of active extracts was calculated, as well as the percentage of active extracts excluding those with only slight (1+) activity against the susceptible organisms *M. phlei* and *P. aeruginosa* Z61.

The ethnopharmacological data collated in Appendix 6 summarizing the traditional medicinal uses of each plant was used as the basis for the ethnopharmacological classifications. Each extract was assigned to the highest numbered category it fit into. The three ethnopharmacological categories used were: (1) potential antibiotics, (2) possible antibiotics, and (3) tonics. The one plant for which there were no references to medicinal usage was categorized as 4) non-medicinal plant.

Extracts which were used to treat specific ailments caused by bacterial organisms were assigned to category 1: potential antibiotics. The specific bacterial ailments included in category 1 were: abcesses, acne, bladder or kidney infections, blood poisoning, boils, consumption, diptheria, dysentery, food poisoning, gonorrhea, infected wounds or sores, ptomaine poisoning, rheumatic fever, scarlet fever, sepsis, syphilis, tooth abscess, tuberculosis, venereal disease, and whooping cough. The infected wounds or sores classification included the descriptors: inflamed wounds/sores, discharge from wounds/sores, wounds/sores with pus, feverish wounds/sores, etc. Plants traditionally used as disinfectants or antiseptics were also assigned to this category. Plants which were compounded for these applications were assigned to category 2, as there is a degree of uncertainty about the actual role of a particular plant in a mixture.

Extracts of plants traditionally used to treat ailments and symptoms which were possibly caused by bacterial infections were assigned to category 2: possible antibiotics. Ethnopharmacological descriptors included in this category were: bladder or kidney disease/problems/troubles, burns, coughs, cuts, diarrhea, fever, gastroenteritis, lung trouble, lung hemorrhage, pneumonia, scrofula, sores, sore gums, sore throat, stomachache, stomach ailments/disease/problems, stomach/intestinal flu, too frequent urination, toothache, tonics and wounds.

Plants which were not used for any of the applications listed above but were reported to have been used as physics, tonics or general medicines were assigned to category 3: tonics. One plant for which there was no recorded medicinal use of that genus in the literature surveyed nor in the Napralert database was assigned to category 4: non-medicinal plant.

The total number of active plant extracts in each category was calculated, as well as the number of active extracts excluding those with only slight (1+) activity against the super-susceptible organisms *E. coli, M. phlei* and *P. aeruginosa* Z61. The statistical test "chi squared goodness-of-fit" with a significance level of 0.01 was used to analyze the percentage of active extracts in each category to determine if the observed values exceeded those expected from a random sampling.

2.1.3 Results

One hundred crude methanolic extracts of plants, 99 of which were used medicinally by First Nations peoples were screened for antibiotic activity against 11 bacterial strains. The overall results of the screening are presented in Table 1, alphabetically by family. The degree of activity of all the extracts are comparable since a standard amount of dried plant material, as well as standard extraction and test procedures were used.

Eighty-nine of the extracts assayed (89%) demonstrated significant antibiotic activity. Seventy of the extracts exhibited activity against both Gram negative and Gram positive organisms. Nine extracts had activity against Gram positive organisms only and five extracts had activity against Gram negative organisms only. Four extracts had activity against the super-susceptible *M. phlei* only. Eleven extracts exhibited no significant activity against any of the bacteria tested.

Forty-six extracts exhibited activity against *P. aeruginosa* Z61 (antibiotic supersusceptible strain) and 18 of these also showed significant activity against *P. aeruginosa* K799 (wild type). Fifty-one extracts were active against *S. aureus* meth^S and 75 were active against *S. aureus* meth^R. All the extracts which were active against the methicillin sensitive strain were also active against the methicillin resistant strain. Thirteen extracts exhibited activity against *S. marcescens* and only six extracts had activity against *K. pneumoniae.*

Several other important observations may be summarized from the data in Table 1:

1. The extracts which exhibited the broadest spectrum of activity (activity against at least 10 bacteria) were: *Alnus rubra* bark and catkins, *Fragaria chiloensis* leaves, *Moneses uniflora* aerial parts, and *Rhus glabra* branches. The extracts of *Arctostaphylos uva-ursi* branches and roots, *Artemisia ludoviciana* var. *latiloba* aerial parts, *Balsamorhiza sagittata* aerial parts and roots, *Cornus canadensis* aerial parts, *Geum macrophyllum* roots, *Heuchera cylindrica* roots, *Juniperus communis* branches, *Larix occidentalis* branches, *Lomatium dissectum* roots, and *Ribes sanguineum* branches were active against nine of the bacteria.

2. The extracts with the greatest activity against *P. aeruginosa* K799 (normal strain) were: *Alnus rubra* catkins, *Argentina egedii* aerial parts, *Artemisia ludoviciana* var. *latiloba, Cornus canadensis* aerial parts, *Fragaria chiloensis* leaves, *Juniperus communis* branches, *Polystichum munitum* rhizomes, *Ribes sanguineum* branches and *Rhus glabra* branches.

3. The extracts with the greatest activity against the methicillin resistant *S. aureus* strain were: *Alnus rubra* bark, *Ambrosia chamissonis* aerial parts, *Lomatium dissectum* roots, *Nuphar lutea* rhizomes, and *Rhus glabra* branches.

4. The families with the largest number of species screened were Compositae and Rosaceae. All 13 of the species from the Compositae exhibited significant antibiotic activity, 11 with activity against both Gram-positive and Gram-negative bacteria and 2 with Gram-positive activity only. Of the 14 species from the Rosaceae screened, 12 exhibited activity against both Gram-positive and Gram-negative bacteria while one had Gram-negative activity only and one exhibited no significant antibiotic activity.

The screening results are presented summarized by taxa in Table 2. The taxa with the greatest degree of antibiotic activity were the Filicinae (ferns) and the Gymnospermae (conifers).

The results of the ethnopharmacological data analysis are summarized in Table 3. Ninety-four per cent of the extracts designated as having potential antibiotic activity based on their traditional usage, exhibited activity. This value significantly exceeds the percentage of active extracts expected from a random sampling.

Table 1 - Phase one antibiotic screening results[a]

Family Species (Voucher No.)	Cat.[b]	Part[c]	B.s.[d]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.
Controls													
Methanol	-	-	0	0	0	0	0	0	0	0	0	0	0
Gentamycin (10 μg)	-	-	5+	4+	5+	5+	5+	5+	4+	4+	5+	5+	5+
Anacardiaceae													
Rhus glabra (P-23)	1	Br	2+	2+	5+	2+	5+	5+	2+	2+	5+	3+	3+
Aracaceae													
Lysichiton americanum (Q-26)	1	Rt	0	0	0	0	0	0	0	0	0	0	0
Araliaceae													
Oplopanax horridus (Q-14)	1	Ib	1+	0	0	0	4+	2+	0	0	4+	1+	1+
Aristolochiaceae													
Asarum caudatum (W-12)	1	Wh	0	0	0	0	1+	0	0	0	0	1+	1+
Berberidaceae													
Mahonia aquifolium (W-2)	1	Rt	1+	0	3+	0	5+	0	0	0	1+	1+	0
Betulaceae													
Alnus rubra (Q-1)	1	Bk	1+	3+	3+	1+	5+	3+	2+	2+	3+	3+	3+

Family Species (Voucher No.)	Cat.[b]	Part[c]	B.s.[d]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.
Alnus rubra (Q-2)	1	Ck	2+	1+	5+	1+	5+	3+	2+	2+	2+	3+	2+
Betula papyrifera (P-38)	1	Br	1+	0	3+	0	3+	0	0	0	2+	1+	1+
Cactaceae													
Opuntia fragilis (F-4)	2	Ae	0	0	0	0	1+	0	0	0	0	0	0
Caprifoliaceae													
Lonicera ciliosa (F-2)	2	Br	0	0	2+	0	0	0	0	0	1+	1+	0
Lonicera involucrata (F-5)	1	Br	0	0	0	0	0	0	0	0	0	0	0
Sambucus cerulea (P-16)	1	Br	2+	0	0	0	2+	1+	1+	0	1+	2+	0
Sambucus racemosa (Q-21)	1	Bk	0	0	0	0	1+	0	0	0	0	1+	0
Symphoricarpos albus (P-26)	1	Br	0	0	1+	0	1+	1+	0	0	0	1+	0
Compositae													
Achillea millefolium (P-10)	1	Wh	0	0	3+	0	2+	0	0	0	1+	2+	1+
Ambrosia chamissonis (Q-29)	1	Ae	1+	0	1+	0	3+	1+	0	0	3+	3+	2+
Antennaria microphylla (P-21)	2	Wh	0	0	0	0	2+	1+	0	0	0	1+	0
Arnica cordifolia (P-31)	2	Ae	0	0	0	0	1+	0	0	0	0	0	1+
Arnica sororia (P-7)	2	Ae	1+	0	1+	0	2+	0	0	0	2+	2+	1+

Family Species (Voucher No.)	Cat.[b]	Part[c]	B.s.[d]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.
Artemisia ludoviciana (W-5)	1	Ae	1+	1+	3+	1+	2+	2+	2+	2+	0	2+	0
Artemisia michauxiana (P-29)	2	Ae	0	0	0	0	2+	0	0	0	1+	2+	0
Artemisia tridentata (W-19)	1	Br	0	0	2+	0	2+	0	0	0	2+	2+	1+
Balsamorhiza sagittata (W-18)	1	Ae	0	0	1+	0	2+	0	0	0	2+	2+	1+
Balsamorhiza sagittata (P-2)	1	Rt	1+	1+	5+	0	3+	2+	1+	0	1+	2+	0
Chaenactis douglasii (P-3)	1	Wh	2+	0	3+	0	3+	0	0	0	2+	2+	1+
Chrysothamnus nauseosus (P-25)	1	Br	0	1+	0	0	1+	0	0	0	0	1+	0
Erigeron filifolius (P-9)	2	Ae	0	0	2+	0	2+	0	0	0	1+	2+	0
Gaillardia aristata (P-8)	1	Ae	2+	0	3+	0	2+	2+	0	0	2+	2+	0
Conocephalaceae [Bryophyta]													
Conocephalum conicum (Q-28)	2	Th	0	0	0	0	1+	0	0	0	0	1+	0
Cornaceae													
Cornus canadensis (Q-12)	2	Ae	2+	2+	4+	0	3+	2+	2+	1+	1+	2+	0
Cornus sericea (W-6)	1	Br	0	0	0	0	1+	0	0	0	0	0	0
Crassulaceae													
Sedum lanceolatum (P-20)	2	Wh	0	0	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat.[b]	Part[c]	B.s.[d]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.
Cruciferae													
Capsella bursa-pastoris (W-8)	1	Wh	0	0	0	0	1+	0	0	0	0	1+	0
Cardamine angulata (Q-16)	2	Rt	0	0	0	0	1+	0	0	0	0	1+	0
Cupressaceae [Gymnospermae]													
Juniperus communis (Q-25)	1	Br	2+	0	3+	0	2+	2+	2+	0	2+	2+	2+
Elaeagnaceae													
Shepherdia canadensis (W-16)	1	Wh	0	1+	2+	0	1+	3+	0	0	0	0	0
Empetraceae													
Empetrum nigrum (Q-17)	1	Br	2+	0	2+	0	5+	2+	0	0	2+	2+	2+
Equisetaceae [Sphenopsida]													
Equisetum arvense (W-3)	2	Ae	0	0	0	0	0	0	0	0	0	0	0
Equisetum hyemale (P-37)	1	Ae	0	0	0	0	0	0	0	0	0	0	0
Ericaceae													
Arctostaphylos uva-ursi (P-42a)	1	Br	2+	1+	5+	0	3+	4+	1+	0	2+	2+	1+
Arctostaphylos uva-ursi (P-42b)	1	Rt	0	0	3+	0	1+	0	0	0	0	1+	0
Kalmia microphylla (Q-5)	1	Br	1+	0	2+	0	2+	1+	0	0	2+	2+	2+

Family Species (Voucher No.)	Cat.[b]	Part[c]	B.s.[d]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.
Ledum groenlandicum (Q-4)	2	Br	1+	0	2+	0	2+	1+	0	0	1+	2+	2+
Moneses uniflora (Q-8)	1	Ae	2+	2+	4+	1+	5+	2+	1+	1+	5+	4+	3+
Monotropa uniflora (P-19)	2	Wh	1+	2+	0	0	0	0	0	0	1+	1+	0
Grossulariaceae													
Ribes sanguineum (P-18)	1	Br	2+	1+	3+	0	2+	2+	1+	0	2+	2+	2+
Hydrangeaceae													
Philadelphus lewisii (P-22)	1	Br	0	0	0	0	1+	0	0	0	1+	0	0
Hylocomiaceae [Bryophyta]													
Hylocomium splendens (Q-9)	2	Ga	0	0	0	0	0	0	0	0	0	0	0
Hypericaceae													
Hypericum perforatum (P-30)	1	Ae	2+	0	3+	0	3+	2+	1+	0	1+	2+	0
Leguminosae													
Lupinus sericeus (P-12)	1	Ae	0	0	2+	0	1+	0	0	0	0	1+	0
Liliaceae													
Disporum trachycarpum (W-11)	2	Wh	0	0	0	0	0	0	0	0	0	0	0
Maianthemum racemosa (W-17)	2	Rh	0	0	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat.[b]	Part[c]	B.s.[d]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.
Maianthemum stellata (W-13)	1	Rh	0	0	0	0	1+	0	0	0	0	0	0
Lobariaceae [Eumycota]													
Lobaria oregana (Q-11)	2	Th	1+	0	0	0	3+	1+	0	0	0	0	0
Lycopodiaceae [Lycopsida]													
Lycopodium clavatum (Q-6)	2	Br	0	0	0	0	2+	1+	0	0	0	2+	0
Menyanthaceae													
Fauria crista-galli (Q-19)	3	Ae	0	0	1+	0	2+	1+	0	0	1+	2+	0
Nymphaeaceae													
Nuphar lutea (Q-3b)	1	Rt	2+	0	2+	0	3+	2+	0	0	2+	2+	0
Nuphar lutea (Q-3c)	1	Rh	3+	0	5+	0	5+	1+	0	0	5+	3+	0
Onagraceae													
Epilobium minutum (P-1)	2	Wh	0	0	3+	0	1+	0	0	0	0	1+	0
Pinaceae [Gymnospermae]													
Larix occidentalis (W-15)	1	Br	1+	0	3+	0	2+	1+	1+	1+	1+	2+	1+
Pinus contorta (Q-18)	1	Br	1+	0	2+	0	3+	2+	0	0	2+	2+	1+
Pinus ponderosa (W-20)	1	Br	1+	0	2+	0	4+	2+	0	0	2+	2+	1+

Family Species (Voucher No.)	Cat.[b]	Part[c]	B.s.[d]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.
Plantaginaceae													
Plantago major (Q-22)	1	Wh	0	0	0	0	1+	0	0	0	0	1+	2+
Polemoniaceae													
Ipomopsis aggregata (P-13a)	1	Ae	0	0	3+	0	2+	0	0	0	0	1+	0
Ipomopsis aggregata (P-13b)	1	Rt	0	0	0	0	1+	0	0	0	0	0	0
Polygonaceae													
Eriogonum heracleoides (P-11)	1	Ae	0	0	3+	0	2+	1+	0	0	1+	2+	2+
Eriogonum heracleoides (P-17)	1	Rt	0	1+	3+	0	2+	2+	0	0	1+	2+	2+
Polypodiaceae [Filicinae]													
Polypodium glycyrrhiza (Q-27)	1	Rh	0	0	2+	0	1+	1+	0	0	0	0	1+
Polystichum munitum (Q-15)	1	Rh	2+	0	3+	0	3+	2+	2+	0	2+	2+	2+
Polyporaceae [Eumycota]													
Ganoderma applanatum (Q-10)	4	Wh	0	0	0	0	0	0	0	0	0	0	0
Ranunculaceae													
Clematis ligusticifolia (P-14)	1	Ae	0	0	0	0	1+	1+	0	0	0	0	0
Delphinium nuttallianum (P-33)	3	Wh	0	0	1+	0	2+	0	0	0	2+	1+	0

Family Species (Voucher No.)	Cat.[b]	Part[c]	B.s.[d]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.
Rhamnaceae													
Ceanothus velutinus (P-39)	1	Br	1+	0	3+	0	2+	1+	0	0	1+	2+	2+
Rosaceae													
Amelanchier alnifolia (P-6)	2	Br	1+	0	1+	0	2+	0	0	0	0	1+	0
Amelanchier alnifolia (P-35)	2	Br	0	0	1+	0	1+	0	0	0	0	1+	1+
Argentina egedii (Q-20)	2	Br	1+	1+	4+	0	2+	0	2+	1+	0	2+	1+
Aruncus dioicus (F-1)	1	Br	0	0	2+	0	0	0	0	0	1+	2+	1+
Crataegus douglasii (W-14)	1	Br	0	0	1+	0	1+	0	0	0	0	1+	0
Fragaria chiloensis (Q-7)	2	Lf	2+	2+	4+	0	3+	2+	1+	1+	2+	2+	1+
Fragaria vesca (W-1)	1	Lf	2+	2+	4+	1+	2+	2+	0	0	0	2+	0
Geum macrophyllum (Q-23)	1	Rt	2+	2+	4+	0	3+	3+	1+	0	1+	2+	1+
Holodiscus discolor (F-3)	1	Br	0	0	1+	0	0	1+	0	0	0	0	0
Potentilla arguta (W-7)	1	Rt	2+	1+	4+	0	3+	3+	1+	0	2+	2+	1+
Prunus virginiana (W-9)	1	Br	0	0	2+	0	0	0	0	0	0	1+	0
Prunus virginiana (P-40)	1	Br	1+	0	2+	0	2+	0	0	0	0	1+	0
Rosa nutkana (P-5)	1	Br	0	0	3+	0	1+	0	0	0	0	0	0

Family Species (Voucher No.)	Cat.[b]	Part[c]	B.s.[d]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.
Rubus parviflorus (P-28)	1	Br	0	0	3+	0	1+	0	0	0	0	2+	0
Spiraea betulifolia (P-41)	1	Br	0	0	0	0	0	0	0	0	0	0	0
Spiraea pyramidata (P-15)	3	Br	0	0	0	0	2+	2+	0	0	0	1+	0
Salicaceae													
Populus tremuloides (P-34)	1	Br	0	0	1+	0	1+	0	0	0	0	0	0
Salix bebbiana (P-36)	2	Br	0	0	1+	0	0	0	0	0	0	0	0
Saxifragaceae													
Heuchera cylindrica (W-4)	1	Rt	2+	1+	4+	0	2+	2+	0	1+	2+	2+	1+
Scrophulariaceae													
Penstemon fruticosus (P-4)	1	Br	0	0	4+	0	2+	1+	0	0	0	2+	2+
Verbascum thapsus (P-24)	1	Lf	0	0	1+	0	1+	0	0	0	0	2+	0
Umbelliferae													
Glehnia littoralis (Q-13)	1	Rt	1+	0	1+	0	4+	1+	0	0	3+	2+	2+
Heracleum maximum (P-32a)	1	Ae	0	0	0	0	2+	1+	0	0	2+	2+	2+
Heracleum maximum (P-32b)	1	Rt	1+	0	2+	0	4+	0	0	0	1+	1+	2+
Lomatium dissectum (W-10)	1	Rt	3+	2+	3+	0	4+	3+	0	1+	2+	3+	2+

Family Species (Voucher No.)	Cat.[b]	Part[c]	B.s.[d]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.
Osmorhiza purpurea (Q-24)	2	Rt	0	0	1+	0	2+	0	0	0	0	2+	0
Urticaceae													
Urtica dioica ssp. *gracilis* (P-27)	2	Ae	0	0	0	0	0	0	0	0	0	0	0
Total number of active extracts			42	20	66	6	85	46	18	13	51	75	42

Key to Table 1

[a] Classification of results: 0 = no zone or zone of inhibition < 8.0 mm; 1+ = zone of inhibition 8.0-10.0 mm; 2+ = 10.1-15.0 mm; 3+ = 15.1-20.0 mm; 4+ = 20.1-25.0 mm; 5+ = > 25.0 mm.

[b] Cat. = Ethnobotanical category: 1 = Potential antibiotic, 2 = Possible antibiotics, 3 = Tonics, 4 = Non-medicinal plant.

[c] Part Extracted: Ae = Aerial, Bk = Bark, Br = Branch, Ck = Catkin, Ga = Gametophyte, Ib = Inner Bark, Lf = Leaf, Rh = Rhizome, Rt = Root, Th = Thallus, Wh = Whole plant.

[d] Bacteria: B.s. = *Bacillus subtilis* (Gm^+); E.a. = *Enterobacter aerogenes* (Gm^-); E.c. = *Escherichia coli* DC2 (Gm^-); K.p. = *Klebsiella pneumoniae* (Gm^-); M.p. = *Mycobacterium phlei*, $Gm^{(+)}$, non-acid fast; Z61 = *Pseudomonas aeruginosa* Z61 (Gm^-); K799 = *Pseudomonas aeruginosa* K799 (Gm^-); S.m. = *Serratia marcescens* (Gm^-); S.a.S. = *Staphylococcus aureus* methicillin sensitive (Gm^+); S.a.R. = *Staphylococcus aureus* methicillin resistant (Gm^+); S.t. = *Salmonella typhimurium* TA98 (Gm^-).

Table 2 - Phase one antibiotic screening results summarized by taxa

Taxa	Number in Category (N)	Number Active (N)	Percent Active (%)	Excluding 1+ super-suscept.[a] Number Active (N)	Excluding 1+ super-suscept.[a] Percent Active (%)
NON-FLOWERING PLANTS					
Lower plants					
Eumycota	2	1	50	1	50
Bryopsida	2	1	50	1	50
Lycopsida	1	1	100	1	100
Sphenopsida	2	0	0	0	0
Lower plants sub-total	7	3	43	3	43
Higher plants					
Filicinae	2	2	100	2	100
Gymnospermae	4	4	100	4	100
Higher plants sub-total	6	6	100**	6	100**
NON-FLOWERING Sub-total	13	9	69	9	69
FLOWERING Sub-total	87	80	92	73	84
GRAND TOTALS	100	89	89	82	82

[a] Number active (N) calculated excluding those extracts with only slight (1+) activity against the super-susceptible organisms *E. coli, M. phlei* and *P. aeruginosa* Z61.

** Percentage of active extracts in category statistically significant, $p < 0.01$

Table 3 - Ethnopharmacological analysis of phase one antibiotic screening results

Category	Number in Category (N)	Number Active (N)	Percent Active (%)	Excluding 1+ Super-susc.[a] Number Active (N)	Excluding 1+ Super-susc.[a] Percent Active (%)
Potential antibiotics	69	65	94*	60	87*
Possible antibiotics	27	21	77	19	70
Tonics	3	3	100	3	100
Subtotal medicinal	99	89	90	83	86
No medicinal use	1	0	0	0	0
Grand Totals	100	89	89	82	82

[a] Number active (N) calculated excluding those extracts with only slight (1+) activity against the super-susceptible organisms *E. coli, M. phlei* and *P. aeruginosa* Z61.

* Percentage of active extracts in category statistically significant, $p < 0.05$

2.1.4 Discussion and Conclusions

Many antibiotic screening studies use a relatively small number of bacteria as their screen. From the data in Table 1, it can be seen that if the results from only five of the test organisms (*B. subtilis, E. aerogenes, E. coli, S. aureus* and *S. typhininium*) are considered, the number of extracts reported as inactive would more than double from 11 to 23. Moreover, some of the extracts which were active against the clinically important organisms *P. aeruginosa* and methicillin resistant *S. aureus* would then have been reported as inactive and many of the active extracts would have been reported as having more limited spectra. Clearly, reducing the size of the bacterial screen would have resulted not only in the failure to retrieve valuable information but, more importantly, in reporting misleading negative data.

However, the number of organisms used in a screening often must be restricted due to resource limitations. The efficacy of a small bacterial screen can be greatly enhanced by the inclusion of a supersensitive organism such as *M. phlei.* In this study, 85 of the 89 extracts which were active against *M. phlei* were also active against at least one other organism. Based on these results, a screening using *M. phlei* and only three other organisms would still have identified all of the active extracts.

In classifying the activity of the antibiotic extracts as Gram positive or Gram negative, it would generally be expected that a much greater number would be active against Gram positive organisms than against Gram negative. However, in this study, a large number of the extracts (70) were active against both Gram positive and Gram negative bacteria while only a relatively low number (9) were active against Gram positive bacteria only. The activity against both types of bacteria may be indicative of the presence of broad spectrum antibiotic compounds or simply general metabolic toxins. The therapeutic potential of each of the broad-spectrum extracts will have to be evaluated individually to determine which merit further investigation.

Given the small number of known antibiotic compounds with a high Therapeutic Index which are effective against Gram negative organisms, all nine extracts which exhibited only Gram negative activity also merit further investigation. The gram negative organisms *K. pneumoniae*, *S. marcescens*, and *P. aeruginosa* are particularly resistant to current antibiotic therapy. The extracts which were found to be active against these organisms especially merit further investigation of their therapeutic potential.

The analysis of the results by taxa showed that a higher percentage of the flowering plants exhibited antibiotic activity than did the non-flowering plants (see Table 2). Among the non-flowering plants though, the Gymnospermae and the Filicinae were particularly noteworthy in that all the species tested exhibited antibiotic activity. Unfortunately, the sample size of the non-flowering plants was too small to draw any definitive conclusions. However, these results certainly suggested that it would worthwhile to collect a larger sample of non-flowering plants for assessment in the next phase of screening.

While the high percentage of extracts which were found to exhibit antibiotic activity in this study may be attributed in part to the relatively large number of bacterial species screened, it may also be partly attributed to the accuracy of the ethnobotanical data used as selection criterion.

The results of the ethnopharmacological analysis show that a significant percentage of the traditional medicines used to treat bacterial infections exhibited antibiotic activity (see Table 3). Overall, 89% of the plants which had been documented as being used medicinally by First Nations peoples were found to have antibiotic activity. More specifically, 94% of the plants designated as potentially antibiotic and 77% of the plants designated as possible antibiotics based on their traditional usage, exhibited antibiotic activity. The sample sizes in the other categories were too small to draw any definitive conclusions. These results suggest that the selection criterion used was effective in targeting a high percentage of plants with antibiotic activity, however, a larger control group (non-medicinal plants) is needed to make a comparison with.

The results of this study also have some much broader implications. The results suggest that at least some of the herbal medicines of British Columbian First Nations peoples may have been efficacious. there remains hundreds more which have yet to be investigated. The present results lend weight to the argument that British Columbian ethnobotany, in particular, and North American ethnobotany, in general, is worthy of further research.

Acknowledgements

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Reference

Lennette, E. H. (1985) *Manual of Clinical Microbiology* (4th ed.) American Association for Microbiology. Washington, D.C., pp. 978-987.

2.2 Phase one antifungal screening

Abstract

One hundred methanolic plant extracts were screened for antifungal activity against nine fungal species. Eighty-one were found to have antifungal activity and 30 extracts showed activity against four or more of the fungi assayed. One hundred percent of the plants classified as potential antifungals based on their traditional usage exhibited activity compared to 33% of the plants with other types of medicinal usages. All of the ferns and gymnosperms assayed exhibited antifungal activity. The extracts with the greatest fungal inhibition were prepared from: *Alnus rubra* catkins, *Artemisia ludoviciana* aerial parts, *A. tridentata* aerial parts, *Geum macrophyllum* roots, *Mahonia aquifolium* roots, and *Moneses uniflora* aerial parts. In addition to these, extracts prepared from the following also exhibited antifungal activity against all nine fungi: *Asarum caudatum* whole plant, *Balsamorhiza sagittata* roots, *Empetrum nigrum* branches, *Fragaria chiloensis* leaves, *Glehnia littoralis* roots, *Heracleum maximum* roots, *Heuchera cylindrica* roots, *Ipomopsis aggregata* aerial parts and roots, and *Rhus glabra* branches.

2.2.1 Introduction

Until recently, there was very little antifungal research being conducted. However, with the upsurge in the number of immuno-suppressed and immuno-compromised patients succumbing to fungal infections, the demand for new antifungal compounds has risen dramatically. Given the growing need for effective antifungal therapeutics and the encouraging results of the antibiotic screening, it was deemed worthwhile to conduct an antifungal screening of the traditional medicines of the British Columbian First Nations peoples. Since ethnopharmacologists rely so heavily on ethnobotanical information for research leads, an attempt was made to evaluate the screening results in the context of the background ethnobotanical literature to determine how such information may best be used to guide future research projects.

2.2.2 Methods

Microorganisms

Nine fungal strains were used in the screening; *Aspergillus flavus*, *Aspergillus fumigatus*, *Candida albicans*, *Fusarium tricuictum*, *Microsporum cookerii*, *Microsporum gypseum*, *Saccharomyces cerevisiae*, *Trichoderma viridae* and *Tricophyton mentagrophytes*. All of the above cultures were from the U.B.C. collection of G.H.N. Towers.

Antifungal assays

The disc diffusion assay (Lennette, 1985) was used to screen for antifungal activity. Sterile paper discs (1/4 ") were impregnated with 20 μl of methanolic extract and the methanol allowed to evaporate at room temperature. Sterile Yeast Morphology Agar (Difco) plates were inoculated with fungal spores before placing the extract impregnated paper discs on the plates. For each extract, four replicate trials were conducted against each fungus. Nystatin was used as a positive control and methanol as a negative (solvent) control. The temperature and length of incubation used for each fungus were as follows: *A. flavus*, *A. fumigatus*, *C. albicans*, *S. cerevisiae* and *T. viridae* were all incubated at 37°C for 18 h; *F. tricuictum* cultures were incubated at 20°C for 36 h; and *M. cookerii*, *M. gypseum* and *T. mentagrophytes* were incubated at 30°C for 72 h. The diameters of the zones of inhibition around each disc were measured and recorded at the end of the incubation period.

Data analysis

The average zone of inhibition was calculated for the four replicates. A clearing zone of 8 mm or greater was used as the criterion for designating significant antifungal activity. In trials where there was germination of a few spores within a very distinctive zone of inhibition, the zone measurement was annotated with the letter "i" to indicate that the inhibition was incomplete. The total number of fungi against which an extract exhibited significant activity was calculated. In order to provide a more rigorous assessment of the results, the total number of fungi which an extract inhibited was also calculated, excluding those extracts which showed only slight activity (1+) against the susceptible dermatophytes *Microsporum cookerii, M. gypseum* and *Tricophyton mentagrophytes.*

For each of the major taxa (Eumycota, Bryophyta, Lycopsida, Sphenopsida, Filicinae, Gymnospermae and Angiospermae), the percentage of active extracts was calculated, as well as the percentage of active extracts excluding those with only slight activity (1+) against the dermatophytes *M. cookerii, M. gypseum* and *T. mentagrophytes*.

The ethnopharmacological classifications were based on the data collated from the ethnobotanical literature which was summarized in Appendix 6. Based on this list of traditional uses, each plant extract was assigned to the highest numbered category it fit into. The numerical breakdown of the classification which resulted was as follows: (1) potential antifungals - 23 extracts, (2) possible antifungals - 36 extracts, (3) other skin ailments - 24 extracts, (4) tonics - 7 extracts, (5) other medicinal uses - 9 extracts, (6) no known medicinal use - 1 extract.

There were very few references to specific fungal ailments such as thrush or diaper rash found in the literature survey. The majority of the references described the treatment of ailments in colloquial, symptomatic terms. As it was far beyond the author's expertise to assess whether a particular symptom might be indicative of a fungal infection, the aid of a panel of eight medical practitioners was solicited, which included both family physicans and dermatologists.

From the background ethnobotanical literature search, a list of all the terms and descriptions that referred to skin ailments or possible yeast infections was compiled. For each of the terms, the physicans were asked to give their opinion as to the probability that the symptom or description was indicative of a fungal infection on a scale of one to three, with one being very likely and three being very unlikely.

Those descriptions which the majority of the physicans assessed as very likely to be indicative of a fungal infection were assigned to category 1: *potential antifungals*. The descriptors assigned to this category were: athlete's foot, baby's coated tongue, use of baby powder, salve or talc, dandruff, diaper rash, leucorrhea, scaly skin, split skin between the toes, the whites, thrush and wash for baby's bottom.

Those descriptions assessed as very unlikely to be indicative of a fungal infection, were assigned to category 3: *other skin ailments*. The dermatological descriptors assigned to this category were: acne, blisters, boils, bruises, carbuncles, chancres, corns, eczema, erysipelas, festering sores, hair tonic, healing sores, heat rash, pimples, poison ivy or poisoning of the skin, psoriasis, prickly rash, scrofula, skin eruptions, skin pustules, skin sores, skin ulcers, sores that would not heal, tetters, to draw blisters, ulcers and warts.

The remaining descriptors which may have described a fungal infection although not necessarily so were assigned to category 2: *possible antifungals.* The descriptors in this category included: body sores, broken skin, chafed skin, chapped lips, chapped hands, chapped skin, cracked skin, dry skin, disinfecting or antiseptic wash for itch, disinfecting or antiseptic wash for newborns, female complaints, female medicine, female tonic, foot soak, hair wash, head wash, irritated scalp, irritated skin, itch, itchy scalp, rash, raw spots on baby, running sores, scabby skin, scabs, scalp disease, skin ailments, skin disease and sores of the feet.

Plants whose traditional uses were not included in categories 1-3 but were cited as being used medicinally as blood purifiers, general medicines, physics, and tonics were categorized as 4: *tonics.* The remaining medicinal plants with usages other than those listed above were categorized as 5: *other medicinal uses.* One plant for which there was no recorded medicinal use of that genus in the literature summary nor in the Napralert database was assigned to category 6: *non-medicinal plant.*

For each category, the percentage of extracts which exhibited activity was calculated, as well as the percentage of active extracts excluding those with only slight activity (1+) against the dermatophytes *M. cookerii, M. gypseum* and *T. mentagrophytes.* The statisitical test chi squared goodness-of-fit was used to determine whether the percentage of active extracts in each category was significantly non-random.

2.2.3 Results

One hundred crude methanolic extracts of plants, 99 of which were used medicinally by First Nations peoples, were screened for antifungal activity against nine fungal strains. The overall results of the screening are presented in Table 4, alphabetically by family. The degrees of activity of all the extracts were comparable since a standard amount of dried plant material, as well as standard extraction and test procedures were used.

Eighty-one (81%) of the extracts assayed demonstrated antifungal activity against at least one of the fungal strains assayed. If those extracts which had only slight activity against the more susceptible dermatophytes *M. cookerii, M. gypseum* and *T. mentagrophytes* were excluded, 57 of the extracts exhibited significant activity. Sixteen of these exhibited activity against all nine fungi tested.

The extract prepared from the aerial parts of *Moneses uniflora* had the greatest antifungal activity, giving a zone of inhibition greater than 10 mm against every fungi assayed and the largest zone of inhibition against *A. flavus*, *A. fumigatus* and *F. tricuictum* of all the extracts tested. The extracts prepared from *Alnus rubra* catkins, *Artemisia ludoviciana* aerial parts, *A. tridentata* aerial parts, *Geum macrophyllum* aerial parts and *Mahonia aquifolium* roots were also active against all nine fungi, with zones of inhibition greater than 10 mm against all the organisms except *A. flavus*.

The extracts of *Asarum caudatum*, *Balsamorhiza sagittata* roots, *Empetrum nigrum* branches, *Fragaria chiloensis* leaves, *Glehnia littoralis* roots, *Heracleum maximum* roots, *Heuchera cylindrica* roots, *Ipomopsis aggregata* aerial parts and roots, *Rhus glabra* branches were also active against all nine fungi.

Several other important observations may be summarized from the data in Table 4:

1. The extracts of *Alnus rubra* catkins and *Geum macrophyllum* aerial parts gave zones of inhibition comparable to that of the positive control (Nystatin) against *Aspergillus fumigatus*. The extract prepared from *Moneses uniflora* aerial parts gave zones of inhibition greater than 25 mm against *A. fumigatus*, more than double that of the positve control. Of the 20 extracts that were active against the related species *A. flavus*, only the extracts of *Asarum caudatum* and *Moneses uniflora* gave a zone of inhibition comparable to that of the positive control.

2. Of the 30 extracts which were active against *S. cerevisiae*, only the extracts of *Moneses uniflora* and *Philadelphus lewisii* gave zones of inhibition comparable to that of Nystatin. The extracts of *Ipomopsis aggregata* aerial parts and roots both gave larger zones of inhibition than that of the positive control.

3. Only five extracts exhibited a strong inhibitory effect on *T. viridae*: *Alnus rubra* catkins, *Artemisia ludoviciana*, *A. tridentata*, *Mahonia aquifolium* and *Moneses uniflora*. The extract prepared from *Mahonia aquifolium* roots gave a zone of inhibition greater than that of the positive control.

Table 5 summarizes the percentage of active extracts in each of the following taxonomic groups: Eumycotia, Bryophyta, Lycopsida, Sphenopsida, Filicinae, Gymnospermae and Angiospermae. Among the non-flowering plants (Eumycota, Lycopsida, Sphenopsida, Filicinae and Gymnospermae cumulatively), 92% of the extracts exhibited antifungal activity. Among the flowering plants (Angiospermae), 79% of the extracts were active. These figures dropped to 69% and 55% respectively when extracts which exhibited only slight activity (1+) against the dermatophytes were excluded from the calculations.

The results of the ethnopharmacological data analysis are summarized in Table 6. Based on the overall totals, 100% of the extracts designated as potential antifungals and 83% of extracts designated as possible antifungals exhibited antifungal activity. The percentage of extracts which exhibited antifungal activity in both category 1 (potential antifungals) and category 2 (possible antifungals), was significantly higher than any of the other categories. The statisitical test of chi squared supported the hypothesis that the percentage of active extracts in these categories was non-random. The more stringent evaluation of the results, i.e., totals calculated, excluding extracts which exhibited only slight activity (1+) against the susceptible dermatophytes, shows a clear trend in the percentage of active extracts with the highest percentage found in category 1 and the lowest percentage in category 5.

Table 4 - Phase one antifungal screening results[a]

Family Species (Voucher No.)	Cat.[b]	Part[c]	A.f.[d]	A.fu.	C.a.	F.t.	M.c.	M.g.	S.c.	T.v.	T.m.	Number[e] active	Number[f] excluding +1 Derm.
Controls													
Methanol	-	-	0	0	0	0	0	0	0	0	0	0	0
Nystatin (50 µg)	-	-	2+	3+	4+	3+	4+	3+	3+	3+	3+	9	9
ANACARDIACEAE													
Rhus glabra (P-23)	2	Br	1+i	1+	1+	2+	5+	4+	1+	1+	5+	9	9
ARACEAE													
Lysichiton americanum (Q-26)	3	Rt	0	0	0	0	0	0	0	0	0	0	0
ARALIACEAE													
Oplopanax horridus (Q-14)	1	Ib	0	1+	1+i	1+	5+	3+	1+	1+	5+	8	8
ARISTOLOCHIACEAE													
Asarum caudatum (W-12)	2	Wh	2+	2+	1+i	2+	4+	4+	1+i	1+	2+	9	9
BERBERIDACEAE													
Mahonia aquifolium (W-2)	2	Rt	1+i	2+	2+	3+	5+	5+	2+	4+	2+	9	9
BETULACEAE													
Alnus rubra (Q-1)	2	Bk	0	0	0	0	3+	3+	0	0	4+	3	3

Family Species (Voucher No.)	Cat.[b]	Part[c]	A.f.[d]	A.fu.	C.a.	F.t.	M.c.	M.g.	S.c.	T.v.	T.m.	Number[e] active	Number[f] excluding +1 Derm.
Alnus rubra (Q-2)	2	Ck	1+i	3+	2+	3+	5+	3+	3+i	2+	5+	9	9
Betula papyrifera (P-38)	1	Br	0	0	0	0	3+	2+	0	0	4+	3	3
CACTACEAE													
Opuntia fragilis (F-4)	3	Ae	0	0	0	0	0	0	0	0	0	0	0
CAPRIFOLIACEAE													
Lonicera ciliosa (F-2)	4	Br	0	0	0	0	1+	1+	0	0	1+	3	0
Lonicera involucrata (F-5)	2	Br	0	0	0	0	1+	1+	0	0	2+	3	1
Sambucus caerulea (P-16)	2	Br	0	0	0	0	0	0	0	0	0	0	0
Sambucus racemosa (Q-21)	2	Bk	0	0	0	0	1+	1+	0	0	0	2	0
Symphoricarpos albus (P-26)	1	Br	0	0	0	0	1+	1+	0	0	0	2	0
COMPOSITAE													
Achillea millefolium (P-10)	2	Wh	0	0	0	0	1+	1+	0	0	1+	3	0
Ambrosia chamissonis (Q-29)	1	Ae	0	1+i	0	0	2+	2+	0	2+i	0	4	4
Antennaria microphylla (P-21)	5	Wh	0	0	0	0	0	0	0	0	0	0	0
Arnica cordifolia (P-31)	3	Ae	0	0	0	0	1+	1+	0	0	1+	3	0
Arnica sororia (P-7)	3	Ae	0	0	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat.[b]	Part[c]	A.f.[d]	A.fu.	C.a.	F.t.	M.c.	M.g.	S.c.	T.v.	T.m.	Number[e] active	Number[f] excluding +1 Derm.
Artemisia ludoviciana (W-5)	1	Ae	1+	2+	2+	2+	3+	2+	2+	2+	2+	9	9
Artemisia michauxiana (P-29)	2	Ae	0	0	0	0	1+	1+	0	0	0	2	0
Artemisia tridentata (W-19)	1	Br	1+	2+	2+	2+	4+	3+	2+	2+	2+	9	9
Balsamorhiza sagittata (W-18)	2	Ae	0	0	0	0	1+	1+	0	0	1+	3	0
Balsamorhiza sagittata (P-2)	3	Rt	1+i	2+	2+	1+	4+	3+	2+	1+	3+	9	9
Chaenactis douglasii (P-3)	2	Wh	0	0	0	0	2+	1+	0	0	1+	3	1
Chrysothamnus nauseosus (P-25)	3	Br	0	0	0	0	2+	1+	0	0	1+	3	1
Erigeron filifolius (P-9)	3	Ae	0	0	0	0	1+	1+	0	0	1+	3	0
Gaillardia aristata (P-8)	2	Ae	0	0	0	0	1+	1+	0	0	1+	3	0
CONOCEPHALACEAE [BRYOPHYTA]													
Conocephalum conicum (Q-28)	2	Th	0	1+	0	0	0	2+	0	0	2+	3	3
CORNACEAE													
Cornus canadensis (Q-12)	3	Ae	1+i	0	0	1+	2+	3+	0	1+	5+	6	6
Cornus sericea (W-6)	2	Br	0	0	0	0	0	1+	0	0	1+	2	0
CRASSULACEAE													
Sedum lanceolatum (P-20)	5	Wh	0	0	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat.[b]	Part[c]	A.f.[d]	A.fu.	C.a.	F.t.	M.c.	M.g.	S.c.	T.v.	T.m.	Number[e] active	Number[f] excluding +1 Derm.
CRUCIFERAE													
Capsella bursa-pastoris (W-8)	5	Wh	0	0	0	0	0	0	0	0	0	0	0
Cardamine angulata (Q-16)	3	Rt	0	0	0	0	0	0	1+	0	0	1	1
CUPRESSACEAE [Gymnospermae]													
Juniperus communis (Q-25)	1	Br	0	0	0	0	1+	2+	0	0	1+	3	1
ELAEAGNACEAE													
Shepherdia canadensis (W-16)	2	Fr	0	0	0	0	0	0	0	0	0	0	0
EMPETRACEAE													
Empetrum nigrum (Q-17)	5	Br	1+	2+	2+i	1+i	5+	5+	1+	1+	5+	9	9
EQUISETACEAE [Lycopsida]													
Equisetum arvense (W-3)	2	Ae	0	0	0	0	0	0	0	0	0	0	0
Equisetum hyemale (P-37)	2	Ae	0	0	0	1+	1+	1+	1+i	0	0	4	2
ERICACEAE													
Arctostaphylos uva-ursi (P-42a)	2	Br	0	0	0	0	3+	2+	0	1+	5+	4	4
Arctostaphylos uva-ursi (P-42b)	2	Rt	0	0	0	0	0	2+	0	0	1+	2	1
Kalmia microphylla (Q-5)	2	Br	0	0	0	0	2+	2+	0	0	1+	3	2

Family Species (Voucher No.)	Cat.[b]	Part[c]	A.f.[d]	A.fu.	C.a.	F.t.	M.c.	M.g.	S.c.	T.v.	T.m.	Number[e] active	Number[f] excluding +1 Derm.
Ledum groenlandicum (Q-4)	1	Br	0	0	0	0	2+	2+	0	0	0	2	2
Moneses uniflora (Q-8)	3	Ae	3+	5+	2+	5+	5+	5+	3+	2+	5+	9	9
Monotropa uniflora (P-19)	2	Wh	0	0	0	0	0	0	0	0	0	0	0
GROSSULARIACEAE													
Ribes sanguineum (P-18)	2	Br	0	0	0	0	2+	1+	0	0	2+	3	2
HYDRANGEACEAE													
Philadelphus lewisii (P-22)	2	Br	0	0	0	0	0	0	3+	0	0	1	1
HYLOCOMIACEAE [BRYOPHYTA]													
Hylocomium splendens (Q-9)	3	Ga	0	0	0	0	1+	1+	0	0	0	2	0
HYPERICACEAE													
Hypericum perforatum (P-30)	3	Ae	0	0	0	0	1+	1+	0	0	0	2	0
LEGUMINOSAE													
Lupinus sericeus (P-12)	5	Ae	0	0	0	0	1+	1+	0	0	1+	3	0
LILIACEAE													
Disporum trachycarpum (W-11)	5	Wh	0	0	0	0	0	0	0	0	0	0	0
Maianthemum racemosa (W-17)	2	Rh	0	0	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat.[b]	Part[c]	A.f.[d]	A.fu.	C.a.	F.t.	M.c.	M.g.	S.c.	T.v.	T.m.	Number[e] active	Number[f] excluding +1 Derm.
Maianthemum stellata (W-13)	1	Rh	0	0	0	0	4+	3+	0	0	5+	3	3
LOBARIACEAE [EUMYCOTA]													
Lobaria oregana (Q-11)	3	Th	0	0	0	0	2+	2+	0	0	0	2	2
LYCOPODIACEAE [Lycopsida]													
Lycopodium clavatum (Q-6)	2	Br	0	0	0	1+	2+	2+	1+	0	0	4	4
MENYANTHACEAE													
Fauria crista-galli (Q-19)	4	Ae	0	1+	1+	1+	1+	1+	1+	0	0	6	4
NYMPHAEACEAE													
Nuphar lutea (Q-3b)	2	Rt	0	0	0	0	0	1+	0	0	2+	2	1
Nuphar lutea (Q-3c)	2	Rh	0	0	0	0	2+i	2+	0	0	5+	3	3
ONAGRACEAE													
Epilobium minutum (P-1)	5	Wh	0	0	0	0	0	0	0	0	0	0	0
PINACEAE [Gymnospermae]													
Larix occidentalis (W-15)	3	Br	1+i	0	0	0	1+	1+	0	0	1+	4	1
Pinus contorta (Q-18)	1	Br	0	0	0	0	3+	2+	0	0	1+	3	2
Pinus ponderosa (W-20)	1	Br	0	0	0	0	2+	1+	0	0	2+	3	2

Family Species (Voucher No.)	Cat.[b]	Part[c]	A.f.[d]	A.fu.	C.a.	F.t.	M.c.	M.g.	S.c.	T.v.	T.m.	Number[e] active	Number[f] excluding +1 Derm.
PLANTAGINACEAE													
Plantago major (Q-22)	2	Wh	0	0	1+i	1+	0	1+	1+i	0	0	4	3
POLEMONIACEAE													
Ipomopsis aggregata (P-13a)	1	Ae	1+i	1+i	2+	1+	5+	4+	4+	0	5+i	8	8
Ipomopsis aggregata (P-13b)	1	Rt	1+i	1+i	2+	1+	5+	4+	4+	1+i	5+i	9	9
POLYGONACEAE													
Eriogonum heracleoides (P-11)	3	Ae	0	0	0	0	1+	1+	0	0	0	2	0
Eriogonum heracleoides (P-17)	3	Rt	0	0	0	0	1+	1+	0	0	0	2	0
POLYPODIACEAE [Filicinae]													
Polypodium glycyrrhiza (Q-27)	1	Rh	0	0	0	0	2+	3+	0	0	5+	3	3
Polystichum munitum (Q-15)	1	Rh	0	0	0	0	3+	3+	0	1+	3+	4	4
POLYPORACEAE [EUMYCOTA]													
Ganoderma applanatum (Q-10)	6	Wh	0	0	0	0	1+	1+	0	0	0	2	0
RANUNCULACEAE													
Clematis ligusticifolia (P-14)	1	Ae	0	0	0	0	1+	1+	0	0	0	2	0
Delphinium nuttallianum (P-33)	4	Wh	0	0	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat.[b]	Part[c]	A.f.[d]	A.fu.	C.a.	F.t.	M.c.	M.g.	S.c.	T.v.	T.m.	Number[e] active	Number[f] excluding +1 Derm.
RHAMNACEAE													
Ceanothus velutinus (P-39)	1	Br	0	1+	2+	2+	4+	2+	1+	0	1+	7	6
ROSACEAE													
Amelanchier alnifolia (P-6)	3	Br	0	0	0	0	0	0	0	0	0	0	0
Amelanchier alnifolia (P-35)	3	Br	0	0	0	0	0	0	0	0	0	0	0
Argentina egedii (Q-20)	3	Br	1+i	2+	2+i	0	2+	1+	2+i	1+	3+	8	7
Aruncus dioicus (F-1)	2	Br	0	0	0	0	1+	1+	0	0	1+	3	0
Crataegus douglasii (W-14)	4	Br	0	0	0	0	0	0	0	0	0	0	0
Fragaria chiloensis (Q-7)	3	Lf	1+i	2+i	1+i	2+	3+	2+	2+i	1+i	4+	9	9
Fragaria vesca (W-1)	1	Lf	1+i	0	0	1+i	2+	2+	2+i	1+i	2+	7	7
Geum macrophyllum (Q-23)	2	Rt	1+i	3+i	2+i	2+	3+	2+	2+i	2+i	5+	9	9
Holodiscus discolor (F-3)	3	Br	0	0	0	0	1+	1+	0	0	1+	3	0
Potentilla arguta (W-7)	5	Rt	0	0	1+i	0	3+	1+	1+i	0	2+	5	4
Prunus virginiana (W-9)	2	Br	0	0	0	0	0	0	0	0	0	0	0
Prunus virginiana (P-40)	2	Br	0	0	0	0	1+	1+	0	0	0	2	0
Rosa nutkana (P-5)	1	Br	0	0	0	0	1+	1+	0	0	0	2	0

Family Species (Voucher No.)	Cat.[b]	Part[c]	A.f.[d]	A.fu.	C.a.	F.t.	M.c.	M.g.	S.c.	T.v.	T.m.	Number[e] active	Number[f] excluding +1 Derm.
Rubus parviflorus (P-28)	3	Br	0	0	0	1+	2+	2+	0	0	3+	4	4
Spiraea betulifolia (P-41)	5	Br	0	0	0	0	0	0	0	0	0	0	0
Spiraea pyramidata (P-15)	4	Br	0	0	0	0	1+	1+	0	0	2+	3	1
SALICACEAE													
Populus tremuloides (P-34)	3	Br	0	1+	1+	2+	3+	2+	1+i	1+	1+	8	7
Salix bebbiana (P-36)	3	Br	0	0	0	0	1+	1+	0	0	0	2	0
SAXIFRAGACEAE													
Heuchera cylindrica (W-4)	1	Rt	1+	1+	1+	1+	1+	1+	1+	1+	2+	9	7
SCROPHULARIACEAE													
Penstemon fruticosus (P-4)	2	Br	0	0	0	0	1+	1+	0	0	0	2	0
Verbascum thapsus (P-24)	1	Lf	0	0	0	0	1+	1+	0	0	0	2	0
UMBELLIFERAE													
Glehnia littoralis (Q-13)	4	Rt	1+	2+	1+	1+	5+	4+	1+	1+	4+	9	9
Heracleum maximum (P-32a)	2	Ae	0	1+	0	0	1+	1+	0	0	1+	4	1
Heracleum maximum (P-32b)	1	Rt	2+i	2+	1+	3+	5+	3+	1+	1+	1+	9	8
Lomatium dissectum (W-10)	1	Rt	0	0	0	0	0	0	0	0	3+i	1	1

Family Species (Voucher No.)	Cat.[b]	Part[c]	A.f.[d]	A.fu.	C.a.	F.t.	M.c.	M.g.	S.c.	T.v.	T.m.	Number[e] active	Number[f] excluding +1 Derm.
Osmorhiza purpurea (Q-24)	4	Rt	0	0	0	1+	0	1+	1+i	0	0	3	2
URTICACEAE													
Urtica dioica (P-27)	2	Ae	0	0	0	0	1+	1+	1+i	0	0	3	1
Total number of active extracts			20	24	23	27	72	78	30	23	56	81	57

Key to Table 4

[a] Classification of results: 0 = no inhibition or zone of inhibition < 8.0 mm; 1+ = zone of inhibition 8.0-10.0 mm; 2+ = 10.1-15.0 mm; 3+ = 15.1-20.0 mm; 4+ = 20.1-25.0 mm; 5+ = > 25.0 mm; i = incomplete inhibition, some spores germinated within clearing zone.

[b] Cat. = Ethnobotanical category: 1 = Potential antifungals; 2 = Possible antifungals; 3 = Other skin problems; 4 = Other medicinal uses; 5 = Related species; 6 = Non-medicinal plant.

[c] Part Extracted: Ae = Aerial; Bk = Bark; Br = Branch; Ck = Catkin; Fr = Fruit; Ga = Gametophyte; Ib = Inner Bark; Lf = Leaf; Rh = Rhizome; Rt = Root; Th = Thallus; Wh = Whole plant.

[d] Fungi: A.f. = *Aspergillus flavus*; A.fu. = *Aspergillus fumigatus*; C.a. = *Candida albicans*; F.t. = *Fusarium tricuictum*; M.c. = *Microsporum cookerii*; M.g. = *Microsporum gypseum*; S.c. = *Saccharomyces cerevisiae*; T.v. = *Trichoderma viridae*; T.m. = *Tricophyton mentagrophytes*

[e] Total number of fungi the extract was active against.

[f] Total number of fungi the extract was active against, excluding +1 activity against *M. cookerii, M. gypseum,* and *T. mentagrophytes*.

Table 5 - Phase one antifungal screening results summarized by taxa

Taxa	Number in Category (N)	Number Active (N)	Percent Active (%)	Excluding 1+ super-suscept.[a] Number Active (N)	Percent Active (%)
NON-FLOWERING PLANTS					
Lower plants					
Eumycota	2	2	100	1	50
Bryopsida	2	2	100	1	50
Lycopsida	1	1	100	1	100
Sphenopsida	2	1	50	0	0
Lower plants sub-total	7	6	86	3	43
Higher plants					
Filicinae	2	2	100	2	100
Gymnospermae	4	4	100	4	100
Higher plants sub-total	6	6	100	6	100
NON-FLOWERING Sub-total	13	12	92	9	69**
FLOWERING Sub-total	87	69	79	48	55
GRAND TOTALS	100	81	81	57	57

[a] Number active (N) calculated excluding those extracts with only slight (1+) activity against the super-susceptible organisms *M. cookerii, M. gypseum* and *T. mentagrophytes.*

** Percentage of active extracts in category statistically significant, $p < 0.01$

Table 6 - Ethnopharmacological analysis of phase one antifungal screening results

Category	Number in Category (N)	Number Active (N)	Percent Active (%)	Excluding 1+ Super-susc.[a] Number Active (N)	Percent Active (%)
Potential antifungals	23	23	100**	19	83**
Possible antifungals	36	30	83**	21	58
Other skin problems	24	19	80	11	46
Tonics	7	5	71	4	57
Other medicinal uses	9	3	33	2	22
Subtotal medicinal	99	80	80	57	57
No medicinal use	1	1	100	0	0
Grand Totals	100	81	81	57	57

[a] Number active (N) calculated excluding those extracts with only slight (1+) activity against the super-susceptible organisms *M. gypseum* and *T. mentagrophytes*.

** Percentage of active extracts in category statistically significant, $p < 0.01$

2.2.4 Discussion and Conclusions

Since fungal infections rarely pose any serious health problems, especially in temperate climates, there are very few specific references to their treatment in the ethnobotanical literature. Consequently, it would seem doubtful that such literature could provide much assistance in the search for new antifungal compounds. However, in consideration of the growing need for new systemic antifungals, it has become important to evaluate the results of this screening in the context of the ethnobotanical literature to determine how this type of information could be of future assistance in identifying potential new antifungal medicaments.

The screening results show a fairly high correlation between traditional medicinal use and antifungal activity (see Table 6). Eighty percent of the plants which have been documented as being used medicinally by First Nations peoples were found to have antifungal activity. This figure drops to 57% when those extracts which were only slightly active against the more susceptible dermatophytes (*M. cookerii, M. gypseum* and *T. mentagrophytes*) are excluded from the calculation.

Given the fairly ambiguous nature of the descriptions on which the ethnopharmacological classifications were based, the results of the ethnopharmacological analysis far exceeded expectations. The percentage of active extracts in category 1 was significantly higher than in any other group. These results certainly suggest that it would be most profitable for future antifungal screenings to focus on plants used specifically to treat fungal infections.

The analysis of results by taxa (see Table 5) suggests that it may be worthwhile to screen more non-flowering plants in future studies. It should be pointed out that the vast majority of plants used medicinally among the British Columbian First Nations belong to the Gymnospermae and Angiospermae. Despite the fact that British Columbia has a very rich diversity mosses and fungi due to its cool, moist climate, very few of these organisms were utilized by the aboriginal peoples as medicines. As the ethnopharmacological analysis demonstrated, the selection of specimens based on traditional usages appears to increase the probability of selecting plants with antifungal activity. Hence a larger screening study of randomly selected non-medicinal lower plants may not find a high percentage of active extracts within these taxa.

In general, those extracts found to have antifungal activity in this screening correlate fairly well with those found to have antibiotic activity with a few notable exceptions. While the extracts of *Arctlostaphylos uva-*

ursi, *Juniperus communis*, *Lomatium dissectum*, *Nuphar lutea* and *Ribes sanguineum* all exhibited good antibiotic activity, they had fairly poor antifungal activity, inhibiting only the sensitive dermatophytes. Conversely, while the extracts of *Asarum caudatum* and *Ipomopsis aggregata* exhibited fairly poor antibiotic activity, they inhibited the growth of all nine fungi in this antifungal screening study. The remaining 13 extracts which had antifungal activity against all nine fungi, also had exhibitied good antibiotic activity.

It is also interesting to note that while the extracts of both the catkins and bark of *Alnus rubra* had very good antibiotic activity, only the catkin extract exhibited broad spectrum antifungal activity. The *Rhus glabra* extract, which had the strongest antibiotic activity, was only moderately inhibitory of the fungi although it exhibited a broad spectrum of activity.

In addition to providing promising new leads in the ongoing search for new antimicrobial compounds, the data analysis from this screening has also suggested how future screenings may be improved. The results reported here seem to support the assertion that the North American flora is worthy of further pharmacological investigation and that the ethnobotanical literature can be useful in guiding this research.

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2.3 Phase one anti-mycobacterial screening

Abstract

One hundred methanolic plant extracts were screened for antibiotic activity against *Mycobacterium tuberculosis* and an isoniazid resistant strain of *Mycobacterium avium.* Nineteen extracts exhibited activity against *M. tuberculosis* and 16 extracts showed activity against *M. avium.* Thirteen of these 19 active extracts were traditionally used to treat tuberculosis. There was a significant correlation (0.945) between anti-mycobacterial activity and activity against the bacteria *M. phlei* used in the general antibiotic screening (see chapter 2.1). Extracts made from *Heracleum maximum* (Umbelliferae) roots, *Moneses uniflora* (Ericaceae) aerial parts and *Oplopanax horridus* (Araliaceae) inner bark completely inhibited the growth of both organisms at a concentration equivalent to 20 mg of dried plant material per disc. Extracts of *Alnus rubra* (Betulaceae) bark and catkins, *Empetrum nigrum* (Empetraceae) branches, *Glehnia littoralis* (Umbelliferae) roots and *Lomatium dissectum* (Umbelliferae) roots completely inhibited the growth of both organisms at a concentration equivalent to 100 mg of dried plant material per disc.

2.3.1 Introduction

In the western world, tuberculosis is commonly considered to be a disease of the past, a disease which has long since been conquered by the miracles of modern antibiotics. Along with the general public, many medical practitioners have come to consider tuberculosis as a disease that no longer posed a serious public health problem.

Consequently, the scientific community has been fairly slow to respond to the growing evidence that the incidence of tuberculosis in North America and Europe is increasing. Some epidemiologists have warned that AIDS and multiple drug-resistant tuberculosis have the potential to precipitate the most disastrous public health crises since the bubonic plague (Stanford, 1991). In addition to *Mycobacterium tuberculosis*, two other species, *M. avium* and *M. intracellulare* (commonly referred to as MAC, *M. avium* complex) cause human disease, particularily in immunocompromised hosts. These two species have also emerged as important pathogens of humans because of the increased incidence associated with AIDS and their natural resistance to the common anti-mycobacterial drugs.

It is clear that public health measures alone cannot contain the threat of multiple drug resistant tuberculosis. Potent new anti-mycobacterial drugs are desperately needed not only for AIDS patients but also for the health care workers and members of the general public who are being striken by these often fatal bacterial infections.

In Canada, the incidence of tuberculosis is significantly higher (10 x) among aboriginal populations than in the general public (Young, 1988). Many people have assumed that this was due to the fact that tuberculosis was newly introduced into the native population by European settlers. However, there is strong archaeological evidence that tuberculosis was present in Pre-Columbian America (Bulkstra, 1981; Clark, 1987; Pfeiffer, 1984) and it is therefore reasonable to assume that the North American aboriginal peoples have an equally long history of seeking out a cure for this disease. Given the pressing need for new anti-mycobacterial drugs, it was deemed worthwhile to examine the potential of these traditional remedies as modern therapeutics.

2.3.2 Methods

Microorganisms

Mycobacterium tuberculosis (strain Erdman, Trudeau Mycobacterial Collection [TMC] # 107; American Type Culture Collection [ATCC] # 35801) and *M. avium* (TMC # 724; ATCC # 25291) were grown, stored and assessed for viability as previously described (Stokes et al., 1993).

Assay protocol

A standard drug sensitiviity testing method for mycobacteria was employed. Ten µl of plant extract (representing 20 mg of dried plant material) was applied to a 0.25 inch diameter blank paper disc (Becton Dickinson, Cockeysville, MD) and allowed to air dry. Discs were placed in quadrant plates (Becton Dickinson) and five mls of molten (56°C) Middlebrook 7H10 agar + oleic acid, dextrose complex (Becton Dickinson) was plated onto each quadrant. After setting, plates were incubated overnight at 4°C to allow for diffusion of the compounds. Control discs were loaded with 10 µl methanol or 10 µl of 10 mg/ml isoniazid (one of the first choice drugs for treatment of *M. tuberculosis*). To each quadrant 100 µl of bacterial suspension was added which contained approximately 1.5 x 10^6 *M. tuberculosis* or 2 x 10^3 *M. avium*. Plates were incubated for 3 weeks in sealed bags at 37°C after which bacterial growth was assessed. To confirm the activity of those extracts which showed only slight inhibition, the assay was repeated using 50 µl/disc (the equivalent of 100mg of dried plant material).

An arbitrary scale was used to score the anti-mycobacterial activity of each extract. Extracts scored as "-" had no discernable effect on the bacterial growth. Extracts scored as "+" caused a small zone of clearing or a zone of inhibition with a few resistant colonies within it, though colonies were too numerous to count. Extracts scored as "++" greatly inhibited the growth of the mycobacteria, to the extent that less than 50 colonies were present. Extracts scored as "+++" completely inhibited all growth.

The Pearson correlation coefficient between the results of this study and the activity these extracts exerted against *M. phlei* in the general antibiotic screening (chapter 2.1) was calculated using the computer program SYSTAT (Wilkinson, 1988).

2.3.3 Results

The anti-mycobacterial screening results for those plant extracts which exhibited activity are given in Table 7. Nineteen of the 100 methanolic plant extracts screened exhibited some antibiotic activity against *M. tuberculosis* and 16 of the extracts were active against *M. avium*. Thirteen of these 19 active extracts were traditionally used to treat tuberculosis and another four were used in the treatment of coughs. The extracts of *Heracleum maximum* roots, *Moneses uniflora* aerial parts and *Oplopanax horridus* inner bark completely inhibited the growth of both *M. tuberculosis* and *M. avium* at a concentration equivalent to 20 mg of dried plant material. The extracts of *Alnus rubra* bark and catkins, *Empetrum nigrum* branches, *Glehnia littoralis* roots and *Lomatium dissectum* roots completely inhibited the growth of both test organisms at a concentration equivalent to 100 mg of dried plant material.

Three extracts inhibited the growth of *M. tuberculosis* but did not affect the growth of *M. avium*. These active extracts were made from: *Balsamorhiza sagittata* roots, *Fragaria vesca* leaves and *Geum macrophyllum* roots.

The correlation between anti-mycobacterial activity and antibiotic activity against *M. phlei* was calculated to be 0.945.

Table 7 - Phase one anti-mycobacterial assay results[a]

Organisms assayed against Equivalent of dried plant material/disc		*M. tuberculosis* 20 mg	 100 mg	*M. avium* 20 mg	 100 mg
Positive control (Isoniazid)		+++	+++	-	-
Alnus rubra (Betulaceae) Q-1 Bark	T[b]	+	+++	-	+++
Alnus rubra (Betulaceae) Q-2 Catkins	T	+	+++	-	+++
Balsamorhiza sagittata (Compositae) P-2	T	+	++	-	-
Chaenactis douglasii (Compositae) P-3	T	+	+++	-	+
Empetrum nigrum (Empetraceae) Q-17	T	++	+++	+	+++
Fragaria vesca (Rosaceae) W-1	T	-	+	-	-
Geum macrophyllum (Rosaceae) Q-23	P	+	+++	-	-
Glehnia littoralis (Umbelliferae) Q-13	M	++	+++	++	+++
Heracleum maximum (Umbelliferae) P-32b	T	+++	+++	+++	+++
Hypericum perforatum (Hypericaceae) P-30	C	-	+	++	++
Juniperus communis (Cupressaceae) Q-25	T	+	++	-	+
Lomatium dissectum (Umbelliferae) W-10	T	++	+++	++	+++
Moneses uniflora (Ericaceae) Q-8	C	+++	+++	+++	+++
Nuphar lutea (Nymphaceae) Q-3c	T	-	+++	+	+
Oplopanax horridus (Araliaceae) Q-14	T	+++	+++	+++	+++
Pinus contorta (Pinaceae) Q-18	T	+	+++	-	+
Polystichum munitum (Polypodiaceae) Q-15	C	-	+	+	+
Populus tremuloides (Salicaceae) P-34	T	+	+++	-	+
Rosa nutkana (Rosaceae) P-5	C	+	+	-	+
Total		15	19	9	16

[a] Key to scoring: -, no inhibition; +, zone of inhibition with a few resistant colonies within it or small zone of clearing (colonies too numerous to count) ; ++, large zone of clearing or greatly inhibited growth (less than 50 colonies present) ; +++, complete inhibition.

[b] Traditional usage: C = coughs, M = unspecified medicinal plant, P = physic, T = tuberculosis medicine.

2.3.4 Discussion and Conclusions

Tuberculosis's infamy is due not only to the fact that it it the greatest killer in human history, responsible for over a billion deaths in the last two centuries alone (Ryan, 1992) but also because each death was preceded by a prolonged, painful decline in health. Tuberculosis is contracted simply by inhaling the airborne bacteria, making every human, regardless of race, sexual preference or economic status, susceptible to the disease. In the majority of people that come in contact with the bacteria, the immune system is able to successfully contain the organism and disease symptoms do not develop. It is thought that the unusual waxy coat of *Mycobacterium* sp. protects them from the killing action of macrophages' proteolytic enzymes, allowing them to survive and multiply within white blood cells. Unable to eradicate the bacteria, the immune system walls off the bacteria within a granuloma to contain the infection. The bacteria remain as a latent threat within these tubercules, capable of reactivating if the host's immune system is compromised in any way.

It has been estimated that there are approximately 1.7 billion people or roughly one third of the world's population infected with tuberculosis (Sudre, 1992). In approximately 10% of these infections, the body fails to contain the bacteria, resulting in disease. Left unchecked the bacteria eventually infiltrate and infect every organ, causing permanent scarring of the lungs, grotesque and painful abcessess of the skin and soft tissues (scrofulous sores), excruciating inflammation of the internal organs and gouging cankerous cavities in the bone. An estimated 2.9 million people died from tuberculosis in 1990, making this disease the largest cause of death from a single pathogen in the world (Murray, 1991).

The HIV virus destroys the very white blood cells which enable most people to fight off *Mycobacterium* infections. AIDS patients are therefore extremely vunerable to contracting tuberculosis from either inhaling the bacteria or through the reactivation of latent disease. The HIV virus also makes patients susceptible to infections of *M. avium* and *M. intracellulare* (MAC), though it is thought that infection with the MAC species occurs through the gastrointestinal route and leads to a very different pathenogenesis from that usually associated with *M. tuberculosis*.

Another reason for the resurgence of mycobacterial infections in the developed world is thought to be the rapidly increasing incidence of multiple drug-resistant strains of *M. tuberculosis* and *M. avium*. The innate capacity of *Mycobacterium* to develop resistance to a drug was observed in trials of the first antibiotics against tuberculosis. Resistance was also observed to emerge when only two drugs are used. Therefore the standard treatment for tuberculosis became a combination of drugs, typically isoniazid, rifampin and pyrazinamide. During the 1980's, the number of reports of multiple drug resistant (MDR) tuberculosis began to increase. More alarmingly, many of these MDR strains were resistant not only to the first line antibiotics but also many of the secondary drugs, some strains being resistant to seven of the most effective tuberculosis drugs available (Iseman, 1985) and as virulent as the wild type strains (Rosenthal, 1992). The increasing incidence of MDR strains worldwide emphasizes the desperate need for new anti-mycobacterial drugs.

The search for tuberculosis therapeutics however, is both far more difficult and dangerous than most antibiotic development programs. The virulence of these airborne pathogens necessitates extraordinary containment facilties and specially trained personnel in order to safely conduct research in this area. Other genera of bacteria cannot reliably substitute for anti-mycobacterial screenings as the unusual waxy coat that makes *Mycobacterium* impervious to the digestive enzymes of white blood cells is also an inpenetrable barrier to many antibiotics and some compounds with anti-mycobacterial activity have no effect against other bacterial species. Therefore, leads towards the discovery of new drugs and findings which may improve the efficacy of the search are of value.

In both of these contexts, the results of this antibiotic screening of 100 methanolic plant extracts against *M. tuberculosis* and *M. avium* appear promising. Nineteen extracts showed activity against *M. tuberculosis* and 16 extracts were active against *M. avium*. Of these active extracts, six extracts were particularily outstanding in their ability to completely inhibit the growth of both organisms: *Empetrum nigrum, Glehnia littoralis, Heracleum maximum, Lomatium dissectum, Moneses uniflora*, and *Oplopanax horridus*. Chemical isolation work to identify the active constituents of *Oplopanax horridus* is still in progress at this writing.

It is noteworthy that 3 of these very active extracts were made from members of the same plant family, the Umbelliferae: *G. littoralis, L. dissectum* and *H. maximum.* A pair of unstable tetronic acids were identified as the antimicrobial constituents of *L. dissectum* (Cardellina and Vanwagenen, 1985; Vanwagenen and Cardellina, 1986) but it is not known if these compounds are also responsible for this plant's anti-*mycobacterium* activity. The family Umbelliferae is well known for its cytotoxic furano-coumarin constituents and these compounds may be responsible for the anti-mycobacterial activity observed in these family members.

A comparison of the results of the general antibiotic screening reported in chapter 2.1 and the anti-mycobacterial screening results suggest that an extract's ability to strongly inhibit the growth of the related organism *Mycobacterium phlei* (a fast growing, non-pathogenic bacteria) may provide a good selection criterion for anti-mycobacterial screening candidates. There was a significant correlation (0.945) between those extracts which had an inhibitory effect on *M. phlei* and those extracts which were active in the present study. The six extracts found to be most active in this study were also in the group of ten extracts which were the most active against *M. phlei*. These results seem to support the assertion that the inclusion of *M. phlei* in general antibiotic screenings is quite useful, as very strong activity against this organism may be indicative of activity against other species of *Mycobacterium*.

Can the traditional usage of a plant to treat tuberculosis also be used as an effective selection criterion for anti-mycobacterial screenings? In this study, a comparison of the ethnobotanical literature and the screening results shows that 13 of the 19 active extracts (68%) were prepared from plant species which were specifically reported to have been used for the treatment of tuberculosis. These active tuberculosis remedies are indicated with a letter "T" in Table 7. There were no reports that the extracts of the six other plant species which exhibited anti-mycobacterial activity were used specifically to treat tuberculosis, however, four of these plants were reported to have been used to treat coughs (these extracts are indicated by a letter "C" in Table 7). Of the 100 extracts screened, 37 samples were prepared from plant species which were reported to have been used to treat tuberculosis or consumption, and an additional 16 were reported to have been used to treat scrofula, lung hemorrhage or blood spitting (see Appendix 6 for ethnobotanical references). These results suggest that there may be a correlation between traditional usage in the treatment of tuberculosis and anti-mycobacterial activity.

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2.4 Phase one antiviral screening

Abstract

One hundred methanolic plant extracts were screened for antiviral activity against seven viruses. Twelve extracts were found to have antiviral activity at the non-cytotoxic concentrations tested. The extracts of *Rosa nutkana* and *Amelanchier alnifolia*, both members of the Rosaceae, were very active against an enteric coronavirus. A root extract of another member of the Rosaceae, *Potentilla arguta*, completely inhibited respiratory syncytial virus. A *Sambucus racemosa* branch tip extract was also very active against respiratory syncytial virus while the inner bark extract of *Oplopanax horridus* partially inhibited this virus. An extract of *Ipomopsis aggregata* demonstrated very good activity against parainfluenza virus type 3. A *Lomatium dissectum* root extract completely inhibited the cytopathic effects of rotavirus. In addition to these, extracts prepared from the following plants exhibited antiviral activity against herpesvirus type 1: *Cardamine angulata*, *Conocephalum conicum*, *Lysichiton americanum*, *Polypodium glycyrrhiza*, and *Verbascum thapsus*.

2.4.1 Introduction

The search for selective antiviral agents, principally focused on anti-human immunodefiency virus (HIV) agents, has been vigorous in recent years (De Clercq, 1988) but progress in the development of useful new antivirals has been painstakingly slow (Galasso, 1988). Meanwhile, frequencies of viral resistance to the relatively few anti-viral drugs currently used are increasing (De Clercq, 1993) and the problem of viral latency, the greatest obstacle to treatment of some viral infections, remains unsolved. The increasingly urgent need to find effective therapeutics justifies not only an accelerated search for new agents but also a broader scope to such research.

Ethnopharmacological screenings provide scientists with an alternative avenue to discovery from the current mainstream approach of attempting to design narrow spectrum drugs for specific molecular targets. The ethnopharmacological approach has equal potential for identifying new antiviral compounds, yet relatively few antiviral screenings of plant ethnomedicines have been conducted to date. "In view of the significant proportion of plant extracts that have yielded positive results in these screenings, it seems reasonable to conclude that there are probably numerous types of antiviral compounds in these materials. Further characterization of the active ingredients of some of these plants should reveal some useful compounds" (Hudson, 1990). It seems prudent, if not imperative, that researchers continue to investigate these sources before the knowledge or the plants themselves are lost.

In this chapter, the results of an antiviral screening of 100 methanolic plant extracts against seven viruses are presented.

2.4.2 Methods

Viruses and Cell lines

The effect of the methanolic plant extracts on the replication of seven selected viruses representing a spectrum of viral families was assayed. The viruses selected were: bovine coronavirus (BCV, *Coronaviridae*), bovine herpesvirus type 1 (BHV1, *Herpesviridae*), bovine parainfluenza virus type 3 (BPI3, *Paramyxoviridae*), bovine rotavirus (BRV, *Reoviridae*), bovine respiratory syncytial virus (BRSV, *Paramyxoviridae*), vaccinia virus (*Poxviridae*) and vesicular stomatitis virus (VSV, *Rhabdoviridae*). Viruses were propagated in established cell lines which were maintained *in vitro* as monolayer cultures using Eagle minimal essential medium (MEM) supplemented with fetal bovine serum (10% v/v) and gentamicin (10ug/ml). The cells were incubated at 37°C in a humidified environment containing 5% CO_2. BCV, BHV1 and VSV were grown in Madin-Darby bovine kidney (MDBK) cells; BRV and vaccinia virus in African green monkey kidney (MA104) cells; BRSV in Georgia bovine kidney (GBK) cells; and BPI3 in African green monkey kidney (Vero) cells.

Antiviral assays

The abilities of dilute plant extracts to inhibit virus-specific cytopathic effects were used as a measure of antiviral activities. Near-confluent 0.3 cm^2 cell monolayers in 96-well plates (Flow Laboratories) were rinsed with serum-free MEM then each was treated with 0.2 ml of a plant extract diluted in serum-free MEM. The extracts were tested at dilutions ranging from 1×10^{-1} through 1×10^{-7}. Antiviral activities were scored using cell cultures treated with extracts diluted sufficiently (usually 1×10^{-4}) to eliminate any microscopically observable toxic effects. Two samples (Q1 and Q2) demonstrated residual toxicity at that level, hence they were scored after application at a dilution of 2.5×10^{-5}.

After 12 hours of treatment at 37°C, the medium was removed and the cultures were infected with stock preparations containing approximately 100 plaque-forming units (PFU) of the respective infectious virus in 0.1 ml of MEM. Mock-infected controls received sterile cell-culture medium. After a one hour absorption period, the innoculum was removed, the cells were washed twice with MEM then overlaid with 0.2 ml of fresh diluted plant extract. Plates were incubated at 37°C for two to seven days, depending upon the virus-cell combination used. Cytopathic effects were scored after microscopic observation. Each treatment (+/- plant extract, +/- virus) was performed in triplicate and the entire regimen was repeated at least once for each extract tested.

2.4.3 Results

One hundred crude methanolic extracts of plants, 96 of which were used medicinally by British Columbian native peoples were screened for antiviral activity against seven viruses. Twelve plant extracts each demonstrated some antiviral activity against one virus. Scores of the degrees of inhibition of virus-induced cytopathic effects caused by treatment with these extracts are presented in Table 8. Results for vaccinia virus and VSV are not shown as none of the plant extracts was observed to inhibit the cellular cytopathology induced by these viruses at the extract dilutions used.

Table 8 - Phase one antiviral assay results[a]

Viruses assayed against[b]	corona-virus	herpes-virus	para-influenza	RSV virus	rota-
Amelanchier alnifolia (Rosaceae) P-6	++	-	-	-	-
Cardamine angulata (Cruciferae) Q-16	-	+	-	-	-
Conocephalum conicum (Conocephalaceae) Q-28	-	+	-	-	-
Ipomopsis aggregata (Polemoniaceae) P-13	-	-	++	-	-
Lomatium dissectum (Umbelliferae) W-10	-	-	-	-	++
Lysichiton americanum (Araceae) Q-26	-	-	+	-	-
Oplopanax horridus (Araliaceae) Q-14	-	-	-	+	-
Polypodium glycyrrhiza (Polypodiaceae) Q-27	-	+	-	-	-
Potentilla arguta (Rosaceae) W-7	-	-	-	++	-
Sambucus racemosa (Caprifoliaceae) Q-21	-	-	-	++	-
Rosa nutkana (Rosaceae) P-5	++	-	-	-	-
Verbascum thapsus (Scrophulariaceae) P-24	-	+	-	-	-

[a] Classification of results: +, partial inhibition of virus-induced CPE; ++, complete inhibition of virus-induced CPE.

[b] Viruses assayed against: coronavirus, bovine herpesvirus type 1, parainfluenza virus type 3, respiratory syncytial virus, rotavirus.

2.4.4 Discussion and Conclusions

One of the inherent drawbacks of *in vitro* antiviral testing is the environmental sensitivity of animal cells in culture. Preparations which exert antiviral effects *in vivo* may not be detected in *in vitro* assays because of the extremely low concentrations of extract tolerated by cells in the artifical system. Even with this limitation, 12 of the 100 methanolic plant extracts screened exhibited some antiviral activity. Six of these active extracts completely inhibited virus induced cytopathic effects at the non-cytotoxic concentrations tested. As has been found in previous antiviral screenings (see Hudson, 1990 for overview), none of the extracts exhibited broad spectrum activity. Each active extract was effective against only one of the seven viruses screened.

Three of the most active extracts in this study were members of the same plant family. The extracts made from *Rosa nutkana* and *Amelanchier alnifolia*, both members of the Rosaceae, completely inhibited the cytopathic effects of an enteric coronavirus. The extract of another member of the Rosaceae, *Potentilla arguta*, completely inhibited respiratory syncytial virus. Coronavirus and respiratory syncytial virus are similar in that they are both single-stranded RNA viruses which infect mucosal surfaces.

A branch tip extract of *Sambucus racemosa* (Caprifoliaceae) also completely inhibited the cytopathic effects of respiratory syncytial virus while an inner bark extract of *Oplopanax horridus* (Araliaceae) exhibited partial inhibition. The extract of *Ipomopsis aggregata* (Polemoniaceae) completely inhibited cytopathology induced by parainfluenza virus type 3, another single-stranded RNA virus which causes respiratory disease. None of the extracts was effective against the fourth single-stranded RNA virus used in the screening, vesicular stomatitis virus.

Rotavirus is a double-stranded RNA virus that causes gastroenteritis, one of the major infectious diseases in the world today, as judged by mortality statistics (Vesikari, 1988). The only extract which exhibited activity against this serious pathogen was a *Lomatium dissectum* (Umbelliferae) root extract which completely inhibited the cytopathic effects.

Two double-stranded DNA viruses were used in this screening, herpesvirus type 1 and vaccinia virus. Herpesviruses cause respiratory, genital, conjunctival or encephalitic infections which become latent in the trigeminal ganglion. There is also a growing body of evidence that Kaposi's sarcoma is caused by a newly discovered type of herpesvirus (Chang, 1994; Cohen, 1995; Chang, 1995). Five of the plant extracts were found to partially inhibit the cytopathic effects of herpesvirus: *Cardamine angulata* (Cruciferae), *Conocephalum conicum* (Conocephalaceae), *Lysichiton americanum* (Araceae), *Polypodium glycyrrhiza* (Polypodiaceae) and *Verbascum thapsus* (Scrophulariaceae). None of the extracts exhibited activity against vaccinia virus at the non-cytotoxic concentrations tested.

Given the pressing need for new antiviral agents and the inherent limitations of *in vitro* antiviral testing for such agents, the results of this screening were promising. It is possible that the elucidation of the active constituents in these plants may provide useful leads in the development of antiviral therapeutics. It is interesting to note that 10 of these 12 active plant species were traditionally used to treat what are now known as viral ailments. Eight of the active plants were used to treat the specific diseases or symptoms caused by the virus that they exhibited activity against. These observations suggest that there may be a useful correlation between antiviral activity and traditional usage. They also suggest that some of these traditional remedies may have been efficacious.

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2.5 Ethnobotanical analyses

2.5.1 Introduction

The ethnopharmacological analyses conducted on the antibiotic and antifungal screening results demonstrated that a significantly higher percentage of plants that were used specifically to treat bacterial or fungal ailments exhibited activity compared to plants that were used for other types of ailments. A review of the ethnobotanical literature on the species which were active in the antiviral and anti-mycobacterial screenings suggested that there may be a correlation between the traditional usage of a plant to treat tuberculosis or viral infections and pharmacological activity. Therefore this study was designed to analyze the data sets to determine whether there were statistically significant correlations.

The results of the antiviral and anti-mycobacterial screenings were easily converted to numerical values. However, it was not readily apparent what method should be used to classify the ethnobotanical data. Therefore three different classification methods were used and the correlations between each of these classifications and the screening results calculated.

2.5.2 Methods

Data classification

The traditional medicinal applications of phase one plants summarized in Appendix 6 were used as the basis for the ethnobotanical classifications. The three different methods used to categorize these references were a "systematic" classification, a "pharmacological" classification, and an "infectious disease" classification system.

In the systematic classification, each referenced usage was classified as to the physiological system the medicine was purported to effect. The categories used were as follows: C = cardiovascular, D = dermal and mucosal, G = gastrointestinal, L = liver, M = muscular-skeletal, N = neurological, O = ophthalmic and otic, P = respiratory, R = reproductive, S = systemic, U = urinary.

The cardiovascular category included all medicines for: the heart, blood circulation and hemostats but not blood tonics. The dermal-mucosal category included remedies for: topical abscesses, boils, cuts, eczema, itches, rashes, skin ailments/diseases/problems, all types of sores, wounds, etc. The gastrointestinal category included all references to digestive ailments and their treatment: carminatives, cathartics, diarrhea, dysentery, dyspepsia, emetics, flatulence, hemorrhoids or piles, indigestion, purgatives, stomachache, stomach problems/ailments/diseases/ulcers, etc. References to treatments purported to affect the liver were placed in the liver category. The muscular-skeletal category included references to: arthritis, broken or aching bones, muscular aches and swellings, rheumatism, sprains, stiffness, etc. The neurological category included: analgesics, headache, narcotics, pain, sedatives, soreness, stimulants, etc. The ophthalmic and otic category included all eye and ear medicines, the majority of which were remedies for sore and/or inflamed eyes. The respiratory category included all medicines purported to affect the respiratory system and included: cold and cough remedies, decongestants, expectorants, throat medicines, pulmonary complaints, pneumonia, bronchitis, tuberculosis or consumption, lung ailments or sickness, etc. The reproductive category included: abortifacients, childbirth medicines, female or women's medicines and tonics, lacteal stimulants, medicines affecting fertility, menstruation, sterility, male impotence and virility. The urinary medicines category included references to: bladder, kidney or urinary ailments/diseases/problems, diuretics, too frequent urination, failure to urinate, etc. The systemic category included treatments for systemic ailments or symptoms such as: antipyretics, diaphoretics, fever, all infectious diseases, blood tonics, tonics, physics, panaceas and general "good for everything" medicines.

The second classification system was based on the traditional western system of classifying medicines by their pharmacological effect. Each reported usage was categorized as to the purported effect that it was thought to exert or the symptom it was used to treat. Definitions of these traditional terms are provided in the glossary. There were a total of 53 categories used in this pharmacological classification system, designated as follows:

1 = Abortifacient, 2 = Analgesic, 3 = Antidiarrheal, 4 = Antiemetic, 5 = Antihelminthic, 6 = Antinflammatory, 7 = Antipyretic, 8 = Antirheumatic, 9 = Antiscorbutic, 10 = Antiseptic, 11 = Antispasmotic, 12 = Antisyphilitic, 13 = Antitussive, 14 = Astringent, 15 = Carminative, 16 = Cathartic, 17 = Cholagogue, 18 = Colds, 19 = Decongestant, 20 = Diaphoretic, 21 = Digestive, 22 = Diuretic, 23 = Emetic, 24 = Emmenogogue, 25 = Expectorant, 26 = Febrifuge, 27 = Hair growth, 28 = Heart, 29 = Hemorrhoids, 30 = Hemostat, 31 = Insect bites, 32 = Lacteal stimulant, 33 = Laxative, 34 = Liver, 35 = Opthalmic, 36 = Other, 37 = Oxytocic, 38 = Purgative, 39 = Sedative, 40 = Sore throat, 41 = Stimulant, 42 = Stomachic, 43 = Tonic, 44 = Urinary System, 45 = Women's medicines, 46 = Wounds (vulnary), 47 = Other skin ailments, 48 = Other pulmonary complaints, 49 =

Viral infections, 50 = Diabetes, 51 = Cancer, 52 = Rubefacients and counterirritants, 53 = Anti-venom, poison antidotes.

The final classification system used was a modification of the systems used in chapters 2.1 and 2.2, specifically focusing on the reports of traditional usage to treat specified infectious diseases. All medicines which were used to treat a specified bacterial infection or disease were categorized as B = bacterial infections. References to treatments for bacterial infection symptoms and ailments which may be caused by bacterial infections were classified as B2 = bacterial infection symptoms. This B2 category included: ague, headache, fever, diarrhea, digestive ailments and diseases, stomach and intestinal ailments/diseases/problems, sore throat, running sores, ulcers, scrofulous sores, swollen glands, toothache, etc.

Similarly, treatments for specified fungal infections were classified as F = fungal infections. The descriptors from the literature designated to this category were: athlete's foot, baby's coated tongue, baby powder or talc, baby's rashes, dandruff, diaper rash, leucorrhea, scaly skin, split skin between the toes, the whites, wash for baby's bottom, thrush, and yeast infections. Treatments for symptoms of fungal infections were categorized as F2 = fungal symptoms. Descriptors for this category included: body sores, broken skin, chafed skin, chapped lips, chapped hands, chapped skin, cracked skin, dry skin, disinfecting or antiseptic wash for itch, disinfecting or antiseptic wash for newborns, female complaints, female medicine, female tonic, foot soak, irritated scalp, irritated skin, itch, itchy scalp, rash, raw spots on baby, running sores, scabby skin, scabs, scalp disease, skin ailments, skin disease and sores of the feet.

References to the treatment of tuberculosis or consumption were classified as T = tuberculosis and references to tubercular symptoms such as spitting or coughing blood and chronic coughs were categorized as T2 = tubercular symptoms. Similarly, treatments for specified viral infections were classified as V = viral infections and treatments for viral infection symptoms were classified as V2 = viral symptoms. A third category, V3, was used for the numerous references to cold and cough medicines.

All blood tonics, blood remedies, physics, tonics, panaceas and medicines for changing or purifying the blood were classified as P = physics. All remaining ailments and symptoms which were not included in any of the preceding categories were classified as O = other medicines.

The anti-mycobacterial data from Table 7 (chapter 2.3) was converted by assigning each entry a value equivalent to the number of "+" in the data table (- = 0, + = 1, ++ = 2, +++ = 3). Similarly, the antiviral data from Table 8 (chapter 2.4) was converted by assigning each entry a value related to number of "+" in the data table (- = 0, + = 1, +++ = 2).

Data analyses

The computer program "SYSTAT" (Wilkinson, 1988) was used to analyze the data sets for correlations between each of the two types of pharmacological activities screened for and each of the ethnopharmacological classification systems used. The Pearson product correlations between the screening results and the ethnopharmacological classifications were calculated, using a Bonferroni adjustment as the basis for statistical significance.

2.5.3 Results

With the "systematic" classification, there were no significant correlations found between any of the physiological categories and any of the screening results (antibiotic, antifungal, anti-*Mycobacterial* or antiviral). There were significant correlations between the "infectious disease" classifications and both anti-mycobacterial and anti-viral activity. Most notably, the traditional usage of a plant to treat tuberculosis was significantly correlated with anti-mycobacterial activity (Table 9). Usage to treat specified viral infections was correlated with antiviral activity (Table 12).

There were also significant correlations between a few of the symptomatic categories and both anti-mycobacterial activity and antiviral activity. Traditional usage to treat rheumatism was correlated with anti-mycobacterial activity (Table 10). Traditional usage to treat pulmonary ailments other than colds and coughs, and specified viral ailments were correlated to antiviral activity (Table 11). There were also correlations between traditional usage as an emetic or purgative and antiviral activity.

Only the statistically significant correlations are shown in Tables 9 to 12.

Table 9 - Correlation between anti-mycobacterial screening results and infectious disease categories

	M. tuberculosis		*M. avium*	
Dried plant material (mg/ml)	20	100	20	100
Tuberculosis medicine	0.451	0.411	0.405	0.483

Table 10 - Correlations between anti-mycobacterial activity and pharmacological categories

	M. tuberculosis		*M. avium*	
Dried plant material (mg/ml)	20	100	20	100
(8) Rheumatism	0.434**	0.311	0.471**	0.340
(50) Diabetes	0.477**	0.277	0.524**	0.333
(51) Cancer	0.288**	0.232	0.413**	0.268

** Statistically significant correlations

Table 11 - Correlations between antiviral activity and pharmacological categories

Activity against	RSV[a]	Rotavirus
Pharmacological category:		
(23) Emetics	0.587**	0.016
(38) Purgatives	0.606**	-0.032
(48) Other pulmonary ailments	0.010	0.552**
(49) Viral infections	0.045	0.460**

[a] Respiratory syncytial virus

** Statistically significant correlations

Table 12 - Correlations between antiviral screening results and infectious disease categories

Activity against	RSV[a]	Rotavirus
Infectious disease category		
B - bacterial diseases	0.500**	0.273
B2 - bacterial symptoms	0.557**	0.195
F2 - fungal symptoms	0.435**	0.234
V - viral diseases	0.348*	0.475**
V2 - viral symptoms	0.583**	0.249
V3 - colds and coughs	0.476**	0.191
T - tuberculosis	0.598**	0.412**
T2 - tuberculosis symptoms	0.436**	0.019
O - other medicines	0.591**	0.078

[a] Respiratory syncytial virus
** Statistically significant correlations

2.5.4 Discussion and Conclusions

The analyses based on both the "infectious disease" and the "pharmacological" classifications revealed several correlations with anti-mycobacterial and antiviral activity. As a visual inspection of the anti-mycobacterial screening results suggested, there was a statistically significant correlation between traditional usage of a plant as a tuberculosis medicine and anti-mycobacterial activity (Table 9). This result would seem to imply that it would be worthwhile to specifically target plants that had been used as tuberculosis medicines for future anti-mycobacterial screenings. However, this analysis was based on a fairly small sample (37 were used as tuberculosis medicines). Analysis of a larger sampling of tuberculosis medicines would provide a greater degree of confidence in the significance of this correlation.

There were also "statistically significant" correlations between some of the pharmacological classifications and anti-mycobacterial activity (Table 10). As there were less than five reports in both the diabetes and cancer medicine categories, these correlations must be treated with a great deal of skepticism. There were over one hundred reports in the rheumatism medicine category so the correlation with this category may be more reliable. Since there is no obvious scientific connection between rheumatism medicines and tuberculosis medicines, it would be quite interesting to see if this apparent correlations stands up to more rigorous testing with a larger sample of plants.

There were also "statistically significant" correlations between the pharmacological categories of emetics, purgatives, other pulmonary ailments and medicines for viral infections, and antiviral activity. However, it is highly questionable whether these findings have any real significance as each of these categories were correlated with activity against either respiratory syncytial virus or rotavirus and there was only one extract active against each of these viruses. Similarly, the correlations between the infectious disease categories and antiviral activity (Table 12) are suspect for the same reason. Clearly, these findings would have to hold up under an analysis of a much larger data set before the significance of these results could be given much weight.

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2.6 Conclusions from phase one research

2.6.1 Introduction

The phase one screenings provided a great deal of valuable information. Many new leads on potential anti-infectious agents were obtained. The results of the ethnobotanical analyses supported the hypothesis that the North American ethnobotanical literature can be used as an effective tool for identifying plants with anti-infectious activity and provided some insights on how future screenings may be improved. The data collected in these screenings also gave rise to several other hypothesis regarding other factors which may be correlated to pharmacological activity.

2.6.2 Leads on potential antimicrobial agents

Several of these leads have already been followed up on with more detailed chemical analysis. From the antibiotic screening, eight plants were targeted for further investigation: *Rhus glabra, Alnus rubra, Balsamorhiza sagittata, Ceanothus velutinus, Empetrum nigrum* and *Glehnia littoralis*. Several of these plants exhibited activity in one or more of the other screenings as well.

The extract of *Rhus glabra* exhibited the strongest broad spectrum antibiotic activity of all the extracts screened although it did not display significant activity in any of the other screens. Three antibiotic compounds were isolated from *R. glabra* using activity guided fractionation: 3,4,5-trihydroxybenzoic acid (methyl gallate), 4-methoxy-3,5-dihydroxybenzoic acid and gallic acid (Saxena, 1994). These compounds are all tannins, a class of compounds which are common constituents found in great abundance in members of the *Rhus* genus and are the basis of usage of *Rhus* species in the tanning industry. The first two compounds, reported for the first time from *R. glabra*, exhibited fairly low minimum inhibitory concentrations (MIC), 12.5 μg/ml and 25 μg/ml respectively, compared to the MIC of the ubiquitous gallic acid which was > 1000 μg/ml. These MIC do not compare favorably to that of commercial antibiotics which range from 0.3-1 μg/ml (Farmer, 1992) and the propensity of tannins to cross-link protein make these compounds unsuitable for intravenous use.

Alnus rubra exhibited strong antibiotic and antifungal activity as well as anti-mycobacterial activity. Two active compounds were isolated from the bark of this plant; diarylheptanone and oregonin (Saxena, 1995a).

The lowest MIC these compounds exerted was 31.2 μg/ml against *Staphylococcus aureus,* values which also do not compare favorably against commercial antibiotics.

The extract of *Balsamorhiza sagittata* exhibited very good antifungal and antibiotic activity. A known thiophene, 7,10-epithio-7,9-tridecadien-3,5,11-triyn-1,2-diol was the main active compound subsequently isolated from *B. sagittata* (Matsuura, 1995b). This compound exhibited antibacterial activity against *Staphylococcus aureus* and *Bacillus subtilis* which was slightly enhanced by exposure to long wave ultraviolet light 320-400 nm. Again the MIC against these organisms (25 μg/ml) did not compare favorably with that of commerical antibiotics. Although the crude extract of *B. sagittata* exhibited activity against the gram negative organisms *Escherichia coli* and *Pseudomonas aeruginosa*, this thiophene was not active against these organisms, suggesting the presence of another antibacterial constituent which was not isolated.

The extract of *Ceanothus velutinus* also exhibited strong antifungal activity and moderate antibiotic activity in the screenings. Four antibiotic compounds were later isolated from *Ceanothus velutinus*: octacosanoic acid, 4',5-dihydroxy-3',7-dimethoxyflavone (velutin), 5-hydroxy-3',4',7'-trimethoxyflavone (4'-O-methylvelutin) and 2-formyl-3-methoxy-A(1)-norlup-20 (29)-en-28-oic acid (Matsuura, 1995c). The last compound which exhibited the lowest MIC of these four compounds (25μg/ml), was a novel triterpene that was isolated for the first time in the course of this research.

The crude extract of *Empetrum nigrum* exhibited good antibiotic, antifungal and anti-mycobacterial activity, prompting the selection of this plant for further investigation. Four antimicrobial compounds were subsequently isolated: batatasin, 4'-O-methylbatatasin, 3-O-methylbatatasin and 7-hydroxy-2,4-dimethoxy-9,10-dihydrophenanthrene (Matsuura, 1995d). However the MIC of these compounds were all relatively poor (>200 μg/ml) and none of these compounds showed anti-mycobacterial activity.

Catechin and an unidentified triterpene were the antibiotic compounds isolated from *Geum macrophyllum* (Matsuura, 1995e). Although the crude extract of this plant exhibited strong broad spectrum antibiotic and antifungal activity, both of these isolated compounds had quite high MIC (> 270 μg/ml and > 420 μg/ml respectively).

Activity guided fractionated resulted in the identification of seven active constituents from *Glehnia littoralis* (Matsuura, 1995a). Three of these compounds were known furanocoumarins (psoralen, bergapten and xanthotoxin) which did not exhibit any activity under 400 μg/ml. A fourth constituent, falcarindiol, had been previously reported as an antibiotic by Muir (1982). The three other constituents identified were novel compounds, an unstable fatty acid, (8E, 10Z) 7-hydroxy-8, 10-octadienoic acid, and two polyyne compounds; (9Z) 1,9-heptadecen-4, 6-diyn-3, 8, 11-triol and (10E) 1, 10-heptadecen-4, 6-diyn-3, 8, 9-triol. The latter two polyne compounds had weak inhibitory effects against both the bacteria and fungi tested (MIC ~ 200-400 μg/ml). The instability of the fatty acid prohibited MIC determination for this compound and attempts to form active stable derivatives were unsuccessful.

It has yet to be determined whether any of these antimicrobial compounds isolated from *G. littoralis* (Umbelliferae) are also responsible for the anti-mycobacterial activity that the crude *G. littoralis* extract exhibited. Two other members of the Umbelliferae, *Heracleum maximum* and *Lomatium dissectum* also exhibited very strong anti-mycobacterial activity (as well as antibiotic and antifungal activity), suggesting that these members of the Umbelliferae may share a common constituent with anti-mycobacterial activity. *H. maximum* was considered a second priority candidate for chemical investigation because it is known to contain a number of toxic constituents, including psoralen (Foster, 1990). *L. dissectum* was previously reported to exert antimicrobial activity (Cardellina and Vanwagenen, 1985). Vanwagenen and Cardellina (1986) identified the active compounds as a pair of unstable, homologous tetronic acids (2-alkenyl-3-hydroxy-penta-2,4-dien-4-olides). It is not known if these compounds are also responsible for the anti-mycobacterial and antiviral activity that the crude *L. dissectum* extract exhibited in these screenings.

The fact that unstable acids were reported as the active antimicrobial compounds in both *G. littoralis* and *L. dissectum* leads to the speculation that a similar compound may also be responsible for the strong antimicrobial activity exhibited by the *H. maximum* extract. The fact that the *L. dissectum* extract exhibited antiviral activity at the non-cytotoxic concentrations tested while the *G. littoralis* and *H. maximum* extracts did not, does not rule out the possibility of a common type of anti-infectious constituent in this family. The absence of demonstrable antiviral activity in the assays of the *G. littoralis* and *H. maximum* extracts was most likely due to higher concentrations of cytotoxic constituents. This point however, will only be of any real interest to chemtaxonomists if pharmaceutical chemists cannot succeed in stabilizing these antimicrobial compounds without loss of activity.

Two plants which demonstrated strong antifungal activity, *Ipomopsis aggregata* and *Moneses uniflora*, were also subjected to in depth chemical investigations. *M. uniflora* exhibited good antibiotic activity including strong anti-mycobacterial activity, while *I. agreggata* exhibited strong activity against parainfluenza virus. A novel chloroquinone (8-chloro-chimaphilin) was isolated from *M. uniflora* in addition to the known antimicrobial compound chimaphilin and its derivative 3-hydroxy-chimaphilin (Saxena, 1995b). The 8-chloro-chimaphilin had the lowest MIC of these three compounds, 12.5 µg/ml against *S. aureus*. This compound was also found to be responsible for the anti-mycobacterial activity exhibited by the crude extract of *M. uniflora*.

Four active compounds were isolated from *I. aggregata*: giliacoumarin, cucurbitacin B, resorcinol, and hydroquinone glucoside (Saxena, 1995c). Resorcinol exhibited the lowest MIC of these four compounds, 25 µg/ml against *S. aureus*. As with all of the other chemical constituents referred to above, the MIC of these compounds did not compare favorably to that of commercial antibiotics.

The relatively poor activity of all these isolated pure active compounds appears to be at odds with the strong activity exhibited by the crude extracts of the plants they were isolated from. Particularily in the plants with many active compounds, synergistic interactions may account for this difference in activity, however this possibility has not been explored. Clearly, in the cases of *G. macrophyllum* and *B. sagittata* where the active compounds did not exert the same range of activity as their respective crude extracts, some active compounds have been broken down or lost in the isolation process.

Oplopanax horridus exhibited the most promising activity in the anti-mycobacterial assays. A novel antimicrobial compound was isolated from this plant (Saxena, 1995d). *O. horridus* also exhibited mild antiviral activity against bovine herpesvirus however the constituent responsible for this activity has not been identified.

In addition to the *O. horridus, I. aggregata* and *L. dissectum* extracts discussed above, the extracts of *Amelanchier alnifolia, Potentilla arguta, Rosa nutkana* and *Sambucus racemosa* also exhibited strong antiviral activity. It is noteworthy that three of these antiviral extracts were prepared from plant species belonging to the Rosaceae (*Amelanchier alnifolia, Potentilla arguta* and *Rosa nutkana*) and all three were active against viruses that infect mucosal surfaces. Although these plants did not perform similarly in the other antimicrobial screenings, it is possible that they possess a common antiviral compound since antimicrobial and antiviral activity are not necessarily correlated.

Tannins are commonly found in large quantities in many members of the Rosaceae, making this type of compound a logical candidate for the common antiviral constituent. Two other facts however, argue strongly against this. Tannins have been reported as the active antimicrobial compounds in many members of the Rosaceae, of which the *G. macrophyllum* discussed above is one example and *Potentilla* another (Selenina, 1973; Makarenko and Chaika, 1974). The samples of these genera exhibited significant antimicrobial activity but none of these plants exhibited antiviral activity. More importantly, *A. alnifolia, P. arguta* and *R. nutkana* exhibited antiviral activity at non-cytotoxic concentrations, demonstrating that any tannin constituents must be present in very low concentrations. It was therefore considered to be worthwhile to attempt to identify the antiviral constituents in these plants. The chemical isolation work is still in progress at this writing.

With the exception of *O. horridus*, none of these chemical investigations has led to commercially viable anti-infectious compounds although the research is not complete and several promising plants have not been explored yet. These chemical investigations have contributed to our knowledge of plant constituents, particularily with the isolation of several novel compounds whose range of pharmacological activities have not been fully researched. The discovery of even one new potential therapeutic agent and the promise of more discoveries yet to come more than justify the continuation of this type of research.

2.6.3 Conclusions from ethnopharmacological analyses

The results of the ethnopharmacological analysis of both the antibiotic and antifungal screening data support the hypothesis that the North American ethnobotanical literature provides an effective tool for targeting plants with anti-infectious activity. These results, along with the results of the anti-mycobacterial screening, further suggest that the specific traditional usages of a medicinal plant may be used as an indicator of the specific type(s) of pharmacological activity a plant possesses. Therefore, future screening studies may be able to identify a higher percentage of active plants if the specific traditional usages are used as selection criteria (ie. selecting plants whose traditional usage implied the treatment of bacterial infections for antibiotic screenings). However, the analyses also suggest that non-flowering plants and plants used as tonics should not be excluded from examination either.

2.6.4 Other factors which may be correlated with antimicrobial activity

The summary of the antifungal results by taxa suggests the hypothesis that more of the lower plants exert antifungal activity than do the higher plants (see Table 4). However, since the selection criterion used in the plant collection for this screening was not designed to test this notion, the sample size of the lower plant group is too small to lend much statistical evidence in support of this. Furthermore, the selection of lower plants was quite biased towards the tiny fraction of lower plants which were used medicinally by the British Columbian First Nations peoples. A much larger, balanced sampling of the lower plants would be required to obtain adequate data to test this hypothesis.

The screening data gives one the impression that the most active antifungal plants were those collected from arid habitats. It would seem much more logical to hypothesize that plants from wet and moist habitats would exhibit the greatest degree of antifungal activity. This intriguing contradiction suggested that it would be very interesting to analyze the degree of activity in relation to plant habitat in future studies.

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3.0 Introduction to phase two screening

In light of the positive results in the phase one screenings, the decision was made to undertake another round of plant collection and screenings. The primary objective of this second phase was also to screen traditional plant medicines for anti-infectious activity in order to identify promising leads on new therapeutics. The first phase of research also raised a number of interesting questions and possible correlations for which there was insufficient data to draw any definitive conclusions. Therefore, the phase two screening study was designed so that several parallel objectives could also be met.

For this second screening, the range of ethnobotanical literature used as the main plant selection criteria was expanded to include all of North America and the range of plant collection expanded to that of western North America. The plant collection for this phase of the research was planned so as to facilitate analyses of the correlation between antimicrobial activity and groupings based on four other factors: (1) medicinal versus non-medicinal plants; (2) the specific medicinal use of the plants; (3) taxa; and (4) plant habitat. Also, sufficient plant material was collected to allow for a comparison of the differences in activity due to the solvent of extraction.

The difference in the degree of activity among medicinal versus non-medicinal plants was one of the most prominent questions raised by the ethnopharmacological analyses of the phase one results. The answer to this question may vary significantly, depending upon the criteria used to designate a plant as non-medicinal. One must assume that there may be any number of medicinal plants classified as non-medicinal simply because their traditional usage has not been recorded in the literature. This problem can not be overcome but the number of plants misclassified can be reduced by excluding plants belonging to medicinal genera from the non-medicinal plant category. There are a number of strong arguments supporting the use of this non-medicinal plant selection criterion, as was done in this study.

First of all, the literature abounds with examples of members of a medicinal genus being used for the same medicinal purposes by disparate cultures around the world. Two good examples of this are the genera *Artemisia* and *Rhus*. The indigenous *Artemisia* species are commonly used to treat infection and inflammation while other *Rhus* species are commonly used to treat diarrhea in China, India, Africa, Europe, North and Central America. This pattern suggests that when there are records that several members of a genus were used as a medicine, related species may also have been used medicinally in other regions.

A much more tangible argument is that the ethnobotanical literature contains many taxonomic uncertainties at the species level and most likely errors in identification as well. There are numerous examples of plants identified by their common name or generic name only. It can not simply be assumed that First Nations peoples always made the same species differentiations as botanists. Nor can it be assumed that ethnobotanist's plant identifications were always correct. There are a number of genera whose members are extremely difficult to identify at the species level unless one is an expert in that genus. It seems most reasonable to suggest that some specimens belonging to taxonomically difficult genera such as *Aster* or *Carex* may have been misidentifed in the literature. For all of these reasons, the decision was made to classify "related species" as medicinal plants. This "related species" group was comprised of plants for which there were generic references to medicinal usage but no specific references.

The previous ethnopharmacological analyses also suggested that the specific medicinal usages of a plant may be used as an indicator of the specific types of pharmacological activity the plant possesses. A larger data set which included appropriate control groups was required to conduct a more rigorous statistical analysis of these apparent correlations. Therefore a larger sampling of plants whose traditional uses did not suggest antimicrobial activity, as well as non-medicinal plants were collected for this study. Similarily, an effort was also made to collect a greater number of samples belonging to the lower plant taxa so that a more robust analysis of the differences in activity between taxa could be made.

Careful detailing of the habitat from which each sample was collected was made at the time of collection and verified against information in the relevent flora so that the plants could be accurately classified according to their habitat. This information was collected so that the screening data could later be analyzed to determine if there were any significant correlations between plant habitats and antimicrobial activity.

3.0.1 Methods

Plant collection

Moerman's bibliography *Medicinal Plants of Native America* (1986) and the British Columbian ethnobotanical literature (Turner et al., 1980, 1990) was surveyed to compile a representative list of those plants used medicinally by the native peoples of western North America. Medicines used to treat abcesses, burns, infected sores and wounds, skin ailments, tuberculosis and yeast infections were the primary focus. The list was used in the field as a selection guide for the plant species and type of material to be collected. From the several hundred plant species on the ethnobotanical list, 142 samples were collected. In addition to these, 18 plants with no reported medicinal use were collected. The material from 25 of these 160 plant species was separated into constituent parts (aerial, roots, etc.) which resulted in a grand total of 185 plant samples.

The collecting was carried out during the period from May, 1994 to September, 1994 in five general areas of western North America: northern California and Oregon, the U.B.C. Malcolm Knapp Research Forest in Maple Ridge, B.C., northern British Columbia, the Princeton-Penticton region in the interior of B.C., and Vancouver Island, B.C.. Details on the plant's habitat were also recorded at the time of collection. Identification authentications were obtained for the plant species whose identification was beyond the taxonomic expertise of the author. In order to ensure accurate botanical identifications of the angiosperms, only plants which were in flower were collected, introducing a seasonal bias into the selection. A voucher specimen was made for each collection and these vouchers have been filed in the University of British Columbia Herbarium. An annotated list of the voucher specimens for the plants collected including their full botanical names and synonyms is located in Appendix 2. An abbreviated summary of the traditional uses of each of these plants compiled from the literature is given in Appendix 7.

Extract preparation

The plant material was air dried and then ground in a Wiley grinder with a 2 mm diameter mesh. Forty g of the ground material were extracted in 200 ml of methanol with three washes of 200 ml, over 3 hours. The crude methanolic extract was first filtered through cheesecloth and cotton wool, then through a Büchner funnel with a No. 4 paper filter. The filtrate was rotoevaporated to dryness and then reconstituted with 20 ml of methanol. The extracts were refrigerated until the time of use.

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Turner, N.J., Thompson, L.E., Thompson, M.T. and York, A.Z. (1990) *Thompson Ethnobotany: Knowledge and Usage of Plants by the Thompson Indians*. Royal British Columbia Museum Memoir No. 25. Royal British Columbia Museum, Victoria, British Columbia, pp. 321.

3.1 Phase two antibiotic screening

Abstract

Methanolic extracts of 185 samples of western North American plants were screened for antibiotic activity against 7 bacterial strains. One hundred forty-three (77%) exhibited significant antibiotic activity. There was a great difference in the degree of antibiotic activity between the traditional plant medicines (75% active) and the non-medicinal plants (22% active). Ninety-one percent (91%) of the plants classified as potential antibiotics based on their traditional usage were found to have antibiotic activity. The taxa with the highest percentage of active plants were the Filinicae (ferns) and Gymnospermae (conifers) of which 100% were active, followed by the Angiospermae (flowering plants) of which 89% were active. The most active broad spectrum antibiotics were made from *Abies grandis* branches, *Elliottia pyroliflorus* branches, *Geum triflorum* roots, *Horkelia fusca* roots, *Paxistima myrsinites* branches, *Paeonia brownii* roots, *Phyllodoce empetriformis* aerial parts, *Picea sitchensis* inner bark and *Pseudotsuga menzesii* branches.

3.1.1 Introduction

In the phase one screenings of British Columbian medicinal plants, the results of the data analyses suggested that the specific applications of plant medicines could be used to select species which have a higher probability of exhibiting antimicrobial activity than medicinal plants in general. Therefore in addition to identifying plants with promising antibiotic activity, this study was designed to test this hypothesis more rigorously as well as to analyze whether other factors such as plant habitat may be used as indicators of antibiotic activity.

3.1.2 Methods

Extract preparation

In addition to the 185 methanol extracts prepared, 30 samples were randomly chosen for extraction with boiling water. These water extracts were prepared using the same procedure as for the methanolic extracts, with the substitution of boiling water for the solvent instead of methanol. Each water extract was refrigerated immediately after preparation and filter sterilized before use.

Ten samples which were traditionally prepared as salves or liniments were also extracted with petroleum ether. These extracts were prepared using the same procedure as for the methanolic extracts with the substitution of petroleum ether as the solvent.

Microorganisms

The clinically important pathogens *Escherichia coli* UB1002, *Enterococcus faecalis*, *Pseudomonas aeruginosa* K799 (wild type), multiple drug resistant *Staphylococcus aureus* P00017 and multiple drug resistant *Staphylococcus epidermidis* were used for this screening. The antibiotic super-susceptible strains of *Mycobacterium phlei* and *P. aeruginosa* Z61 were also used because they are sensitive indicator organisms which may detect the activity of compounds present in concentrations which are too low to exert an observable effect against the hardier wild type pathogens.

Cultures of the two *P. aeruginosa* strains and *E. coli* UB1002 were from the collection of R.E.W. Hancock. The Z61 strain was an antibiotic supersusceptible strain and the K799 strain was a wild type strain. The cultures of *Enterococcus faecalis*, multiple drug resistant *S. aureus* P00017 and multiple drug resistant *S. epidermidis* were clinical isolates provided by Dr. A. Chow, Department of Medical Microbiology, U.B.C. The culture of *M. phlei* was from the collection of G.H.N. Towers.

An inoculum of each bacterial strain was suspended in 3 ml of nutrient broth and incubated overnight at 37^0C. The overnight cultures were diluted 1/10 with nutrient broth before use. To ensure that the density of the diluted cultures were all within the range of 10^{7-8} CFU/ml, serial dilution plate counts were also made for each culture.

Antibiotic assays

The disc diffusion assay (Lennette, 1985) was used to screen for antibiotic activity. Paper discs (1/4") were impregnated with 20 µl of extract, the equivalent of 40 mg of dried plant material, and the solvent allowed to evaporate at room temperature. One hundred µl of the diluted bacterial culture was spread on sterile Mueller-Hinton agar plates before placing the extract impregnated paper discs on the plates. For each extract, three replicate trials were made against each bacterial species screened. Gentamicin was used as a positive control and methanol as a negative control. The plates were incubated for 18 h at $37^{0}C$, with the exception of *M. phlei* which was incubated for 36 h. The diameter of the zone of inhibition around each disc was measured and recorded at the end of the incubation period.

Data analysis

The average zone of inhibition was calculated for the three replicates. A clearing zone of 8 mm or greater was used as the criterion for designating significant antibiotic activity. In cases where there were a few colonies growing within the zone of inhibition, the activity rating was annotated with the letter "i" for incomplete inhibition. The overall trial average for each assay was used for the classification of results in Table 13.

For each of the major taxonomic divisions (Eumycota, Thallophyta, Bryopsida, Sphenopsida, Lycopsida, Filicinae, Gymnospermae and Angiospermae), the total number and percentage of active extracts was calculated, as well as the percentage of active extracts excluding those with only slight (1+) activity against the susceptible organisms *M. phlei* and *P. aeruginosa* Z61.

The ethnopharmacological data collated in Appendix 7 summarizing the traditional medicinal uses of each plant was used as the basis for the ethnopharmacological classifications. Each extract was assigned to the highest numbered category it fit into. The five ethnopharmacological categories used were: (1) potential antibiotics, (2) possible antibiotics, (3) tonics, (4) other medicinal uses, (5) related species, and (6) non-medicinal plants.

Extracts which were used to treat specific ailments caused by bacterial organisms were assigned to category 1: potential antibiotics. The specific bacterial ailments included in category 1 were: abcesses, acne, bladder or kidney infections, blood poisoning, boils, consumption, diptheria, dysentery, food poisoning, gonorrhea, infected wounds or sores, pneumonia, ptomaine poisoning, rheumatic fever, scarlet fever, scrofula, sepsis, syphilis, tooth abcess, tuberculosis, venereal disease, and whooping cough. The infected wounds or sores classification included the descriptors: inflamed wounds/sores, discharge from wounds/sores, wounds/sores with pus, feverish wounds/sores, etc. Plants traditionally used as disinfectants or antiseptics were also assigned to this category.

Extracts of plants traditionally used to treat ailments and symptoms which were possibly caused by bacterial infections were assigned to category 2: possible antibiotics. Ethnopharmacological descriptions included in this category were: bladder or kidney disease/problems/troubles, burns, coughs, cuts, diarrhea, fever, gastroenteritis, lung trouble, lung hemorrhage, sores, sore gums, sore or inflamed eyes, sore throat, stomachache, stomach ailments/disease/problems, stomach/intestinal flu, too frequent urination, toothache and wounds.

Plants whose traditional usages did not include those listed for category one or two which were used as tonics or physics were designated to category 3: tonics. The remaining plants with specific references that did not suggest treatment of a bacterial infection or use as a tonic, were assigned to category 4: other medicines. The descriptors included in this category were: abortifacents, arthritis, biliousness, broken bones, bruises, cancer, cathartics, childbirth, constipation, emenagogues, emetics, flatulence, gas, hair tonics, hair washes, heart disease/problems/ailments, indigestion, insect bites, laxatives, liver disease/problems/ailments, purgatives, rheumatism, sprains, swellings and women's medicines.

Plants for which there was no recorded medicinal use under the botanical species name but for which there were generic references in the literature were assigned to category 5: related species. Most of the plants in this category were either referred to generically or by common name only in the literature and/or belonged to taxonomically difficult genera (ie, *Carex*). As errors and uncertainties in taxonomic identification may occur in the ethnobotanical literature, particularly in older works using common names, discrimination for the non-medicinal category was made at the generic level. Plants for which there was no recorded medicinal use of that genus in the literature cited above nor in the Napralert database were assigned to category 6: non-medicinal plants.

The total number of active plant extracts in each category was calculated, as well as the number of active extracts excluding those with only slight (1+) activity against the super-susceptible organisms *M. phlei* and *P. aeruginosa* Z61.

The plants were also categorized according to the habitat in which they were collected. These classifications were verified with habitat descriptions in the relevant floras; Hitchcock and Conquist (1973), Hickman (1993), MacKinnon (1992) and Pojar and MacKinnon (1994). The habitat categories used were: saltwater, coastal, freshwater wetlands (included aquatic plants, plants of bogs, swamps, lake and stream margins), moist, temperate, dry, arid (pine scrub and sagebrush scrub) and subalpine (elevations over 5,000 feet). As in the phase one analyses, the total number of active plant extracts in each category was calculated, as well as the number of active extracts excluding those with only slight (1+) activity against the super-susceptible organisms *M. phlei* and *P. aeruginosa* Z61.

In each analysis, the statisitical significance of the percentage of active extracts in each category was evaluated using the chi squared goodness-of-fit test.

3.1.3 Results

The results of the antibiotic screening are summarized in Table 13, alphabetically by family. A total of 158 extracts (85%) exhibited some antibiotic activity. Excluding those extracts with only slight (1+) activity against the super-susceptible organisms *M. phlei* and *P. aeruginosa* Z61 from the calculations, 143 extracts were active (77%). The most active broad spectrum antibiotics were made from the plants: *Abies grandis, Elliottia pyroliflorus, Geum triflorum, Horkelia fusca, Paxistima myrsinites, Paeonia brownii, Phyllodoce empetriformis, Picea sitchensis,* and *Pseudotsuga menziesii.*

The antibiotic assay results summarized by taxa are given in Table 14. There was a significant difference in the percentage of lower non-flowering plants (54%), higher non-flowering plants (100%) and flowering plants (89%) which were active. Calculated excluding those extracts with only slight activity against the super-susceptible organisms *M. phlei* and *P. aeruginosa* Z61, only 29% of the lower non-flowering plants were active while 100% of the higher non-flowering plants (ferns and conifers) and 83% of the flowering plants were active.

Table 15 shows the antibiotic activity of selected methanolic extracts compared to water and petroleum ether extracts of the same plants. The differences in antibiotic activity between the methanol extracts and the water extracts were mostly quantitative. None of the petroleum ether extracts was active with the lone exception of M-4 which was slightly active against *S. aureus*.

The results of the ethnopharmacological analysis are shown in Table 16. There was a significant difference in the percentage of active medicinal plants (83%) compared to the non-medicinal plants (22%). Among the medicinal plants, the highest percentage of active extracts were those classified as potential antibiotics (91%) and those classified as possible antibiotics (79%) based on their traditional uses.

The results summarized by plant habitat are shown in Table 17. The habitat from which the highest percentage of active plants was collected was the sub-alpine (100%).

Table 13 - Phase two antibiotic screening results[a]

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
Controls												
Methanol	-	-	-	0	0	0	0	0	0	0	0	0
Gentamicin (10 μg)	-	-	-	4+	2+i	5+	5+	4+	0	0	5	5
ACERACEAE												
Acer macrophyllum M-17a	2	Lf	T	0	0	2+	2+	1+	2+	2+	5	5
Acer macrophyllum M-17b	2	Ib	T	1+i	0	3+	3+	1+i	2+	2+	6	6
AIZOACEAE												
Carpobrotus edulis Ca-3	3	Ae	C	0	0	2+	1+	0	3+	2+	4	3
ALISMATACEAE												
Alisma trivalis N-40a	2	Ae	W	0	0	1+	0	0	0	0	1	0
Alisma trivalis N-40b	2	Rt	W	0	0	2+	0	0	2+	0	2	2
Sagittaria latifolia N-11	1	Wh	W	0	0	1+	0	0	2+	0	2	1
APOCYNACEAE												
Apocynum androsaemifolium P-47a	2	Ae	D	0	0	1+i	2+	1+i	2+	2+	5	4
Apocynum androsaemifolium P-47b	2	Rt	D	0	0	1+	0	0	1+	1+	3	2

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
ARALIACEAE												
Aralia nudicaulis N-3a	1	Ae	M	0	0	2+	1+	0	0	0	2	1
Aralia nudicaulis N-3b	1	Rt	M	0	0	2+	1+i	0	0	0	2	1
ASCLEPIADACEAE												
Asclepias speciosa P-45	1	Wh	W	0	0	0	0	0	0	0	0	0
BALSAMINACEAE												
Impatiens capensis M-18	2	Ae	M	0	0	1+	0	0	1+	1+	3	2
BERBERIDACEAE												
Achlys triphylla V-20	2	Ae	M	0	0	0	0	0	0	1+i	1	1
BETULACEAE												
Corylus cornuta N-41	2	Br	T	1+i	0	2+	2+	1+	2+	3+	6	6
BORAGINACEAE												
Lithospermum ruderale P-43	2	Wh	D	0	0	0	0	0	0	0	0	0
Mertensia paniculata N-5	5	Wh	M	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
BRYIDAE												
Homalothecium nevadense P-51	6	Wh	T	0	0	0	0	0	0	0	0	0
Hookeria lucens V-37	6	Wh	M	0	0	0	0	0	0	0	0	0
Isothecium stoloniferum V-22	6	Wh	M	0	0	2+	1+i	0	1+i	1+	4	3
Plagiothecium undulatum M-11	5	Wh	M	0	0	1+	0	0	1+i	0	2	1
Pogonatum contortum M-14	6	Wh	M	0	0	0	0	0	0	0	0	0
Polytrichum commune V-13	5	Wh	W	0	0	1+	0	0	1+	0	2	1
Racomitrium elongatum V-18	6	Wh	T	0	0	0	0	0	0	0	0	0
Rhizomnium glabrescens M-13	2	Wh	M	0	0	1+i	0	0	0	0	1	0
Rhytidiadelphus loreus V-23	6	Wh	M	0	0	1+	0	0	0	0	1	0
Scapania bolanderi M-12	6	Wh	M	0	0	1+	1+i	0	0	0	2	0
Sphagnum henryense V-9	6	Wh	W	0	0	0	0	0	0	0	0	0
CAPRIFOLIACEAE												
Linnaea borealis V-15	2	Wh	M	0	0	1+	0	0	1+i	0	2	1
Viburnum edule N-4	1	Br	M	0	0	2+	1+	0	1+	1+	4	3

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
CELASTRACEAE												
Paxistima myrsinites N-38	1	Br	D	1+	1+	3+	2+	1+i	2+	4+	7	7
COMPOSITAE												
Adenocaulon bicolor N-19	2	Ae	M	0	0	1+i	0	0	1+	0	2	1
Anaphalis margaritacea V-40a	1	Lf	D	0	1+i	3+	1+i	1+	2+	2+	6	5
Anaphalis margaritacea V-40b	1	Rt	D	0	0	3+	2+	0	3+	3+	4	4
Anaphalis margaritacea V-40c	1	Fl	D	0	0	3+	1+	1+i	2+	3+	5	4
Artemisia cana F-6	1	Ae	S	0	0	2+	3+	0	2+	2+	4	4
Artemisia douglasiana E-31	1	Ae	T	0	1+i	2+	5+	1+i	2+	2+	6	6
Artemisia pycnocephala E-29	1	Ae	C	0	0	3+	1+i	1+i	1+	1+i	5	4
Artemisia tripartita E-30	1	Ae	A	0	1+i	3+	3+	1+i	3+	2+	6	6
Aster modestus N-7	5	Wh	M	0	0	2+	0	0	0	0	1	0
Grindelia integrifolia V-38	2	Wh	C	0	1+	5+	2+	0	2+	2+	5	5
Grindelia nana N-1	2	Wh	A	0	1+	3+	2+	0	2+	2+	5	5
Hieracium albiflorum V-16	2	Wh	D	0	0	1+	0	0	1+i	0	2	1
Leucanthemum vulgare N-21a	1	Fl	D	0	0	2+	1+	0	2+i	1+	4	3

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
COMPOSITAE - continued												
Leucanthemum vulgare N-21b	5	Vg	D	0	0	2+	2+	0	0	0	2	2
Matricaria discoidea N-36	1	Wh	D	0	0	2+	0	0	1+i	0	2	2
Petasites frigidus N-2a	2	Lf	M	0	0	1+	0	0	0	0	1	0
Petasites frigidus N-2b	1	Rh	M	0	0	1+	0	0	1+i	0	2	1
Solidago canadensis N-35	2	Wh	D	0	0	2+	1+	0	1+i	1+	4	3
Solidago spathulata N-10a	1	Ae	D	0	0	3+	3+	0	2+i	1+i	4	4
Solidago spathulata N-10b	1	Rt	D	0	0	2+	0	0	1+	0	2	2
Tragopogon pratensis Ca-20a	1	Ae	D	0	0	0	0	0	0	0	0	0
Tragopogon pratensis Ca-20b	1	Rt	D	0	0	0	0	0	0	0	0	0
Wyethia mollis Ca-15a	2	Ae	A	0	1+	4+	2+	1+i	3+	3+	6	6
Wyethia mollis Ca-15b	2	Rt	A	1+i	0	3+	2+	1+i	2+	2+	6	6
CRUCIFERAE												
Lepidium virginicum N-25	1	Wh	D	0	0	0	0	0	0	0	0	0
Cakile edentula V-1	6	Wh	C	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
CUPRESSACEAE												
Thuja plicata M-2	1	Ib	M	0	0	2+	2+	0	2+	2+	4	4
CYPERACEAE												
Carex aquatilis M-8	5	Wh	W	0	1+	2+	2+	0	2+	2+	5	5
Carex lyngbyei V-6	5	Ae	C	0	0	2+	2+	0	2+	2+	4	4
Carex muricata M-7	5	Wh	W	0	0	1+	2+	0	1+	1+	4	3
Scirpus cyperinus V-30	5	Wh	W	0	0	2+	0	0	1+	1+	3	3
DROSERACEAE												
Drosera rotundifolia V-8	3	Wh	W	0	0	2+	2+	1+	3+	4+	5	5
EPHEDRACEAE												
Ephedra nevadensis Ca-13	1	Br	A	2+	0	2+	2+	2+	4+	3+	6	6
EQUISETACEAE												
Equisetum fluviatile N-48	5	Ae	W	0	0	1+i	1+i	0	1+i	1+i	4	2
Equisetum pratense V-11	2	Wh	W	0	0	2+	1+	0	2+	2+	4	3
Equisetum scirpoides N-46	5	Ae	M	0	0	0	0	0	0	0	0	0
Equisetum variegatum P-46	4	Wh	W	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
ERICACEAE												
Arbutus menziesii V-39a	2	Lf	D	1+i	0	3+	3+	1+i	3+	3+	6	6
Arbutus menziesii V-39b	2	Ib	D	1+i	0	2+	1+i	1+i	2+	3+	6	6
Arbutus menziesii V-39c	2	Ob	D	0	0	2+	1+i	0	2+	2+	4	3
Arctostaphylos patula Ca-19	1	Br	D	1+i	0	2+	2+	2+	3+	3+	6	6
Cassiope mertensiana N-32	1	Ae	S	0	0	2+	0	0	2+	3+	3	3
Chimaphila umbellata Ca-18	1	Wh	T	1+	0	3+	2+	1+	4+	3+	6	5
Elliottia pyroliflorus P-55	3	Br	S	1+	1+	2+	2+	1+i	3+	3+	7	7
Gaultheria shallon V-35	2	Br	M	0	0	2+	1+	0	2+	2+	4	3
Phyllodoce empetriformis N-33	1	Ae	S	1+	1+	5+	1+	1+	4+	4+	7	6
Pyrola picta N-15	2	Wh	M	0	0	3+	1+	0	2+	2+	4	3
EUMYCOTA												
Peltigera brittanica V-19	5	Wh	D	0	0	1+	1+	0	1+i	1+i	4	2
GENTIANACEAE												
Gentianella amarella N-6	5	Wh	M	0	0	2+	0	0	1+i	1+i	3	3

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
GRAMINAE												
Ammophila arenaria V-3	6	Ae	C	0	0	0	0	0	0	0	0	0
HIPPOCASTANACEAE												
Aesculus californica Ca-8	2	Br	D	0	0	2+	2+	0	1+	1+	4	4
HYDROPHYLLACEAE												
Phacelia ramosissima Ca-17a	1	Ae	D	0	0	0	0	0	0	0	0	0
Phacelia ramosissima Ca-17b	1	Rt	D	0	0	0	2+	1+i	2+	1+	4	3
HYPERICACEAE												
Hypericum anagalloides V-7	5	Wh	W	0	1+	5+	2+	1+i	3+	2+	6	6
IRIDACEAE												
Iris tenuissima Ca-25	5	Wh	S	0	0	3+	2+	1+	2+	2+	5	5
JUNCACEAE												
Juncus bufonius V-14	3	Wh	W	0	0	1+	0	0	0	1+i	2	1
Juncus effusus var. *gracilis* V-4	3	Ae	W	0	0	1+	1+	0	1+	0	3	1
Juncus effusus var. *pacificus* V-5	3	Ae	W	0	0	1+	0	0	0	0	1	0
Juncus falcatus V-12	5	Wh	W	0	0	2+	1+i	0	2+	1+i	4	3

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
Juncus lesuerii V-2	5	Ae	C	0	0	1+	1+	0	1+	1+i	4	2
LABIATAE												
Prunella vulgaris V-17	1	Wh	M	0	0	1+	1+	0	1+	2+	4	2
Stachys bullata Ca-7	1	Ae	C	0	0	1+	1+	0	1+	0	3	1
Stachys ciliata V-31	1	Ae	M	0	0	1+	0	0	1+	0	2	1
LILIACEAE												
Clintonia uniflora N-9	2	Wh	M	0	0	0	0	0	0	0	0	0
Lilium columbianum P-50a	2	Ae	T	0	0	1+	1+	0	0	1+i	3	1
Lilium columbianum P-50b	2	Bu	T	0	0	1+	0	0	0	0	1	0
Lilium philadelphicum N-23a	2	Ae	T	0	0	0	0	0	0	0	0	0
Lilium philadelphicum N-23b	1	Bu	T	0	0	1+	0	0	2+	0	2	1
Trillium ovatum M-20	1	Wh	M	0	0	3+	1+	0	0	0	2	1
Veratrum viride N-28	1	Wh	S	0	0	2+	0	0	0	0	1	1
LINACEAE												
Linum lewisii Ca-22	1	Wh	A	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
LYCOPODIACEAE												
Lycopodium annotinum N-22	3	Ae	M	0	0	1+	0	0	0	0	1	0
MALVACEAE												
Malva neglecta N-20	2	Wh	D	0	0	1+	0	0	0	0	1	0
MENYANTHACEAE												
Menyanthes trifoliata V-32	2	Wh	W	0	0	1+	1+	0	1+i	1+i	4	2
ONAGRACACEAE												
Camissonia brevipes Ca-12	6	Wh	A	0	0	0	0	0	0	0	0	0
Epilobium angustifolium V-36a	1	Ae	T	1+i	0	5+	2+	2+	2+	3+	6	6
Epilobium angustifolium V-36b	1	Rt	T	1+i	0	3+	1+	2+	2+	3+	6	6
Oenothera villosa N-14a	1	Ae	T	1+i	0	2+	2+	2+i	2+	3+	6	6
Oenothera villosa N-14b	1	Rt	T	1+i	0	2+	2+	2+i	2+	3+	6	6
Oenothera villosa N-24	1	Wh	T	1+i	0	3+	2+	2+i	3+i	3+	6	6
ORCHIDACEAE												
Goodyera oblongifolia N-16	1	Wh	T	0	0	2+	0	0	1+i	0	2	2
Platanthera dilatata P-53	3	Ae	W	0	0	2+	0	0	2+	2+	3	3

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
ORCHIDACEAE - continued												
Platanthera orbiculata N-17	2	Wh	M	0	0	1+	0	0	2+	0	2	1
OXALIDACEAE												
Oxalis oregana Ca-2	1	Wh	M	0	0	2+	2+	0	2+	1+	4	4
PAEONIACEAE												
Paeonia brownii Ca-21a	2	Ae	A	2+	1+	3+	3+	2+	3+	2+	7	7
Paeonia brownii Ca-21b	1	Rb	A	2+	1+	3+	3+	2+	3+	2+	7	7
Paeonia brownii Ca-21c	1	Rc	A	2+	1+	3+	3+	2+	3+	3+	7	7
PAPAVERACEAE												
Argemone munita Ca-14a	2	Ae	A	0	0	1+	0	0	0	0	1	0
Argemone munita Ca-14b	3	Rt	A	0	0	1+	0	0	0	0	1	0
Eschscholzia californica Ca-1	1	Rt	D	0	1+	4+	1+i	0	3+	2+	5	4
Platystemon californicus Ca-5	6	Wh	C	0	0	2+	0	0	1+i	0	2	2
PINACEAE												
Abies grandis N-42	1	Br	M	1+i	1+	3+	2+	1+	2+	2+	7	7
Picea sitchensis M-3	1	Ib	M	1+i	1+i	3+	3+	1+i	3+	4+	7	7

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
PINACEAE - continued												
Picea sitchensis M-4	1	Br	M	1+i	0	1+	1+	0	2+	2+	5	3
Picea sitchensis V-10	1	Br	M	0	0	1+	0	0	1+	1+	3	2
Pseudotsuga menziesii N-43	1	Br	M	1+i	1+i	5+	1+	1+	2+	2+	7	6
Tsuga heterophylla M-1	1	Ib	M	0	1+i	3+	3+	1+	3+	3+	6	6
PLUMBAGINACEAE												
Armeria maritima Ca-4	3	Wh	C	1+i	1+	2+	1+	0	3+	2+	6	5
POLEMONIACEAE												
Polemonium pulcherrimum N-27	3	Wh	D	0	0	2+	1+	0	0	0	2	1
POLYGONACEAE												
Eriogonum umbellatum Ca-24	1	Wh	S	1+	0	1+	2+	1+	2+	2+	6	5
Oxyria digyna N-34	1	Wh	S	0	0	2+	0	0	2+	2+	3	3
Polygonum amphibium N-12	3	Wh	W	0	0	2+	2+	0	1+	2+	4	4
POLYPODIACEAE												
Adiantum pedatum V-25	1	Ae	M	0	0	2+	1+i	0	1+	1+	4	4
Blechnum spicant M-6	2	Wh	M	0	0	1+	0	0	2+	2+	3	3

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
POLYPODIACEAE - continued												
Cryptogramma acrostichoides N-39	4	Wh	D	0	0	2+	1+i	0	1+	2+	4	4
Dryopteris campyloptera M-5	1	Ae	M	0	0	2+	1+i	0	2+	2+	4	4
Gymnocarpium dryopteris P-52	6	Ae	M	0	0	1+	0	0	1+	1+	3	3
Onoclea sensibilis N-45	1	Ae	M	0	0	2+	1+i	0	1+	2+	4	4
Polypodium scouleri V-33a	1	Ae	C	0	1+i	3+	2+	0	2+	3+	5	5
Polypodium scouleri V-33b	1	Rh	C	0	1+	4+	4+	0	2+	3+	5	5
Pteridium aquilinum M-15	1	Ae	M	0	0	1+	0	0	1+	1+	3	3
Woodsia scopulina N-26	5	Wh	D	0	0	2+	1+i	0	2+	2+	4	4
PORTULACACEAE												
Claytonia sibirica V-29	2	Wh	M	0	0	2+	1+	0	0	2+i	3	3
POTAMOGETONACEAE												
Potamogeton richardsonii N-13	6	Wh	W	0	0	1+	0	0	0	0	1	0
RANUNCULACEAE												
Actaea rubra P-56a	2	Ae	M	0	0	0	0	0	0	0	0	0
Actaea rubra P-56b	1	Rt	M	0	0	1+	1+i	0	1+	1+	4	4

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
RANUNCULACEAE - continued												
Anemone multifida N-8a	3	Ae	M	0	0	2+	1+	0	0	0	2	2
Anemone multifida N-8b	4	Rt	M	0	0	2+	1+	0	0	1+	3	3
Aquilegia formosa P-49a	2	Ae	M	0	0	2+	0	0	0	0	1	1
Aquilegia formosa P-49b	1	Rt	M	0	0	1+	0	0	1+i	1+i	3	2
Trauvetteria caroliniensis V-28	2	Wh	M	0	0	1+	2+i	0	0	0	2	1
ROSACEAE												
Geum triflorum Ca-23a	1	Ae	A	1+i	1+	2+	2+	1+	2+	2+	7	7
Geum triflorum Ca-23b	2	Rt	A	1+i	2+	3+	3+	2+	3+	3+	7	7
Horkelia fusca Ca-26a	5	Ae	S	1+i	0	3+	2+	1+i	2+	3+	6	6
Horkelia fusca Ca-26b	5	Rt	S	1+i	1+	3+	2+	1+	2+	3+	7	7
Luetkea pectinata N-31	2	Wh	S	0	0	2+	0	0	2+	1+	3	3
Malus fusca N-47	1	Br	M	0	0	4+	2+	0	5+i	2+	4	4
Physocarpus capitatus M-10	2	Br	W	0	0	1+	1+i	0	1+	1+	4	2
Potentilla norwegica N-18	1	Wh	W	1+i	0	2+	2+	2+i	1+i	2+	6	6
Purshia tridentata Ca-10	1	Br	A	1+	0	3+	2+	1+	3+	2+	6	6

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
ROSACEAE - continued												
Rosa canina Ca-11	3	Br	D	1+i	0	2+	3+	1+	2+	2+	6	6
Rosa woodsii P-48	1	Br	D	1+i	0	2+	3+	1+	2+	2+	6	6
Sorbus sitchensis P-54	2	Br	S	0	0	2+	1+	0	2+	2+	4	3
RUBIACEAE												
Galium trifidum M-9	2	Wh	M	0	0	1+i	0	0	1+i	1+i	3	2
Galium triflorum V-21	2	Wh	M	0	0	1+i	1+i	0	2+	4+	4	2
SAXIFRAGACEAE												
Boykinia occidentalis N-44	1	Wh	S	1+i	0	3+	2+	1+i	2+	3+	6	6
Leptarrhena pyrolifolia V-24	2	Br	S	1+i	0	3+	1+	1+i	3+	3+	6	5
Mitella brewerii N-30	5	Wh	S	1+i	0	4+	3+	2+	3+	3+	6	6
Tiarella trifoliata V-27	2	Wh	M	1+i	0	2+	2+	1+i	2+	3+	6	6
SCROPHULARIACEAE												
Castilleja affinis Ca-27	1	Wh	C	0	0	2+	2+	0	2+	4+	4	4
Castilleja thompsonii P-44	2	Ae	A	0	0	0	0	0	1+	1+	2	2
Euphrasia stricta M-16	4	Wh	M	0	0	1+	2+	0	1+	3+	4	3

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
SCROPHULARIACEAE - continued												
Mimulus guttatus V-26	2	Wh	W	0	0	0	0	0	0	0	0	0
SELAGINACEAE												
Selaginella wallacei N-37	5	Ae	D	0	0	1+	0	0	0	0	1	0
THALLOPHYTA (Algae)												
Enteromorpha clathrata V-41	6	Wh	N	0	0	0	0	0	0	0	0	0
Fucus gardneri V-34	2	Wh	N	0	0	1+	0	0	1+	1+	3	2
Mazzaella splendens V-45	6	Wh	N	0	0	0	0	0	0	0	0	0
Laminaria saccharina V-43	6	Wh	N	0	0	1+	0	0	0	0	1	0
Nereocystis luetkeana V-42	2	Wh	N	0	0	0	0	0	0	0	0	0
Ulva fenestrata V-44	4	Wh	N	0	0	0	0	0	0	0	0	0
TYPHACEAE												
Typha latifolia M-19	2	Fr	W	0	0	1+	0	0	0	0	1	0
VALERIANACEAE												
Plectritis congesta Ca-6	6	Ae	M	0	0	2+	0	0	0	0	1	1
Valeriana sitchensis N-29a	2	Ae	S	0	0	2+	1+	0	2+i	0	3	2

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	E.c.[e]	E.f.	M.p.	Z61	K799	S.a.	S.e.	Total[f] active	Total[g] excl. S.S.
VALERIANACEAE - continued												
Valeriana sitchensis N-29b	2	Rt	S	0	0	2+	0	0	1+i	2+	3	3
VIOLACEAE												
Viola glabella Ca-16	5	Wh	W	0	0	0	0	0	0	0	0	0
Total number active				37	23	148	101	45	118	110	158	143

Key to Table 13

[a] Classification of results: 0 = no inhibition or zone of inhibition < 8.0 mm; 1+ = zone of inhibition 8.0-10.0 mm; 2+ = zone of inhibition 10.1-15.0 mm; 3+ = zone of inhibition 15.1-20.0 mm; 4+ = zone of inhibition 20.1-25.0 mm; 5+ = zone of inhibition > 25.1 mm; i = incomplete inhibition, some colonies within the clearing zone.

[b] Cat. = Ethnopharmacological category: 1 = potential antibiotics; 2 = possible antibiotics; 3 = other medicinal uses; 4 = related species; 5 = Not used medicinally.

[c] Part extracted: Ae = Aerial; Bk = Bark; Br = Branch; Bu = Bulb; Fl = flowers; Fr = Fruit; Ib = Inner bark; Lf = leaf; Ob = Outer bark; Rb = Root bark; Rc = Root cortex; Rh = Rhizome; Rt = Root; Wh = Whole plant.

[d] Hab = Habitat: A = arid; C = coastal; D = dry; M = moist; N = saltwater; S = subalpine; T = temperate; W = wet.

[e] Bacteria: E.c. = *Escherichia coli*; E.f. = *Enterococcus faecalis*; M.p. = *Mycobacterium phlei*; Z61 = *Pseudomonas aeruginosa* Z61 (antibiotic super-susceptible); K799 = *Pseudomonas aeruginosa* K799 (wild type); S.a.R. = *Staphylococcus aureus* P00017 multiple drug resistant strain; S.e.R. = *Staphylococcus epidermidis* multiple drug resistant strain.

[f] Total number of bacteria the extract was active against.

[g] Total number of bacteria the extract was active against, excluding 1+ activity against the super-susceptible organisms *M. phlei* and *P. aeruginosa* Z61.

Table 14 - Phase two antibiotic screening results summarized by taxa

Taxa	Number in Category (N)	Number Active (N)	Percent Active (%)	Excluding 1+ super-suscept.[a] Number Active (N)	Excluding 1+ super-suscept.[a] Percent Active (%)
NON-FLOWERING PLANTS					
Lower plants					
Eumycota	1	1	100	1	100
Thallophyta	6	2	33	1	17
Bryopsida	11	6	55	3	27
Lycopsida	2	2	100	0	0
Sphenopsida	4	2	50	2	50
Lower plants sub-total	24	13	54	7	29
Higher plants					
Filicinae	10	10	100	10	100
Gymnospermae	8	8	100	8	100
Higher plants sub-total	18	18	100	18	100**
NON-FLOWERING Sub-total	42	31	74	25	60
FLOWERING Sub-total	143	127	89	118	83
GRAND TOTALS	185	158	85	143	77

[a] Number active (N) calculated excluding those extracts with only slight (1+) activity against the super-susceptible organisms *M. phlei* and *P. aeruginosa* Z61.

** Percentage of active extracts statistically significant, $p < 0.01$

Table 15 - Phase two antibiotic screening results for methanolic, water and petroleum ether extracts[a]

Bacteria[b]	E. coli			Z61			K799			S. aureus			S. epi.		
Solvent[c]	M	W	P	M	W	P	M	W	P	M	W	P	M	W	P
Sample No.[d]															
Ca-1	-	-	na	8	-	na	-	-	na	18	-	na	15	-	na
Ca-2	-	-	na	11	-	na	-	-	na	11	-	na	8	-	na
Ca-4	8	10	na	10	11	na	-	11	na	16	15	na	15	20	na
Ca-5	-	-	na	-	-	na	-	-	na	9	-	na	-	-	na
Ca-7	**-**	**8**	**na**	**9**	**11**	**na**	**-**	**13**	**na**	**10**	**15**	**na**	**-**	**20**	na
Ca-10	9	9	na	15	12	na	8	14	na	17	17	na	14	22	na
Ca-11	10	8	na	16	17	na	8	16	na	13	19	na	12	25	na
Ca-13	11	8	na	15	12	na	13	9	na	25	14	na	20	15	na
Ca-14b	-	na	-	-	na	-	-	na	-	7	na	-	-	na	-
Ca-15a	-	-	na	11	10	na	9	13	na	17	10	na	18	14	na
Ca-18	9	-	na	12	10	na	10	-	na	21	12	na	16	15	na
Ca-19	8	11	na	13	16	na	13	15	na	18	19	na	17	27	na
Ca-20a	-	-	na	-	-	na	-	-	na	-	-	na	-	-	na
Ca-21c	12	10	na	18	10	na	11	-	na	16	11	na	16	14	na
Ca-22	-	-	na	-	-	na	-	-	na	-	-	na	-	-	na
Ca-23a	9	12	na	13	17	na	10	15	na	12	20	na	13	23	na
Ca-24	-	-	-	11	11	-	10	-	-	14	13	-	15	18	-
Ca-25	-	na	-	11	na	-	10	na	-	15	na	-	15	na	-
Ca-26a	9	-	na	11	11	na	9	-	na	15	15	na	16	18	na
Ca-26b	10	8	na	15	14	na	10	10	na	15	16	na	17	19	na
E-29	-	-	na	10	-	na	9	-	na	9	-	na	9i	-	na
M-1	-	-	-	17	21	-	8	10	-	16	18	-	16	22	-
M-2	-	-	-	15	13	-	-	-	-	15	13	-	12	15	-
M-3	8	10	-	16	12	-	8	11	-	20	21	-	24	31	-

Bacteria[b]	E. coli			Z61			K799			S. aureus			S. epi.		
Solvent[c]	M	W	P	M	W	P	M	W	P	M	W	P	M	W	P
Sample No.[d]															
M-4	8	8	-	9	9	-	-	9	-	14	14	8	14	23	-
M-6	-	-	na	-	8	na	-	-	na	12	10	na	11	10	na
M-17b	8	na	-	16	na	-	8	na	-	13	na	-	15	na	-
N-7	-	na	-	-	na	-	-	na	-	-	na	-	-	na	-
N-20	-	na	-	-	na	-	-	na	-	-	na	-	-	na	-
P-43	-	-	na	-	-	na	-	-	na	-	-	na	-	-	na
P-44	-	-	na	-	-	na	-	-	na	10	9	na	10	12	na
P-45	-	-	na	-	-	na	-	-	na	-	-	na	-	-	na
P-47	-	-	na	11	8	na	9	8	na	13	11	na	12	9	na
P-48	9	9	na	16	15	na	10	11	na	14	16	na	14	17	na
P-50	-	-	na	8	-	na	-	8	na	-	-	na	9i	-	na

Key to Table 15

[a] Values shown are the average zone of inhibition diameters, "-" represents no zone of inhibition; na = not applicable (extract not prepared).

[b] Bacteria screened against: E.c. = *E. coli*; Z61 = *P. aeruginosa* Z61; K799 = *P. aeruginosa* K799; *S. aureus* P00017; S. epi. = *S. epidermidis*.

[c] Solvent of extraction: M = methanol; W = water; P = petroleum ether.

[d] Sample No. = Plant collection sample number.

Table 16 - Phase two ethnopharmacological analysis of antibiotic screening results

Category	Number in Category (N)	Number Active (N)	Percent Active (%)	Excluding 1+ Super-susc.[a] Number Active (N)	Percent Active (%)
Potential antibiotics	68	62	91	62	91**
Possible antibiotics	57	51	90	45	79
Tonics	6	6	100	5	83
Other medicines	13	11	85	9	70
Related species	23	20	87	18	78
Subtotal medicinal	167	150	90	139	83
No medicinal use	18	8	43	4	22
Grand Totals	185	158	85	143	77

[a] Number active (N) calculated excluding those extracts with only slight (1+) activity against the super-susceptible organisms *M. phlei* and *P. aeruginosa* Z61.

** Percentage of active extracts statistically significant, $p < 0.01$

Table 17 - Phase two antibiotic screening results summarized by habitat

Category	Number in Category (N)	Number Active (N)	Percent Active (%)	Excluding 1+ Super-susc.[a] Number Active (N)	Percent Active (%)
Saltwater	6	2	33	1	17
Coastal	13	11	85	11	85
Wetlands (freshwater)	28	23	82	19	68
Moist	55	49	89	43	78
Temperate	17	14	82	13	76
Dry	33	28	85	26	79
Arid	16	14	88	13	81
Sub-alpine	17	17	100	17	100**
Total	185	158	85	143	77

[a] Number active (N) calculated excluding those extracts with only slight (1+) activity against the super-susceptible organisms *M. phlei* and *P. aeruginosa* Z61.

** Percentage of active extracts statistically significant, $p < 0.01$

3.1.4 Discussion and Conclusions

The primary objective of this screening was to examine the antibiotic activity of North American plants and in this regard the results were very promising. The secondary objective of this study was to obtain the necessary data to answer some fundamental questions regarding the design of ethnopharmacological screenings. Data analysis of the phase one screening results suggested that there may be differences in antimicrobial activity based on: whether or not the plants were used in traditional medicine; whether the specific medicinal applications of a plant remedy suggested potential antibiotic activity; and whether the extracts were made from flowering or non-flowering plants. Other variables which were considered important to examine were plant habitat and solvent of extraction. Therefore, the results of the screening were also analyzed in relation to all of these factors.

Overall, 85% of the methanolic plant extracts exhibited antibiotic activity (see Table 13). Out of the 158 active extracts, 50 extracts showed strong broad spectrum activity (active against a minimum of 5 bacteria) which was equal to or better than the performance of the positve control, gentamicin. Extracts from 9 plant species were active against all seven bacteria: *Abies grandis*, *Elliottia pyroliflorus*, *Geum triflorum*, *Horkelia fusca*, *Paxistima myrsinites*, *Paeonia brownii*, *Phyllodoce empetriformis*, *Picea sitchensis* and *Pseudotsuga menziesii.*

In addition to these, the extract of *Ephedra nevadensis* was particularly noteworthy for its strong activity against the gram negative pathogens *E. coli* and *P. aeruginosa.* Extracts of *Arctostaphylos patula*, *Epilobium angustifolium*, *Mitella breweri*, *Oenothera villosa*, and *Potentilla norwegica* also exhibited strong activity against the clinically important organism *P. aeruginosa.*

At the family level, 3 families were outstanding for the comprehensive antibiotic activity their members exhibited. Extracts of all 8 species from the Ericaceae, all 10 species from the Polypodiaceae and all 10 species from the Rosaceae were active against a minimum of 3 bacteria. The known antibiotic compounds chimaphilin and arbutin are common constituents among the Ericaceae and these compounds are likely responsible for the activity observed in the members of this family. The candidates for the antibiotic constituents of the Polypodiaceae and the Rosaceae are not as clear cut however. A number of tannins and flavonoids from the Rosaceae have been reported as antibiotic constituents and these types of compounds may be responsible for the activity observed in this study. However, very little work has been done on the Polypodiaceae and the identity of their antibiotic constituents are largely unknown.

An analysis of the results categorized by major taxa also provided some interesting observations (see Table 14). The percentage of active extracts among the flowering plants (89%) was higher than that among the non-flowering plants (74%). Among the non-flowering plants, there was a striking division between the percentage of active extracts among the Filicinae and Gymnospermae (100%) and that of the lower plants (54%). This difference was even more apparent when the percentage of active extracts was calculated excluding those extracts with only slight (1+) activity against the super-susceptible *M. phlei* and *P. aeruginosa* Z61. Under this more rigorous evaluation, 100% of the Filicinae and 100% of the Gymnospermae were active while only 29% of the lower plants were active. These results were similar to those observed in the phase one analysis of antibiotic activity by taxa.

Most ethnopharmacologists prefer the relative ease of organic solvent extraction compared to the time consuming and contamination-prone method of water extraction. However, this practice provides an opening for the criticism that such assays do not truly examine traditional medicines if traditional methods of preparation were not followed. To explore the possibility that some antibiotic activity may be overlooked due to the method of extraction, boiling water and petroleum ether extracts of some samples were also made. A comparison of selected antibiotic activities of extracts made with these solvents are shown in Table 15.

There were slight quantitative differences between the methanol and water extracts but there were only a few cases where there were qualitative differences between them. Overall, these differences did not appear significant as there was only one sample (Ca-7) whose antibiotic activity could possibly have been missed entirely in a narrow screening of methanol extracts.

The plants selected for extraction with petroleum ether were those which were traditionally prepared as salves or liniments made with grease, fat, lard, or oil. With one minor exception, none of these non-polar extracts exhibited any antibiotic activity although many of the methanolic extracts of the same material were active.

Ethnopharmacologists tacitly assume that by following ethnobotanical leads they are much more likely to identify clinically useful phytochemicals and the results of the ethnopharmacological data analysis provide evidence to support the validity of this assumption (see Table 16). Excluding those extracts which had only slight (1+) activity against the super-susceptible *M. phlei* and *P. aeruginosa* Z61 from the calculations, only 22% of the non-medicinal plants exhibited antibiotic activity while 83% of the plants used in traditional medicine were active (see Table 16).

While most ethnopharmacologists do not need to be convinced of the value of ethnobotanical leads, many are quite skeptical regarding the specificity of such information. The ethnobotanical analysis of the phase one antibiotic screening results showed that the plant group with the highest percentage of active extracts was the group classified as potential antibiotics based on their traditional uses. This screening was designed in part to obtain sufficient data to allow a more robust test of the hypothesis that specified traditional uses could be used to target plants with specific types of antibiotic activity.

This hypothesis was supported by the results of the ethnopharmacological analysis, as 91% of the extracts classified as potential antibiotics were active, while only 70% of extracts classified as other (non-antibiotic) medicines were active (see Table 16). These results suggest that future screening studies could identify a higher percentage of active extracts if screening candidates were selected from traditional remedies for symptoms and ailments caused by bacterial infections.

The analysis of antibiotic activity by plant habitat also provided some intriguing results. It would seem logical to think that the plants adapted to wet and moist habitats would be much more likely to evolve antibiotic constituents than those plants which are adapted to drier habitats. However in this study, the plants collected from saltwater and those collected from freshwater wetlands were found to exhibit the lowest percentage of antibiotic activity, 17% and 68% respectively (see Table 17). There was very little difference in the percentage of active extracts among the plants collected from moist (78%), temperate (76%), dry (79%) and arid (81%), and coastal (85%) habitats were active. Although it would seem significant that 100% of the plants collected in sub-alpine regions exhibited antibiotic activity, it should be pointed out that all of the plants in this group were also used as traditional medicines. It would be interesting to see if these results would be replicated in a screening of a larger group of subalpine species in which there was an equal number of medicinal and non-medicinal plants.

In conclusion, the results of this screening have provided not only many new leads in the search for novel antibiotic compounds but also given valuable insights on ways to improve the design of ethnopharmacological screenings. The antibiotic activity by all of the ferns suggest that they would be good candidates for further chemical investigation, in addition to the previously noted angiosperm species. It may also be worthwhile to include more plants from subalpine regions in future screens.

The results of the ethnopharmacological analysis support one of the underlying assumptions of ethnopharmacology, the inherent value of focusing investigations on traditional medicines. Furthermore, the data also supports the hypothesis that this information may be effectively used to select screening candidates with a high probability of activity. From a cultural perspective, the results of the ethnopharmacological analysis provide scientific evidence of the potential efficacy of North American traditional herbal medicines.

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3.2 Phase two antifungal screening

Abstract

Methanolic extracts of 185 samples of western North American plants were screened for antifungal activity against 7 fungi. One hundred and nine extracts (59%) exhibited some antifungal activity. There was a great difference in the degree of antifungal activity between traditional plant medicines (56% active) and non-medicinal plants (28% active). Seventy-five percent (75%) of the plants classified as potential antifungals based on their traditional usage were found to have significant antifungal activity. The taxa with the highest percentage of active plants were the Gymnospermae (conifers) of which 100% were active. The most active broad spectrum antifungal extracts were from *Boykinia occidentalis* whole plant, *Chimaphila umbellata* aerial parts, *Drosera rotundifolia* whole plant, *Epilobium angustifolium* aerial parts and roots, *Geum triflorum* aerial parts, *Horkelia fusca* aerial parts, *Oenothera villosa* aerial parts and roots, *Paeonia brownii* root bark, *Potentilla norwegica* whole plant, *Trillium ovatum* whole plant, and *Woodsia scopulina* whole plant.

3.2.1 Introduction

Once dismissed as a nuisance, fungi are becoming a serious public-health hazard (Sternberg, 1994). In the past 20 years, fungal infections have increased dramatically -- paradoxically, as a result of medical advances, although treatments have lagged behind bacterial chemotherapy (Georgopapadakou and Walsh, 1994). A lack of antifungal drugs, increasing fungal resistance, the growing list of fungal pathogens and lagging research have been cited as factors contributing to the emergence of fungi as serious pathogens (Sternberg, 1994). In their recent review of human mycoses, leading researchers Georgopapadakou and Walsh (1994) concluded that new approaches and chemical entities are urgently needed since the conditions that led to the emergence of fungal infections as serious health threats in the first place are likely to persist in the future.

Ethnopharmacological screenings provide a promising approach to the identification of novel antifungal compounds. Although numerous antimicrobial assays of Old World traditional medicines have been reported, there have been relatively few studies conducted on the traditonal medicines of North American First Nations peoples. Given the promising results of the phase one antifungal screening of this undervalued resource, the phase two plant samples were also screened for antifungal activity. In addition to finding leads in the search for new antifungal compounds, this study was also designed to examine the relationship between traditional medicinal use, plant taxa, plant habitat and the corresponding degree of antifungal activity.

3.2.2 Methods

Microorganisms

Seven fungi were used in the screening; *Aspergillus fumigatus*, *Candida albicans*, *Fusarium tricuitum*, *Microsporum gypseum*, *Pseudoallescheria boydii*, *Rhizopus oryzae*, and *Trichophyton mentagrophytes*. The *P. boydii* culture was a clinical isolate obtained from the B.C. Provincial Laboratory. All of the remaining cultures were from the U.B.C. collection of G.H.N. Towers.

Antifungal assays

The disc diffusion assay (Lennette, 1985) was used to screen for antifungal activity. Paper discs (1/4") were impregnated with 20 µl of methanolic extract, the equivalent of 40 mg of dried plant material, and the methanol allowed to evaporate at room temperature. Sterile Saboraud Dextrose Agar (Difco) plates were inoculated with fungal spores before placing the extract impregnated paper discs on the plates. For each extract, three replicate trials were conducted against each fungus. Nystatin was used as a positive control and methanol as a negative (solvent) control. The temperature and length of incubation used for each fungus were as follows: *A. fumigatus* amd *C. albicans* were incubated at 37°C for 18 h; *P. boydii* was incubated at 30°C for 48 h; *M. gypseum* and *T. mentagrophytes* were incubated at 30°C for 72 h; *F. tricuictum* and *R. oryzae* cultures were incubated at 20°C for 36 h. The diameter of the zones of inhibition around each disc were measured and recorded at the end of the incubation period.

Data analysis

The average zone of inhibition was calculated for the three replicates. A clearing zone of 8 mm or greater was used as the criterion for designating significant antifungal activity. In trials where there was germination of a few spores within a very distinctive zone of inhibition, the zone measurement was annotated with the letter "i" to indicate that the inhibition was incomplete. The total number of fungi against which an extract exhibited significant activity was calculated. In order to provide a more rigorous assessment of the results, the total number of fungi which an extract inhibited was also calculated excluding those extracts which showed only slight activity (1+) against the super-susceptible dermatophytes *M. gypseum* and *T. mentagrophytes*.

For each of the major taxonomic divisions (Eumycota, Thallophyta, Bryopsida, Sphenopsida, Lycopsida, Filicinae, Gymnospermae and Angiospermae), the total number and percentage of active extracts was calculated, as well as the percentage of active extracts excluding those with only slight (1+) activity against the super-susceptible organisms *M. gypseum* and *T. mentagrophytes*.

The summary of the traditional medicinal uses of each plant (Appendix 7) was used as the basis for the ethnopharmacological classifications. Each extract was assigned to the highest numbered category it fit into. The six ethnopharmacological categories used were: (1) potential antifungals, (2) possible antifungals, (3) other skin ailments, (4) other medicinal uses, (5) related species, and (6) non-medicinal plants. The methods used to determine the designation of the descriptors for categories 1, 2 and 3 were described in chapter 2.2.2.

Those descriptions assessed as very likely to be indicative of a fungal infection were assigned to category 1: *potential antifungals*. The descriptors assigned to this category were: athlete's foot, baby's coated tongue, use of baby powder or talc, dandruff, diaper rash, leucorrhea, scaly skin, split skin between the toes, the whites and thrush.

Those descriptions assessed as very unlikely to be indicative of a fungal infection, were assigned to category 3: *other skin ailments*. The dermatological descriptors assigned to this category were: acne, blisters, boils, bruises, carbuncles, chancres, corns, eczema, erysipelas, festering sores, hair tonic, healing sores, heat rash, pimples, poison ivy or poisoning of the skin, psoriasis, prickly rash, scrofula, skin eruptions, skin pustules, skin sores, skin ulcers, sores that would not heal, tetters, to draw blisters, ulcers and warts.

The remaining descriptors which may have described a fungal infection although not necessarily so were assigned to category 2: *possible antifungals*. The descriptors in this category included: body sores, broken skin, chafed skin, chapped lips, chapped hands, chapped skin, cracked skin, dry skin, disinfecting or antiseptic wash for itch, disinfecting or antiseptic wash for newborns, female complaints, female medicine, female tonic, foot soak, hair or head wash, irritated scalp, irritated skin, itch, itchy scalp, rash, scabby skin, scabs, scalp disease, skin ailments, skin disease and sores of the feet.

Plants whose traditional uses were not included in categories 1-3 but were cited as being used medicinally for other ailments were categorized as 4: *other medicines*. Plants for which there was no recorded medicinal use under the botanical species name but for which there were generic references in the literature were assigned to category 5: related species. Most of the plants in this category were either referred to generically or by common name only in the literature and/or belonged taxonomically difficult genera (ie, *Carex*). As errors and uncertainties in taxonomic identification may occur in the ethnobotanical literature, particularly in older works using common names, discrimination for the non-medicinal category was made at the generic level. Plants for which there was no recorded medicinal use of that genus in the literature cited above nor in the Napralert database were assigned to category 6: non-medicinal plants.

For each category, the percentage of extracts which exhibited activity was calculated, as well as the percentage of active extracts excluding those with only slight activity (1+) against the dermatophytes *M. gypseum* and *T. mentagrophytes*.

The plants were also classified according to the habitat in which they were collected. These classifications were verified with habitat descriptions in the relevant floras: Hitchcock and Conquist (1973), Hickman (1993), MacKinnon et al (1992) and Pojar and MacKinnon (1994). The habitat categories used were: saltwater, coastal, freshwater wetlands (included aquatic plants, plants of bogs, swamps, lake and stream margins), moist, temperate, dry, arid (Ponderosa pine scrub and sagebrush scrub) and subalpine (elevations over 5,000 feet). As in the previous analysis, the total number of active plant extracts in each category was calculated, as well as the number of active extracts excluding those with only slight (1+) activity against the super-susceptible organisms *M. gypseum* and *T. mentagrophytes*.

The statistical significance of the percentage of active extracts in each category was evaluated using the chi squared goodness-of-fit test.

3.2.3 Results

Table 18 summarizes the results of the antifungal screening, alphabetically by family. Overall, 59% of the extracts exhibited some antifungal activity. The most active broad spectrum antifungal extracts were from *Boykinia occidentalis* whole plant, *Chimaphila umbellata* aerial parts, *Drosera rotundifolia* whole plant, *Epilobium angustifolium* aerial parts and roots, *Geum triflorum* aerial parts, *Horkelia fusca* aerial parts, *Oenothera villosa* aerial parts and roots, *Paeonia brownii* root bark, *Potentilla norwegica* whole plant, *Trillium ovatum* whole plant, and *Woodsia scopulina* whole plant. All the samples from the families Pinaceae, Rosaceae and Saxifragaceae exhibited antifungal activity.

The results of the screening summarized by higher taxa are shown in Table 19. Overall, 62% of the flowering plants and 48% of the non-flowering plants were active. Among the non-flowering plants, there was a large difference in activity between the lower plants (25% active) and the higher plants (77%). The activity of the extracts made from members of the Gymnospermae were particularly noteworthy in that 100% of these extracts were active.

The results of the ethnopharmacological analysis are shown in Table 20. Excluding the extracts with only slight (1+) activity against the super-susceptible organisms *M. gypseum* and *T. mentagrophytes* from the calculations, 32% of the medicinal plants were active while only 5% of the non-medicinal exhibited activity. Seventy-five percent (75%) of the extracts classified as potential antifungals and 48% of the extracts classified as possible antifungals were active.

The results of the antifungal screening summarized by plant habitat are shown in Table 21. Seventy-five percent (75%) of the plants collected from arid regions exhibited significant antifungal activity.

Table 18 - Phase two antifungal screening results[a]

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
Controls												
Methanol	-	-	-	0	0	0	0	0	0	0	0	0
Nystatin (10 μg)	-	-	-	3+	3+	5+	3+	1+	1+	3+	7	7
ACERACEAE												
Acer macrophyllum M-17a	3	Ae	T	0	0	0	1+	0	0	1+	2	0
Acer macrophyllum M-17b	3	Ib	T	0	0	0	1+	0	0	1+	2	0
AIZOACEAE												
Carpobrotus edulis Ca-3	2	Ae	C	0	0	0	0	0	0	0	0	0
ALISMATACEAE												
Alisma trivalis N-40a	3	Ae	W	0	0	0	0	0	0	1+i	1	0
Alisma trivalis N-40b	4	Rt	W	0	0	0	0	0	0	1+i	1	0
Sagittaria latifolia N-11	3	Wh	W	0	0	0	0	0	0	0	0	0
APOCYNACEAE												
Apocynum androsaemifolium P-47a	4	Ae	D	0	1+i	0	1+	0	0	2+	3	2
Apocynum androsaemifolium P-47b	1	Rt	D	0	1+i	0	1+	0	0	1+	3	1

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
ARALIACEAE												
Aralia nudicaulis N-3a	3	Ae	M	0	0	0	1+	1+	0	3+	3	2
Aralia nudicaulis N-3b	1	Rt	M	0	0	0	1+	1+	0	4+	3	2
ASCLEPIADACEAE												
Asclepias speciosa P-45	1	Wh	W	0	0	0	0	0	0	0	0	0
BALSAMINACEAE												
Impatiens capensis M-18	2	Ae	M	0	0	0	0	0	0	0	0	0
BERBERIDACEAE												
Achlys triphylla V-20	2	Ae	M	0	0	0	0	0	0	0	0	0
BETULACEAE												
Corylus cornuta N-41	3	Br	T	0	2+	0	2+	3+i	1+i	3+	5	5
BORAGINACEAE												
Lithospermum ruderale P-43	4	Wh	D	0	0	0	0	0	0	0	0	0
Mertensia paniculata N-5	5	Wh	M	0	0	0	0	0	0	0	0	0
BRYIDAE												
Homalothecium nevadense P-51	6	Wh	T	0	0	0	1+	0	0	1+	2	0
Hookeria lucens V-37	6	Wh	M	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
BRYIDAE - continued												
Isothecium stoloniferum V-22	6	Wh	M	0	0	0	1+	0	0	1+	2	0
Plagiothecium undulatum M-11	5	Wh	M	0	0	0	1+i	0	0	1+	2	0
Pogonatum contortum M-14	6	Wh	M	0	0	0	1+i	0	0	1+i	2	0
Polytrichum commune V-13	5	Wh	W	0	0	0	1+i	0	0	1+	2	0
Racomitrium elongatum V-18	6	Wh	T	0	0	0	0	0	0	0	0	0
Rhizomnium glabrescens M-13	3	Wh	M	0	0	0	0	0	0	0	0	0
Rhytidiadelphus loreus V-23	6	Wh	M	0	0	0	0	0	0	0	0	0
Scapania bolanderi M-12	6	Wh	M	0	0	0	0	0	0	0	0	0
Sphagnum henryense V-9	6	Wh	W	0	0	0	0	0	0	0	0	0
CAPRIFOLIACEAE												
Linnaea borealis V-15	2	Wh	M	0	0	0	0	0	0	0	0	0
Viburnum edule N-4	4	Br	M	0	0	0	0	0	0	1+	1	0
CELASTRACEAE												
Paxistima myrsinites N-38	4	Br	D	0	0	0	1+	0	0	1+	2	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
COMPOSITAE												
Adenocaulon bicolor N-19	3	Ae	M	0	0	0	0	0	0	1+	1	0
Anaphalis margaritacea V-40a	3	Lf	D	0	0	0	1+	0	0	1+	2	0
Anaphalis margaritacea V-40b	4	Rt	D	0	0	0	1+	0	0	2+	2	0
Anaphalis margaritacea V-40c	2	Fl	D	0	0	0	1+	0	0	1+	2	0
Artemisia cana F-6	1	Ae	S	1+	0	0	4+	2+	1+	2+	5	5
Artemisia douglasiana E-31	2	Ae	T	1+	5+	2+	5+	5+	0	5+	6	6
Artemisia pycnocephala E-29	4	Ae	C	0	0	1+	3+	2+	0	3+	4	4
Artemisia tripartita E-30	1	Ae	A	1+i	1+	1+	5+	5+	0	5+	6	5
Aster modestus N-7	5	Wh	M	0	0	0	0	0	0	0	0	0
Grindelia integrifolia V-38	3	Wh	C	0	0	1+	2+	1+	0	2+	4	4
Grindelia nana N-1	4	Wh	A	0	0	1+	2+	1+	1+i	4+	5	5
Hieracium albiflorum V-16	5	Wh	D	0	0	0	0	0	0	0	0	0
Leucanthemum vulgare N-21a	2	Fl	D	0	0	1+i	3+	3+	2+	5+	5	5
Leucanthemum vulgare N-21b	4	Vg	D	0	0	0	1+i	0	0	1+	2	0
Matricaria discoidea N-36	3	Wh	D	0	0	1+	2+	2+	2+	2+	5	5
Petasites frigidus N-2a	3	Ae	M	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
COMPOSITAE - continued												
Petasites frigidus N-2b	2	Rt	M	0	0	0	1+	0	0	1+	2	0
Solidago canadensis N-35	4	Wh	D	0	0	1+i	1+i	0	0	1+	3	1
Solidago spathulata N-10a	4	Ae	D	0	0	1+	2+	1+	2+i	4+	5	5
Solidago spathulata N-10b	4	Rt	D	0	0	0	0	0	0	0	0	0
Tragopogon pratensis Ca-20a	4	Ae	D	0	0	0	0	0	0	0	0	0
Tragopogon pratensis Ca-20b	4	Rt	D	0	0	0	0	0	0	0	0	0
Wyethia mollis Ca-15a	4	Ae	A	0	1+	1+	5+	2+	1+	4+	6	6
Wyethia mollis Ca-15b	4	Rt	A	0	0	0	1+i	0	0	2+	2	1
CRUCIFERAE												
Lepidium virginicum N-25	2	Wh	D	0	0	0	0	0	0	0	0	0
Cakile edentula V-1	6	Wh	C	0	0	0	0	0	0	0	0	0
CUPRESSACEAE												
Thuja plicata M-2	1	Ib	M	0	0	0	2+	0	1+	2+	3	3
CYPERACEAE												
Carex aquatilis M-8	5	Wh	W	0	0	0	1+i	0	0	1+	2	0
Carex lyngbyei V-6	5	Ae	C	0	0	0	1+	0	0	1+	2	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
CYPERACEAE - continued												
Carex muricata M-7	5	Wh	W	0	0	0	1+	0	0	1+	2	0
Scirpus cyperinus V-30	5	Wh	W	0	0	0	1+	0	0	1+i	2	0
DROSERACEAE												
Drosera rotundifolia V-8	3	Wh	W	1+i	3+	2+	3+	1+i	1+i	5+	7	7
EPHEDRACEAE												
Ephedra nevadensis Ca-13	3	Br	A	0	0	0	2+	0	0	3+	2	2
EQUISETACEAE												
Equisetum fluviatile N-48	5	Ae	W	0	0	0	0	0	0	0	0	0
Equisetum pratense V-11	4	Ae	W	0	0	0	0	0	0	0	0	0
Equisetum scirpoides N-46	5	Ae	M	0	0	0	0	0	0	0	0	0
Equisetum variegatum P-46	4	Wh	W	0	0	0	0	0	0	0	0	0
ERICACEAE												
Arbutus menziesii V-39a	3	Lf	D	0	0	0	1+	0	0	1+	2	0
Arbutus menziesii V-39b	3	Ib	D	0	0	0	1+	0	0	1+	2	0
Arbutus menziesii V-39c	3	Ob	D	0	0	0	0	0	0	0	0	0
Arctostaphylos patula Ca-19	3	Br	D	0	0	0	1+	0	0	1+	2	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
ERICACEAE - continued												
Cassiope mertensiana N-32	4	Ae	S	0	0	0	1+	0	0	1+	2	0
Chimaphila umbellata Ca-18	4	Ae	T	2+	1+	2+	5+	2+	1+	5+	7	7
Elliottia pyroliflorus P-55	4	Br	S	0	0	0	1+	0	0	1+	2	0
Gaultheria shallon V-35	3	Br	M	0	0	0	1+	0	0	1+	2	0
Phyllodoce empetriformis N-33	4	Ae	S	0	0	0	2+	1+i	0	2+	3	3
Pyrola picta N-15	4	Wh	M	0	0	0	0	0	0	0	0	0
EUMYCOTA												
Peltigera brittanica V-19	5	Wh	D	0	0	0	0	0	0	0	0	0
GENTIANACEAE												
Gentianella amarella N-6	5	Wh	M	0	0	1+	1+i	1+	0	2+	4	3
GRAMINAE												
Ammophila arenaria V-3	6	Ae	C	0	0	0	0	0	0	0	0	0
HIPPOCASTANACEAE												
Aesculus californica Ca-8	4	Br	D	0	0	0	0	0	0	0	0	0
HYDROPHYLLACEAE												
Phacelia ramosissima Ca-17a	4	Ae	D	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
Phacelia ramosissima Ca-17b	4	Rt	D	0	0	0	1+	0	0	1+	2	0
HYPERICACEAE												
Hypericum anagalloides V-7	5	Wh	W	0	0	1+	2+	0	0	2+	3	3
IRIDACEAE												
Iris tenuissima Ca-25	5	Wh	S	0	0	0	1+i	0	0	1+	2	0
JUNCACEAE												
Juncus bufonius V-14	4	Wh	W	0	0	0	0	0	0	0	0	0
Juncus effusus var. *gracilis* V-4	4	Ae	W	0	0	0	0	0	0	0	0	0
Juncus effusus var. *pacificus* V-5	4	Ae	W	0	0	0	0	0	0	0	0	0
Juncus falcatus V-12	5	Ae	W	0	0	0	1+i	0	0	1+	2	0
Juncus lesuerii V-2	5	Ae	C	0	0	0	1+	0	0	1+	2	0
LABIATAE												
Prunella vulgaris V-17	2	Ae	M	0	0	0	0	0	0	0	0	0
Stachys bullata Ca-7	3	Ae	C	0	0	0	1+i	0	0	1+	2	0
Stachys ciliata V-31	4	Ae	M	0	0	0	0	0	0	0	0	0
LILIACEAE												
Clintonia uniflora N-9	4	Ae	M	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
LILIACEAE - continued												
Lilium columbianum P-50a	4	Ae	T	0	0	0	0	0	0	0	0	0
Lilium columbianum P-50b	4	Bu	T	0	0	0	0	0	0	0	0	0
Lilium philadelphicum N-23a	4	Ae	T	0	0	0	0	0	0	0	0	0
Lilium philadelphicum N-23b	3	Bu	T	0	0	0	0	0	0	1+i	1	0
Trillium ovatum M-20	1	Wh	M	1+	3+	2+	5+	2+i	1+	5+	7	7
Veratrum viride N-28	3	Ae	S	0	0	0	0	0	0	0	0	0
LINACEAE												
Linum lewisii Ca-22	2	Wh	A	0	0	0	2+	0	0	1+	2	1
LYCOPODIACEAE												
Lycopodium annotinum N-22	4	Ae	M	0	0	0	2+	0	0	1+	2	1
MALVACEAE												
Malva neglecta N-20	3	Wh	D	0	0	0	0	0	0	0	0	0
MENYANTHACEAE												
Menyanthes trifoliata V-32	4	Wh	W	0	0	0	0	0	0	0	0	0
ONAGRACACEAE												
Camissonia brevipes Ca-12	6	Wh	C	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
ONAGRACEAE - continued												
Epilobium angustifolium V-36a	2	Ae	T	1+	2+i	1+	4+	3+i	1+	4+	7	7
Epilobium angustifolium V-36b	2	Rt	T	1+i	2+i	4+	4+	3+i	1+	3+	7	7
Oenothera villosa N-14a	2	Ae	T	2+i	2+	2+i	2+	5+i	3+	5+	7	7
Oenothera villosa N-14b	2	Rt	T	1+i	2+	2+i	3+	5+i	3+	4+	7	7
Oenothera villosa N-24	2	Wh	T	2+i	2+	2+i	3+	5+i	3+	4+	7	7
ORCHIDACEAE												
Goodyera oblongifolia N-16	3	Wh	T	0	0	0	1+	0	0	1+	2	0
Platanthera dilatata P-53	4	Ae	W	0	0	0	2+	0	0	2+	2	2
Platanthera orbiculata N-17	3	Wh	M	0	0	0	1+i	0	0	3+	2	1
OXALIDACEAE												
Oxalis oregana Ca-2	4	Wh	M	0	0	0	0	0	0	0	0	0
PAEONIACEAE												
Paeonia brownii Ca-21a	4	Ae	A	0	1+i	1+	2+	2+	2+	2+	6	6
Paeonia brownii Ca-21b	3	Rb	A	1+i	2+	1+	2+	1+	1+	2+	7	7
Paeonia brownii Ca-21c	3	Rc	A	0	1+	1+	2+	1+	2+	2+	6	6

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
PAPAVERACEAE												
Argemone munita Ca-14a	4	Ae	A	0	0	0	0	0	0	0	0	0
Argemone munita Ca-14b	4	Rt	A	0	0	0	0	0	0	0	0	0
Eschscholzia californica Ca-1	2	Rt	D	2+i	1+	1+	2+	2+	0	3+	6	6
Platystemon californicus Ca-5	6	Wh	C	0	0	0	0	0	0	0	0	0
PINACEAE												
Abies grandis N-42	1	Br	M	0	0	2+i	1+	0	0	2+	3	2
Picea sitchensis M-3	2	Ib	M	1+i	1+	2+	3+	0	0	3+	5	5
Picea sitchensis M-4	2	Br	M	0	0	0	1+	0	0	2+	2	1
Picea sitchensis V-10	2	Br	M	0	0	0	0	0	0	1+	1	0
Pseudotsuga menziesii N-43	1	Br	M	0	0	2+i	2+	1+i	1+	2+	5	5
Tsuga heterophylla M-1	2	Ib	M	0	0	1+	2+	1+	1+	2+	5	5
PLUMBAGINACEAE												
Armeria maritima Ca-4	4	Wh	C	0	0	0	0	0	0	0	0	0
POLEMONIACEAE												
Polemonium pulcherrimum N-27	2	Wh	D	0	0	0	0	1+	0	0	1	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
POLYGONACEAE												
Eriogonum umbellatum Ca-24	4	Wh	S	0	0	0	1+	0	0	1+	2	0
Oxyria digyna N-34	1	Wh	S	0	0	0	0	0	0	0	0	0
Polygonum amphibium N-12	4	Wh	W	0	0	0	0	0	0	0	0	0
POLYPODIACEAE												
Adiantum pedatum V-25	2	Ae	M	0	0	0	0	0	0	0	0	0
Blechnum spicant M-6	3	Wh	M	0	0	0	1+	0	0	1+	2	0
Cryptogramma acrostichoides N-39	4	Wh	D	0	0	0	1+i	0	0	0	1	0
Dryopteris campyloptera M-5	2	Ae	M	0	0	0	1+	0	0	1+	2	0
Gymnocarpium dryopteris P-52	6	Ae	M	0	0	0	0	0	0	0	0	0
Onoclea sensibilis N-45	2	Ae	M	0	0	0	0	0	0	0	0	0
Polypodium scouleri V-33a	4	Ae	C	0	0	0	2+	0	0	2+	2	2
Polypodium scouleri V-33b	4	Rh	C	0	0	0	0	0	0	0	0	0
Pteridium aquilinum M-15	3	Ae	M	0	0	0	1+	0	0	1+i	2	0
Woodsia scopulina N-26	5	Wh	D	1+	1+	1+	2+	1+	1+	2+	7	7
PORTULACACEAE												
Claytonia sibirica V-29	2	Wh	M	0	0	0	1+	0	0	1+i	2	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
POTAMOGETONACEAE												
Potamogeton richardsonii N-13	6	Wh	W	0	0	0	2+	0	0	2+	2	2
RANUNCULACEAE												
Actaea rubra P-56a	4	Ae	M	0	0	0	0	0	0	0	0	0
Actaea rubra P-56b	2	Rt	M	0	0	0	0	0	0	1+	1	0
Anemone multifida N-8a	4	Ae	M	0	0	0	0	0	0	0	0	0
Anemone multifida N-8b	4	Rt	M	0	0	0	0	0	0	0	0	0
Aquilegia formosa P-49a	2	Ae	M	0	0	0	0	0	0	0	0	0
Aquilegia formosa P-49b	2	Rt	M	0	0	1+	1+	0	0	1+	3	1
Trauvetteria caroliniensis V-28	4	Wh	M	0	0	0	0	0	0	0	0	0
ROSACEAE												
Geum triflorum Ca-23a	4	Ae	A	1+i	2+	1+	3+	2+i	1+i	3+	7	7
Geum triflorum Ca-23b	2	Rt	A	0	0	1+	3+	2+i	2+i	3+	5	5
Horkelia fusca Ca-26a	5	Ae	S	2+i	2+i	1+	3+	1+	1+	3+	7	7
Horkelia fusca Ca-26b	5	Rt	S	2+i	2+i	1+	3+	1+	0	3+	6	6
Luetkea pectinata N-31	3	Ae	S	0	0	0	2+	0	0	3+	2	2
Malus fusca N-47	2	Br	M	0	0	0	2+i	3+i	0	1+	3	3

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
ROSACEAE - continued												
Physocarpus capitatus M-10	4	Br	W	0	0	0	2+	0	0	1+	2	1
Potentilla norwegica N-18	4	Wh	W	2+i	2+	2+i	2+	5+i	3+	4+	7	7
Purshia tridentata Ca-10	2	Br	A	0	0	0	2+	5+	2+i	2+	4	4
Rosa canina Ca-11	4	Br	D	0	0	1+	1+	0	0	2+	3	2
Rosa woodsii P-48	1	Br	D	1+i	2+i	1+	2+	5+i	0	2+	6	6
Sorbus sitchensis P-54	4	Br	S	0	0	0	1+i	0	0	0	1	0
RUBIACEAE												
Galium trifidum M-9	1	Wh	M	0	0	0	0	0	0	0	0	0
Galium triflorum V-21	4	Wh	M	0	0	0	0	0	0	0	0	0
SAXIFRAGACEAE												
Boykinia occidentalis N-44	4	Wh	S	2+i	2+	1+	4+	5+i	2+i	2+	7	7
Leptarrhena pyrolifolia V-24	4	Br	S	0	0	0	1+	0	0	1+	2	0
Mitella brewerii N-30	5	Wh	S	0	1+i	1+	2+	1+	1+i	1+	6	5
Tiarella trifoliata V-27	4	Wh	M	0	0	0	1+	0	0	1+	2	0
SCROPHULARIACEAE												
Castilleja affinis Ca-27	3	Ae	C	0	0	0	0	0	0	0	0	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
SCROHPULARIACEAE - continued												
Castilleja thompsonii P-44	3	Ae	A	0	0	0	0	0	0	0	0	0
Euphrasia stricta M-16	4	Wh	M	0	0	0	0	0	0	0	0	0
Mimulus guttatus V-26	3	Wh	W	0	0	0	0	0	0	0	0	0
SELAGINACEAE												
Selaginella wallacei N-37	5	Ae	D	0	0	0	0	0	0	0	0	0
THALLOPHYTA (Algae)												
Enteromorpha clathrata V-41	6	Wh	N	0	0	0	0	0	0	0	0	0
Fucus gardneri V-34	2	Wh	N	0	0	0	0	0	0	0	0	0
Mazzaella splendens V-45	6	Wh	N	0	0	0	0	0	0	0	0	0
Laminaria saccharina V-43	6	Wh	N	0	0	0	0	0	0	0	0	0
Nereocystis luetkeana V-42	4	Wh	N	0	0	0	0	0	0	0	0	0
Ulva fenestrata V-44	6	Wh	N	0	0	0	0	0	0	0	0	0
TYPHACEAE												
Typha latifolia M-19	4	Fr	W	0	0	0	0	0	0	0	0	0
VALERIANACEAE												
Plectritis congesta Ca-6	6	Ae	M	0	0	0	1+	0	0	1+	2	0

Family Species (Voucher No.)	Cat[b]	Part[c]	Hab[d]	A.f.[e]	C.a.	F.t.	M.g.	P.b.	R.o.	T.m.	Total[f]	Total[g] excl. SS.
VALERIANACEAE - continued												
Valeriana sitchensis N-29a	3	Ae	S	0	0	0	0	0	0	1+	1	0
Valeriana sitchensis N-29b	3	Rt	S	0	0	0	1+i	0	0	2+	2	0
VIOLACEAE												
Viola glabella Ca-16	5	Wh	W	0	0	0	0	0	0	0	0	0
Total number active				21	27	39	100	41	29	106	109	60

Key to Table 18

[a] Classification of results: 0 = no inhibition or zone of inhibition < 8.0 mm; 1+ = zone of inhibition 8.0-10.0 mm; 2+ = zone of inhibition 10.1-15.0 mm; 3+ = zone of inhibition 15.1-20.0 mm; 4+ = zone of inhibition 20.1-25.0 mm; 5+ = zone of inhibition > 25.1 mm; i = incomplete inhibition.

[b] Cat. = Ethnopharmacological category: 1 = Potential antifungals; 2 = Possible antifungals; 3 = Other dermatological uses; 4 = Other medicinal uses; 5 = Related species; 6 = Not used medicinally.

[c] Part extracted: Ae = Aerial; Bk = Bark; Br = Branch; Bu = Bulb; Fl = flowers; Fr = Fruit; Ib = Inner bark; Lf = leaf; Ob = Outer bark; Rb = Root bark; Rc = Root cortex; Rh = Rhizome; Rt = Root; Wh = Whole plant.

[d] Habitat: A = arid, C = coastal, D = dry, M = moist, N = saltwater, S = sub-alpine, T = temperate, W = wetlands (freshwater).

[e] Fungi: A.f. = *Aspergillus fumigatus*; C.a. = *Candida albicans*; F.t. = *Fusarium tricuitum*; M.g. = *Microsporum gypseum*; P.b. = *Pseudoallescheria boydii*; R.o. = *Rhizopus oryzae*; T.m. = *Trichophyton mentagrophytes.*

[f] Total number of fungi the extract was active against.

[g] Total number of fungi the extract was active against, excluding the supersusceptible dermatophytes *M. gypseum* and *T. mentagrophytes*.

Table 19 - Phase two antifungal screening results summarized by taxa

Taxa	Number in Category (N)	Number Active (N)	Percent Active (%)	Excluding 1+ super-suscept.[a] Number Active (N)	Excluding 1+ super-suscept.[a] Percent Active (%)
NON-FLOWERING PLANTS					
Lower plants					
Eumycota	1	0	0	0	0
Thallophyta	6	0	0	0	0
Bryopsida	11	5	46	0	0
Lycopsida	2	1	50	1	50
Sphenopsida	4	0	0	0	0
Lower plants sub-total	24	6	25	1	4
Higher plants					
Filicinae	10	6	60	2	20
Gymnospermae	8	8	100	7	88**
Higher plants sub-total	18	14	77	9	50
NON-FLOWERING Sub-total	42	20	48	10	24
FLOWERING Sub-total	143	89	62	50	35
GRAND TOTALS	185	109	59	60	32

[a] Number active (N) calculated excluding those extracts with only slight (1+) activity against the super-susceptible organisms *M. gypseum* and *T. mentagrophytes*.

** Percentage of active extracts statistically significant, $p < 0.01$

Table 20 - Phase two ethnopharmacological analysis of antifungal screening results

Category	Number in Category (N)	Number Active (N)	Percent Active (%)	Excluding 1+ Super-susc.[a] Number Active (N)	Excluding 1+ Super-susc.[a] Percent Active (%)
Potential antifungals	12	9	75	9	75**
Possible antifungals	33	23	70	16	48**
Other skin problems	35	25	58	10	29
Other medicinal uses	64	33	52	18	28
Related species	23	14	61	6	26
Subtotal medicinal	167	104	62	59	35
No medicinal use	18	5	28	1	5
Grand Totals	185	109	59	60	32

[a] Number active (N) calculated excluding those extracts with only slight (1+) activity against the super-susceptible organisms *M. gypseum* and *T. mentagrophytes*.

** Percentage of active extracts statistically significant, $p < 0.01$

Table 21 - Phase two antifungal screening results summarized by habitat

Category	Number in Category (N)	Number Active (N)	Percent Active (%)	Excluding 1+ Super-susc.[a] Number Active (N)	Percent Active (%)
Saltwater	6	0	0	0	0
Coastal	13	6	46	3	23
Wetlands (freshwater)	28	13	46	6	21
Moist	55	29	53	14	26
Temperate	17	13	77	8	47
Dry	33	21	64	10	30
Arid	16	12	75	12	75**
Sub-alpine	17	15	88	7	41
Total	185	109	59	60	32

[a] Number active (N) calculated excluding those extracts with only slight (1+) activity against the super-susceptible organisms *M. gypseum* and *T. mentagrophytes*.

** Percentage of active extracts statistically significant, $p < 0.01$

3.2.4 Discussion

The objectives of this antifungal screening were twofold. Given the urgent need for new antifungal compounds, the primary goal was to screen the flora of western North America to identify potential new leads on novel antifungal structures. A parallel objective was to further explore some interesting observations which arose from the results of the phase one screenings. Analysis of antifungal activity by higher taxa showed that more of the non-flowering plants exhibited antifungal activity than did the flowering plants. Analysis of antifungal activity based on the traditional uses of the plants showed that plants whose traditional medicinal use implied that they may have been used to treat fungal infections exhibited a much higher degree of antifungal activity than all other groups. The data set also gave a rather counterintuitive impression that plants from arid habitats exhibited a higher degree of antifungal activity than plants from moister habitats. This study was therefore designed to obtain sufficient data to analyze the impact of these factors on the screening results.

Overall, 109 extracts (59%) exhibited some antifungal activity. This figure dropped to 32% when the extracts with only slight (1+) activity against the super-susceptible dermatophytes were excluded from the calculation. Extracts of 11 plants were active against all seven fungi screened: *Boykinia occidentalis, Chimaphila umbellata, Drosera rotundifolia, Epilobium angustifolium, Geum triflorum, Horkelia fusca, Oenothera villosa, Paeonia brownii, Potentilla norwegica, Trillium ovatum* and *Woodsia scopulina*. Nineteen additional extracts were active against at least five of the fungi screened.

Only 21 extracts were active against *Aspergillus fumigatus* and most of these extracts only inhibited spore germination, not hyphal growth. Only the six extracts made from: *Artemisia cana, A. douglasiana, Chimaphila umbellata, Trillium ovatum, Epilobium angustifolium*, and *Woodsia scopulina* completely inhibited the growth of this fungus.

Twenty-seven extracts were active against the pathogen *Candida albicans*. Of these active extracts, the anti-*Candida* activity of the *Artemisia douglasiana* extract was outstanding, far exceeding the activity of all the other extracts and that of the positive control Nystatin. The activity of the extracts made from *Drosera rotundifolia* and *Trillium ovatum* was comparable to that of Nystatin against *C. albicans*.

The activity of both *A. douglasiana* and the related species *A. tripartita* against the dermatophytes *M. gypseum, P. boydii* and *T. mentagrophytes* also far exceeded that of the positive control Nystatin. Extracts from seven other plant species also exhibited exceptional activity against the clinical pathogen *P. boydii*: *Boykinia occidentalis, Corylus cornuta, Leucanthemum vulgare, Oenothera villosa, Potentilla norwegica, Purshia tridentata*, and *Rosa woodsii*. Other plants with activity exceeding that of the positive control against *M. gypseum* and *T. mentagrophytes* were: *Aralia nudicaulis, Artemisia cana, Boykinia occidentalis, Chimiphila umbellata, Drosera rotundifolia, Epilobium angustifolium, Grindelia nana, Oenothera villosa, Potentilla norwegica, Solidago spathulata, Trillium ovatum* and *Wyethia mollis*.

Three plant families were particularily outstanding in this screening: Pinaceae, Rosaceae, and Saxifragaceae. All of the samples from these families exhibited antifungal activity. The results summarized by higher taxa are shown in Table 19. Overall, there was a higher percentage of active extracts among the flowering plants (62%) than the non-flowering plants (48%). However, among the non-flowering plants, there was a great difference in the degree of activity between the lower plants (25% active) and the higher plants (77% active). This was largely due to the fact that 100% of the Gymnospermae (conifers) were active.

The antifungal screening results summarized by plant habitat are shown in Table 21. It would seem logical to postulate that plants from wet and moist habitats would exhibit a higher degree of antifungal activity than plants from drier habitats. However, the results of this screening show the reverse, as 75% of the plants from arid regions were active while among the plants from moister habitats, activity ranged from 0 to 26%. It should be pointed out that all of the plants collected from arid habitats were plants which used medicinally.

The plants collected from temperate, dry and subalpine regions also were more active than those from moister habitats. It should be noted that there were no cacti nor other species with thick waxy cuticles were included among the plants collected from arid regions. All of the arid plants had quite hairy leaf surfaces which may be an adaptation to decrease water loss through the stomata.

One possible explanation for these observations may be that plants in moister habitats, exposed to the constant threat of fungal parasites, are more likely to evolve mechanical barriers to fungal infections. Among the plants that occupy drier habitats, the physical adaptions to prevent desication also make these plants more vunerable to fungal infections and therefore there may be a much greater selection pressure for the evolution of chemical defenses. It would be interesting to test this hypothesis by screening a sampling of plants from arid regions which consisted of both medicinal and non-medicinal plants with a range of surface features.

The results of the ethnopharmacological data analysis (see Table 20) showed that those species which were used in traditional medicine exhibited a much greater degree of activity (35%) than the non-medicinal plants (5%). In the medicinal plant group, the degree of antifungal activity among the plants whose traditional use suggested that they may have been used to treat fungal infections greatly exceeded that of the rest of the group. Seventy-five percent of the plants classified as potential antifungals and 48% of those classified as possible antifungals were active, while only 28% of the plants with other medicinal uses were active.

The ethnopharmacological analysis of antifungal activity in both this study and the phase one screening revealed that a high percentage of plants which were traditionally used to treat fungal infections exhibited antifungal activity. This evidence supports the hypothesis that the ethnobotanical literature may be used to target plants with antifungal activity. Furthermore, as the majority of these plant medicines were applied topically to fungal infections of the skin or mucosa, it is possible that these traditional remedies were efficacous.

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4.0 Conclusions from ethnopharmacological screenings

The entire series of ethnopharmacological screenings have provided a great deal of valuable information. The main objective of these studies was well met with the identification of numerous promising leads on potential anti-infectious agents worthy of further investigation. Several of the most active plants from the first phase of screening have already been investigated and some novel compounds isolated. Many of the most promising plants from the phase two studies have been targeted for follow up work in future research projects. The comprehensive antibiotic activity of the ferns for example, make them strong candidates for further chemical investigation into their antibiotic constituents.

In addition to having provided new leads in the search for novel anti-infectious compounds, the screenings also gave valuable insights on ways to improve the design of ethnopharmacological screenings. The results supported the tacit assumption that more leads on biologically active constituents are found from screening traditional medicines rather than non-medicinal plants. Similarly, the effectiveness of the common practice of assaying methanolic extracts of plant samples, even though the folk practice was usually to prepare water extracts, was supported by a comparison of the relative activities of different types of solvent extracts.

The results of the habitat analyses were quite interesting as, counterintuitively, plants from wet habitats did not exhibit the greatest degree of antimicrobial activity. The data from these screenings suggested that it may be interesting to screen a balanced sampling of medicinal and non-medicinal plants from subalpine and arid regions.

The results of the ethnopharmacological analyses not only supported one of the underlying assumptions of ethnopharmacology, the inherent value of focusing investigations on traditional medicines, but they also provided supporting evidence for the hypothesis that the ethnobotanical literature may be effectively used to identify the most promising screening candidates. The ethnopharmacological analyses also provided evidence to support the argument that the traditional North American medicinal lore has validity in a scientific context as many of these herbal remedies may have been efficacious. Overall, all of the results of the screenings indicate that the traditional medicine of the North American First Nations people is deserving of much greater respect than it is currently accorded. All of humanity could stand to benefit from further scientific investigations of this important cultural heritage.

5.0 Introduction to Artemisia research

The genus *Artemisia* L. is a member of the Anthemidae tribe of the Compositae. As with many members of this tribe, *Artemisia* species are noted predominantly for their aromatic foliage rather than their inconspicuous discoid heads. The genus is also renowned in horticultural circles for the attractive silver leaves that many members bear. Beyond these two common features, *Artemisia* species exhibit a diverse array of botanical characteristics. Lifeforms range from herbs to shrubs with annual or more often, perennial life cycles. *Artemisia* species occupy a variety of habitats from the arctic to the equator, low to high elevations, inland and coastal, mesic to xeric. Another uniting characteristic of this versatile genus, albeit a non-botanical one, is the common use of *Artemisia* species as herbal medicines.

All around the world, members of the genus *Artemisia* have traditionally been used medicinally by indigenous peoples. Many Old World species have been screened for pharmacological properties and found to have significant activity. Follow up investigations to identify the active constituents have resulted in the isolation of several active compounds of therapeutic value. The most renowned example of these successes is perhaps the novel sesquiterpene lactone isolated from *A. annua* which is now in clinical trials as a therapeutic for drug resistant malaria (see Trigg, 1989 for review).

In spite of the fact that many useful therapeutics have been derived from Old World medicinal *Artemisia* species, few New World species had been screened for pharmacological activity prior to this study. This oversight seems even more extraordinary in light of the fact that *Artemisia* species were among the most important physical and spiritual medicines of the North American native peoples. These facts, along with the broad spectrum activity observed among the *Artemisia* species assayed in the phase one and two studies, provided a strong impetus for a more in depth investigation of the genus.

The importance of *Artemisia* species in the traditional medicine of North American First Nations peoples was evidenced in Moerman's (1986) bibliographic *Medicinal Plants of Native America*, wherein the genus *Artemisia* had the greatest number of references and *A. tridentata* was one of the ten most frequently cited species. A brief summary of the North American ethnobotanical literature on *Artemisia* species was compiled to give an overview of their traditional medicinal applications (see Appendix 8). An evaluation of this literature summary revealed that one of the most common medicinal uses of *Artemisia* species was in the treatment of ailments that are now known to have been caused by infectious organisms. Given the findings in the phase one and two ethnopharmacological analyses, that there was a correlation between traditional usage and anti-infectious activity, this evidence from the literature also provided strong support for the decision to focus this ethnopharmacological investigation on the anti-infectious activity of *Artemisia* species.

For this study, seventy-four additional samples from thirty *Artemisia* taxa were collected. Following the same methods outlined in earlier chapters, the *Artemisia* samples were dried, ground and extracted with methanol. The methanolic extracts were then screened for antibiotic, antifungal, anti-mycobacterial and antiviral activity. The methods, results and conclusions from these screening studies are detailed in chapters 5.1 - 5.5.

As *Artemisia* taxonomy is notoriously difficult due to the plastic morphology, rampant polyploidy, hydrization and species intergradation commonly encountered in this genus, all identifications of these samples were authenticated by Dr. L. Schultz of the Harvard Herbarium. A summary of *Artemisia* taxonomic literature was given in Appendix 3 to clarify the taxonomic distinctions used herein as the treatments, especially those of the sub-genera Vulgares and Tridentatae, have an impact on this research. An annotated list of the voucher specimens for the *Artemisia* samples assayed is provided in Appendix 4.

In the first part of this work, an attempt was made to statistically analyze the relationship between the traditional medicinal uses of the various plant species and their antibiotic activity. However, while the identity of the *Artemisia* species collected for this research have been authenticated, the accuracy of the botanical identifications of *Artemisia* species cited in the ethnobotanical literature must be considered suspect for a number of reasons. Firstly, it is not at all clear what parameters First Nations peoples used to delineate *Artemisia* "species". Secondly, there could easily have been many errors made in ethnobotanists' identifications of the species employed by the native peoples. And finally, even among botanical taxonomic experts, there has been much dissention regarding species boundaries and the number of taxa recognized, particularly within the sub-genera Vulgares and Tridentatae, has varied greatly over the years (see Appendix 3 for summary).

Considering these factors, it would seem that in order to have a reasonable degree of confidence in the accuracy of the identifications cited in the ethnobotanical literature, the designations *A. ludoviciana* and *A. tridentata* must be interpreted in their broadest sense, that is, as references to the Vulgares and Tridentatae respectively. Therefore, a meaningful statistical analysis of the relationship between the traditional medicinal uses of *Artemisia* species and their pharmacological activity is precluded. However, some interesting general observations on the relationship may still be made.

References

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5.1 Antibiotic screening of *Artemisia* species

Abstract

Seventy-four samples from 30 *Artemisia* taxa were screened for antibiotic activity. All samples demonstrated activity against a minimum of six bacteria with the exception of two extracts of *A. absinthium.* Antibiotic activity was distributed throughout all four subgenera and the variation in the degree of activity between samples did not follow taxonomic groupings. Among the samples from members of the subgenus *Absinthium*, extracts of *A. frigida* exhibited the strongest activity. Among the samples from members of the subgenus *Dracunculus*, extracts of *A. dracunculus* demonstrated the greatest degree of inhibition. There were numerous samples from the *Tridentatae* and the Vulgares complex which showed strong activity, including extracts of *A. ludoviciana* and *A. tridentata. A. dracunculus, A. frigida, A. ludoviciana* and *A. tridentata* were also the *Artemisia* species which were most frequently cited as being used as traditional medicines.

5.1.1 Introduction

Many of the traditional uses of *Artemisia* species by the North American aboriginal peoples suggest that they were applied to prevent or cure bacterial infections. In examining the North American ethnobotanical literature on *Artemisia* species, it is readily apparent that four species in particular; *A. dracunculus, A. frigida, A. ludoviciana* and *A. tridentata*, were the most widely used and indeed samples of *A. ludoviciana* and *A. tridentata* exhibited good antibiotic activity in the phase one screening. This raised the question whether other *Artemisia* species which were employed in a similar manner also contained antibiotic constituents and whether the distribution of antibiotic constituents followed taxonomic delineations. Therefore, this study was designed to assay the range of antibiotic activity among North American *Artemisia* species and to determine whether the distribution of activity followed previously described chemotaxonomic patterns.

5.1.2 Methods

A number of preliminary trials were conducted to determine the optimal extraction protocol using fresh frozen and air dried samples of the leaves, flowers and roots of *A. dracunculus, A. frigida, A. tilesii* and *A.*

tridentata. Extraction solvents tested were hexane, petroleum ether, dichloromethane, methanol and water. Three hour, 24 hour and 96 hour extractions were also compared. Based on the results of these trials, a three hour methanolic extraction of the leaves and flowers was used to prepare all the samples used in the screening.

The methods used for the antibiotic screening were the same as those described in 2.1.2. The methanolic extracts were retested for activity 2, 4, 6, 26 and 104 weeks after preparation, having been stored in the dark at room temperature in the interim. Fresh extracts of dried and ground plant material (from the same collections that the above extracts were prepared from) which had been stored for 104 weeks in the dark at room temperature, were also prepared and tested.

An extract of *A. tripartita* E-28 was partitioned between the solvents hexane, petroleum ether, ethyl acetate, dichloromethane and butanol. These solvent fractions were concentrated and tested for antibiotic activity. The bioautographic agar overlay method (Rahalison, 1991) was used to detect the antimicrobial compounds in the solvent fractions. The fractions were spotted on silica gel alumina backed plates with fluorescent indicator and developed in a solvent system of $CHCl_3$: MeOH (98:2). Duplicate TLC plates were made, one for the assay and one as a reference for the detection of UV active spots. Additional duplicates were developed with 10% and 15% methanol: chloroform and then sprayed with vanillin. The ethyl acetate fraction was then run on a silica column with increasing amounts of methanol. The column fractions were bioassayed and the active fractions bioautographed.

5.1.3 Results

Preliminary trials using samples of *A. dracunculus, A. frigida, A. tilesii* and *A. tridentata* showed that methanolic and dichloromethane extracts exhibited the greatest antibiotic activity when compared with hexane, petroleum ether and water extracts. There was no significant difference in the activity of fresh frozen samples of these species, compared to air dried samples. Extending the period of extraction beyond three hours did not effect the degree of activity that the extracts exerted. For each species tested, there was no significant difference in the activity of flower extracts versus leaf extracts. None of the root extracts exhibited antibiotic activity.

Upon retesting, all of the methanolic extracts exhibited the same degree of activity up to six weeks after their preparation. After six weeks, the extracts showed a 10 - 30 % decrease in activity. There was no further loss of activity up to two years after their preparation. Dried and ground plant material which had been stored for two years exhibited 5 - 10 % decrease in activity compared to the first testing of the original extracts.

Seventy-four methanolic extracts prepared from 30 *Artemisia* taxa were assayed for antibiotic activity against a panel of 11 bacteria. The results of the screening are shown in Table 22. All of the extracts exhibited activity against a minimum of six bacteria with the exception of two samples of *A. absinthium.* The extracts which demonstrated the broadest spectrum of activity were samples from the Vulgares complex (*A. douglasiana* and *A. ludoviciana*) and the *Tridentatae* (*A. cana* ssp. *bolanderi, A. spiciformis* and *A. tridentata*). The extracts with the least activity were prepared from samples of *A. absinthium* (subgenus *Absinthium*), an introduced species. Samples from the only other member of this subgenus which was assayed, *A. frigida*, all demonstrated both a greater degree and a broader spectrum of activity than those of *A. absinthium.* Among the samples of species belonging to the subgenus *Dracunculus*, the extracts made from *A. dracunculus* and *A. spinescens* exhibited the greatest degree and broadest spectrum of activity.

Among the *Tridentatae* and the Vulgares complex, the variation in activity between species was no greater than the variation among samples of one species. There was no significant difference in antibiotic activity among the subspecies of *A. ludoviciana* nor among the subspecies of *A. tridentata.*

All of the solvent fractions exhibited antibiotic activity with the ethyl acetate and dichloromethane fractions exhibiting the greatest degree of activity. Bioautographic overlays of the crude *A. tripartita* extracts with *S. aureus* showed 8 spots where there was a zone of clearing. Bioautographic overlays of the ethyl acetate fraction showed the active constituent at the base (Rf. = 0). This golden brown spot moved when the TLC was developed with 10% methanol and with 15% methanol. When the TLC was developed with vanillin, this spot appeared black. This ethyl acetate fraction was further fractionated by column chromatography and the active column fractions bioautographed.

Table 22 - *Artemisia* antibiotic screening results[a]

Species Sample Number	B.s.[b]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.	Total[c] N. active	Total[d] Gm.⁻
Controls													
Methanol	0	0	0	0	0	0	0	0	0	0	0	0	0
Gentamicin (10 µg)	5+	4+	5+	5+	5+	5+	4+	4+	5+	5+	5+	11	7
ABROTANUM													
A. bigelovii													
E-22	2+	0	2+	0	5+	1+	0	0	4+	2+	3+	7	3
A. californica													
E-12	3+	1+i	3+	0	4+	1+	0	0	4+	2+	2+	8	4
***ABROTANUM* - VULGARES**													
A. carruthii													
E-19	2+	1+i	1+	0	4+	1+	0	0	4+	2+	2+	8	4
A. douglasiana													
B-3	2+	1+	2+	0	4+	2+	1+	0	3+	2+	2+	9	5
E-14	2+	1+	2+	1+	5+	1+	1+	0	4+	2+	4+	10	6
A. lindleyana													
B-4	2+	1+i	1+	0	3+	1+	0	0	2+	2+	3+	8	4

Species Sample Number	B.s.[b]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.	Total[c] N. active	Total[d] Gm.⁻
B-5	2+	1+i	2+	0	3+	1+	0	0	2+	2+	2+	8	4
F-2	2+	1+	2+	0	3+	1+	0	0	2+	2+	2+	8	4
F-3	2+	1+	2+	0	4+	1+	0	0	2+	2+	3+	8	4
A. longifolia													
C-10	2+	1+i	2+	0	3+	1+	0	0	2+	2+	3+	8	4
C-12	2+	1+i	2+	0	4+	2+	0	0	3+	2+	3+	8	4
A. ludoviciana ssp. *candicans*													
B-11	2+	1+	2+	0	5+	1+	0	1+	3+	2+	3+	9	5
C-2	2+	1+	2+	0	4+	1+i	0	0	2+	2+	3+	8	4
E-1	2+	1+i	3+	0	4+	1+i	0	0	2+	2+	2+	8	4
E-15	2+	1+	2+	1+	5+	1+i	0	0	4+	2+	3+	9	5
A. ludoviciana ssp. *incompta*													
C-11	2+	1+i	2+	0	4+	1+	0	0	3+	2+	3+	8	4
A. ludoviciana ssp. *ludoviciana*													
B-8	2+	1+	2+	1+i	4+	1+	1+i	1+	3+	2+	2+	11	7
B-12	2+	1+i	2+	0	4+	1+	0	0	3+	2+	2+	8	4

Species Sample Number	B.s.[b]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.	Total[c] N. active	Total[d] Gm.⁻
C-8	2+	1+i	2+	0	4+	1+	0	0	3+	2+	3+	8	4
C-15	1+	0	1+i	0	3+	1+i	0	0	2+	2+	2+	7	3
A. michauxiana													
C-3	2+	0	1+	0	3+	0	0	0	2+	2+	2+	6	2
C-4	2+	0	1+	0	3+	0	0	0	2+	2+	2+	6	2
C-6	2+	0	1+	0	3+	0	0	0	2+	2+	2+	6	2
C-7	2+	0	1+	0	4+	0	0	0	2+	2+	2+	6	2
A. suksdorfii													
B-1	2+	1+i	2+i	0	4+	1+	0	0	3+	2+	2+	8	4
E-11	3+	1+	3+	0	5+	1+	0	0	3+	3+	3+	8	4
A. tilesii													
A-7	1+	1+i	1+	0	2+	1+	0	0	2+	1+	2+i	8	4
A-8	1+	1+i	1+	0	2+	1+	0	0	1+	1+	2+i	8	4
B-14	1+	1+i	1+	0	2+	1+	0	0	2+	1+	2+	8	4
A. vulgaris													
C-17	1+	0	1+i	0	2+	1+i	0	0	1+	1+	1+	7	3

Species Sample Number	B.s.[b]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.	Total[c] N. active	Total[d] Gm.⁻
ABSINTHIUM													
A. absinthium													
A-5	1+	0	0	0	2+	0	0	0	2+	1+	1+i	5	1
B-13	1+	0	1+i	0	3+	0	0	0	1+	1+i	1+i	6	2
C-1	2+	0	1+	0	4+	0	0	0	4+	2+	2+	6	2
C-13	1+	0	1+i	0	2+	0	0	0	0	0	0	3	1
A. frigida													
A-2	2+	1+i	2+	0	3+	1+	0	0	3+	2+	2+	8	4
A-3	1+	1+	2+	0	3+	1+	0	0	3+	3+	2+	8	4
C-5	2+	1+	2+	0	4+	1+	0	0	3+	3+	2+	8	4
E-23	2+	1+i	3+	0	4+	1+	0	0	3+	2+	3+	8	4
E-27	2+	1+	3+	0	4+	1+	0	0	4+	3+	3+	8	4

Species Sample Number	B.s.[b]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.	Total[c] N. active	Total[d] Gm.⁻
DRACUNCULUS													
A. campestris													
C-9	1+	0	1+i	0	4+	0	0	0	2+	2+	1+	6	2
A. dracunculus													
B-9	2+	1+	2+	1+i	5+	1+	0	1+	3+	3+	3+	10	5
C-16	1+	0	1+	0	3+	0	0	0	1+	1+	1+	6	2
E-13	1+	1+	1+	1+i	4+	1+i	0	0	2+	2+	1+	9	5
F-1	1+	1+	1+	1+i	3+	1+i	0	0	2+	2+	1+	9	5
F-4	2+	1+	2+	1+i	5+	1+	0	1+	3+	3+	3+	10	5
A. filifolia													
E-20	1+	0	1+	0	4+	0	0	0	3+	2+	2+	6	2
A. pycnocephala													
C-18	1+	0	0	0	3+	1+i	0	0	1+	1+	1+	6	2
A. spinescens													
D-1	2+	1+	2+	0	3+	2+	0	0	2+	2+	3+	8	4

Species Sample Number	B.s.[b]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.	Total[c] N. active	Total[d] Gm.⁻
TRIDENTATAE													
A. arbuscula													
B-7	2+	1+	3+	1+	5+	1+	0	1+	4+	2+	2+	10	6
E-5	2+	1+	3+	1+i	5+	1+i	0	1+	3+	2+	3+	10	6
A. cana ssp. *bolanderi*													
E-9	3+	1+	4+	1+	5+	2+	1+	1+	5+	3+	5+	11	7
A. nova													
E-17	2+	1+i	3+	0	5+	1+i	0	0	3+	2+	1+	8	4
E-18	2+	1+i	2+	0	5+	1+i	0	0	3+	2+	1+	8	4
A. rothrockii													
E-16	2+	1+i	1+	0	4+	1+i	0	0	2+	1+	1+	8	4
F-5	2+	1+i	1+	0	4+	1+	0	1+i	2+	1+	1+	9	5
A. spiciformis													
E-8	3+	1+	4+	1+	5+	2+	1+	1+	5+	4+	4+	11	7
A. tridentata ssp. *parishii*													
E-6	2+	1+	3+	0	5+	1+i	0	1+	4+	2+	4+	9	5

Species Sample Number	B.s.[b]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.	Total[c] N. active	Total[d] Gm.-
E-10	3+	1+	4+	1+	5+	1+	1+	1+	5+	3+	3+	11	7
A. tridentata ssp. *tridentata*													
A-6	2+	1+	3+	1+i	4+	2+	1+i	1+	3+	2+	3+	11	7
B-2	2+	2+	3+	1+	5+	2+	1+i	2+	3+	2+	3+	11	7
C-14	2+	1+	3+	1+	5+	2+	0	1+	3+	3+	3+	10	6
E-2	3+	1+	4+	1+	5+	1+	1+	1+	3+	3+	3+	11	7
E-3	2+	1+	4+	1+	5+	2+	1+	1+	4+	2+	3+	11	7
E-21	3+	1+	4+	1+	5+	1+	1+	1+i	4+	3+	4+	11	7
E-24	2+	1+	3+	1+	5+	1+	1+	2+	3+	2+	3+	11	7
E-28	2+	1+	3+	1+	5+	1+	1+	2+	3+	2+	3+	11	7
A. tridentata ssp. *vaseyana*													
A-1	2+	1+	1+	1+i	3+	1+	1+i	1+i	3+	2+	3+	11	7
B-15	3+	1+	3+	1+	5+	3+	1+	1+	5+	3+	3+	11	7
E-4	2+	1+	3+	1+	5+	2+	2+	2+	3+	2+	3+	11	7
E-7	3+	1+	4+	1+	5+	2+	1+	1+	5+	3+	4+	11	7

Species Sample Number	B.s.[b]	E.a.	E.c.	K.p.	M.p.	Z61	K799	S.m.	S.a.S	S.a.R	S.t.	Total[c] N. active	Total[d] Gm.⁻
A. tridentata ssp. *wyomingensis*													
B-6	2+	1+	3+	1+	5+	2+	1+	2+	3+	2+	3+	11	7
B-10	2+	1+	3+	1+	5+	2+	1+	2+	3+	2+	3+	11	7
A. tripartita ssp. *tripartita*													
A-4	2+	1+	3+	0	5+	2+	1+	1+	3+	2+	3+	10	6
E-25	2+	1+i	3+	0	5+	2+i	1+	1+	3+	2+	2+	10	6
E-26	2+	1+i	4+	0	5+	2+i	1+	1+	3+	2+	3+	10	6

Key to Table 22

[a] Classification of results: 0 = no zone or zone of inhibition < 8.0 mm; 1+ = zone of inhibition 8.0-10.0 mm; 2+ = 10.1-15.0 mm; 3+ = 15.1-20.0 mm; 4+ = 20.1-25.0 mm; 5+ = > 25.0 mm.

[b] Bacteria: B.s. = *Bacillus subtilis* (Gm^+); E.a. = *Enterobacter aerogenes* (Gm^-); E.c. = *Escherichia coli* DC2 (Gm^-); K.p. = *Klebsiella pneumoniae* (Gm^-); M.p. = *Mycobacterium phlei*, $Gm^{(+)}$, non-acid fast; Z61 = *Pseudomonas aeruginosa* Z61 (Gm^-); K799 = *Pseudomonas aeruginosa* K799 (Gm^-); S.m. = *Serratia marcescens* (Gm^-); S.a.S. = *Staphylococcus aureus* methicillin sensitive (Gm^+); S.a.R. = *Staphylococcus aureus* methicillin resistant (Gm^+); S.t. = *Salmonella typhininium* TA98 (Gm^-).

[c] Total number of bacteria extract exhibited activity against.

[d] Total number of gram negative bacteria extract exhibited activity against.

5.1.4 Discussion and Conclusions

Artemisia species were widely employed by the First Nations peoples of western North America and had a prominent place in their pharmacopeia. One common medicinal application of *Artemisia* species was in the treatment of ailments which are now known to be caused by bacterial infections and the few *Artemisia* species which were assayed in the phase one and two screenings did exhibit antibiotic activity. Based on these facts, it was deemed worthwhile to screen a broader range of *Artemisia* species for antibiotic activity.

In the ethnobotanical literature, four species in particular figure most prominently: *A. dracunculus, A. frigida, A. ludoviciana* and *A. tridentata* (see Appendix 8). Each of these species belongs to a different subgenus, raising the questions of whether antibiotic activity is evenly distributed throughout the genus and whether these species exhibit the strongest activity among the members of their subgenus.

Seventy-four additional samples drawn from all four *Artemisia* subgenera were screened and every one of these samples exhibited some degree of antibiotic activity (see Table 22). Although the number of samples screened was not large enough to conduct a rigorous statistical analysis, it is apparent from a visual examination of the data that the amount of variation among the subgenera is greater than the variation between subgenera. In other words, antibiotic constituents are present throughout all four subgenera. Within each of the four subgenera, those species most frequently reported in the ethnobotanical literature were among the species which exhibited the strongest antibiotic activity.

Among the species from the *Dracunculus* which were sampled, *A. dracunculus* clearly exhibited the broadest spectrum of activity and similarly, among the *Absinthium*, *A. frigida* exhibited the greatest activity. This distinction was not quite so clear cut among the *Abrotanum* and the *Tridentatae*. Although *A. ludoviciana* (*Abrotanum*) and *A. tridentata* (*Tridentatae*) were among the species exhibiting the broadest spectrum of activity, there also several other species in each group which exhibited the same degree of activity. However, as was discussed in the *Artemisia* general introduction, in order to have a reasonable degree of confidence in the accuracy of the identifications cited in the ethnobotanical literature, the designations *A. ludoviciana* and *A. tridentata* must be interpreted in their broadest sense, that is, as references to the Vulgares complex and the *Tridentatae* respectively.

In terms of antibiotic activity among the samples from the Vulgares and the *Tridentatae*, the variation among the samples of one subspecies was equal to or greater than the variation between subspecies and species. It would appear that there are other factors besides taxonomic delineations which more strongly influence the degree of antibiotic activity. Studies conducted on the extracts viability demonstrated that the degree of antibiotic activity decreased over time. Therefore, the differences in activity observed between samples could simply be a result of age differences among the extracts.

Another factor which may have influenced the degree of antibiotic activity was the stage of growth the plant was in when the sample was collected. Traditional lore holds that the potency of aerial plant parts peaks just before flowering. A comparison of the activity of samples from the same *A. absinthium* plant, one collected prior to flowering (A-5) and one collected after flowering (C-13), showed that the plant material exhibited much stronger activity before flowering. Similarly, a comparison of two samples from the same *A. tridentata* ssp. *tridentata* plant, one collected two months prior to flowering (A-6) and one collected one month prior to flowering (C-14), showed that the activity increased during floral development.

Bioautography of a *A. tripartita* extract revealed there was at least eight active constituents in this extract. All of the solvent fractions of this extract were active. The activity observed in the hexane fraction was probably due to monoterpenes. Bioautography of the ethyl acetate fraction showed that the active compounds were quite polar. Further tests demonstrated that the compounds were probably not tannins or sesquiterpene lactones and might be glycosides. Following further fractionation, bioautography of the column fractions revealed that two of active compounds fluoresced bright blue under UV light and a third absorbed UV light, appearing black. These preliminary findings suggest that the antibiotic compounds may be flavonoids.

In conclusion, the antibiotic activity exhibited by all of the *Artemisia* samples assayed suggests that there may be a scientific basis for the traditional usage of the *Artemisias* in the treatment of ailments caused by bacterial infections, particularily in topical applications. Furthermore, the *Artemisia* species which were mostly frequently cited as being used as traditional medicines, *A. dracunculus, A. frigida, A. ludoviciana* and *A. tridentata*, were among the species with the broadest spectrum and greatest degree of antibiotic activity. The data also tends to support the assertions of many native healers that the plant material should be collected just prior to flowering as this is when it is most potent.

References

Rahalison, L., Hamburger, M. Hostettmann, K., Monod, M. and Frenk, E. (1991) A bioautographic agar overlay method for the detection of antifungal compounds from higher plants. *Phytochemical Analysis* 2: 199-203.

5.2 Antifungal screening of *Artemisia* species

Abstract

Seventy-four methanolic extracts prepared from 30 *Artemisia* taxa were assayed for antifungal activity against eight fungi. All 74 extracts exhibited some antifungal activity, clearly demonstrating that antifungal activity was distributed throughout all four subgenera. The variation in the degree of activity that the samples exerted did not follow taxonomic groupings. Among the samples of members of the subgenus *Absinthium*, extracts of *A. fridiga* exhibited the strongest activity. Among the samples of members of the subgenus *Dracunculus*, extracts of *A. dracunculus* exhibited the greatest degree of antifungal activity. There were numerous extracts prepared from members of the Vulgares and *Tridentatae* which were active against all eight fungi, including samples of the archetypes *A. ludoviciana* and *A. tridentata*. There were several reports in the ethnobotanical literature of the usage of these active species in the treatment of fungal infections such as athlete's foot and diaper rash.

5.2.1 Introduction

There were several reports in the ethnobotanical literature of *Artemisia* species having been used to treat fungal infections such as diaper rash and athlete's foot. These observations, taken into consideration with the strong antifungal activity that the phase one and two samples of *Artemisia* exhibited, suggested that it would be worthwhile to conduct a broader screening of North American *Artemisia* species for antifungal activity.

5.2.2 Methods

The methods used for this screening were the same as those described in 2.2.2, with the following exceptions. Some changes were made in the fungal species used for the screening. *Aspergillus flavus*, *Microsporum gypseum, Trichoderma viridae* and *Tricophyton mentagrophytes* were not screened against and the following species were added to the screening panel: *Candida lipolytica* (incubated at 37^0 C for 18 h), *Cladosporium vesinae* (incubated at 20^0 C for 48 h), and *Filobasidium filiformis* (incubated at 20^0C for 48 h).

In each trial, one replicate was exposed to UV light (320-400 nm) for two hours at the appropriate temperature for that fungi and the other replicate was kept in the dark at the appropriate temperature for that fungi to test for light activated antifungal activity. A total of three light replicates and three dark replicates were made for each extract. The average zone of inhibition was calculated for the dark replicates and for the light replicates.

5.2.3 Results

Seventy-four methanolic extracts prepared from samples of 30 *Artemisia* taxa were assayed for antifungal activity against eight fungi. The results of the screening are shown in Table 23. All 74 extracts exhibited some antifungal activity. The extracts with the broadest spectrum and greatest degree of activity were prepared from samples of *A. douglasiana, A. dracunculus, A. frigida, A. ludoviciana* and *A. tridentata.*

There was a significant difference in the degree of inhibition between the UV light exposed replicates versus the dark replicates for many extracts, but only against the fungi *Fusarium tricuictum, Microsporum cookeri* and *Saccharomyces cerevisiae.*

Table 23 - *Artemisia* antifungal screening results[a,b]

Subgenus / Species / Sample Number	A.f.		C.a.		C.l.		C.v.		F.f.		F.t.		M.c.		S.c.		Total[c]	
	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D
Controls																		
Methanol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nystatin (10 µg)	1+	1+	1+	1+	2+	2+	0	0	2+	2+	2+	2+	4+	4+	2+	2+	7	7
ABROTANUM																		
A. bigelovii																		
E-22	1+	1+i	1+	1+i	0	0	0	0	1+	1+	3+	1+	3+	3+	2+	2+	6	6
A. californica																		
E-12	0	0	1+	1+	0	0	0	0	1+	1+	2+	1+	2+	2+	2+	2+	5	5
***ABROTANUM* - VULGARES**																		
A. carruthii																		
E-19	1+	1+	0	0	0	0	0	0	1+	1+	2+	2+	2+	2+	2+	2+	5	5
A. douglasiana																		
B-3	1+i	1+i	1+	1+	1+i	1+i	0	0	0	0	3+	1+	4+	4+	2+	2+	6	6
E-14	3+i	3+i	2+	2+	2+	2+	2+	2+	2+	2+	2+	2+	3+	3+	4+	4+	8	8

Subgenus Species Sample Number	A.f. L	 D	C.a. L	 D	C.l. L	 D	C.v. L	 D	F.f. L	 D	F.t. L	 D	M.c. L	 D	S.c. L	 D	Total L	 D
A. lindleyana																		
B-4	1+	1+	2+	2+	0	0	0	0	1+	1+	3+	2+	3+	3+	2+	2+	6	6
B-5	1+	1+	1+	1+	0	0	0	0	0	0	2+	1+	3+	3+	2+	2+	5	5
F-2	1+	1+	1+	1+	0	0	0	0	1+	1+	2+	1+	3+	3+	2+	2+	6	6
F-3	1+	1+	2+	2+	0	0	0	0	1+	1+	3+	2+	3+	3+	2+	2+	6	6
A. longifolia																		
C-10	0	0	1+	1+	0	0	3+	3+	1+	1+	2+	1+	3+	3+	3+	2+	6	6
C-12	1+	1+	1+	1+	1+	1+	1+	1+	1+	1+	2+	2+	4+	4+	3+	2+	8	8
A. ludoviciana ssp. *candicans*																		
B-11	1+	1+	2+	2+	1+	1+	1+	1+	2+	2+	3+	2+	4+	4+	2+	2+	8	8
C-2	1+i	1+i	1+	1+	0	0	1+	1+	1+	1+	4+	3+	4+	4+	2+	2+	7	7
E-1	1+i	1+i	1+i	1+i	1+	1+	1+	1+	1+	1+	2+	1+	4+	4+	2+	2+	8	8
E-15	1+	1+	1+	1+	1+	1+	1+	1+	1+	1+	2+	2+	3+	3+	3+	2+	8	8
A. ludoviciana ssp. *incompta*																		
C-11	1+i	1+i	1+	1+	1+i	1+i	1+	1+	1+	1+	2+	2+	4+	4+	3+	2+	8	8

Subgenus / Species / Sample Number	A.f. L	A.f. D	C.a. L	C.a. D	C.l. L	C.l. D	C.v. L	C.v. D	F.f. L	F.f. D	F.t. L	F.t. D	M.c. L	M.c. D	S.c. L	S.c. D	Total L	Total D
A. ludoviciana ssp. *ludoviciana*																		
B-8	1+	1+	1+	1+	1+	1+	1+	1+	1+	1+	2+	2+	5+	5+	2+	2+	8	8
B-12	1+	1+	1+	1+	1+	1+	1+	1+	1+	1+	2+	1+	4+	4+	2+	1+	8	8
C-8	1+	1+	1+	1+	1+	1+	1+	1+	1+	1+	3+	2+	4+	4+	2+	2+	8	8
C-15	0	0	1+i	1+i	0	0	0	0	1+	1+	2+	1+	2+	2+	2+	1+	6	6
A. michauxiana																		
C-3	1+i	1+i	1+	1+	1+	1+	1+	1+	1+	1+	2+	1+	3+	2+	1+	1+	8	8
C-4	2+i	2+i	1+i	1+i	1+	1+	1+	1+	2+	2+	2+	1+	3+	2+	1+	1+	8	8
C-6	0	0	1+i	1+i	1+i	1+i	1+	1+	1+	1+	2+	1+	3+	3+	2+	1+	7	7
C-7	0	0	1+i	1+i	1+i	1+i	1+	1+	0	0	2+	1+	3+	3+	2+	1+	6	6
A. suksdorfii																		
B-1	1+	1+	1+	1+	1+	1+	1+	1+	1+i	1+i	2+	1+	4+	3+	3+	2+	8	8
E-11	1+	1+	2+	2+	1+i	1+i	1+	1+	1+	1+	2+	2+	4+	3+	3+	2+	8	8
A. tilesii																		
A-7	1+i	1+i	1+	1+	1+i	1+i	0	0	1+	1+	2+	2+	2+	2+	2+	2+	7	7
A-8	1+i	1+i	1+	1+	1+i	1+i	0	0	1+i	1+i	2+	1+	2+	2+	2+	2+	7	7

Subgenus / Species / Sample Number	A.f. L	A.f. D	C.a. L	C.a. D	C.l. L	C.l. D	C.v. L	C.v. D	F.f. L	F.f. D	F.t. L	F.t. D	M.c. L	M.c. D	S.c. L	S.c. D	Total L	Total D
B-14	1+i	1+i	1+	1+	1+i	1+i	0	0	1+i	1+i	3+	1+	3+	2+	2+	2+	7	7
A. vulgaris																		
C-17	0	0	1+i	1+	0	0	0	0	1+i	1+i	2+	1+	2+	2+	1+	1+	5	5
ABSINTHIUM																		
A. absinthium																		
A-5	0	0	1+	1+	0	0	0	0	0	0	2+	1+	2+	2+	0	0	3	3
B-13	0	0	1+i	1+i	0	0	0	0	0	0	2+	1+	2+	2+	1+	1+	4	4
C-1	1+	1+	1+	1+	1+	1+	1+	1+	0	0	3+	2+	4+	3+	1+	1+	7	7
C-13	0	0	1+i	1+i	0	0	0	0	0	0	1+	1+i	2+	1+	0	0	3	3
A. frigida																		
A-2	1+	1+	1+	1+	0	0	0	0	0	0	3+	2+	3+	3+	2+	2+	5	5
A-3	1+i	1+i	1+	1+	0	0	0	0	0	0	1+	1+	4+	4+	2+	1+	5	5
C-5	0	0	1+i	1+i	0	0	0	0	0	0	3+	2+	4+	3+	2+	1+	4	4
E-23	1+	1+	2+	2+	0	0	1+	1+	1+	1+	3+	2+	3+	3+	2+	2+	7	7
E-27	1+	1+	1+	1+	0	0	1+	1+	1+	1+	3+	1+	3+	3+	2+	2+	7	7

Subgenus / Species / Sample Number	A.f.		C.a.		C.l.		C.v.		F.f.		F.t.		M.c.		S.c.		Total	
	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D
Dracunculus																		
A. campestris																		
C-9	0	0	0	0	0	0	2+	2+	1+	1+	2+	1+	2+	2+	1+	1+	5	5
A. dracunculus																		
B-9	4+i	4+i	3+	3+	5+	5+	5+	5+	5+	5+	3+	2+	5+	5+	5+	5+	8	8
C-16	1+	1+	1+	1+	1+	1+	2+	2+	1+	1+	2+	1+	3+	2+	1+	1+	8	8
E-13	2+	2+	2+	2+	2+	2+	5+	5+	2+	2+	2+	1+	3+	2+	4+	3+	8	8
F-1	2+	2+	3+	3+	4+	4+	4+	4+	2+	2+	3+	2+	5+	5+	4+	3+	8	8
F-4	4+i	4+i	3+	3+	5+	5+	5+	5+	5+	5+	3+	2+	5+	5+	5+	5+	8	8
A. filifolia																		
E-20	1+	1+	1+	1+	0	0	0	0	1+	1+	2+	2+	2+	2+	2+	2+	6	6
A. pycnocephala																		
C-18	1+	1+	1+	1+	1+	1+	2+	2+	1+	1+	1+	1+i	3+	2+	1+	1+	8	8
E-29	0	0	0	0	0	0	1+	1+	0	0	1+	1+	3+	3+	1+	1+	4	4
A. spinescens																		
D-1	0	0	0	0	0	0	0	0	1+	1+	3+	2+	4+	3+	2+	1+	4	4

Subgenus Species Sample Number	A.f. L	A.f. D	C.a. L	C.a. D	C.l. L	C.l. D	C.v. L	C.v. D	F.f. L	F.f. D	F.t. L	F.t. D	M.c. L	M.c. D	S.c. L	S.c. D	Total L	Total D
Tridentatae																		
A. arbuscula																		
B-7	1+	1+	2+	2+	1+	1+	1+	1+	2+	2+	3+	2+	4+	4+	2+	2+	8	8
E-5	2+	2+	2+	2+	1+	1+	1+	1+	2+	2+	3+	2+	4+	4+	2+	2+	8	8
A. cana ssp. *bolanderi*																		
E-9	3+	3+	3+	3+	4+	4+	3+	3+	2+	2+	3+	2+	5+	4+	4+	4+	8	8
A. nova																		
E-17	1+	1+	0	0	0	0	1+	1+	1+	1+	2+	1+	4+	3+	1+	1+	6	6
E-18	1+	1+	0	0	0	0	1+	1+	1+	1+	2+	1+	4+	4+	1+	1+	6	6
A. rothrockii																		
E-16	1+	1+	1+	1+	0	0	1+	1+	2+	2+	2+	1+	4+	3+	2+	1+	7	7
F-5	1+	1+	1+	1+	0	0	1+	1+	1+	1+	2+	1+	3+	3+	1+	1+	7	7
A. spiciformis																		
E-8	2+	2+	3+	3+	1+	1+	1+	1+	1+	1+	3+	3+	5+	4+	4+	4+	8	8
A. tridentata ssp. *parishii*																		
E-6	2+	2+	2+	2+	1+	1+	1+	1+	2+	2+	3+	2+	4+	4+	2+	2+	8	8

Subgenus / Species / Sample Number	A.f.		C.a.		C.l.		C.v.		F.f.		F.t.		M.c.		S.c.		Total	
	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D
E-10	1+	1+	2+	2+	1+	1+	1+	1+	1+	1+	3+	2+	3+	3+	4+	4+	8	8
A. tridentata ssp. *tridentata*																		
A-6	2+	2+	1+	1+	1+	1+	1+	1+	1+	1+	3+	2+	5+	4+	3+	2+	8	8
B-2	2+	2+	2+	2+	2+	2+	2+	2+	2+	2+	5+	2+	5+	4+	4+	3+	8	8
C-14	2+	2+	1+	1+	1+	1+	1+	1+	1+	1+	3+	2+	5+	5+	3+	3+	8	8
E-2	2+	2+	2+	2+	2+	2+	2+	2+	2+	2+	3+	2+	4+	4+	3+	2+	8	8
E-3	2+	2+	2+	2+	2+	2+	1+	1+	2+	2+	3+	2+	4+	4+	3+	3+	8	8
E-21	2+	2+	2+	2+	1+	1+	1+	1+	2+	2+	3+	2+	4+	4+	3+	2+	8	8
E-24	3+	3+	2+	2+	2+	2+	1+	1+	2+	2+	4+	3+	4+	4+	4+	3+	8	8
E-28	2+	2+	2+	2+	2+	2+	1+	1+	2+	2+	4+	2+	4+	3+	2+	2+	8	8
A. tridentata ssp. *vaseyana*																		
A-1	1+	1+	1+	1+	1+i	1+i	2+	2+	1+	1+	2+	2+	4+	4+	2+	1+	8	8
B-15	2+	2+	2+	2+	2+	2+	2+	2+	2+	2+	4+	3+	5+	5+	4+	3+	8	8
E-4	2+	2+	2+	2+	2+	2+	1+	1+	2+	2+	3+	3+	4+	4+	3+	3+	8	8
E-7	2+	2+	2+	2+	3+	2+	1+	1+	2+	2+	3+	2+	5+	5+	4+	3+	8	8

Subgenus Species Sample Number	A.f.		C.a.		C.l.		C.v.		F.f.		F.t.		M.c.		S.c.		Total	
	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D
A. tridentata ssp. *wyomingensis*																		
B-6	2+	2+	2+	2+	1+	1+	1+	1+	1+	1+	5+	2+	5+	4+	3+	3+	8	8
B-10	2+	2+	2+	2+	1+	1+	1+	1+	3+	2+	4+	2+	5+	4+	4+	4+	8	8
A. tripartita ssp. *tripartita*																		
A-4	2+	2+	1+	1+	1+	1+	1+	1+	1+	1+	2+	2+	4+	4+	2+	1+	8	8
E-25	3+	3+	2+	2+	1+	1+	1+	1+	1+	1+	2+	1+	4+	3+	2+	1+	8	8
E-26	3+	3+	2+	2+	1+	1+	1+	1+	1+	1+	2+	1+	4+	4+	2+	2+	8	8

Key to Table 23

[a] Classification of results: 0 = no inhibition or zone of inhibition < 8.0 mm; 1+ = zone of inhibition 8.0-10.0 mm; 2+ = 10.1-15.0 mm; 3+ = 15.1-20.0 mm; 4+ = 20.1-25.0 mm; 5+ = > 25.0 mm; i = incomplete inhibition, some spores germinated within clearing zone; for *Aspergillus fumigatus*, "i" indicates inhibition of spore production.

[b] Fungi: A.f. = *Aspergillus flavus*; A.fu. = *Aspergillus fumigatus*; C.a. = *Candida albicans*; F.t. = *Fusarium tricuictum*; M.c. = *Microsporum cookerii*; M.g. = *Microsporum gypseum*; S.c. = *Saccharomyces cerevisiae*; T.v. = *Trichoderma viridae*; T.m. = *Tricophyton mentagrophytes*. L = Light replicates, D = Dark replicates.

[c] Total number of fungi the extract was active against.

5.2.4 Discussion and Conclusions

In North America, fungal infections have typically been considered as nuisance infections since fatalities are extremely rare. Of course, in more recent times, the advent of the AIDS epidemic and the need for immunosuppression in transplant patients has resulted in a dramatic increase in the mortality rate from fungal infections and a growing awareness of the urgent need for new antifungal therapeutics. From a historical perspective though, it seems understandable that there are very few specific references to the treatment of fungal infections in the North American ethnobotanical literature since such infections were not a major health threat. From this point of view, the numerous references to the use of *Artemisia* species in the treatment of athlete's foot, diaper rash, thrush and leucorrhea appear significant and the strong antifungal activity demonstrated by some of the *Artemisia* samples in the phase one and two screenings support this assertion.

Taken in this context, it is not surprising that all of the *Artemisia* samples exhibited some degree of antifungal activity (see Table 23). Similarly, considering that there have been a number of light enhanced antimicrobial compounds reported from other members of the Compositae, it is not unduly surprising that some light enhanced activity was also detected in this screening. The observation that this light enhanced activity only appeared in the trials against *Fusarium tricuictum, Microsporum cookeri* and *Saccharomyces cerevisiae* suggests that there may be two or more antifungal constituents present in these *Artemisia* species.

As was found in the antibiotic screening, the variation in activity among the samples within each sub-genus was more or less equal to the variation in activity between sub-genera. And similarly, the amount of variation in activity among samples of each species was equal to the amount of variation in activity between species. Based on the results of this study, there does not appear to be any clear relationship between antifungal activity and taxonomic groupings. As was discussed in the previous chapter, the variation in the degree of activity that the extracts exhibited may be due to the relative age of the extracts or differences in the time of collection.

Overall, the extracts which consistantly exhibited the broadest spectrum and greatest degree of antifungal activity were prepared from samples of *A. dracunculus, A. ludoviciana* and *A. tridentata.* These were also the species which were most frequently cited in the ethnobotanical literature (see Appendix 8). Among the Okanagan-Coville peoples of British Columbia, *A. dracunculus* was used to heal diaper rash and rawness of the skin. There are numerous references to *A. ludoviciana* as a "women's medicine" (vaginal yeast infections?), as well as its use in treating rashes and itches. In addition to specific references to the use of *A. tridentata* to treat athlete's foot and diaper rash, there are also reports of its use as an antiseptic wash for newborns, talcum powder for babies, foot deodorant and disinfectant wash. The results of this screening certainly appear to support the potential efficacy of these traditional practices and suggest that they may have been efficacious.

5.3 Anti-mycobacterial screening of *Artemisia* species

Abstract

Seventy-five methanolic extracts prepared from samples of 31 *Artemisia* taxa were screened for anti-mycobacterial activity against *Mycobacterium tuberculosis* and *M. avium.* Twenty-three samples exhibited activity against *M. tuberculosis* at a concentration equivalent to 20 mg of dried plant material per disc and 29 samples exhibited activity at a concentration equivalent to 100 mg of dried plant material per disc. Eight samples exhibited activity against *M. avium* at a concentration equivalent to 20 mg of dried plant material per disc and 22 samples were active at a concentration equivalent to 100 mg of dried plant material per disc. The extracts with the greatest anti-mycobacterial activity were prepared from samples of *A. dracunculus* (sub-genus *Dracunculus*) and samples of several species from the *Tridentatae* (*A. cana, A. nova, A. tridentata* ssp. *tridentata* and *A. tripartita*). None of the samples from the sub-genus *Absinthium* exhibited activity and only six samples from the *Abrotanum* were slightly active.

5.3.1 Introduction

One of the traditional uses of *Artemisia* species common to many groups of North American indigenous peoples was in the treatment of a large range of pulmonary complaints. There are several specific references to *Artemisia* species used in the treatment of tuberculosis, particularily for *A. tridentata* (see Appendix 8). Considering that there was a positive correlation found between traditional usage as a tuberculosis remedy and anti-mycobacterial activity, this fact, taken together with the strong antibiotic activity that the *Artemisia* extracts demonstrated in the general antibiotic screening (chapter 5.1), suggested that it would be worthwhile to screen all the available *Artemisia* samples for anti-mycobacterial activity.

5.3.2 Methods

The methods used for this screening were the same as those described in chapter 2.3.2.

5.3.3 Results

Seventy-five methanolic extracts prepared from samples of thirty-one *Artemisia* taxa were screened for anti-mycobacterial activity against *Mycobacterium tuberculosis* and *M. avium.* The results are shown in Table 24. Twenty-three samples exhibited activity against *M. tuberculosis* at a concentration equivalent to 20 mg of dried plant material per disc and 29 samples exhibited activity at a concentration equivalent to 100 mg of dried plant material per disc. Eight samples exhibited activity against *M. avium* at a concentration equivalent to 20 mg of dried plant material per disc and 22 samples were active at a concentration equivalent to 100 mg of dried plant material per disc.

The extracts with the greatest anti-mycobacterial activity were prepared from samples of *A. dracunculus* (sub-genus *Dracunculus*) and samples of several species from the *Tridentatae* (*A. cana, A. nova, A. tridentata* ssp. *tridentata* and *A. tripartita*). None of the samples from the sub-genus *Absinthium* exhibited activity and only six samples from the *Abrotanum* were slightly active.

Table 24 - *Artemisia* anti-mycobacterial screening results[a]

Organisms assayed against	*M. tuberculosis*		*M. avium*	
Dried plant material per disc	20 mg	100 mg	20 mg	100 mg
Negative control	-	-	-	-
Positive control (Isoniazid)	+++	+++	-	-
ABROTANUM				
A. bigelovii				
E-22	-	+	-	-
A. californica				
E-12	-		-	
***ABROTANUM* - VULGARES**				
A. carruthii				
E-19	-		-	
A. douglasiana				
B-3	-		-	
E-14	-		-	
A. lindleyana				
B-4	-		-	
B-5	-		-	
F-2	-		-	
F-3	-	+++	-	+
A. longifolia				
C-10	-	++	-	+
C-12	-		-	
A. ludoviciana ssp. *candicans*				
B-11	-		-	
C-2	-		-	

Organisms assayed against Dried plant material per disc	*M. tuberculosis* 20 mg	 100 mg	*M. avium* 20 mg	 100 mg
E-1	-		-	
E-15	-		-	
A. ludoviciana ssp. *incompta*				
C-11	-	++	-	-
A. ludoviciana ssp. *ludoviciana*				
B-8	-		-	
B-12	-		-	
C-8	-		-	
C-15	-	-	+	+
A. michauxiana				
C-3	-		-	
C-4	-		-	
C-6	-		-	
C-7	-		-	
A. suksdorfii				
B-1	-		-	
E-11	-		-	
A. tilesii				
A-7	-		-	
A-8	-		-	
B-14	-		-	
A. vulgaris				
C-17	-		-	

Organisms assayed against Dried plant material per disc	*M. tuberculosis* 20 mg	 100 mg	*M. avium* 20 mg	 100 mg
ABSINTHIUM				
A. absinthium				
A-5	-		-	
B-13	-		-	
C-1	-		-	
C-13	-		-	
A. frigida				
A-2	-		-	
A-3	-		-	
C-5	-		-	
E-23	-		-	
E-27	-		-	
DRACUNCULUS				
A. campestris				
C-9	-	-	-	-
A. dracunculus				
B-9	+	+++	-	+++
C-16	-	+++	-	++
E-13	+	+++	-	+
F-1	+++		-	
F-4	++		-	
A. filifolia				
E-20	-	+	-	-
A. pycnocephala				
C-18	-		-	

Organisms assayed against	M. tuberculosis		M. avium	
Dried plant material per disc	20 mg	100 mg	20 mg	100 mg
A. spinescens				
D-1	-		-	
TRIDENTATAE				
A. arbuscula				
B-7	+	+++	-	++
E-5	+	+++	-	+
A. cana ssp.*bolanderi*				
E-9	+++		-	
A. cana ssp. *cana*				
F-6	+++		-	
A. nova				
E-17	+++	+++	+++	+++
E-18	+++	+++	-	+++
A. rothrockii				
E-16	-	+++	-	+
F-5	+++		-	
A. spiciformis				
E-8	+++		-	
A. tridentata ssp. *parishii*				
E-6	-		-	
E-10	-		-	
A. tridentata ssp. *tridentata*				
A-6	-	+++	-	+
B-2	+++	+++	-	+++
C-14	++	+++	-	+

Organisms assayed against Dried plant material per disc	*M. tuberculosis* 20 mg	 100 mg	*M. avium* 20 mg	 100 mg
E-2	-	+++	-	++
E-3	-	+++	-	++
E-21	++	+++	-	+++
E-24	+		-	
E-28	+	+++	-	+
A. tridentata ssp. *vaseyana*				
A-1	-		-	
B-15	+++		-	
E-4	-		-	
E-7	-		-	
A. tridentata ssp. *wyomingensis*				
B-6	-		-	
B-10	-		-	
A. tripartita ssp. *tripartita*				
A-4	+++		-	
E-25	+++	+++	+++	+++
E-26	+++	+++	+++	+++

[a] Key to scoring: -, no inhibition; +, zone of inhibition with a few resistant colonies within it or small zone of clearing (colonies too numerous to count) ; ++, large zone of clearing or greatly inhibited growth (less than 50 colonies present) ; +++, complete inhibition.

5.3.4 Discussion and Conclusions

Of the 75 *Artemisia* extracts screened for anti-mycobacterial activity, 34 extracts were found to exhibit some degree of activity (see Table 24). Twenty-nine extracts were active against *M. tuberculosis* and 22 were active against *M. avium*, with 17 extracts demonstrating activity against both organisms. The extracts with strongest activity against both of these organisms were prepared from samples of *A. nova* and *A. tripartita*, both members of the *Tridentatae*. The strong activity that these extracts, as well as *A. dracunculus* extracts, exhibited against the izoniazid resistant *M. avium* suggests that these species would be worthy of further investigation.

In the antibiotic and antifungal screenings of these extracts reported on in the previous chapters, there did not appear to be any relationship between activity and any of the taxonomic divisions. However, in terms of anti-mycobacterial activity, the members of the *Dracunculus* and the *Tridentatae* clearly exerted the strongest effect. Among the samples prepared from species in the sub-genus *Dracunculus*, extracts of *A. dracunuculus* demonstrated the strongest activity. It should be further noted that among the samples of *A. dracunculus*, those prepared from the most recent plant collections (F-1 and F-4) exerted the strongest activity against *M. tuberculosis* although the opposite pattern was observed in the results for *M. avium.*

Among the extracts prepared from members of the sub-genus *Tridentatae*, there was at least one sample from each species which exhibited activity against both *M. tuberculosis* and *M. avium*. The extracts prepared from samples of *A. nova* and *A. tripartita* were particularily notable for their strong activity against *M. avium*. The differences in the degree of activity between samples of *A. tridentata* subspecies was equal to the differences in activity between the species of the *Tridentatae*. Therefore, the quantitative differences in active constituents were not related to taxonomic groupings within the subgenus.

It has previously been noted that *A. dracunculus, A. ludoviciana* and *A. tridentata* were among the most frequently cited *Artemisia* species in the ethnobotanical literature. While there were references to the use of *A. dracunculus* and several references to the usage of *A. tridentata* in the treatment of tuberculosis, no references to the usage of *A. ludoviciana* were found in the literature. The findings in this study, that the samples of *A. dracunculus* and *A. tridentata* exhibited strong anti-mycobacterial activity while those of *A. ludoviciana* did not, corroborate the correlation between traditional usage and anti-mycobacterial activity which was observed in the phase one screening data.

Acknowledgements

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5.4 Antiviral screening of *Artemisia* species

Abstract

In preliminary assays, 27 *Artemisia* extracts were screened against four viruses: Sindbis, polio 1, Coxsackie and murine cytomegalovirus (MCMV). Four of these extracts were found to inhibit the cytopathic effects (CPE) induced by Coxsackie and polio virus. In plaque assays with these two viruses, extracts of *A. dracunculus* (sub-genus *Dracunculus*), *A. rothrockii* (*Tridentatae*), *A. lindleyana* and *A. lindleyana* (Vulgares) reduced viral plaques by log 3. The entire collection of seventy-three extracts was assayed for antiviral activity against additional seven viruses. Fourteen extracts each demonstrated some antiviral activity against either corona virus or respiratory syncytial virus. Eight extracts partially inhibited respiratory syncytial virus, four of which were prepared from members of the *Tridentatae*, three from the Vulgares complex, and one from the *Absinthium*. Five other extracts, three from the Vulgares complex and two from the *Tridentatae*, partially inhibited corona virus. Only one extract, prepared from the aerial parts of *A. frigida* (*Absinthium*) completely inhibited the virus-induced cytopathology of corona virus and another extract of the same plant partially inhibited respiratory syncytial virus. At the extract dilutions used for testing, none of the *Artemisia* extracts was observed to inhibit the CPE induced by: herpesvirus, parainfluenza virus, rotavirus, vaccinia virus and vesicular stomatis virus.

5.4.1 Introduction

Many of the traditional medicinal uses of *Artemisia* species were for the treatment of ailments that are now known to be caused by viral pathogens. There are numerous references in the ethnopharmacological literature to the usage of *Artemisia* species, especially *A. dracunculus, A. frigida, A. ludoviciana* and *A. tridentata*, as remedies for colds, coughs, influenza, measles, smallpox, etc., as well as many symptoms of viral diseases such as fever, headache, sore throat and cough (see Appendix 8). The high frequency of reports of these usages among First Nations peoples across North America suggested that this genus would be a good candidate for antiviral screening.

5.4.2 Methods

Extracts

Twenty-seven extracts which had demonstrated strong antibiotic and antifungal activity were selected for a series of in-depth antiviral assays. The entire collection of 73 *Artemisia* extracts were subsequently assayed in a broader spectrum antiviral screening.

Cell lines and culture

The monolayer-forming cells, "Vero" (Green monkey kidney) and murine fibro-blast (3T3-L1), were used for the bioassays. The cells were grown in a culture medium of Dulbecco's modified Eagle A media with 10 ug/ml gentamicin (MEMA) and 10% fetal bovine serum, incubated at 37^0 C in a humidified environment containing 5% CO_2. The cytotoxicity assays and the initial antiviral assays were performed using cell monolayers grown in 96-well microtiter plates (Falcon 3072). Viral plaque assays were performed with cell monolayers grown on medium petri plates (Corning).

Cytotoxicity assays

Cytotoxicity of the extracts was first tested by exposure of the cells to serial dilutions of the extracts in the culture medium (MEMA). The highest concentration of extract tested was a 1/100 dilution, equivalent to 200 mg of dried plant material, from which twofold serial dilutions were made with serum-free MEMA. The cells were incubated for 24 hours at 37^0C with 5% CO_2 and then observed for cytopathic effects (CPE) to determine the maximum non-cytotoxic concentration for each extract.

Antiviral assays

In the initial antiviral assays, serial dilutions starting with the maximun non-cytotoxic concentration (MNCC) of each of the 27 selected extracts were used. The viruses used in these assays were: Sindbis (single-stranded RNA virus of the Togavirus group), polio 1 and Coxsackie B6 viruses (both single-stranded RNA viruses of the Picornaviridae), and murine cytomegalovirus (MCMV), a double-stranded DNA virus of the Herpesvirus group. Sindbis, polio, and Coxsackie viruses were propagated in monolayer cultures of African green monkey kidney (Vero) cells. The MCMV were grown in murine fibroblast (3T3-L1) cells.

After 24 hours incubation with the serially diluted extracts, the cells were infected with 0.2 ml stock preparations containing approximately 1000 plaque forming units (pfu) per ml of the respective virus. After a one hour absorption period, the viral innoculum was removed by suctioning and the cells washed with MEMA. The cells were then overlaid with fresh serially diluted extracts and MEMA with 5% fetal bovine serum. Mock-infected controls received sterile MEMA alone or methanol diluted with sterile MEMA. Plates which had been infected with Sindbis virus were incubated for 24 hours, polio and Coxsackie infected plates for 48 hours and MCMV infected plates for 5 days, at 37^0 C in a humidified environment containing 5% CO_2. Cytopathic effects were scored after microscopic examination. Each treatment was performed in triplicate and the entire regimen was repeated at least twice for each extract.

Viral plaque assays were performed with the four active extracts, using near-confluent cell monolayers grown in 75mm petri plates with 5 ml of MEMA and 10% fetal bovine serum. The same methods as those outlined above were used with the following modifications: cells were infected with stock preparations containing approximately 10^5, 10^4, or 10^3 pfu per ml of the respective infectious virus and after the innoculum was removed and the cells washed with MEMA, the plates were overlaid with a mixture of 2.5 ml of 1% agarose and 2.5 ml of double MEM with 10% fetal bovine serum.

In the plaque assays, three different experimental protocols were used wherein the cells were exposed to the extracts: 1) prior to viral infection (pre-infection), 2) concurrent with viral infection (co-infection) and 3) after viral infection (post-infection). In the pre-infection protocol, the cells were incubated with the MNCC of the extract for 24 hours, then the extract was removed and the cells washed imediately prior to viral infection. In the co-infection protocol, the cells were exposed to the MNCC of the extract and the viruses at the same time, incubated together for a one hour absorption period and then the media was removed. In the post-infection protocol, the cells were exposed to the MNCC of the extract during the entire incubation perod which followed the removal of the viral innoculum. At the completion of the incubation period, each plate was examined microscopically and the number of plaques counted. In each trial, additional control plates innoculated with 10^2 and 10^1 pfu/ml of the respective viruses were made to verify the number of pfu/ml in the stock preparations. The average reduction in the number of plaques formed on each experimental plate was calculated as a percentage of the verified number of pfu/ml.

The methods used for the broad spectrum screening of all 73 extracts against coronavirus, herpesvirus, parainfuenza virus, respiratory syncytial virus, vaccinia virus and vesicular stomatis virus were the same as those described in chapter 2.4.2.

5.4.3 Results

The results of the cytotoxicity assays are shown in Table 25. There was a large variation in the maximum non-cytotoxic concentrations of the extracts, as the required dilutions ranged from 1/32,000 to 1/508,000. The extract with the lowest toxicity was *A. pycnocephala* (C-18) with a MNCC equivalent to 2.5 mg dried plant material per ml, followed by those of *A. absinthium* (A-5) and *A. vulgares* (C-17) with a MNCC equivalent to 1.25 mg of dried plant material per ml. The extracts with the highest toxicity were those of *A. arbuscula* (B-7, E-5), *A. cana* ssp. *bolanderi* (E-9), *A. ludoviciana* ssp. *candicans* (E-15) and *A. spiciformis* (E-8), which all had a MNCC equivalent to 0.09 mg dried plant material per ml.

The results of the initial antiviral assays are shown in Table 26. None of the extracts inhibited the CPE of MCMV. The extracts of *A. rothrockii* (E-16), *A. lindleyana* (B-5), *A. dracunculus* (B-9) and *A. vulgares* (C-17) inhibited the CPE of polio and Coxsackie virus. The former two also inhibited the CPE of Sindbis.

In the plaque assays with polio, Coxsackie and Sindbis virus, none of the extracts inhibited plaque formation with viral innoculum of 10^5 or 10^4 pfu/ml in the pre-infection treatment. At 10^3 pfu/ml of polio virus (Table 27), plaque formation was inhibited by all four extracts at 48 hours, however after 96 hours the cells were completely infected (plaques too numerous to count - TNC). Only the extract of *A. rothrockii* (E-16) completely inhibited plaque formation at 10^3 pfu/ml of Sindbis virus (Table 29).

In the co-infection treatment with polio virus, plaque formation was inhibited after 48 hours incubation. However, after 96 hours, all of the experimental plates were completely infected (plaques TNC) except those with extracts of *A. rothrockii* (E-16) at 10^4 and 10^3 pfu/ml. In the co-infection treatment with Sindbis virus (10^3 pfu/ml), all four extracts partially inhibited plaque formation although only the activity of *A. rothrockii* and *A. lindleyana* was significant (Table 29).

In the post-infection treatment with polio virus, there were no plaques formed in the plates innoculated with 10^3 and 10^4 pfu/ml and at 10^5 pfu/ml, there was significant reduction in the number of plaques with each of the four extracts. A similar pattern of results was observed in the plaque assays with Coxsackie virus (Table 28), with the greatest degree of plaque reduction observed in the plates with *A. rothrockii* and *A. dracunculus* extracts. None of the viruses inhibited plaque formation in the post-infection treatment with Sindbis.

Additional experiments were performed to determine the minimum inhibitory concentrations (MIC) of the extracts in the post-infection treatment with polio. These results are shown in Table 30. The extract of *A. dracunculus* had the lowest MIC (0.12 mg dried plant material/ml).

In the broad spectrum screening, seventy-three extracts prepared from 30 taxa of *Artemisia* were assayed for antiviral activity against seven viruses. Fourteen extracts each demonstrated some antiviral activity against one virus. The scores of the degree of inhibition of virus-induced cytopathic effects caused by treatment with these extracts are presented in Table 31. Results for herpesvirus, parainfluenza virus, rotavirus, vaccinia virus and VSV are not shown as none of the plant extracts was observed to inhibit the cellular cytopathology induced by these viruses at the extract dilutions used.

Eight extracts; four of which were prepared from members of the *Tridentatae*, three from the Vulgares complex, and one from the *Absinthium*, partially inhibited respiratory syncytial virus. Five other extracts, three from the Vulgares complex and two from the *Tridentatae*, partially inhibited corona virus. Only one extract, prepared from the aerial parts of *A. frigida* (*Absinthium*) completely inhibited the virus-induced cytopathology of corona virus and another extract of the same species partially inhibited respiratory syncytial virus. At the extract dilutions used, none of the extracts prepared from members of the *Dracunculus* were observed to inhibit virus-induced cytopathology in the broad spectrum screening.

Table 25 - Cytotoxicity assay results[a]

Plant extract	Equivalent of dried plant material in mg/ml					
	5.00	2.50	1.25	0.625	0.313	0.157
A. absinthium (A-5)	T	-	-	-	-	-
A. arbuscula (B-7)	T	T	T	T	T	-
A. arbuscula (E-5)	T	T	T	T	T	-
A. bigelovii (E-22)	T	T	T	T	-	-
A. campestris (C-9)	T	T	T	-	-	-
A. cana (E-9)	T	T	T	T	T	-
A. carruthii (E-19)	T	T	T	T	-	-
A. douglasiana (E-14)	T	T	T	T	-	-
A. dracunculus (B-9)	T	T	-	-	-	-
A. filifolia (E-20)	T	T	-	-	-	-
A. frigida (E-23)	T	T	T	T	-	-
A. frigida (E-27)	T	T	T	T	-	-
A. lindleyana (B-5)	T	T	-	-	-	-
A. longifolia (C-10)	T	T	T	-	-	-
A. ludoviciana ssp. *candicans* (E-1)	T	T	T	-	-	-
A. ludoviciana ssp. *candicans* (E-15)	T	T	T	T	T	-
A. ludoviciana ssp. *candicans* (E-1)	T	T	T	T	-	-
A. ludoviciana ssp. *incompta* (C-11)	T	T	T	T	-	-
A. ludoviciana ssp. *ludoviciana* (C-8)	T	T	-	-	-	-
A. ludoviciana ssp. *ludoviciana* (C-15)	T	T	-	-	-	-
A. pycnocephala (C-18)	-	-	-	-	-	-
A. rothrockii (E-16)	T	T	T	T	T	-
A. spiciformis (E-8)	T	T	T	T	T	-
A. spinescens (D-1)	T	T	T	T	-	-
A. tridentata ssp. *parishii* (E-6)	T	T	T	-	-	-

A. tridentata ssp. *tridentata* (B-2)	T	-	-	-	-	-
A. tridentata ssp. *wyomingensis* (B-6)	T	-	-	-	-	-
A. vulgares (C-17)	T	-	-	-	-	-

[a] "T" = Toxicity, "-" = no cytopathic efffects observed.

Table 26 - Preliminary antiviral assays results[a]

Plant extract / Viruses assayed against	Cox.[b]	MCMV	polio	Sindbis[c]
A. absinthium (A-5)	-	-	-	-
A. arbuscula (B-7)	-	-	-	-
A. arbuscula (E-5)	-	-	-	-
A. bigelovii (E-22)	-	-	-	-
A. campestris (C-9)	-	-	-	-
A. cana (E-9)	-	-	-	-
A. carruthii (E-19)	-	-	-	-
A. douglasiana (E-14)	-	-	-	-
A. dracunculus (B-9)	++	-	++	+
A. filifolia (E-20)	-	-	-	-
A. frigida (E-23)	-	-	-	-
A. frigida (E-27)	-	-	-	-
A. lindleyana (B-5)	+	-	+	+
A. longifolia (C-10)	-	-	-	-
A. ludoviciana ssp. *candicans* (E-1)	-	-	-	-
A. ludoviciana ssp. *candicans* (E-15)	-	-	+	-
A. ludoviciana ssp. *candicans* (E-1)	-	-	-	-
A. ludoviciana ssp. *incompta* (C-11)	-	-	-	-
A. ludoviciana ssp. *ludoviciana* (C-8)	-	-	-	-
A. ludoviciana ssp. *ludoviciana* (C-15)	-	-	-	-
A. pycnocephala (C-18)	-	-	-	-
A. rothrockii (E-16)	+	-	+	+
A. spiciformis (E-8)	-	-	-	-
A. spinescens (D-1)	-	-	-	-
A. tridentata ssp. *parishii* (E-6)	-	-	-	-

A. tridentata ssp. *tridentata* (B-2)	-	-	-	-
A. tridentata ssp. *wyomingensis* (B-6)	-	-	-	-
A. vulgares (C-17)	++	-	++	+

[a] Classification of results: "-" = no inhibition of cytopathic effects (CPE) at maximum non-cytotoxic concentration (MNCC), "+" = inhibition of CPE at MNCC, "++" = inhibition of CPE at concentrations less than MNCC.

[b] Viruses assayed against: Cox. = Coxsackie B6, MCMV = murine cytomegalovirus, polio = polio 1, Sindbis, all viral innoculum approximately 1000 pfu/ml.

[c] Sindbis results for the first two trials (six replicates). These results were not reproducible with two month old extract.

Table 27 - Polio plaque assay results[a]

Viral pfu/ml	10^5		10^4		10^3	
	48 H	96H	48H	96H	48H	96H
Pre-infection treatment						
A. dracunculus (B-9)	0	0	96	TNC	99	TNC
A. lindleyana (B-5)	0	0	92	TNC	99	TNC
A. ludoviciana (E-15)	0	0	96	TNC	99	TNC
A. rothrockii (E-16)	0	0	96	TNC	99	TNC
A. vulgares (C-17)	0	0	94	TNC	99	TNC
Co-infection treatment						
A. dracunculus (B-9)	96	TNC	100*	97	100*	99
A. lindleyana (B-5)	100	TNC	100*	95	100*	98
A. rothrockii (E-16)	99	95	100*	100	100	100
A. vulgares (C-17)	99	TNC	100*	96	100*	99
Post-infection treatment						
A. dracunculus (B-9)	99	99	100	100	100	100
A. lindleyana (B-5)	98	98	100	100	100	100
A. rothrockii (E-16)	99	99	100	100	100	100
A. vulgares (C-17)	97	97	100	100	100	100

[a] Results expressed as the percentage of reduction in plaque number, * a few infected cells observed microscopically.

Table 28 - Coxsackie B6 plaque assay results

Viral pfu/ml	10^5	10^4	10^3
A. dracunculus (B-9)	100	100	100
A. lindleyana (B-5)	0	97	99
A. rothrockii (E-16)	100	100	100
A. vulgares (C-17)	0	96	99

[a] Results expressed as the percentage of reduction in plaque number, * a few infected cells observed microscopically.

Table 29 - Sindbis plaque assay results

Viral innoculum 10^3 pfu/ml	pre-infection	co-infection	post-infection
A. dracunculus (B-9)	0	81	0
A. lindleyana (B-5)	0	98	0
A. rothrockii (E-16)	99	99	0
A. vulgares (C-17)	0	60	0

[a] Results expressed as the percentage of reduction in plaque number, * a few infected cells observed microscopically.

Table 30 - Minimum inhibitory concentration (MIC) against polio in post-infection treatment[a]

A. dracunculus (B-9)	0.12
A. lindleyana (B-5)	0.30
A. rothrockii (E-16)	0.28
A. vulgares (C-17)	1.24

a MIC expressed in mg of dried plant material/ml, determined with a viral innoculum of 10^5 pfu/ml.

Table 31 - Broad spectrum antiviral assay results[a]

Viruses assayed against	coronavirus	respiratory syncytial virus
ABROTANUM		
A. bigelovii		
E-22	-	-
A. californica		
E-12	-	-
***ABROTANUM* - VULGARES**		
A. carruthii		
E-19	+	-
A. douglasiana		
B-3	-	-
E-14	-	+
A. lindleyana		
B-4	-	-
B-5	-	-
A. longifolia		
C-10	-	-
C-12	-	-
A. ludoviciana ssp. *candicans*		
B-11	-	+
C-2	-	-
E-1	-	-
E-15	-	-
A. ludoviciana ssp. *incompta*		
C-11	-	-

Viruses assayed against	coronavirus	respiratory syncytial virus
A. ludoviciana ssp. *ludoviciana*		
B-8	-	-
B-12	-	-
C-8	-	+
C-15	-	-
W-5	-	-
A. michauxiana		
C-3	-	-
C-4	-	-
C-6	-	-
C-7	-	-
P-29	-	-
A. suksdorfii		
B-1	+	-
E-11	-	-
A. tilesii		
A-7	+	-
A-8	-	-
B-14	-	-
A. vulgaris		
C-17	-	-
ABSINTHIUM		
A. absinthium		
A-5	-	-
B-13	-	-
C-1	-	-

Viruses assayed against	coronavirus	respiratory syncytial virus
C-13	-	-
A. frigida		
A-2	-	-
A-3	-	-
C-5	-	-
E-23	++	-
E-27	-	+
Dracunculus		
A. campestris		
C-9	-	-
A. dracunculus		
B-9	-	-
C-16	-	-
E-13	-	-
A. filifolia		
E-20	-	-
A. pycnocephala		
C-18	-	-
A. spinescens		
D-1	-	-
TRIDENTATAE		
A. arbuscula		
B-7	-	-
E-5	-	+
A. cana ssp. *bolanderi*		
E-9	-	-

Viruses assayed against	coronavirus	respiratory syncytial virus
A. nova		
E-17	-	-
E-18	-	-
A. rothrockii		
E-16	-	-
A. spiciformis		
E-8	-	-
A. tridentata ssp. *parishii*		
E-6	-	+
E-10	-	-
A. tridentata ssp. *tridentata*		
A-6	-	-
B-2	+	-
C-14	-	-
E-2	-	-
E-3	-	-
E-21	-	-
E-24	+	-
E-28	-	-
W-19	-	-
A. tridentata ssp. *vaseyana*		
A-1	-	-
B-15	-	-
E-4	-	-
E-7	-	-

Viruses assayed against	coronavirus	respiratory syncytial virus
A. tridentata ssp. *wyomingensis*		
B-6	-	-
B-10	-	-
A. tripartita ssp. *tripartita*		
A-4	-	+
E-25	-	-
E-26	-	+

[a] Classification of results: +, partial inhibition of virus-induced CPE; ++, complete inhibition of virus-induced CPE.

5.4.4 Discussion and Conclusions

The preliminary cytotoxicity assays demonstrated that there was significant variation in cellular toxicity between *Artemisia* samples, even at the subspecific level (see Table 25). The effect of the quantitative differences in chemical composition that these results imply was also observed in the antibiotic and antifungal screenings. There are also a number of reports in the literature on both quantitative and qualitative differences in chemical constituents observed in *Artemisia* species both during onotgeny (Kelsey, 1982; Kelsey, 1986; Deans, 1988) and among chemotypes (Lokar, 1987; Segal, 1987; Vienne, 1989). The effect of these differences was also apparent in the antiviral screening results and may account for the variation in activity among samples from the same taxa.

The low "therapeutic index" of these *Artemisia* samples with the sensitive cell systems used for the antiviral screening made it difficult to accurately assess the antiviral activity of the extracts. The range of activity the extracts exert *in vivo* may be significantly different from the *in vitro* test results reported here. However, even with the limitations imposed by *in vitro* cytotoxicity levels, significant antiviral activity was observed against several viruses.

In the preliminary antiviral screening of 27 extracts against Coxsackie, murine cytomegalovirus (MCMV), polio and Sindbis virus, four extracts exhibited activity (see Table 26). Extracts of *A. dracunculus, A. lindleyana, A. rothrockii* and *A. vulgares* were active against Coxsackie, polio and Sindbis, all single-stranded RNA viruses. None of the extracts was active against MCMV, a double-stranded DNA virus.

These four active extracts were then screened in plaque assays using three experimental protocols wherein the cells were exposed to the extracts either prior to viral infection, at the same time as viral infection or following viral infection. In the pre-infection treatments, none of the extracts inhibited the virally induced cytopathic effects (CPE), except when extremely low viral innoculum (10^3 pfu/ml) were used (Table 27). In the co-infection treatments, there was stronger inhibition of plaque formation. The observation that the cells which received this treatment eventually became infected showed that the extracts effect was temporarily virostatic and not virocidal. With Coxsackie and polio virus, only in the post-infection treatment was there significant inhibition of virally induced CPE, with plaque reduction of log 3. These results are similar to the finding of Minshi (1988) who reported that the related species *A. capillaris* had a virus inhibition of log 2-3.

These results clearly showed that the continuous presence of the extracts was necessary to completely inhibit viral infection. Further experiments are required to determine the mechanism of action, however the results of these preliminary assays tend to suport the hypothesis that the extracts interfer with viral replication rather than viral attachment.

The four active extracts in these preliminary assays were prepared from species belonging to the sub-genera *Dracunculus* (*A. dracunculus*), *Tridentatae* (*A. rothrockii*) and Vulgares (*A. lindleyana* and *A. vulgares*), suggesting that antiviral constituents may be widely distributed throughout the genus. It was therefore deemed worthwhile to conduct a broader screening of *Artemisia* extracts, both in terms of increasing the number of samples from all taxa screened and in terms of screening against a broader range of pathenogenic viruses. Subsequently, a total of 73 extracts from 30 taxa were screened for activity against seven additional viruses.

Five extracts were found to partially inhibit corona virus, three of which were prepared from species in the Vulgares complex and two were from species in the *Tridentatae* (see Table 31). Only one extract, prepared from the aerial parts of *A. frigida* (*Absinthium*) completely inhibited the virus-induced cytopathology of corona virus. It is intriguing to note that another sample of this plant species partially inhibited respiratory syncytial virus.

Seven other extracts also partially inhibited respiratory syncytial virus. Four of the extracts active against this virus were prepared from species in the *Tridentatae*, three were from species in the Vulgares complex, and one from the *Absinthium*. At the extract dilutions used, none of the extracts was effective against the other two single-stranded RNA viruses assayed; parainfluenza virus and vesicular stomatis virus, nor the double-stranded viruses: rotavirus, herpesvirus and vaccinia virus.

Although the results of the broad spectrum screening demonstrated that antiviral constituents are widely distributed throughout the genus, as was observed in the cytotoxicity assays and preliminary screenings, activity was not consistantly exerted by samples from the same taxa. It was hypothesized that this variation was due to quantitative and qualitative differences in chemical composition during the growing season. An examination of the herbarium voucher specimens supported this hypothesis, as most of the active extracts were prepared from plant material which was collected at the beginning of the flowering period. However, chemotypic and ecotypic differences in chemical composition can not yet be ruled out.

In reviewing the North American ethnopharmacological literature on *Artemisia* species, it is readily apparent that the treatment of respiratory and gastrointestinal ailments were two of the most common medicinal usages of all the *Artemisia* taxa (see Appendix 8). From the ethnobotanical perspective, it seems noteworthy that in the broad spectrum screening, fourteen *Artemisia* extracts each demonstrated some antiviral activity against either corona virus or respiratory syncytial virus. These two viruses are similar in that they are both single-stranded RNA viruses that infect mucosal surfaces (as are Coxsackie, polio and Sindbis). The enteric corona virus used in these assays causes diarrheal disease, while other closely related corona viruses infect the mucosal surfaces of the respiratory system causing mild (15 -20 % of all colds) to severe disease. Respiratory syncytial virus also causes serious (and often fatal, particularily in children) respiratory disease. The antiviral activity that the *Artemisia* extracts exhibited against these viruses suggests that the traditional usage of *Artemisia* species to treat gastrointestinal and respiratory ailments may have had some efficacy.

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5.5 Conclusions to Artemisia research

As was noted in the introduction to this work, *Artemisia* species are among the most important physical and spiritual medicines of the North America First Nations peoples. A review of the ethnobotanical literature revealed that one of the most common medicinal usages of members of this genus was in the treatment of infectious diseases and infectious disease symptoms. The results of this research program provide clear evidence that extracts of the *Artemisia* species assayed exert significant anti-infectious activity *in vitro* against bacteria, fungi and viruses.

It had also been observed from the literature review that *A. dracunculus, A. frigida, A. ludoviciana* and *A. tridentata* were most frequently cited as the *Artemisia* species used medicinally. In this study, samples of these four species were found to be among the extracts which exhibited the strongest and broadest spectrum of activity. The results of the *Artemisia* screenings concur with those of the phase one and two research, in that there was a correlation between the specific traditional usage of a plant species and the type of pharmacological activity that an extract of it exhibited. These results suggest that there may be a scientific rational for the traditional usage of *Artemisia* species in the treatment of infectious diseases and that these remedies may have been efficacious.

Another objective of this research was to determine whether anti-infectious activity was distributed throughout the genus or if the activity exerted by the members of any one subgenus was particularly outstanding. Analysis of the results of each screening showed that antimicrobial activity was indeed distributed fairly evenly throughout the genus. The variation in activity among samples of any one sub-genus was equal to or greater than the variation between sub-genera. The lone exception to this pattern of activity appeared in the anti-mycobacterial screening where members of the sub-genera *Dracunculus* and *Tridentatae* exhibited stronger activities than members of the Vulgares and *Absinthium.*

Further, in terms of the relationship between pharmacological activity and taxonomic delineations, it was observed in the results of all the screenings that the variation in activity among the samples of any one taxon (species or subspecies) was equal to or greater than the amount of variation in activity between taxa. It was hypothesized that the variation in activity observed among samples of a taxa may have been due to differences either in the age of the extract or differences in the stage of ontogeny of the samples collected. Further experiments are necessary to determine whether the differences are due to extract age or ontogeny, or due to other factors such as chemotypic or ecotypic variations. However, if the pharmacologically active constituents are only essential oils, none of the above factors may be responsible as Kelsey (1983) has reported experimental evidence that there was no correlation between the essential oil composition and geographic site, plant age or subspecies genotype.

In terms of the search for new drugs, the results of these screenings (especially the antiviral and anti-mycobacterial screenings) suggest that North American *Artemisia* species are very strong candidates for further investigation. The secondary metabolites of *Artemisia* species have been widely investigated. Marco (1990) compiled a review of the 376 *Artemisia* constituents reported up until 1988. The majority of these constituents belonged to four major classes of compounds; the acetylenes, coumarins, flavonoids and terpenes. There is a great deal of circumstantial evidence that compounds from each of these groups may be among the anti-infectious constituents of the *Artemisias.*

Towers (1987) and Lam (1988) have reviewed the biological activities of the polyacetylenes, including the antibiotic, antifungal and antiviral activities of this class of compounds. More specifically to the genus *Artemisia*, Wang (1990) reported that antifungal polyacetylenes were isolated from *A. borealis*, with the major polyacetylene identified as falcarindiol. Wahyuono (1991) reported that dehydrofalcarindiol was isolated from *A. pacifica* as the primary antibiotic and antifungal constituent and further noted that this compound belongs to the class of polyacetylenes that do not require ultraviolet light in order to induce activity. The instability of this type of compound may partially explain the decrease in antimicrobial activity of the extracts which was observed in this study.

Summaries of the polyacetylenes reported from *Artemisia* species were compiled and discussed by Bohlman (1973) and Greger (1981). Both authors observed that the occurrence of dehydrofalcarinone derivatives in the *Dracunculus* and the Vulgares clearly separate these two groups from the other sections of the genus (see also Wallnofer, 1989). It is clear from these reviews that while dehydrofalcarinone derivatives may contribute to the antimicrobial activity observed in the samples from the *Dracunculus* and Vulgares, these types of compounds are not responsible for the activity observed in the samples from members of the *Absinthium* and *Tridentatae.*

The antimicrobial activity of essential oils is well established and the constituent essential oils of many

Artemisia species have been investigated (see Marco, 1990 for summary). Among many Old World *Artemisia* species, the essential oils have been identified as the primary antimicrobial compounds (Ayoub, 1990; Deans, 1988; Deans, 1992; Dikshit, 1984; Feuerstein, 1988; Kishore, 1988; Moran, 1989; Nagy, 1967; Recio, 1989; Saksena, 1985; Samaiya, 1986; Yashphe, 1979; 1987). While the antibiotic essential oils reported from North American *Artemisia* species must contribute to the antimicrobial activity, the experimental evidence in this study indicated that there were other types of compounds present which exerted stronger activities. There are also several papers in the literature on Old World *Artemisia* species in which aqueous (Chen, 1989) and alcohol (Tharib, 1983; Mishenkova, 1985) extracts were reported as the most active fractions.

The sesquiterpene lactones have been the most thoroughly investigated class of *Artemisia* constituents (Geissman, 1970; Herz, 1975; Kelsey, 1979; Seaman, 1982; Marco, 1990) and these compounds are known to exert a wide range of biological activities including antibiotic, antifungal and antiviral activity (see Rodriguez, 1976; Stevens, 1982; Picman, 1986 for reviews). In spite of the fact that there has been several hundred constituent sesquiterpene lactones reported from *Artemisia* species, there were no reports in the literature of the isolation of sesquiterpene lactones as the active anti-infectious compounds from *Artemisia* species other than the antimalarial qing hao su isolated from *A. annua.*

The coumarins and flavonoids constitute the other major classes of compounds isolated from *Artemisia* species. Yang (1988) reported that the antimalarial activity of qing hao su from *A. annua* is markedly enhanced by the presence of methoxylated flavones such as artemetin and casticin although they do not exert antimalarial activity when assayed in isolation. Mahmoud (1988) reported coumarin isolated from *A. herba-alba* as one of the primary antimicrobial constituents. Although there are several reports in the literature of other types of pharmacological activities due to coumarin and flavonoid *Artemisia* constituents, the above cited papers are the only reports which directly link these compounds to the anti-infectious activity of *Artemisia* species. However, the preliminary findings of this study suggest that methylated flavones and 5-hydroxyflavonoids may be among the primary anti-infectious constituents of the genus *Artemisia,* in addition to the essential oils.

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6.0 Appendices

6.1 Appendix 1 - Annotated list of phase one voucher specimens

A voucher specimen for each of the plants assayed in the phase one testing was filed in the University of British Columbia Herbarium. The details of the collection of each of these specimens are given below umder the highlighted heading of the current botanical name and common names. The list of common names was made as comprehensive as possible, drawing from both current and historical works, as a number of ethnobotanical references cite plants by their common names only. As a large number of the older ethnobotanical literature references used in this thesis contain citations under previous botanical names, a complete list of synonyms was also compiled for each species name. Synonmity with the names listed in this appendix was used as the criterion for the inclusion of references in the subsequent ethnobotanical literature appendices.

It should be noted that although many specimens were identified to the subspecific or varietal level, the synonyms listed are for the entire species (ie. inclusive of all subspecies and varieties) because very few ethnobotanical informants or recorders made identifications below the species level. For the plants *Argentina egedii* and *Osmorhiza purpurea* which many workers have included within a larger species concept in the past (*Potentilla anserina* and *Osmorhiza chiloensis* respectively), synonyms were also listed for these latter names.

EUMYCOTA (Fungi)

***Ganoderma applanatum* L. (Polyporaceae) - Indian Artist Conk.**

Collection - Masset, B.C. (Queen Charlotte Islands) - near Masset cemetary. Growing on horizontal dead log in forest. June 23, 1991. Phytochemical voucher Q-10.

***Lobaria oregana* (Tuck.) Mull. (Lobariaceae) - Lung Lichen.**

Collection - Masset, B.C. (Queen Charlotte Islands) - near Masset cemetary. Collected from forest floor. June 23, 1991. Phytochemical voucher Q-11.

BRYOPHYTA (Mosses and liverworts)

***Conocephalum conicum* (L.) Dum. (Conocephalaceae) [Hepaticae] - Thalloid Liverwort.**

Collection - Near Tow Hill on Graham Island, B.C. (Queen Charlotte Islands), along the Cape Fife Trail. Growing in low lying muddy area alongside trail in dense shade. June 28, 1991. Phytochemical voucher Q-28.

***Hylocomium splendens* (Hedw.) B.S.G. (Hylocomiaceae) [Bryidae] - Step Moss.**

syn. *Hypnum splendens* Hedw., *H. proliferum* Brid., *Hylocomium proliferum* (Brid.) Lindb.

Collection - Masset, B.C. (Queen Charlotte Islands) - near Masset cemetary. Growing on mossy stumps or decaying wood throughout forest. June 23, 1991. Phytochemical voucher Q-9.

TRACHEOPHYTA (Vascular plants)

Lycopsida (Club mosses)

Lycopodium clavatum **L. (Lycopodiaceae) - Clubmoss, Ground-pine, Running-pine, Stag's Horn Moss.**

syn. *L. integrifolium* Goldie

Collection - Rose Spit, Graham Island (Queen Charlotte Islands, B.C.). Growing at the edge of the forest along Rose Spit in full and partial sun, sandy soil. June 22, 1991. Phytochemical voucher Q-6.

Sphenopsida (Horsetails)

Equisetum arvense **L. (Equisetaceae) - Common Horsetail, Field Horsetail, Joint Grass.**

syn. *E. boreale* Bong., *E. cauderi* Boivin

Collection - 20 km. north of Creston, B.C. on Hwy 3A. Along north dike between Duck Lake and Kootenay River. In open areas along the dike with grasses. Elev. ~ 1900 ft. May 19, 1991. Phytochemical voucher W-3.

Equisetum hyemale **L. (Equisetaceae) - Cañutillo Del Llano, Common or Western Scouring Rush.**

syn. *Hippochaete* Farw., *H. hyemalis* (L.) Braun, *E. affine* Engelm., *E. hiemale* L., *E. prealtum* Raf., *E. ramosissimum* Macoun, *E. robustum* A. Braun

Collection - 10 km from Penticton, B.C. along Green Mountain road. Plants growing in moist gravelly soil alongside a slow moving stream. June 6, 1991. Phytochemical voucher P-37.

Pteropsida - Filicinae (Ferns)

Polypodium glycyrrhiza **D.C. Eaton (Polypodiaceae) - Licorice Fern.**

syn. *P. vulgare* L., *P. falcatum* Kellogg, *P. occidentale* (Hook.) Maxon

Collection - Tow Hill on Graham Island, B.C. (Queen Charlotte Islands) at the mouth of Watson River. Growing on moss covered conifers. June 28, 1991. Phytochemical voucher Q-27.

Polystichum munitum **(Kaulf.) Presl (Polypodiaceae) - Sword Fern, Western Sword Fern.**

syn. *Aspidium* Kaulf.

Collection - Near Port Clements, B.C. (Queen Charlotte Islands), along the Golden Spruce Trail.

Growing in the undergrowth of hemlock forest. June 24, 1991. Phytochemical voucher Q-15.

Pteropsida - Gymnospermae (Conifers)

Juniperus communis **L. (Cupressaceae) - Common Juniper, Dwarf Juniper, Mountain Juniper, Prickly Juniper.**

syn. *J. alpina* (Sm.) S.F. Gray, *J. canadensis* Lodd. ex Burgsd., *J. depressa* (Pursh) Raf., *J. nana* Willd., *J. sibirica* Burgsd.

Collection - South of Masset, B.C. (Queen Charlotte Islands) at "Garbage Hill". Growing in large open bog at the top of the hill with *Pinus cortorta*. June 27, 1991. Phytochemical voucher Q-25.

Larix occidentalis **Nutt. (Pinaceae) - Hackamatack, Tamarack, Western Larch.**

syn. *Pinus nuttallii* Parl., *L. nuttallii* Parl. ex Gord.

Collection - Summit Creek Park, 13 km. west of Creston, B.C. on Hwy 3. Open area on east side of suspension bridge. May 20, 1991. Phytochemical voucher W-15.

Pinus contorta **Dougl. ex Loud. var.** ***contorta*** **(Pinaceae) - Beach Pine, Black Pine, Contorted Pine, Lodgepole Pine, Scrub Pine, Tamarack Pine.**

syn. *P. banksiana* Lindl., *P. bolanderi* Parl. ex DC., *P. boursieri* Carr., *P. divaricata* (Ait.) Dum. -Cours., *P. inops* Bong., *P. mac-intoshiana* Hort. ex P. Laws, *P. muricata* Boland., *P. murreyana* Grev. et Belf., *P. saskatchewanensis* Hook. ex Parl., *P. tenuis* Lemmon

Collection - Pure Lake on Graham Island, B.C. (Queen Charlotte Islands) Growing in bog surrounding lake in full sun. June 25, 1991. Phytochemical voucher Q-18.

Pinus ponderosa **P. et C. Lawson (Pinaceae) - Blackjack Pine, Ponderosa Pine, Western Yellow Pine.**

syn. *P. beardsleyi* Murr., *P. benthamiana* Hartw., *P. brachyptera* Engelm., *P. craigana* Murr., *P. engelmanni* Torr., *P. jeffreyi* Balfour, *P. macrophylla* Torr., *P. nootkatensis* Manetti ex Gord., *P. parryana* Gord., *P. resinosa* Torr., *P. sinclairiana* Carr.

Collection - Summit Creek Park, 13 km. west of Creston, B.C. on Hwy 3. At the foot of the suspension bridge across Summit Creek on east side. May 20, 1991. Phytochemical voucher W-20.

Pteropsida - Angiospermae (Flowering plants)

***Achillea millefolium* L. var. *occidentalis* DC. (Compositae) - Common Yarrow, Milfoil, Nosebleed, Old Man, Plumajilo, Sneezeweed, Thousand Seal.**

syn. *A. alpicola* Rydb., *A. ambigua* Boiss., *A. anethifolia* Fisch. ex Herd., *A. angustissimia* Rydb., *A. asplenifolia* Vent., *A. borealis* Bong., *A. collina* Becker ex Reichb., *A. crassifolia* Hort. ex Steud., *A. cuspidata* Wall., *A. dentifera* Reichb., *A. eradicata* Piper, *A. gracilis* Raf., *A. haekeana* Tausch, *A. intermedia* Schleich, *A. lanata* Lam., *A. lanulosa* Nutt., *A. laxiflora* Poll. et Cockr., *A. magna* Haenke, *A. megacephela* Raup., *A. monticola* Martr., *A. occidentalis* (DC.) Raf. ex Rydb., *A. chroleuca* Eichw., *A. ossica* C. Koch, *A. pannonica* Scheele, *A. rosea* Desf., *A. scabra* Host., *A. seidlii* J. et C. Presl, *A. setacea* Schwein, *A. subalpina* Greene, *A. subhirsuta* Gilib., *A. sylvatica* Becker, *A. tenufolia* Salisb., *A. tenuis* Schur, *A. tomentosa* Pursh

Collection - 23 km. west of Osoyoos, B.C. on Hwy. 3, in open gravelly waste area alongside road. June 5, 1991. Phytochemical voucher P-10.

***Alnus rubra* Bong. (Betulaceae) - Red Alder, Oregon Alder.**

syn. *A. oregana* Nutt., *A. incana* Regel

Collection - Masset, B.C. (Queen Charlotte Islands) at the S.W. corner lot at Collison St. and Wallace Street. Growing along the edge of a wet grassy area. June 21, 1991. Phytochemical voucher Q-1, Q-2.

***Ambrosia chamissonis* (Less.) Greene var. *chamissonis* (Compositae) - Beach Ragweed, Silver Burweed.**

syn. *Franseria chamissonis* Less., *F. cuneifolia* Nutt., *Gaertnera chamissonis* Kuntze

Collection - Masset, B.C. (Queen Charlotte Islands). Growing in full sun on sandy beach dunes at the end of Cemetary Road. June 29, 1991. Phytochemical voucher Q-29.

***Amelanchier alnifolia* Nutt. var. *humptulipensis* (Jones) Hitchc. (Rosaceae) - Juneberry, Sarvis Berry, Saskatoon, Serviceberry.**

syn. *A. covillei* Standl., *A. cusickii* Fern., *A. florida* Lindl. var. *humptulipensis* Jones, *A. glabra* Greene, *A. gracilis* Muhl., *A. pallida* Greene, *A. parviflora* Hort. ex Loud., *A. pringlei* Koehne, *A. pumila* Nutt. ex T. et G., *A. recurvata* Abrams, *A. siskiyouensis* Schn., *A. subintegra* Greene, *A. utahensis* Koehne, *A. venulosa* Greene

Collection - 21 km. east of Princeton, B.C. on Hwy 3. Growing in open, rocky waste area alongside the highway. June 5, 1991. Phytochemical voucher P-6.

Collection - Near Penticton, B.C. at the south end of Apex Alpine road, 13 km. from Hwy 97. Growing in gravelly soil with fir, pine and aspen. June 6, 1991. Phytochemical voucher P-35.

***Antennaria microphylla* Rydb. (Compositae) - Rosy Pussy-toes.**

syn. *A. acuminata* Greene, *A. angustifolia* Rydb., *A. arida* E. Nels., *A. breitungii* Porsild, *A. concinna* Nels., *A. elegans* Porsild, *A. erigeroides* Greene, *A. henersoni* Piper, *A. imbricata* E. Nels., *A. incarnata* Porsild, *A. laingii* Porsild, *A. oxyphylla* Greene, *A. leptopodioides* Cody, *A. nitida* Greene, *A. rosea* Greene var. *nitida* (Greene) Breitung, *A. solstitialis* Greene, *A. viscidula* Neils, *A. subviscosa* Neils (Includes synonyms for *A. rosea.*)

Collection - North of Osoyoos, B.C. along Hwy 3 at Osoyoos hill. Growing on rocky outcropping with shallow sandy soil. June 6, 1991. Phytochemical voucher P-21.

***Arctostaphylos uva-ursi* (L.) Spreng. (Ericaceae) - Arberry, Coralillo, Kinnikinnik, Red Bearberry, Upland Cranberry.**

syn. *A. adenotrichia* (Fern. et Macbr.) A. et D. Love et Kapoor, *A. angustifolia* Payot, *A. officinalis* Wimm et Grab., *A. procumbens* Patze, Mey. et Elk, *Arbutus uva-ursi* L., *Uva-Ursi uva-ursi* (L.) Britt., *U. procumbens* Moench

Collection - 105 km northeast of Hope, B.C. on Hwy 3. Growing alongside road at the edge of Douglas fir/Ponderosa pine forest in part shade, gravelly soil. June 7, 1991. Phytochemical voucher P-42.

***Argentina egedii* (Wormsk.) Rydb. (Rosaceae) - Pacific Silverweed.**

syn. *A. anserina* Rydb., *A. argentea* Rydb, *A. pacifica* Rydb., *Potentilla anserina* L. ssp. *pacifica* Howell) Rousi, *P. anserina* L. var. *sericea* Hayne, *P. occidentale* Fedde, *P. pacifica* Howell, *P. pratincola* Boivin, *P. rolandii* Boivin Other *P. anserina* syn. - *Anserina concolor* (Ser.) Rydb., *A. argentea* Rydb., *Potentilla anserina* L. var. *concolor* Ser., *P. anserina* L. var. *grandis* T. et G., *P. anserina* L. var. *lanata* Boivin, *P. yukonensis* Hult.

Collection - Near Port Clements, B.C. (Queen Charlotte Islands). 3 km. south of Port Clements on

Juskatla Road, close to the mouth of the Yakoun River. Growing in boggy silt along the edge of the river in light shade. June 26, 1991. Phytochemical voucher Q-20.

Arnica cordifolia **Hook. (Compositae) - Heart-leaf Arnica.**

syn. *A. andersonii* Piper, *A. austiniae* Rydb., *A. discoidea* Benth., *A. evermannii* Greene, *A. grayii* Heller, *A. hardinae* St. John, *A. humilis* Rydb., *A. macrophylla* Nutt., *A. paniculata* A. Nels., *A. pumila* Rydb., *A. subcordata* Greene, *A. whitneyi* Fern.

Collection - June 6, 1991. Near Penticton, B.C. at the south end of Apex Alpine road, 3 km. from Hwy 97. Growing in open Ponderosa pine forest, gravelly soil, partially to heavily shaded. Phytochemical voucher P-31.

Arnica sororia **Greene (Compositae) - Twin Arnica.**

syn. *A. fulgens* Pursh var. *soraria* (Greene) G.W. et G.R. Dougl., *A. stricta* Greene, *A. trinervata* Rydb.

Collection - 46 km. east of Princeton, B.C. on Hwy 3. Growing in an ungrazed pasture on the south side of the highway. June 5, 1991. Phytochemcial voucher P-7.

Artemisia ludoviciana **Nutt.,** *Artemisia michauxiana* **Bess.,** *Artemisia tridentata* **Nutt.** - see Appendix 3.

Aruncus dioicus **(Walt.) Fern. var.** *vulgaris* **(Maxim.) Hara (Rosaceae) - (Sylvan) Goat's Beard.**

syn. *A. acuminatus* (Dougl.) Rydb., *A. allegheniensis* Rydb., *A. aruncus* (L.) Karst., *A. pubescens* Rydb., *A. sylvester* Kostel., *A. vulgaris* Raf., *Spiraea acuminata* Dougl., *S. americana* Steud., *S. aruncus* L., *S. astilboides* T. Moore, *S. kamchatica* Maxim, *S. triternata* Wall.

Collection - West of Hope, B.C. on Hwy 7. Growing alongside road at forest edge in partial shade, gravelly soil. July 12, 1991. Phytochemical voucher F-1.

Asarum caudatum **Lindl. (Aristolochiaceae) - Long Tailed Ginger, Wild Ginger.**

syn. *A. hookeri* Field et Gardn.

Collection - Summit Creek Park, 13 km. west of Creston, B.C. on Hwy 3. West side of Summit Creek, 1/2 km. in on Old Dewdney Trail. Moist, deeply shaded forest with heavy litter. May 20, 1991. Phytochemical voucher W-12.

Balsamorhiza sagittata **(Pursh) Nutt. (Compositae) - Arrowleaf Balsamorhiza, Balsam Root,**

Spring Sunflower.

syn. *B. helianthoides* Nutt., *Buphthalum* Pursh

Collection (aerial) - 2 km. east of Greenwood, B.C. on Hwy 3. Large population in pasture alongside road. Sandy soil. May 20, 1991. Phytochemical voucher W-18.

Collection (roots) - 16 km. west of Princeton, B.C. on Hwy. 3. Large population in open grass - ponderosa pine/cedar meadow alongside road. Western extreme of its range at this latitude, common in pastures, along road eastward into the interior. June 5, 1991. Phytochemical voucher P-2.

***Betula papyrifera* Marsh (Betulaceae) - Paper Birch, White Birch.**

syn. *B. alaskana* Sarg., *B. alba* L., *B. cordifolia* Regel, *B. kenaica* Evans, *B. neoalaskana* Sarg., *B. occidentalis* Hook., *B. papyracea* Ait., *B. resinifera* Britt.

Collection - Apex Alpine Road, 6 km northwest from intersection with Green Mountain Road, approximately 27 km. from Penticton, B.C. Growing at the base of a gravelly embankment alongside road in full sun. June 6, 1991. Phytochemical vocuher P-38.

***Capsella bursa-pastoris* (L.) Medik. (Cruciferae) - Shepherd's Purse.**

syn. *Bursa pastoris* Weber, *B. bursa-pastoris* (L.) Britt., *B. rubella* Reut., *C. agretis* Jord., *C. amblodes* Raf., *C. apetala* Opiz, *C. agrestis-rubella* Paill., *C. bursa* Raf., *C. gracilis* Gren., *C. integrifolia* Raf., *C. pastoralis* Dulac, *C. polymorpha* Cav., *C. poimenobalantion* St. Lag., *C. praecox* Jord., *C. rubello-agrestis* Paill., *C. ruderalis* Jord., *C. triangularis* St. Lag., *C. virgata* Jord.

Collection - Oceanography Building, U.B.C. Campus, Vancouver, B.C.. Weed in landscaped area at south end of the building. June 30, 1991. Phytochemical voucher W-8.

***Cardamine angulata* Hook. (Cruciferae) - Bitter Cress, Wood Cress.**

Collection - Near Port Clements, B.C. (Queen Charlotte Islands), along the Golden Spruce Trail. Growing in shaded, moist sites in heavy litter of hemlock forest. June 24, 1991. Phytochemical voucher Q-16.

Ceanothus velutinus **Dougl. ex Hook. (Rhamnaceae) - Buck-brush, Greasewood, Mountain Balm, Sheep Herder Tea, Snow-brush, Squaw Tea, Sticky Laurel, Tobacco-brush.**

syn. *C. grandis* Dougl. ex Hook., *C. laevigatus* Hook.

Collection - along Apex Alpine Road, 3 km. from the intersection with Green Mountain Road, approximately 24 km. from Penticton, B.C.. June 6, 1991. Phytochemical voucher P-39.

Chaenactis douglasii **(Hook.) H. et A. (Compositae) - False Yarrow, Hoary Chaenactis.**

syn. *C. achilleaefolia* Hook. et Arn., *C. alpina* (Gray) Jones, *C. angustifolia* Greene, *C. brachyiata* Greene, *C. cineria* Stockwell, *C. humilis* Rydb., *C. panamintensis* Stockwell, *C. ramosa* Stockwel, *C. rubricaulis* Rydb., *C. suksdorfii* Stockwell, *Hymenopappus* Hook., *Macrocarphus* Nutt.

Collection - 10 km. west of Princeton, B.C. on Hwy 3. Growing in large gravel pit on the south side of the highway. Scattered plants on the west side of the gravel pit with mullein. Very dry, open site. June 5, 1991. Phytochemical voucher P-3.

Chrysothamnus nauseosus **(Pall.) Britt. ssp.** ***albicaulis*** **(Nutt.) H. et C. (Compositae) - Chamiso Blanco, Chamiso Cimarron, False Goldenrod, Golden Bush, Grey Rabbit-brush.**

syn. *Bigelowia graveolens* Nutt., *C. graveolens* (Nutt.) Greene, *C. frigidus* Greene, *C. macounii* Greene, *C. plattensis* Greene, *C. pulcherrimus* Nels., *C. nauseosus* (Pall.) Britt. ssp. *speciosus* (Nutt.) H. et C., *C. nauseosus* (Pall.) Britt. var. *albicaulis* (Nutt.) Rydb., *C. nauseosus* (Pall.) Britt. var. *speciosus* (Nutt.) Hall, *C. speciousus* Nutt. var. *albicaulis* Nutt. *Chrysocoma nauseosus* Pall.

Collection - 36 km. west of Osoyoos, B.C. on Hwy 3. Dry, gravelly pasture with *Artemisia tridentata.* June 6, 1991. Phytochemical voucher P-25.

Clematis ligusticifolia **Nutt. (Ranunculaceae) - Pipe-stems, Traveler's Joy, Western Clematis, Western Virgin's-bower, White Virgin's-bower, Yerba De Chivato.**

syn. *C. brevifolia* Howell, *C. neomexicana* Robins, *C. suksdorfii* Robins

Collection - 17 km. west of Osoyoos, B.C. on Hwy 3. On gravelly southern slope alongside the road. June 5, 1991. Phytochemical voucher P-14.

Cornus canadensis **L. (Cornaceae) - Bunchberry, Dwarf Cornel, Pigeon Berry, Puddingberry, Quatre-temps, Rougets.**

syn. *Chamaepericlymenum* Aschers et Graebn., *Chamaepericlymenum unalschkensis* Rydb., *Cornella* Rydb., *Cornus unalaschkensis* Ledeb., *Cynoxylon* Schaffn.

Collection - Masset, B.C. (Queen Charlotte Islands), near Masset cemetary. Growing along forest margins and in forest openings, in sandy soil, dappled shade. June 23, 1991. Phytochemical voucher Q-12.

Cornus sericea **L. ssp. *sericea* (Cornaceae) - American Dog-berry, American Dogwood, Cornel, Creek Dogwood, Hart Rouge, Kinnikinnick, Red-osier Dogwood, Red Willow, Rose Willow.**

NB. The common name Kinnikinnik is also used to refer to *Arctostaphylos uva-ursi.*

syn. *C. alba* Can. Rep. ssp. *stolonifera* (Michx.) Wang., *C. californica* Mey., *C. candissima* Bisch., *C. instoloneus* A. Nels., *C. occidentalis* (T. et G.) Cov., *C. (Svida) pubescens* Nutt., *C. purshii* G. Don., *C. sanguinea* Marsh, *C. sericea* L. var. *occidentalis* T. et G., *C. stolonifera* Michx., *C. stricta* Can. Rep., *C. suecica* A. Gray

Collection - 20 km. north of Creston, B.C. on Hwy. 3A, east side dike turnoff. Common on dike between Duck Lake and Kootenay River. May 19, 1991. Phytochemical voucher W-6.

Crataegus douglasii **Lindl. (Rosaceae) - Black Hawthorn.**

syn. *Anthomedeles douglasii* Roem., *C. brevispina* Dougl. ex Steud., *C. consanguinea* Beadle var. *brevispina* Dougl., *C. gaylussacia* Hel., *C. punctata* Jacq. var. *douglasii* T. et G., *C. rivularis* Nutt. ex T. et G., *Mesilus rivularis* Koch, *M. douglasii* Aschers et Gardn.

Collection - West Creston Flats, Reclamation Road crossing of the Kootenay River, 12 km. due west of Creston, B.C.. Open area on the south bank of the river. May 20, 1990. Phytochemical voucher W-14.

Delphinium nutallianum **Pritz. var. *nutallianum* (Ranunculaceae) - Upland Larkspur.**

syn. *D. bicolor* Nutt., *D. lineapetalum* Ewan, *D. menziesii* DC., *D. nelsonii* Greene, *D. variegatum* Macoun

Collection - Near Penticton, B.C. at the south end of Apex Alpine road, 6 km. from Hwy 97. Under Ponderosa pine and fir on grassy mountain slope. Sandy soil. June 6, 1991. Phytochemical voucher P-33.

Disporum trachycarpum **(Wats.) Benth. et Hook. (Liliaceae) - Fairy Bells.**

syn. *D. majus* Britton, *Lethea trachycarpum* Noronha, *Prosartes trachyandra* Torr., *P. trachycarpa* S. Wats., *P. oregana* S. Wats., *Uvularia lanuginosa* Hook., *U. puberula* Rich.

Collection - Summit Creek Park, 13 km. west of Creston, B.C. on Hwy 3. On the west side of Summit Creek, around 1/2 km. in on the Old Dewdney Trail. Deeply shaded forest in moist areas with heavy litter. May 20, 1991. Phytochemical voucher W-11.

Empetrum nigrum **L. (Empetraceae) - Black Crowberry, Heathberry.**

syn. *E. andinum* Phil. ex A. DC., *E. crassifolium* Raf., *E. eamesii* Fern. et Wieg. ssp. *hermaphroditum* (Lange ex Hagerup) D. Love, *E. hermaphroditum* Lange ex Hagerup, *E. medium* Carmich., *E. procumbens* Gilib., *E. purpureum* Rafin., *E. rubrum* Vahl ex Willd., *E. scoticum* Hook. ex Steud.

Collection - Pure Lake on Graham Island, B.C. (Queen Charlotte Islands). Growing in bog surrounding lake in full sun. June 25, 1991. Phytochemical voucher Q-17.

Epilobium minutum **Lindl. ex Lehm. (Onagraceae) Small Flowered Willow-weed.**

syn. *E. adscendens* Suksd., *E. pubescens* Macoun, *Crossostigma lindleyi* Spach

Collection - 45 km. west of Princeton, B.C. on Hwy 3. Open, dry gravelly waste area alongside the highway. June 5, 1991. Phytochemical voucher P-1.

Erigeron filifolius **(Hook.) Nutt. (Compositae) - Thread Leaf Fleabane.**

syn. *E. flexuosum* Hochet., *E. foliasum* Nutt. ex T. et G., *Chrysopsis canescens* DC., *Diplopappus* Hook.

Collection - 25 km. west of Osoyoos, B.C. on Hwy 3. Several plants in open, gravelly waste area alongside the highway. June 5, 1991. Phytochemical voucher P-9.

Eriogonum heracleoides **Nutt. (Polygonaceae) - Wild Buckwheat, Wyeth Buckwheat.**

syn. *E. angustifolium* Nutt., *E. gyrophyllum* Nutt., *E. umbellatum* Benth.

Collection (aerial) - 23 km. west of Osoyoos, B.C. on Hwy. 3. Open, gravelly slope alongside the highway - sagebrush scrublands. June 5, 1991. Phytochemical voucher P-11.

Collection (roots) - North of Osoyoos, B.C. on Hwy 3 on Osoyoos hill. Open, dry slope with sagebrush. Locally common. June 6, 1991. Phytochemical voucher P-17.

Fauria crista-galli **(Menzies ex Hook.) Makino (Menyanthaceae) - Deer Cabbage.**

syn. *Menyanthes crista-galli* Menzies ex. Hook., *Nephrophyllidium crista-galli* (Menzies ex Hook.) Gilg.

Collection - Pure Lake on Graham Island, B.C. (Queen Charlotte Islands). Growing in bog surrounding lake in full sun. June 25, 1991. Phytochemical voucher Q-19.

Fragaria chiloensis **(L.) Mill. (Rosaceae) - Beach Strawberry, Sand Strawberry.**

syn. *F. ananassa* Duchesne, *F. bonariensis* Pers., *F. californica* Neuberry, *F. cunefolia* Nutt., *F. calyculata* Duchesne, *F. caroliniensis* Duchesne, *F. chilensis* Molina, *F. grandiflora* Ehrh., *F. grossa* Salisb., *F. latiuscula* Greene, *F. platypetala* Rydb., *F. sandwicensis* Dcne, *F. sericea* Dougl. ex Hook., *F. suksdorfii* Holtz, *F. tincta* Duchesne in Lam., *F. vesca* L. var. *chiloensis* L.

Collection - Rose Spit, Graham Island, B.C. (Queen Charlotte Islands). Growing at the edge of the forest and out onto the sand dunes of Rose Spit in full sun and partial shade. June 22, 1991. Phytochemical voucher Q-7.

Fragaria vesca **L. var.** ***bracteata*** **(Heller) Staudt. (Rosaceae) - Wild Strawberry.**

syn. *F. abnormis* Tratt., *F. alpina* Steud., *F. americana* (Porter) Britt., *F. botryformis* Duchesne, *F. bracteata* Heller, *F. californica* Cham. et Schlecht., *F. eflagellis* Duchesne, *F. helleri* Holz., *F. hortensis* Duchesne, *F. mexicana* Schlecht., *F. minor* Duchesne, *F. monophylla* Duchesne, *F. multiplex* Duchesne, *F. muricata* L., *F. nemoralis* Salisb., *F. nubicola* Lindl., *F. nuda* Pers., *F. retorsa* Greene, *F. semperflorens* Duchesne, *F. sempervirens* Duchesne, *F. silvestris* Duchesne, *F. succulenta* Gilib., *F. unifolia* Steud., *F. vulgaris* Ehrh.

Collection - 15 km. north of Creston, B.C. along Hwy. 3A, #6668, M.L. Hubner homestead. Rocky hillside with southern exposure. Elev. ~ 3,000 ft. Waste area, in semi-shaded and full sun sites alongside trail, sandy soil. May 18, 1991. Phytochemical voucher W-1.

Gaillardia aristata **Pursh (Compositae) - Brown-eyed Susan.**

syn. *G. bicolor* Pursh, *G. hallii* Rydb., *G. rustica* Cass., *Virgilia grandiflora* Nutt.

Collection - 25 km. west of Osoyoos on Hwy. 3, in open, gravelly waste area alongside road. June 5, 1991. Phytochemical voucher P-8.

Geum macrophyllum **Willd. var. *macrophyllum* (Rosaceae) - Big-leaf Avens, Large-leaved Avens.**

syn. *G. oregonense* (Schuetz) Rydb., *G. perincisum* Rydb., *G. strictum* Shank var. *macrophyllum* Hook.

Collection - Near Port Clements, B.C. (Queen Charlotte Islands). 3 km. south of Port Clements on Juskatla Road, close to the mouth of the Yakoun River. Growing in open, sandy waste area near the edge of the river in full sun and light shade. June 26, 1991. Phytochemical voucher Q-23.

Glehnia littoralis **F. Schmidt ssp. *leiocarpa* (Mathias) Hult. (Umbelliferae) - American Glehnia.**

syn. *Phellopterus littoralis* Benth., *G. littoralis* F. Schmidt var. *leiocarpa* (Mathias) Boivin, *G. leiocarpa* Mattias, *Cymopterus littoralis* A. Gray

Collection - Masset, B.C. (Queen Charlotte Islands). Growing on the leeward side of the sand dunes and beach flats at the end of Cemetary Road, in full sun. June 23, 1991. Phytochemical voucher Q-13.

Heracleum maximum **Bartr. (Umbelliferae) - Berce, Cow-parnsip, Indian Rhubarb, Masterwort, Yerba Del Oso.**

syn. *H. auritum* Bischoff, *H. barbaratum* Ledeb., *H. dissectum* Ledeb., *H. douglasii* DC., *H. dulce* Fisch. ex Fisch., Mey. et Ave-Lall, *H. lanatum* Michx., *H. moellendorffii* Hance, *H. spondylium* Pall., Cham. et Schlecht., *H. spondylium* L. ssp. *montanum* (Schleich. ex Caudin) Briq., *H. spondylium* L. var. *lanatum* (Michx.) Dorn

Collection - Near Penticton, B.C. at the south end of Apex Alpine road, 3 km. from Hwy 97. In gravel alongside road with nettles. June 6, 1991. Phytochemical voucher P-32.

Heuchera cylindrica **Dougl. ex Hook. var. *cylindrica* (Saxifraceae) - Mat Alumroot, Roundleaf Alumroot.**

syn. *H. glabella* T. et G., *H. ovalifolia* Nutt. ex T. et G., *H. saxicola* E. Nels., *H. suksdorfii* Rydb.

Collection - 20 km. north of Creston, B.C. on Hwy 3A., dike turnoff. Growing out of cracks in the rock on the north face of a cliff near the railroad tracks. May 19, 1991. Phytochemical voucher W-4.

***Holodiscus discolor* (Pursh) Maxim. (Rosaceae) - Cream Bush, Ocean Spray.**

syn. *H. ariaefolia* (Sm.) Greene, *H. dumosus* (Nutt. ex Hook.) Heller, *H. francisana* Rehd., *H. glabrescens* (Greenm.) Heller, *H. microphyllus* Rydb., *H. saxicola* Muhl., *Schizonotus argenteus* Kuntze, *S. discolor* Raf., *Spiraea argentea* Benth., *S. ariaefolia* Sm., *S. boursieri* (Carr.) Rehd., *S. discolor* Pursh, *S. dumosa* Nutt. ex Hook., *S. fissa* Lindl., *S. glabrescens* Muhl., *Sericotheca* Pursh, *S. concolor* Rydb., *S. francisana* Rydb., *S. obovata* Rydb.

Collection - Emory Creek, B.C., north of Hope on Hwy 1. Growing in along edge of the forest in partial shade. July 12, 1991. Phytochemical voucher F-3.

***Hypericum perforatum* L. (Hypericaceae) - Klamath Weed, St. John's-wort.**

syn. *H. angustifolium* Lowe, *H. deidesheimense* Sch. Bip. ex Trev., *H. lineolatum* Jord. in F. Schultz, *H. medium* Peterm., *H. microphyllum* Jord. in F. Schultz, *H. officinale* Gater. ex Steud., *H. officinarum* Crantz, *H. pseudo-perforatum* Bertol., *H. schlosseri* Heuff., *H. songaricum* Ledeb. ex Spreng., *H. stenophyllum* Opiz, *H. veronense* Schrank ex Link, *H. vulgare* Lam.

Collection - Vancouver, B.C. on the UBC Endowment Lands, along West 16 Avenue. Common weed in landscaped boulevard. July 4, 1991. Phytochemical voucher P-30.

***Ipomopsis aggregata* (Pursh) Grant ssp. *aggregata* (Polemoniaceae) - Scarlet Gilia, Sky-rocket, Trumpet Phlox.**

syn. *Batanthes aggregata* (Pursh) Raf., *B. bridgesii* Greene, *B. pulchella* (Dougl. ex Benth.) Greene, *Callisteria aggregata* (Pursh) Greene, *C. bridgesii* Greene, *Cantua aggregata* Pursh, *Collomia aggregata* (Pursh) Porter, *Gilia aggregata* (Pursh) Spreng., *G. puchella* Dougl. ex Benth., *Ipomeria aggregata* (Pursh) Nutt. Synonyms for other *I. aggregata* subspecies - *G. attenuata* (Gray) A. Nels., *G. bridgesii* (Gray) Wherry, *G. candida* Rydb., *G. texana* (Greene) Woot. et Standl., *I. arizonica* (Greene) Rydb.

Collection - 17 km. west of Osoyoos, B.C. on Hwy. 3. Open, gravelly, southern slope with *Lupinus sulphureus, Achillea millefolium,* and *Gaillardia aristata.* June 5, 1991. Phytochemical voucher P-13.

***Kalmia microphylla* (Hook.) Heller (Ericaceae) - Bog Laurel, Pale Laurel, Small-leaved Kalmia, Swamp Laurel, Swamp Tea.**

syn. *K. glauca* Ait. var. *microphylla* Hook., *K. microphylla* ssp. *occidentalis* (Small) Taylor et MacBryde, *K. microphylla* (Hook.) Heller var. *occidentalis* (Sm.) Ebinger, *K. occidentalis* Small, *K. polifolia* Wangenh. ssp. *microphylla* (Hook.) Caulder et Taylor, *K. polifolia* Wangenh. var. *occidentalis* (Sm.) Abrams

Collection - Mayer Lake, B.C. on Graham Island in the Queen Charlottes. Large population in boggy area around east side of lake, in full and part sun. June 21, 1991. Phytochemical voucher Q-5.

***Ledum groenlandicum* Oeder (Ericaceae) - Labrador Tea.**

syn. *L. canadense* Lodd., *L. latifolium* Ait., *L. pacificum* Small, *L. palustre* L. var. *groenlandicum* (Oeder) Hult., *L. palustre* L. var. *dilatum* Gray, *L. palustre* L. var. *latifolium* (Ait.) Michx., *Rhododendron groenlandicum* (Oeder) Kron et Judd

Collection - Mayer Lake, B.C. on Graham Island in the Queen Charlottes. Large population in boggy area around east side of lake, in full and part sun. June 21, 1991. Phytochemical voucher Q-4.

***Lomatium dissectum* (Nutt.) Math. et Const. var. *multifidum* (Nutt.) Math. et Const. (Umbelliferae) - Bear Root, Chocolate Tips, Fern Leaved Lomatium, Indian Balsam, Ritual Root.**

syn. *Cynapium bigelovii* Torr., *Ferula dissoluta* Wats., *F. multifida* A. Gray, *Leptotaenia dissecta* Nutt. ex T. et G., *Leptotaenia multifida* Nutt., *Leptotaenia purpurea* Rydb.

Collection - 15 km. north of Creston, B.C. on Hwy 3A, #6668, M.L. Hubner homestead. In waste area along east side of the highway. Steep rock bluff with shallow sandy soil and southern exposure. Elev. ~ 1900 ft. May 19, 1991. Phytochemical voucher W-10.

***Lonicera ciliosa* (Pursh) Poir. ex DC. (Caprifoliaceae) - Orange Honeysuckle, Western Trumpet Honeysuckle.**

syn. *Caprifolium ciliosum* Pursh, *C. occidentale* Lindl., *Lonicera brownii* Hort. ex Fl. des Serres, *L. ciliata* F.G. Dietr., *L. occidentalis* Hook.

Collection - Emory Creek, B.C., north of Hope on Hwy 1. Growing in forest understory in partial shade. July 12, 1991. Phytochemical voucher F-2.

***Lonicera involucrata* Banks ex Spreng. (Caprifoliaceae) - Bearberry, Black Twinberry, Twinflower Honeysuckle.**

syn. *L. flavescens* Dippel, *L. gibbosa* (Moc. et Suesse) ex DC.. *L. intermedia* Kellogg, *L. ledebourrii* Eschsch., *L. mociniana* DC., *Caprifolium* Kuntze, *Distegia* Coch., *Xylosteum* Rich.

Collection - 8.7 km east of Mount Currie, B.C. on Duffy Lake Road. Growing alongside the road in sandy soil with *Rosa nutkana*. July 12, 1991. Phytochemical voucher F-5.

***Lupinus sericeus* Pursh ssp. *sericeus* (Leguminosae) - Sulphur Lupin.**

syn. *L. albicaulis* Hook., *L. aliumbellatus* C.P. Sm., *L. amniculi* C.P. Sm., *L. blankinshipii* Heller, *L. buckinghamii* C. P. Sm., *L. falsocomatus* C.P. Sm., *L. fikeranus* C.P. Sm., *L. flavicaulis* Rydb., *L. flexuosus* S. Wats., *L. herman-workii* C.P. Sm., *L. huilcoflorus* C.P. Sm., *L. jonesii* Blank, *L. leucopsis* J.G. Agardh., *L. obtusilobus* , *L. ornatus* Nutt., *L. ramosus* A. Nels., *L. sericeus* Cooper, *L. spiraephilus* C.P. Sm., *L. subulatus* Rydb., *L. tuckerianus* C.P. Sm.

Collection - 17 km. west of Osoyoos, B.C. on Hwy. 3. On southern exposure of gravelly slope with *Gilia aggregata, Achillea millefolium,* and *Gaillardia aristata.* June 5, 1991. Phytochemical voucher P-12.

***Lysichiton americanum* Hulten et St. John (Araceae) - Western Skunk Cabbage.**

syn. *Dracontium kamtschatcense* L., *Lysichiton camtschatcensis* (L.) Schott, *Symplocarpus kamtschaticus* Bong.

Collection - 4 km. north of Port Clements, B.C. (Queen Charlotte Islands). Growing in stagnant ditch water in heavy grey clay and around edges of swampy gully. June 27, 1991. Phytochemical voucher Q-26.

***Mahonia aquifolium* (Pursh) Nutt. (Berberidaceae) - Barberry, Mountain Grape, Oregon Grape.**

syn. *Berberis aquifolium* Pursh, *B. dictyota* Jeps., *M. dictyota* (Jeps.) Fedde in Engler, *M. diversifolia* Sweet, *M. fascicularis* DC., *Odostemon aquifolium* (Pursh) Rydb.

Collection - 15 km. north of Creston, B.C. on Hwy 3A, Wyndel District, #6668. M.L. Hubner homestead. On rocky hillside with southern exposure. Elev. ~ 3,000 ft. Waste area alongside trail, in shallow sandy soil. May 18, 1991. Phytochemical voucher W-2.

Maianthemum racemosum **(L.) Link (Liliaceae) - False Solomon's Seal, (False) Spikenard, Fat Solomon, Smilacine à Grappes.**

syn. *Convallaria* L., *Smilicina amplexicaulis* Nutt., *S. brachypetala* Rydb., *S. ciliata* Desf., *S. flexicaulis* Wender, *S. racemosa* (L.) Desf., *Vagnera amplexicaulis* (Nutt.) Greene, *V. australis* Rydb., *V. racemosa* (L.) Morong

Collection - 15 km. north of Creston, B.C. on Hwy 3A, #6668, M.L. Hubner homestead. In undergrowth along driveway, rich humus, western exposure. May 20, 1991. Phytochemical voucher W-17.

Maianthemum stellatum **(L.) Link (Liliaceae) - Slim Solomon, Smilacine Etoilée, Spikenard, Star Flower, Star Flowered False Solomon's Seal, Thin Solomon.**

syn. *Convallaria* L., *Smilicina liliacea* (Greene) Wynd, *S. sessilifolia* Nutt., *S. stellata* (L.) Desf., *Unifolium liliaceum* Greene, *Vagnera liliacea* (Greene) Rydb., *V. sessilifolia* (Nutt. ex Baker) Greene, *V. stellata* (L.) Morong

Collection - West Creston Flats on S. Nick's Island Road, 11 km. west of Creston, B.C. Shaded waste area along bank of Kootenay River in sandy soil with grasses. May 29, 1991. Phytochemical voucher W-13.

Moneses uniflora **(L.) Gray (Ericaceae) - Single delight, Woodnymph.**

syn. *M. brevicaulis* Schur, *M. grandiflora* S.F. Gray, *M. reticulata* Nutt., *M. verticillata* Schur, *Pyrola uniflora* L., *P. halleri* Steud.

Collection - Masset, B.C. (Queen Charlotte Islands), near Masset cemetary. Growing on mossy stumps and decaying wood throughout forest. June 23, 1991. Phytochemical voucher Q-8.

Monotropa uniflora **L. (Ericaceae) - Indian Pipe.**

syn. *M. brittonii* Small, *M. coccinea* Zucc., *M. humilis* D. Don, *M. morisoni* Pers.

Collection - Maple Ridge, B.C. at the UBC Research Forest. Along the Green Trail, on the south side of the Alouette River. Growing in rich humus litter of coniferous forest. July 18, 1991. Phytochemical voucher P-19.

Nuphar lutea **(L.) Sm. ssp.** *polysepala* **(Engelm.) E.O. Beal (Nymphaeaceae) - Cow Lily, Indian Pond Lily, Spatterdock, Wakas, Wokas, Yellow Pond Lily.**

syn. *N. polysepala* Engelm., *Nymphaea advena* Soland. in Ait., *Nymphaea polysepala* (Engelm.) Greene, *Nymphozanthus polysepala* (Engelm.) Fern.

Collection - Mayer Lake, B.C. on Graham Island in the Queen Charlottes. Large population around edge of the lake. June 21, 1991. Phytochemical voucher Q-3.

Oplopanax horridus **Miq. (Araliaceae) - Devil's Club.**

syn. *Echinopanax horridus* (Sm.) Decne et Planch., *Fatsia horrida* Benth. et Hook., *Panax horridus* Smith, *Ricinophyllum horridum* Nels. et Macbr.

Collection - Near Port Clements, B.C. (Queen Charlotte Islands), along the Golden Spruce Trail. Growing in shaded site on the silty riverbank of the Yakoun River. June 24, 1991. Phytochemical voucher Q-14.

Opuntia fragilis **(Nutt.) Haw. (Cactaceae) - Pigmy Tuna, Prickly-pear Cactus.**

syn. *Cactus* Nutt., *O. brachyarthra* Engelm. et Bigel., *O. columbiana* Griff., *O. missouriensis* Macoun, *O. polyacantha* Raup, *O. sabinii* Hort. ex Pfeiff., *O. schweriniana* K. Schum., *Tunas fragilis* (Nutt.) Nwd. et Lunell

Collection - 30 km. east of Lilloett, B.C. on Hwy 12. Growing on dry, gravelly hillside with *Artemisia tridentata* and *Chrysothamnus nauseosus* in full sun. July 12, 1991. Phytochemical voucher F-4.

Osmorhiza purpurea **(Coult. et Rose) Suksdorf (Umbelliferae) - Sweet Cicely, Purple Sweet Cicely, Purple Sweet-root, Wood Cicely.**

syn. *Myrrhis nuda* Greene, *Washingtonia (O.; Uraspermum) brevipes* C. et R., *O. chiloensis* H. et A. var. *purpurea* (Coult. et Rose) Boivin, *O. (Scandix; W.; U.) divaricata* Nutt., *W. (O.) intermedia* Rydb., *O. (S.; U.; W.) nuda* Torr., *Washingtonia purpurea* Coult. et Rose, *W (O.) leibergii* C. et R.

Collection - Near Port Clements, B.C. (Queen Charlotte Islands). 3 km. south of Port Clements on Juskatla Road, close to the mouth of the Yakoun River. Growing in open, sandy waste area near the shore of the river, in full sun and light shade. June 26, 1991. Phytochemical voucher Q-24.

***Penstemon fruticosus* (Pursh) Greene (Scrophulariaceae) - Shrubby or Bush Penstemmon.**

syn. *Gerardia fruticosus* Pursh, *Dasanthera fruticosa* Raf., *Penstemon adamsianus* Howell, *P. crassifolius* Lindl., *P. douglasii* Hook., *P. lewisii* Benth., *P. menziesii* Hook., *P. newberryi* A. Gray, *P. peduncularis* Nutt., *P. scouleri* Lindl.

Collection - 21 km. east of Princeton, B.C. on Hwy 3. Growing in cracks in rock bluff alongside the road. June 5, 1991. Phytochemical voucher P-4.

***Philadelphus lewisii* Pursh (Hydrangeaceae) - Mockorange, Syringe.**

syn. *P. angustifolius* Rydb., *P. californicus* Benth., *P. cordifolius* Lange, *P. freemontii* Rydb., *P. gordonianus* Lindl., *P. helleri* Rydb., *P. intermedius* A. Nels., *P. platyphyllus* Rydb.

Collection - 7 km. west of Osoyoos, B.C. on Hwy 3. Growing on a steep embankment on north side of the highway, full sun. June 6, 1991. Phytochemical voucher P-22.

***Plantago major* L. (Plantaginaceae) - Common Plantain, Lantén, LLanten, White Man's Foot, Yanten.**

syn. *P. adriatica* Campana, *P. altissima* Loisel., *P. angustata* Schur, *P. arctica* Torr., *P. asiatica* L., *P. bracteata* Moench, *P. camtschatica* Lindl., *P. cornuti* Gowan, *P. crenata* Blanco, *P. dentata* Fl. Corc., *P. exaltata* Hornem., *P. filiformis* Buch. - Ham. ex D. Don, *P. gracilis* Hort. ex Steud., *P. halophila* Bickn., *P. humifusa* Bernh., *P. intermedia* Gilib., *P. latifolia* Salisb., *P. limosa* Kit. ex Roem. et Schult., *P. longiscapa* Jacquem. ex Decne, *P. lutulenta* Lamotte, *P. maxima* Ruching, *P. media* Blanco, *P. minima* DC., *P. minor* Gilib., *P. nana* Tratt., *P. nitrophylla* Nels., *P. officinarum* Crantz, *P. pauciflora* Gilib., *P. polystachia* Fl. Corc., *P. rosea* Hort. ex Reichb., *P. stylosa* Bess. ex Decne, *P. subsinuata* Hornem., *P. tabernaemontani* Baumg., *P. uliginosa* F.W. Schmidt

Collection - Near Port Clements, B.C. (Queen Charlotte Islands). 3 km. south of Port Clements on Juskatla Road, close to the mouth of the Yakoun River. Growing in open, sandy waste area near the shore of the river in dapple shade. June 26, 1991. Phytochemical voucher Q-22.

Populus tremuloides **Michx. (Salicaceae) - American Aspen, Quaking Aspen, Tremble, Trembling Aspen.**

syn. *P. aurea* Tid., *P. benzoifera* Tausch, P. cercidphylla Britt., *P. cordata* Hort. ex Poir., *P. glandulosa* Willd. ex Steud., *P. graeca* Ait., *P. pendula* Hort. ex Tausch, *P. sibirica* Hort. ex Tausch, *P. tremula* Cochran, *P. vancouveriana* Trel.

Collection - Near Penticton, B.C. at the south end of Apex Alpine road, 13 km. from Hwy 97. With Ponderosa pine and fir in open woods. June 6, 1991. Phytochemical voucher P-34.

Potentilla arguta **Pursh (Rosaceae) - Glandular, Tall or Valley Cinquefoil.**

syn. *Drymocaulis agrimonoides* (Pursh) Rydb., *D. arguta* (Pursh) Rydb., *D. corymbosa* Rydb., *Geum agrimonoides* Pursh, *P. agrimonoides* Pursh, *P. artica* Hort. ex Lehm., *P. bigloviana* Wender., *P. confertiflora* Torr., *P. convallaria* Rydb., *P. ferruginea* Dougl. ex Hook., *P. glutinosa* Pursh

Collection - 10 km. north of Creston, B.C. on Hwy 3A. Waste area alongside the road with southern exposure. Rocky area with shallow, sandy topsoil. May 19, 1991. Phytochemical voucher W-7.

Prunus virginiana **L. (Rosaceae) - Chokecherry, Capulín, Rum Cherry.**

syn. *P. arguta* Bigel. ex M. Roem., *P. canadensis* Marsh., *P. demissa* D. Dietr., *P. demissa* (Nutt.) Walp., *P. fimbriata* Steud., *P. hirsuta* Ell., *P. melanocarpa* (A. Nels.) Rydb., *P. micrantha* Steud., *P. montana* Hort. ex C. Koch, *P. (Padus) nana* Duroi, *P. obovata* Bigel., *P. rubra* Ait., *P. serotina* Poir., *Cerasus (Prunus; Padus) demissa* Nutt., *C. demissa* Nutt. var. *melanocarpa* Nels., *Padus melanocarpa* (A Nels.) Shafer, *Padus virginiana* (L.) Roem.

Collection - 15 km. north of Creston, B.C. on Hwy 3A, #6668, M.L. Hubner homestead. On rock bluff with shallow sandy soil and southern exposure. Elev. ~ 1900 ft. May 19, 1991. Phytochemical voucher W-9; var. *demissa* (Nutt.) Torr.

Collection - 22 km. east of Princeton, B.C. along Hwy 3, near Bromley's Rock Picnic Ground. Growing in gravelly soil in full sun. June 6, 1991. Phytochemical voucher P-40; var. *melanocarpa* (Nels.) Sarg.

Rhus glabra **L. (Anacardiaceae) - Scarlet or Smooth Sumac.**

syn. *R. borealis* Greene, *R. calophylla* Greene, *R. carolinina* Mill., *R. elegans* Ait., *R. laevicaulis* T. et G., *R. viridiflora* Hort. ex Engl. in DC.

Collection - 7 km. west of Osoyoos, B.C. on Hwy 3. Growing on a steep embankment on the north side of the highway, in full sun. June 6, 1991. Phytochemical voucher P-23.

Ribes sanguineum **Pursh (Grossulariaceae) - Red Currant, Sierra Currant.**

syn. *R. albidum* Paxt., *R. alceaefolium* Kunze ex Walp., *R. ascendens* Eastw., *R. augustum* Dougl. ex Baxt., *R. deductum* Greene, *R. glaucescens* Eastw., *R. glutinosum* Benth., *R. grantii* Muhl., *R. hittellianum* Eastw., *R. malvaceum* Sm. in Rees, *R. nevadense* Kellogg, *R. sanctae-luciae* Jancz., *R. trilobum* Meyen., *R. tubiflorum* C.A. Mey., *R. tubulosum* Eschsch.

Collection - North of Osoyoos, B.C. along Hwy 3 on Osoyoos hill. Growing in the wash of a grassy slope. June 6, 1991. Phytochemical voucher P-18.

Rosa nutkana **Presl var.** ***nutkana*** **(Rosaceae) - Wild Rose, Nootka Rose, Nutkana's Rose.**

syn. *R. aleutensis* Crep., *R. amblyotis* C.A. Mey., *R. anatonensis* St. John, *R. brownii* Rydb., *R. caeruleimontana* St. John, *R. camtschatica* Erman, *R. caryocarpa* Dougl., *R. durandii* Crep., *R. fraxinifolia* Hook., *R. jonesii* St. John, *R. lyalliana* Crep., *R. macdougalii* Holz., *R. macrocarpa* Nutt. ex Rafin., *R. megacarpa* Nutt. ex Torr. et Gray, *R. megalantha* Jones, *R. muriculata* Greene, *R. spaldingii* Crep., *R. woodsii* Regel not Lindl., *R. yainacensis* Greene

Collection - 21 km. east of Princeton, B.C. on Hwy 3. In open, rocky waste area alongside the road with grasses. June 5, 1991. Phytochemical voucher P-5.

Rubus parviflorus **Nutt. (Rosaceae) - Thimbleberry.**

syn. *Bossekia parviflora* (Nutt.) Greene, *Rubacer parviflorum* (Nutt.) Rydb., *Rubus nutkanus* Moc. ex Ser., *R. tomentosum* Rydb., *R. velutinus* Muhl.

Collection - Near Penticton, B.C. at the south end of Apex Alpine road, 1 km. from Hwy 97. Moist shady site alongside stream in gravelly soil. June 6, 1991. Phytochemical voucher P-28.

***Salix bebbiana* Sarg. (Salicaceae) - Bebb Willow, Long-beaked Willow.**

syn. *S. cinerascens* Link ex Willd., *S. depresa* L., *S. fusca* Hook., *S. livida* Wahlenb. var. *occidentalis* Gray, *S. perrostrata* Rydb., *S. rostrata* Rich., *S. starkeana* Willd., *S. vagens* Hook.

Collection - 10 km. from Penticton, B.C. on Green Mountain Road. Tree growing in gravelly soil alongside a slow moving stream. June 6, 1991. Phytochemical voucher P-36.

***Sambucus cerulea* Raf. (Caprifoliaceae) - Blue Elderberry, Capulín Silvestre, Flor De Sauz.**

syn. *S. californica* Hort. ex C. Koch, *S. decipiens* Jones, *S. ferax* Nels., *S. fimbriata* Greene, *S. fontenaysii* Carr., *S. glauca* Nutt. ex T. et G., *S. mexicana* Presl ex DC. ssp. *cerulea* (Raf.) Murr., *S. neomexicana* Woot., *S. orbiculata* Greene, *S. velutina* Dur. et Hilg., *S. tomentella* Hell. ex Schwer.

Collection - 5 km. west of Osoyoos, B.C. on Hwy. 3. North face of steep rock cliff alongside highway, in run-off channel from slope. June 5, 1991. Phytochemical voucher P-16.

***Sambucus racemosa* L. ssp. *pubens* (Michx.) House var. *arborescens* (T. et G.) A. Gray (Caprifoliaceae) - Black Elderberry.**

syn. *S. arborescens* (T. et G.) Howell, *S. callicarpa* Greene, *S. leiosperma* Leib., *S. maritima* Greene, *S. melanocarpa* Gray, *S. microbotyrs* Rydb., *S. nigra* Thunb., *S. pubens* Michx. var. *arborescens* T. et G., *S. pubescens* Pers., *S. seminata* Vilm. ex Schwer., *S. sieboldiana* Blume ex Miq., *S. verrucosa* Raf., *S. williamsii* Hance

Collection - Near Port Clements, B.C. (Queen Charlotte Islands). 3 km. south of Port Clements on Juskatla Road, close to the mouth of the Yakoun River. Growing in sandy soil near the edge of the river in full sun. June 26, 1991. Phytochemical voucher Q-21.

***Sedum lanceolatum* Torr. (Crassulaceae) Explorers Sedum, Lance-leaved Sedum.**

syn. *Amerosedum lanceolatum* (Torr.) A. et D. Love, *A. nesioticum* (Jones) A. et D. Love, *A. subalpinum* (Blank.) A. et D. Love, *S. stenopetalum* Pursh, *S. coerulescens* Haw., *S. latifolia* Nutt. ex Baker

Collection -North of Osoyoos, B.C. along Hwy 3 on Osoyoos hill. Growing in cracks of mossy rocks, southwestern exposure. June 6, 1991. Phytochemical voucher P-20.

Shepherdia canadensis **(L.) Nutt. (Elaeagnaceae) - Soapberry, Soopolallie, Canadian Buffalo Berry.**

NB. The name "Buffalo Berry" is generally used to refer to the eastern species *S. argentea.*

syn. *Hippophae canadensis* L., *Elaeaganus canadensis* (L.) Nels., *Lepargyrea canadensis* (L.) Greene

Collection - Prince George, B.C. at Moore's Meadow. Semi-open, sub-boreal spruce forest. 1 m. shrub growing with Aspen, Willow and Twinberry. Locally common. Elev. 570 m. July 16, 1991. Phytochemical voucher W-16.

Spiraea betulifolia **Pall. (Rosaceae) - Shiny Leaf Spiraea.**

syn. *S. arbuscula* Greene, *S. corymbosa* Raf., *S. densiflora* Nutt., *S, helleri* Rydb., *S. lucida* Dougl. ex Greene, *S. ostryfolia* Rafin., *S. procumbens* Kirch., *S. repens* Raf., *S. splendens* Baum.

Collection - 22 km. northeast of Princeton, B.C. on Hwy 3 at Bromley's Rock Picnic Ground. Growing in gravelly soil along river. June 6, 1991. Phytochemical voucher P-41.

Spiraea pyramidata **Greene (Rosaceae) - Pyramid Spiaea.**

syn. *S. tomentulosa* Rydb.

Collection - 5 km. west of Osoyoos, B.C. on Hwy 3. Growing on northern face of rocky slope. June 5, 1991. Phytochemical voucher P-15.

Symphoricarpos albus **(L.) Blake var.** ***laevigatus*** **(Fern.) Blake (Caprifoliaceae) - Common Snowberry.**

S. elongatus Presl ex DC., *S. heterophyllus* Presl ex DC., *S. leucocarpus* Hort. ex C. Koch, *S. pauciflorus* (Rob. Britt., *S. pubescens* Pers., *S. (Symphoria) racemosus* Michx. var. *laevigatus* Fern., *S. rivularis* Suksd., *Vaccinium* L., *Xylosteon* Moldenke

Collection - Near Penticton, B.C. at the south end of the road to Apex Alpine, 0.5 km. from intersection with Hwy 97. June 6, 1991. Phytochemical voucher P-26.

Urtica dioica **L. ssp.** ***gracilis*** **(Ait.) Seland. var.** ***lyallii*** **(Wats.) Hitchc. (Urticaceae) - Stinging Nettle.**

syn. *U. aquatica* Lindl., *U. bollae* Kanitz, *U. breweri* S. Wats., *U. californica* Greene, *U. cardiophylla* Rydb., *U. diplotricha* Phil., *U. galeopsifolia* Wierz. ex Opiz, *U. glabratum* Clem. ex Vis., *U. gracilis* Ait., *U. hispida* DC., *U. hispidula* Cariot, *U. holosericea* (Nutt.) Jepson, *U. lyallii* S. Wats., *U. major*Kanitz, *U. mexicana* Blume, *U. platyphylla* Wedd., *U. procera* Muhl. ex Willd., *U. pseudo-dioica* Steud., *U. pubescens* Ledeb., *U. radicans* Bolla, *U. serra* Blume, *U. strigosissima*

Rydb., *U. submitis* Boiss., *U. trachycarpa* Weddell

Collection - Near Penticton, B.C. at the south end of road to Apex Alpine, 1 km. from intersection with Hwy 97. Moist, shady site alongside stream. Gravelly soil. June 6, 1991. Phytochemical voucher P-27.

Verbascum thapsus **L. (Scrophulariaceae) - Candelaria, Common Mullein, Flannel Leaf, Flannel Mullein or Plant, Gordolobo, Hung Wort, Mule Tail, Punchón, Tobaco Cimarrón, Torch Weed, Velvet Dock or Plant, Verbasco, Wood Blade, Woolly Mullein.**

syn. *V. alatum* Lam., *V. angustius* Schrank, *V. bicolle* Roem. et Schult., *V. blattaria* J.A. Schmidt, *V. bracteactum* Kichx ex Dum., *V. canscens* Jord., *V. collinum* Schrad., *V. cuspidatum* Schrad., *V. decurrens* Stokes, *V. elongatum* Wild., *V. giganteum* Willk., *V. indicum* Wall., *V. intermedium* Leman ex Roem. et Schult., *V. lanatum* Gilib., *V. linnaei* Opiz ex Berecht. et Opiz, *V. lychnitis* Schultz, *V. neglectum* Guss., *V. officinarum* Crantz, *V. pallidum* Nees, *V. plantagineum* Moris, *V. schraderi* G.F.W. Mey., *V. seminigrum* Fries, *V. spectabile* Salisb., *V. subalpinum* Schur, *V. tapsus* Neck, *V. thapsiforme* Guss., *V. thapsoides* Schrank ex Schrad., *V. thapsum* St. Lag., *V. visianianum* Reichb., *Thapsus limaei* Opiz, *T. schraderi* Opiz

Collection - 14 km. west of Osoyoos, B.C. on Hwy 3. Dry, gravelly embankment on the north side of the highway, full sun. June 6, 1991. Phytochemical voucher P-24.

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[a] Key to collection sites: F, Fraser River Canyon; P, Princeton-Penticton region; Q, Queen Charlotte Islands; W, Wyndel region. Collectors for all specimens were A.R. McCutcheon and S.M. Ellis.

6.2 Appendix 2 - Annotated list of phase two voucher specimens

A voucher specimen for each plant collected for the phase two study was filed in the University of British Columbia Herbarium. The collection details for each of these specimens are given below. Synonyms for the botanical names and common names have also been included to facilitate the evaluation of ethnobotanical literature in subsequent appendices. It should be noted that even though several specimens were identified at the subspecific or varietal level, the synonyms listed are for the specific epithet. In the past, many authors have treated *Oenothera villosa* and *Physocarpus capitatus* as a variety or subspecies of a larger species (*O. biennis* and *P. opulifolius* respectively). Therefore, in these two cases, synonyms for the latter species names have also been included.

EUMYCOTA (Lichens) as authenticated by Dr. W. Schofield, Dept. of Botany, University of British Columbia.

Peltigera brittanica **(Gyeln.) Holtan-Hartw. et Tonsb. - Freckle Pelt.**

Collection - Rest area 46 km. west of Port Alberni, B.C. on Hwy. 4. Growing on very dense coniferous forest litter in heavy shade. Phytochemical voucher V-19.

THALLOPHYTA (Algae) as authenticated by J. Oliviera, Dept. of Botany, University of British Columbia.

Enteromorpha clathrata **(Roth) Greville (Ulvaceae) - Green Filamentous Alga.**

Collection - Vancouver, B.C. South side of English Bay at Spanish Banks Beach. September 26, 1994. Phytochemical voucher V-41.

Fucus gardneri **Silva (Fucaceae) - Rockweed.**

syn. *F. distichus* Silver, *F. evanescens* C. Agardh.

Collection - Frank Island off of Chesterman's Beach (west coast of Vancouver Island between Pacific Rim National Park and Tofino, B.C.) Growing on volcanic rocks on the windward side of the island, beneath the high tide mark. July 27, 1994. Phytochemical voucher V-34.

Mazzaella splendens **(Setch. et Gard.) Hommersand (Gigartinaceae)**

syn. *Iridea cordata* (Turner) Bory var. *splendens* Roth, *I. splendens* Roth.

Collection - Vancouver, B.C. South side of English Bay at Spanish Banks Beach. September 26, 1994. Phytochemical voucher V-45.

Laminaria saccharina **(L.) Lamouroux (Laminariaceae) - Brown Kelp.**

Collection - Vancouver, B.C. South side of English Bay at Spanish Banks Beach. September 26, 1994.

Phytochemical voucher V-43.

Nereocystis luetkeana **(Mertens) Post. et Rupr. (Laminariaceae) - Bladder Kelp.**

Collection - Vancouver, B.C. South side of English Bay at Spanish Banks Beach. September 26, 1994.

Phytochemical voucher V-42.

Ulva fenestrata **Post. et Rupr. (Ulvaceae) - Sea Lettuce.**

Collection - Vancouver, B.C. South side of English Bay at Spanish Banks Beach. September 26, 1994.

Phytochemical voucher V-44.

BRYOPHYTA (Mosses and liverworts) as authenticated by Dr. W. Schofield, Dept. of Botany, U.B.C.

Homalothecium nevadense **(Lesq.) Ren. et Card. (Brachytheciaceae) - Golden Leaved Moss.**

syn. *Hypnum nevadense* Lesq., *Homalothecium sericeoides* C. Muell. et Kindb.

Collection - Birkenhead Lake, B.C. Growing on a vertical rock face on the north side of the lake, eastern exposure. July 5, 1994. Phytochemical voucher P-51.

Hookeria lucens **(Hedw.) Sm. (Hookeriaceae) - Clear Moss.**

syn. *Hypnum lucens* Hedw., *Pterygophyllum lucens* (Hedw.) Brid.

Collection - Meare's Island, B.C. Growing in deep shade of coniferous rainforest on well rotted wood. July 22, 1994. Phytochemical voucher V-37.

Isothecium stoloniferum **Brid. (Brachytheciaceae) - Cat Tail Moss.**

syn. *Eurhynchium stoloniferum* (Brid.) Jaeq., *Hypnum acuticuspis* Mitt., *H. spiculiferum* Mitt., *I. cardotii* Kindb. ex Mac., *I. myosuroides* Brid., *I. myurcellum* Kindb. in Mac., *I. myurellum* Kindb. in Mac., *I. obtusatulum* Kindb., *I. thamnioides* Kindb., *Pseudisothecium stoloniferum* (Brid.) Grout var. *myrullum* (Kindb.) Grout

Collection - Carmanagh Valley, B.C. (west coast of Vancouver Island between Port Renfrew and Ueculot). Growing on a live tree along the trail down into the Carmanagh. July 3, 1994. Phytochemical voucher V-22.

Plagiothecium undulatum **(Hedw.) B.S.G. (Plagiotheciaceae) - Wavy Leaved Cotton Moss.**

syn. *Hypnum undulatum* Hedw., *Stereodon undulatus* (Hedw.) Mitt.

Collection - Maple Ridge, B.C at the U.B.C. Research Forest. Growing on a living tree beside the Alouette River. June 27, 1994. Phytochemical voucher M-11.

***Pogonatum contortum* (Brid.) Lesq. (Polytrichiaceae) - Contorted Hair-cap Moss.**

syn. *P. laterale* (Schrimp. in Jard.) Brid., *Polytrichum contortum* Munz, *Polytrichum laterale* Brid.

Collection - Maple Ridge, B.C. at the U.B.C. Research Forest. Growing on rotting wood along the Green Trail on the east side of the Alouette River. June 27, 1994. Phytochemical voucher M-14.

***Polytrichum commune* Hedw. (Polytrichiaceae) - Common Hair-cap Moss, Pigeon Wheat.**

syn. *P. jensenii* Hag., *P. perigoniale* Michx., *P. propinquum* R. Br., *P. quadrangulare* Gilib. ex Steud.

Collection - Near Tofino, B.C.. Boggy ditch along Hwy 4, just north of the north entrance to Pacific Rim National Park. June 22, 1994. Phytochemical voucher V-13.

***Racomitrium elongatum* Ehrh. ex Frisv. (Grimmiaceae) - Shaggy Yellow Sand Moss.**

Collection - Rest area 46 km. west of Port Alberni, B.C. on Hwy 4. Growing in a forest opening on a rock. June 22, 1994. Phytochemical voucher V-18.

***Rhizomnium glabrescens* (Kindb.) Kop. (Mniaceae) - Large Leafy Moss.**

syn. *Mnium glabrescens* Kindb.

Collection - Maple Ridge, B.C. at the U.B.C. Research Forest. Growing on rotting wood along the Green Trail on the east side of the Alouette River. June 27, 1994. Phytochemical voucher M-13.

***Rhytidiadelphus loreus* (Hedw.) Warnst. (Rhytidiaceae) - Hanging Basket Moss, Lanky Moss.**

syn. *Hypnum loreum* Hedw., *Hylocomium loreum* (Hedw.) B.S.G.

Collection - Carmanagh Valley, B.C. (west coast of Vancouver Island between Port Renfrew and Ueculot). Growing on a dead tree along the trail down into the Carmanagh. July 3, 1994. Phytochemical voucher V-23.

***Scapania bolanderi* Aust. (Bryidae) - Yellow Ladle Liverwort.**

Collection - Maple Ridge, B.C. at the U.B.C. Research Forest. Growing on rotting wood along the Green Trail on the east side of the Alouette River. Phytochemical voucher M-12.

***Sphagnum henryense* Warnst. (Sphagnidae) - Henry's Peat Moss.**

Collection - Near Tofino, B.C.. Boggy ditch along Hwy 4, just north of the north entrance to Pacific Rim National Park. June 22, 1994. Phytochemical voucher V-9.

TRACHEOPHYTA (Vascular plants)

Lycopsida (Club mosses)

***Lycopodium annotinum* L. (Lycopodiaceae) - Stiff Club-moss.**

syn. *L. pungens* La Pylaie, *L. dubium* Zoega, *Lepidotis annotinum* Beauv.

Collection - Monashee Summit, B.C.. Growing in dry coniferous forest in dense litter and heavy shade. August 12, 1994. Phytochemical voucher N-22.

***Selaginella wallacei* Hieron. (Selaginaceae) - Wallace's Spikemoss, Selaginelle.**

syn. *S. montanensis* Hieron.

Collection - West end of the Baden-Powell Trail, 1 km. southeast of Horseshoe Bay, B.C. on the east side of Hwy 1. On a rock cliff overlooking the highway. Growing under an Arbutus tree with *Spiraea.* September 3, 1994. Phytochemical voucher N-37.

Sphenopsida (Horsetails)

***Equisetum fluviatile* L. (Equisetaceae) - Swamp Horsetail, Water Horsetail.**

syn. *E. limosum* L.

Collection - Vancouver, B.C. at the U.B.C. Botanical Gardens - Native Garden. Growing in the pond. September 28, 1994. Phytochemical voucher N-48.

***Equisetum pratense* Ehrb. (Equisetaceae) - Meadow Horsetail.**

syn. *E. umbrosum* Mey.

Collection - Near Tofino, B.C.. Boggy ditch along Hwy 4, just north of the north entrance to Pacific Rim National Park. June 22, 1994. Phytochemical voucher V-11.

***Equisetum scirpoides* Michx. (Equisetaceae) - Dwarf Scouring Rush, Sedgelike Horsetail.**

Collection - Vancouver, B.C. at the U.B.C. Botanical Gardens - Native Garden. Growing in amongst shrubs around the pond. September 28, 1994. Phytochemical voucher N-46.

***Equisetum variegatum* (Schleich.) Bruhin (Equisetaceae) - Northern Scouring Rush, Variegated Horsetail.**

syn. *E. hyemale* L. var. *jesupii* (Eat.) Vict., *Hippochaete variegata* Schleich. ex F. Weber et D.H.M. Mohr

Collection - 35 km. east of Keremeos, B.C. on Hwy. 3 (13 km. west of junction with Hwy. 97). Growing in an open, muddy ditch leading into a small pond, on south side of the highway. June 8, 1994. Phytochemical voucher P-46.

Pteropsida - Filicinae (Ferns)

***Adiantum pedatum* L. (Polypodiaceae) - Northern or Western Maidenhair Fern.**

Collection - Pachena Bay near Bamfield, B.C., at the beginning of the West Coast Trail. Growing on the western face of a partially shaded, steep rocky cliff with *Polystichum munitum*. July 3, 1994. Phytochemical voucher V-25.

***Blechnum spicant* (L.) Roth. (Polypodiaceae) - Deer Fern.**

syn. *Lomaria spicant* (L.) Desv., *Osmunda spicant* L., *O. borealis* Salisb., *Struthiopteris* Weiss

Collection - U.B.C. Research Forest at Maple Ridge, B.C. Growing in coniferous forest, partially shaded. June 10, 1994. Phytochemical voucher M-6.

***Cryptogramma acrostichoides* R. Br. (Polypodiaceae) - American Parsley Fern, Rock-brake, Mountain Parsley.**

syn. *C. crispa* (L.) R. Br.

Collection - West end of the Baden-Powell trail, 1 km. southeast of Horseshoe Bay, B.C. on the east side of Hwy 1. On a rock cliff overlooking the highway. Growing in rock crevices, full sun. September 3, 1994. Phytochemical voucher N-39.

***Dryopteris campyloptera* Clarkson (Polypodiaceae) - Mountain Wood Fern, Spreading Wood Fern, Spinulose Shield Fern.**

syn. *D. austriaca* (Jacq.) Woynar, *D. carthusiana* Gray, *D. dilatata* (Hoffm.) Gray, *D. spinulosa*

(Hoffm.) Watt, *Polypodium dilatatum* Hoffm., *P. spinulosum* Muell.

Collection - Maple Ridge, B.C. at the U.B.C. Research Forest. Growing in coniferous forest, dapple shade. June 10, 1994. Phytochemical voucher M-5.

***Gymnocarpium dryopteris* (L.) Newm. (Polypodiaceae) - Oak Fern.**

syn. *Carpogymnia* Love et Love, *Nephrodium* Michx., *Phegopteris* Fee, *Polypodium* L., *Thelyopteris* Slosson, *Dryopteris dissjuncta* (Rupr.) Morton, *D. dryopteris* Christ, *D. linnaeana* Chr.

Collection - 10 km. east of Birkenhead Lake, B.C. in moist, shady coniferous forest. July 7, 1994. Phytochemical voucher P-52.

***Onoclea sensibilis* L. (Polypodiaceae) - Sensitive Fern.**

syn. *O. obtus* Schk.

Collection - Vancouver, B.C. at the U.B.C. Botanical Gardens - Native Garden. Growing in moist, shaded site alongside a small stream. September 28, 1994. Phytochemical voucher N-45.

***Polypodium scouleri* Hook. et Grev. (Polypodiaceae) - Coast Polypody, Leathery Polypody, Leather-leaf Polypody.**

syn. *P. carnosum* Kell., *P. pachyphyllum* Eat.

Collection - Chesterman's Beach (west coast of Vancouver Island between Pacific Rim National Park and Tofino, B.C.). Growing on the vertical face of an eroded sandy cliff on the shoreline. Also found in rock crevices on the leeward side of Frank Island. July 27, 1994. Phytochemical voucher V-33.

***Pteridium aquilinum* (L.) Kuhn. (Polypodiaceae) - Brachen, Brake, Bracken Fern, Western Bracken.**

syn. *Pteris aquilina* L., *Pteris feei* Schaffn., *Pteridium latiusculum* Desv.

Collection - U.B.C. Research Forest at Maple Ridge, B.C. Growing along the margins of coniferous forest. July 17, 1994. Phytochemical voucher M-15.

***Woodsia scopulina* DC. Eat. (Polypodiaceae) - Rocky Mountain Woodsia.**

syn. *W. obtusa* (Spreng.) Torr. var. *lyallii* Hook.

Collection - Darke Lake, B.C. (west of Summerland). Growing in crevices on the east face of a steep rocky cliff, full sun. Phytochemical voucher N-26.

Pteropsida - Gymnospermae (Conifers)

***Abies grandis* (Dougl. ex D. Don) Forbes (Pinaceae) - Grand Fir, Great Silver Fir, Lowland Fir.**

syn. *A. gordoniana* Carr., *Picea grandis* Loud., *P. lasiocarpus* Hort. ex Gord., *P. lowiana* Gord., *P. parsonsii* Hort. ex Gord., *Pinus grandis* Dougl.

Collection - Maple Ridge, B.C. at the U.B.C. Research Forest. Mixed plot of Grand fir, Douglas fir and Cedar along G Road. September 7, 1994. Phytochemical voucher N-42.

***Ephedra nevadensis* Wats. (Ephedraceae) - Joint Fir, Mormon Tea, Nevada Ephedra.**

syn. *E. antisyphilitica* Wats., *E. aspera* Engelm. ex S. Wats., *E. reedii* Cory

Collection - Mono Co., California, 6 mi. west of Benton Hot Springs on Hwy 120. Open sagebrush -juniper scrub. Occasional populations. May 27, 1994. Phytochemical voucher Ca-13.

***Picea sitchensis* (Bong.) Carr. (Pinaceae) - Sitka Spruce, Tideland Spruce.**

syn. *Abies falcata* Raf., *A. meneziesii* Lindl., *A. trigana* Raf., *Picea menziesii* Carr., *Pinus menziesii* Dougl., *Pinus sitchensis* Bong.

Collection - Maple Ridge, B.C. at the U.B.C. Research Forest. Approximately 10 year old plot of Sitka Spruce. June 5, 1994. Phytochemical voucher M-3, Inner Bark. M-4, Branches.

Collection - Near Tofino, B.C.. Boggy ditch along Hwy 4, just north of the north entrance to Pacific Rim National Park. June 22, 1994. Phytochemical voucher V-10.

***Pseudotsuga menziesii* (Mirbel) Franco (Pinaceae) - Douglas Fir, Douglas Spruce.**

syn. *Abies douglasii* Lindl., *A. (Pseudotsuga) mucronata* Raf., *Abies taxifolia* Presl, *Picea douglasii* Link, *Pinus douglasii* Lamb., *Pinus taxifolia* Lamb., *Pseudotsuga (Tsuga) douglasii* Carr., *Pseudotsuga lindleyana* Carr., *Pseudotsuga taxifolia* (Lamb.) Britt., *Pseudotsuga vancouverensis* Flous.

Collection - Maple Ridge, B.C. at the U.B.C. Research Forest. Mixed plot of Grand fir, Douglas fir and Cedar along G Road. September 7, 1994. Phytochemical voucher N-43.

***Thuja plicata* Donn ex D. Don (Cupressaceae) - Canoe Cedar, Giant Cedar, Western Red Cedar.**

syn. *Thuya* L., *Thuia* Scop., *T. asplenifolia* Hort. ex Carr., *T. californica* Hort. ex Carr., *T. flagelliformis* Hort. ex Gord., *T. gigantea* Nutt., *T. meneziesii* Carr., *T. sibirica* Hort. ex Carr., *T. occidentalis* Booth

Collection - Maple Ridge, B.C. at the U.B.C. Research Forest. Growing on the grade of an old logging railway. Approximately 60 year old tree. June 5, 1994. Phytochemical voucher M-2.

Tsuga heterophylla **(Raf.) Sarg. (Pinaceae) - Coast Hemlock, Western Hemlock.**

syn. *Abies albertiana* Murr., *A. bridgesii* Kell., *A. heterophylla* Raf., *Pinus canadensis* Bong., *T. mertensiana* Carr. not Sarg.

Collection - Maple Ridge, B.C. at the U.B.C. Research Forest. Growing on the grade of an old logging railway. Approximately 60 year old tree. June 5, 1994. Phytochemical voucher M-1

Pteropsida - Angiospermae (Flowering plants)

Acer macrophyllum **Pursh (Aceraceae) - Big-leaf Maple, Oregon Maple.**

syn. *A. auritum* Greene, *A. coptophyllum* Greene, *A. dactylophyllum* Greene, *A. flabellatum* Greene, *A. hemionitis* Greene, *A. leptodactylon* Greene, *A. murreyanum* Hort. ex Dippel, *A. palmatum* Raf., *A. platypterum* Greene, *A. politum* Greene, *A. stellatum* Greene

Collection - Maple Ridge, B.C., 1/4 mi. west of Golden Ears Provincial Park on Fern Cresent. Common alongside road. July 13, 1994. Phytochemical voucher M-17.

Achlys triphylla **(Smith) DC. (Berberidaceae) - Vanilla Leaf, Deer-foot.**

syn. *Leontice* Sm.

Collection - Cowichan Lake, B.C.. West end of the lake in coniferous forest. July 3, 1994. Phytochemical voucher V-20.

Actaea rubra **(Ait.) Willd. (Ranunculaceae) - Poison de Couleuvre, Red Baneberry, Snakeberry, Yerba Del Peco.**

A. americana var. *rubra* (Ait.) Pursh, *A. arguta* Nutt., *A. asplenifolia* Greene, *A. caudata* Greene, *A. brachypetala* var. *rubra* Ait., *A. neglecta* Gillman, *A. spicata* L. ssp. *rubra* (Ait.) Hult., *A. spicata* L. ssp. *arguta* (Nutt.) Torr.

Collection - 11 km. east of Birkenhead Lake. Growing along the banks of a small stream at the edge of the forest, in partial shade. July 5, 1994. Phytochemical voucher P-56.

***Adenocaulon bicolor* Hook. (Compositae) - Pathfinder, Trail-plant, Silver-green.**

syn. *A. integrifolium* Nutt.

Collection - McDonald Creek (10 km. south of Nakusp, B.C.). Dry coniferous forest south of the campground, partial shade. August 112, 1994. Phytochemical voucher N-19.

***Aesculus californica* (Spach) Nutt. (Hippocastanaceae) - California Buckeye, Horse Chestnut.**

syn. *calothyrsus californica* Spach, *Hippocastanum californicum* (Spach) Greene

Collection - Sonoma Co., California, 1 mi. east of Valley Ford on Hwy 1. Windrow tree along side roadway, dry, open, gravelly site. May 16, 1994. Phytochemical voucher Ca-8.

***Alisma trivalis* Pursh (Alismataceae) - Water Plantain, Suck-leaves.**

syn. *A. brevipes* Greene, *A. natans* L., *A. plantaginifolium* St. Lag., *A. plantago* L., *A. plantago-aquatica* L., *Plantago aquatilis* Gueldenst.

Collection - Under the first (south) bridge on Neaves Road, Pitt Meadows, B.C.. Growing in very fine silt, shallow (6-12 inches) water, in full sun. September 7, 1994. Phytochemical voucher N-40.

***Ammophila arenaria* (L.) Link (Graminae) - Beach-grass, Marram grass, Sand-reed.**

syn. *Arundo* L.

Collection - Chesterman's Beach (west coast of Vancouver Island between Pacific Rim National Park and Tofino, B.C.). Growing along the margins of sandy beach, in full sun. June 22,1994. Phytochemical voucher V-3

***Anaphalis margaritacea* (L.) B. et H. (Compositae) - Pearly Everlasting.**

syn. *A. angustifolia* Rydb., *A. occidentalis* (Greene) Heller, *A. sierrae* Heller, *A. subalpina* (Gray) Rydb., *Antennaria cinnamomea* var. *angustier* Miq., *Gnaphalium margaritaceum* L.

Collection - Saltspring Island, B.C. at 320 Sunset Drive. Growing in dry, sandy ditch with grasses, in full sun. July 26, 1994. Phytochemical voucher V-40.

***Anemone multifida* Poir. (Ranunculaceae) - Cliff Anemone, Cut-leaf Anemone, Pacific Anemone.**

syn. *A. globosa* (T. et G.) Nutt. ex Pritz, *A. hudsoniana* (DC.) Rich., *A. tetonensis* Porter

Collection - Gwilliam Lake, B.C. (south of Chetwynd). Northwest of the campground along the lakeshore. Growing in crevices of rocky outcropping. August 10, 1994. Phytochemical voucher N-8.

Apocynum androsaemifolium **L. (Apocynaceae) - Bitter-root, Fly-trap, Herbe a la Puce, Indian Hemp, Spreading Dogbane.**

syn. *A. ambigens* Greene, *A. griseum* Greene,*A. macranthum* Rydb., *A. pumilum* (Gray) Greene, *A. rhomboideum* Greene, *A. scopulorum* Greene ex Rydb., *A. tomentellum* Greene

Collection - Near Osoyoos, B.C., 1/2 mi. north of the lookout over Osoyoos on Hwy 3. Dry, rocky hillside in full sun. June 8, 1994. Phytochemical voucher P-47.

Aquilegia formosa **Fisch. ex DC. (Ranunculaceae) - Red Columbine, Sitka Columbine.**

syn. *A. canadensis* L. var. *formosa* (Fisch.) Wats., *A. columbiana* Rydb., *A. mohavensis* Munz, *A. shockleyi* Eastw., *A. truncata* F. et M.

Collection - Green Mountain Road (near Penticton, B.C. - road to Apex Alpine Ski Resort). Open gravelly waste area alongside road, full sun and partial shade. June 9, 1994. Phytochemical voucher P-49.

Aralia nudicaulis **L. (Araliaceae) - Wild Sasparilla, Salsepareille.**

Collection - 2 km. south of Taylor, B.C. at Taylor Landing. Moist deciduous forest along the Peace River. August 8, 1994. Phytochemical voucher N-3.

Arbutus menziesii **Pursh (Ericaceae) - Arbutus, Madrone, Madrono.**

syn. *A. procera* Dougl.

Collection - 680 Sunset Drive, Saltspring Island, B.C.. Growing along rocky western shoreline of the island in full sun. July 26, 1994. Phytochemical voucher V-39.

Arctostaphylos patula **Greene (Ericaceae) - Green Leaved Manzanita.**

syn. *A. acutifolia* Eastw., *A. obtusifolia* Piper, *A. parryana* Lemmon var. *pinetorum* (Rollins) Wies. et Schreib., *A. patula* Greene ssp. *platyphylla* (Gray) P.V. Wells, *A. patula* Greene var. *coalescens* W. Knight, *A. pungens* Kunth var. *platyphylla* A. Gray, *Uva-ursi patula* Abrams

Collection - Sierra Co., California, 20 mi. north of Truckee. Dry coniferous forest near Sulphur Creek. May 29, 1994. Phytochemical voucher Ca-19.

Argemone munita **Dur. et Hilg. (Papaveraceae) - Cardo Santo, Chicalote, Prickly or Thistle Poppy.**

syn. *A. hispida* Gray, *A. munita* Dur. et Hilg. var. *argentea* (Ownbey) Shinners, *A. munita* Dur. et

Hilg. var. *robusta* (Ownbey) Shinners, *A. munita* Dur. et Hilg. var. *rotundata* (Ownbey) Shinners, *A. platyceras* Link et Otto, *A. rotundata* Rydb.

Collection - Mono Co., California, 3 mi. west of Benton Hot Springs on Hwy. 120 in open sagebrush -juniper scrub. Growing in sand alongside the road, full sun. May 27, 1994. Phytochemical voucher Ca-14.

***Armeria maritima* (Mill.) Willd. (Plumbaginaceae) - California Thrift, Sea-pink, Seathrift, Thrift.**

syn. *A. andina* Boiss., *A. andina* Boiss. var. *californica* Boiss., *A. arctica* (Cham.) Wallr. ssp. *californica* (Boiss.) Abrams, *A. campestris* Wallr., *A. elongata* Skottsb., *A. labradorica* Wallr., *A. maclouriana* Inversen, *A. scabra* Cham., *A. (Statice) sibirica* Turcz., *A. (S.) vulgaris* Willd., *S. interior* Rydb., *S. maritima* Mill. var. *sibirica* (Turcz.) Simmons

Collection - Near Bodega Bay in Sonoma Co., California. On the west end of Bodega Head on a sandy coastal bluff, full sun. May 25, 1995. Phytochemical voucher Ca-4.

***Artemisia cana* Pursh, *Artemisia douglasiana* Bess., *Artemisia pycnocephala*, *Artemisia tripartita* Rydb.**

see Appendix 3.

***Asclepias speciosa* Torr. (Asclepiadaceae) - Big Milkweed, Greek Milkweed, Lecheros, Showy Milkweed.**

syn. *A. douglasii* Hook.

Collection - 35 km. east of Keremeos, B.C. on Hwy. 3 (13 km. west of junction with Hwy. 97). Growing in an open, muddy ditch leading into a small pond, on south side of the highway. June 8, 1994. Phytochemical voucher P-45.

***Aster modestus* Lindl. (Compositae) - Great Northern Aster, Few-flowered Aster.**

syn. *A. major* (Hook.) Porter, *A. mutatus* T. et G., *A. sayianus* Nutt., *A. sayii* Gray, *A. unalaschkensis* Hook. var. *major* Hook., *Weberaster modestus* (Lindl.) A. et D. Love

Collection - Gwilliam Lake, B.C. (south of Chetwynd). Growing along the banks of a small stream which empties into the lake, full and partial shade. August 6, 1994. Phytochemical voucher N-7.

Boykinia occidentalis **T. et G. (Saxifragaceae) - Brook Foam, Coast Boykinia, Santalucia Boykinia, Slender Boykinia.**

syn. *B. circinnatum* Rosend. et Rydb., *B. elata* (Nutt.) Greene, *B. nuttallii* Macoun, *B. vancouverensis* (Rydb.) Fedde, *Saxifraga* Nutt., *Therophon circinnatum* Rosend. et Rydb.

Collection - Mount Seymour in North Vancouver, B.C., along the trail to Goldie Lake. September 27, 1994. Phytochemical voucher N-44.

Cakile edentula **(Bigel.) Hook. (Cruciferae) - Sea Rocket.**

syn. *Bunias* Bigel., *C. americana* Nutt., *C. californica* Heller, *C. edentula* var. *californica* (Hell.) Fern., *C. edentula* var. *californica* (Hell.) Hult., *C. harperi* Small, *C. lacustris* (Fern.) Pobed., *C. maritima* Scop. var. *americana* (Nutt.) T. et G.

Collection - Chesterman's Beach (west coast of Vancouver Island between Pacific Rim National Park and Tofino, B.C.). Growing on sandy beach, in full sun. June 22, 1994. Phytochemical voucher V-1.

Camissonia brevipes **(A. Gray) Raven (Onagraceae)**

syn. *Oenothera brevipes* Gray, *O. pallidula* (Munz) Munz

Collection - Mono Co., California, 6 mi. west of Benton Hot Springs on Hwy 120. Sagebrush-juniper scrub, sandy soil, full sun. May 27, 1994. Phytochemical voucher Ca-12.

Carex aquatilis **Wahlenb. var *dives* (Holm) Kukenth. (Cyperaceae) - Sitka Sedge.**

syn. *C. acutinella* Mack., *C. barbarae* Macoun, *C. dives* Holm, *C. howellii* Bailey, *C. panda* Clarke, *C. sitchensis* Prescott, *C. substricta* (Kukenth.), *C. suksdorfii* Kukenth.

Collection - U.B.C. Research Forest at Maple Ridge, B.C. Growing around margins of Marion Lake. June 27, 1994. Phytochemical voucher M-8, authenticated by Dr. J. Maze, Dept. of Botany, U.B.C.

Carex lyngbyei **Hornem. (Cyperaceae) - Lyngby's Sedge.**

syn. *C. behringensis* Gand., *C. cryptocarpa* Mey., *C. cryptochlaena* Holm., *C. macounii* Benn., *C. romanzowia* Cham., *C. salina* Wahl. var. *robusta* Bailey, *C. scouleri* Torr.

Collection - Chesterman's Beach (west coast of Vancouver Island between Pacific Rim National Park and Tofino, B.C.). Growing in marshy area approximately 50 m. from the beach, in full sun. June 22, 1994. Phytochemical voucher V-6, authenticated by Dr. J. Maze, Dept. of Botany, U.B.C.

***Carex muricata* L. (Cyperaceae) - Muircate Sedge.**

syn. *C. angustior* Mack., *C. cephalanta* (Bailey) Bickn., *C. echinata* Murr., *C. laricina* Mack., *C. leersia* Willd., *C. pairaei* Schultz

Collection - U.B.C. Research Forest at Maple Ridge, B.C.. Growing around margins of Marion Lake. June 27, 1994. Phytochemical voucher M-7, authenticated by Dr. J. Maze, Dept. of Botany, U.B.C.

***Carpobrotus edulis* (L.) L. Bolus (Aizoaceae) - Sea Fig.**

Collection - Bodega Head, near Bodega Bay in Sonoma Co., California. Common along sandy coastal bluffs, full sun. May 25, 1995. Phytochemical voucher Ca-3.

***Cassiope mertensiana* (Bong.) D. Don (Ericaceae) - Merten's Moss Heather, Moss-bush, Mountain Heather, Western Mountain Heather, White Heather.**

syn. *Andromeda* Bong., *A. cupressina* Hook., *C. gracilis* Piper

Collection - Blackcomb Mountain at Whistler, B.C.. Rock outcropping just above the Rendezvous. Elev. ~ 6200 ft. August 20, 1994. Phytochemical voucher N-32.

***Castilleja affinis* H. et A. (Scrophulariaceae) - Oregon Coast Paintbrush, Pacific Paintbrush, Southern California Indian Paintbrush.**

syn. *C. californica* Abrams, *C. douglasii* Benth., *C. inflata* Pennell, *C. litoralis* Pennell ex Hitch., *C. wightii* Elmer

Collection - Tillamook Co., Oregon. Three Capes route off Hwy 101, 1/2 mi. south of Cape Meares. Growing on steep coastal bluff of red sand/rock. May 29, 1994. Phytochemical voucher Ca-27.

***Castilleja thompsonii* Pennell (Scrophulariaceae) - Thompson's Indian Paintbrush, Yellow Paintbrush.**

syn. *C. villicaulis* Pennell et Ownbey

Collection - Osoyoos Hill, B.C., 35 km. east of Keremeos on Hwy. 3, 13 km. west of junction with Hwy 97. Open sagebrush scrub with *Gilia aggregata, Gaillardia aristata, Erigonum heracleoides, Phacelia hastata* and *Cynoglossum officinale*. June 8, 1994. Phytochemical voucher P-44.

***Chimaphila umbellata* (L.) Bart. (Ericaceae) - Herbe à Peigne, Herbe à la Clef, Pipissewa, Prince's Pine.**

syn. *C. corymbosa* Pursh, *C. occidentalis* Rydb., *Pyrola umbellata* L.

Collection - Sierra Co., California, 20 mi. north of Truckee on Hwy 89. Dry coniferous forest near Sulphur Creek. May 29, 1994. Phytochemical voucher Ca-18.

***Claytonia sibirica* L. (Portulacaceae) - Miner's Lettuce.**

syn. *C. alsinoides* Sims, *C. asarifolia* Bong., *C. unalaschkensis* Fisch., *Limnia* Haw., *Montia cordifolia* Wats., *M. heterophylla* (T. et G.) Jeps., *M. sibirica* (L.) Howell

Collection - Sarita Lake, B.C (near Bamfield). Growing along margins of the lake and roadway, full and partial shade. July 28, 1994. Phytochemical voucher V-29.

***Clintonia uniflora* (Menzies ex Schult.) Kunth. (Liliaceae) - Beadlily, Bride's Bonnet, Queen's Cup, Single-flowered Clintonia.**

syn. *Smilacina borealis* (Ait.) Raf. var. *uniflora* Menzies ex Schultes, *S. uniflora* Menzies ex Schultes

Collection - Baker Creek Rest Area, approx. 25 km. south of McBride, B.C. on Hwy 16. Open spruce forest with bracken fern and thimbleberry. August 10, 1994. Phytochemical voucher N-9.

***Corylus cornuta* Marsh. (Betulaceae) - Beaked Hazelnut.**

syn. *C. californica* (DC.) Rose, *C. rostrata* Ait.

Collection - Maple Ridge, B.C. at the U.B.C. Research Forest. Along G Road, across from the gravel pit. September 7, 1994. Phytochemical voucher N-41.

***Drosera rotundifolia* L. (Droseraceae) - Common Sundew, Round-leaved Sundew.**

Collection - Near Tofino, B.C.. Boggy ditch along Hwy 4, just north of the north entrance to Pacific Rim National Park. June 22, 1994. Phytochemical voucher V-8.

***Elliottia pyroliflorus* (Bong.) Brim. et Stev. (Ericaceae) - Copper-bush, Copper-flower.**

syn. *Cladothamnus pyroliflorus* Bong., *Tolmeia occidentalis* Hook.

Collection - Mount Seymour in North Vancouver, B.C., along the trail to Goldie Lake. September 27, 1994. Phytochemical voucher P-55

***Epilobium angustifolium* L. (Onagraceae) - Bouquete Rouges, Fireweed, Great Willow-herb, Rosebay Willow-herb, Wick-up.**

syn. *Chamaenerion angustifolium* (L.) Scop., *C. exaltum* Rydb., *Chamerion angustifolium* (L.) Holub, *C. spicatum* (Lam.) S.F. Gray, *C. danielsii* D. Love, *C. platyphyllum* (Daniels) A. et D. Love, *E. antonianum* Auct. ex Pers., *E. brachycarpum* Leight., *E. danielsii* D. Love, *E. difforme* Gilib., *E. elatum* Munro ex Haussk., *E. latifolium* Mattusch., *E. leiostylon* Peterm., *E. montanum* Hacq., *E. gesneri* Vill., *E. gracile* Bruegg., *E. intermedium* Wormsk. ex Ser. in DC., *E. macrocarpum* Steph., *E. pauciflorum* Schrank, *E. persicifolium* Vall., *E. rubrum* Luce, *E. salicifolium* Stokes, *E. spicatum* Lam., *E. variabile* Luce, *E. verticillatum* Tenore

Collection - Near Tofino, B.C.. Waste area alongside road out to Grece Bay. July 21, 1994. Phytochemical voucher V-36.

Eriogonum umbellatum **Torr. (Polygonaceae) - Sulphur Buckwheat, Sulphur Eriogonum, Sulphur Flower, Sulphur Umbrella Plant.**

syn. *E. cognatum* Greene, *E. covillei* Small, *E. croceum* Small, *E. dumosum* Greene, *E. ellipticum* Nutt., *E. modocense* Greene, *E. ovatum* Greene, *E. polyanthum* Benth., *E. reclinatum* Greene, *E. smallianum* Heller, *E. speciosum* Drew, *E. sphaerocephalum* Dougl., *E. stellatum* Benth., *E. sub-alpinum* Greene, *E. tolmeianum* Hook., *E. torreyanum* Gray, *E. trichotomum* Small

Collection - Siskiyou Co., California, 10 mi. south of Medicine Lake. Roadside, open pine forest near lava beds. May 29, 1994. Phytochemical voucher Ca-24.

Eschscholzia californica **Cham. (Papaveraceae) - California Poppy.**

syn. *Cryseis compacta* Lindl., *C. douglasii* H. et A., *E. chartacea* Fedde, *E. crocea* Benth., *E. cornuta* Greene, *E. cucullata* Greene, *E. douglasii* Walp., *E. maritima* Greene, *E. meneziesii* Greene, *E. mexicana* Greene, *E. penisularis* Greene, *E. pseudoinflata* Fedde, *E. recta* Greene, *E. setchellii* Fedde, *E. tristis* Fedde

NB. Greene split this species into 55 different species most of which were not recognized by other authors. Therefore, only the most commonly encountered synonyms of Greene's are cited above.

Collection - Del Norte Co., California, 3 mi. south of Cresent City on Hwy 101. Steep western embankment in dapple shade. May 24, 1994. Phytochemical voucher Ca-1.

Euphrasia stricta **D. Wolff ex J.F. Lehm. (Scrophulariceae) - Eyebright.**

syn. *E. americana* Wettst., *E. condensata* Jord., *E. officinalis* L., *E. rigidula* Jord.

Collection - U.B.C. Research Forest at Maple Ridge, B.C. Open, grassy meadow, along the edge of the Red Trail, northwest of the office. July 13, 1994. Phytochemical voucher M-16.

***Galium trifidum* L. (Rubiaceae) - Small Bedstraw, Cleavers.**

syn. *G. brandegei* Gray, *G. brevipes* Fern. et Wieg., *G. claytonii* Michx., *G. columbianum* Rydb., *G. cymosum* Wieg., *G. palustre* L., *G. subbiflorum* (Wieg.) Rydb., *G. tinctorum* L.

Collection - U.B.C. Research Forest at Maple Ridge, B.C.. Growing around margins of Marion Lake. June 27, 1994. Phytochemical voucher M-9

***Galium triflorum* Michx. (Rubiaceae) - Fragrant Bedstraw, Madder's Cousin, Sweet-scented Bedstraw, Sweet-scented Cleavers.**

syn. *G. brachiatum* Pursh, *G. pennsylvanicum* Bartr.

Collection - Cowichan Lake, B.C.. West end of the lake in coniferous forest and along shoreline. July 3, 1994. Phytochemical voucher V-21.

***Gaultheria shallon* Pursh (Ericaceae) - Salal.**

Collection - Long Beach village, near Tofino, B.C.. Growing along the beach, in full sun and partial shade. July 21, 1994. Phytochemical voucher V-35.

***Gentianella amarella* (L.) Börner ssp. *acuta* (Michx.) Gillet (Gentianaceae) - Felwort, Northern Gentian.**

syn. *Amarella anisosepala* Greene, *A. californica* Greene, *A. conferta* Greene, *A. copelandii* Greene, *A. lembertii* Greene, *A. macounii* Greene, *A. plebeji* (Ledeb. ex Spreng.) Greene, *Gentiana amarella* L. var *acuta* (Michx.) Herder., *G. (Amarella) acuta* Michx., *G. plebeji* Ledeb. ex Spreng., *G. strictiflora* Rydb., *G. tenuis* Griseb.

Collection - Moberly Lake, B.C. (between Hudson's Hope and Chetwynd). Moist site along the edge of the forest in partial shade. August 7, 1994. Phytochemical voucher N-6.

***Geum triflorum* Pursh (Rosaceae) - Lion's Beard, Old Man's Whiskers, Pink Plumes, Prairie Smoke, Purple Avens.**

syn. *Erythrocoma affinis* Greene, *E. campanulata* Greene, *E. canescens* Greene, *E. ciliata* Pursh, *E. triflora* Greene, *Geum canescens* (Greene) Munz, *G. pubescens* Hook., *Sieversia campanulata* (Greene) Jones, *S. canescens* (Greene) Rydb., *S. ciliata* (Pursh) G. Don, *S. triflora* (Pursh) R. Br.

Collection - Lassen Co., California, 5 mi. east of Eagle Lake on Hwy 139. Growing in dense litter in dry, open pine forest, dapple shade. May 29, 1994. Phytochemical voucher Ca-23.

***Goodyera oblongifolia* Raf. (Orchidaceae) - Giant Rattlesnake Plantain.**

syn. *G. decipiens* (Hook.) Hubbard, *G. menziesii* Lindl., *Peramium decipiens* (Hook.) Piper, *P. meneziesii* Morong, *Spiranthes decipiens* Hook.

Collection - Shelter Bay Provincial Campground on Upper Arrow Lake (B.C.). Dry coniferous forest north of the campground. August 11, 1994. Phytochemical voucher N-16.

***Grindelia integrifolia* DC. var. *macrophylla* (Greene) Cronq. (Compositae) - Entire Leaved Gumweed or Gum Plant, Resinweed, Tarweed.**

syn. *G. aggregata* Steyerm., *G. andersonii* Piper, *G. arenicola* Steyermark, *G. collina* Henry, *G. hendersonii* Greene, *G. lanata* Greene, *G. macrophylla* Greene, *G. oregana* Gray, *G. nana* Carter not Nutt., *G. stricta* DC.,, *G. virgata* Nutt., *Donia gluttinosa* Hook.

Collection - Frank Island off Chesterman's Beach (west coast of Vancouver Island between Pacific Rim National Park and Tofino, B.C.). Growing on volcanic rocks on the lee side of the island, full sun. July 27, 1994. Phytochemical voucher V-38.

***Grindelia nana* Nutt. var. *nana* (Compositae) - Puget-Sound Gumweed or Gum Plant, Resinweed.**

syn. *G. nana* Nutt. var. *integrifolia* Nutt., *G. squarrosa* (Pursh) Dunal var. *integrifolium* (Nutt.) Boivin

Other syn. for *G. squarrosa*: *G. integerrinus* Rydb., *G. perennis* Nels., *G. serrulata* Rydb., *Donia squarrosa* Pursh

Collection - Spences Bridge, B.C., 200 m. south of the Petro Canada on Hwy 1. Waste area alongside the highway, in very dry, sandy soil and full sun. August 6, 1994. Phytochemical voucher N-1.

***Hieracium albiflorum* Hook. (Compositae) - White-flowered Hawkweed.**

syn. *H. candelabrum* Gand., *H. helleri* Gandog., *H. leptopodanthum* Gand., *H. pacificum* Zahn, *H. vancouverianum* Arv.-Tour., *Chlorocrepis albiflora* (Hook.) W.A. Weber

Collection - Rest area 46 km. west of Port Alberni, B.C. on Hwy. 4. Growing in shady coniferous forest. June 22, 1994. Phytochemical voucher V-16.

***Horkelia fusca* Lindl. (Rosaceae) - Oregon Honeydew, Tawny Horkelia.**

syn. *H. brownii* Rydb., *H. capitata* Lindl., *H. parviflora* Nutt., *H. pseudocapitata* Rydb., *H. tenuisecta* Rydb., *Potentilla andersonii* Greene, *P. douglasii* Greene

Collection - Siskiyou Co., California, 20 mi. south of Medicine Lake. Growing in gravel alongside the road through an open pine forest. May 29, 1994. Phytochemical voucher Ca-26, authenticated by Dr. G. Straley, U.B.C Botanical Gardens.

***Hypericum anagalloides* C. et S. (Hypericaceae) - Bog St. John's Wart, Creeping St. John's Wort, Tinker's Penny.**

syn. *H. bryophytum* Elmer, *H. tapetoides* A. Nels.

Collection - Near Tofino, B.C.. Boggy ditch along Hwy 4, just north of the north entrance to Pacific Rim National Park. June 22, 1994. Phytochemical voucher V-7.

***Impatiens capensis* Meerb. (Balsaminaceae) - Jewelweed, Snapweed, Spotted Touch-Me-Not.**

syn. *I. biflora* Walt., *I. fulva* Nutt., *I. noli-tangere* L. ssp. *biflora* (Walt.) Hult., *I. nortonii* Rydb.

Collection - 6 mi. east and 2 mi. south of Abbottsford, B.C., along margins of deep ditches. August 27, 1994. Phytochemical voucher M-18.

***Iris tenuissima* Dykes (Iridaceae) - Humboldt Iris.**

syn. *I. citrina* Eastw., *I. humboldtiana* Eastw.

Collection - Siskiyou Co., California, 20 mi. south of Medicine Lake. Growing in gravel alongside the road through an open pine forest. May 29, 1994. Phytochemical voucher Ca-25, authenticated by Dr. G. Straley, U.B.C. Botanical Gardens.

***Juncus bufonius* L. (Juncaceae) - Toad-rush.**

syn. *J. capitus* Weigel, *J. ranarius* Perr. et Song., *J. sphaerocarpus* Nees ex Funck

Collection - Near Tofino, B.C.. Boggy ditch along Hwy 4, just north of the north entrance to Pacific Rim National Park. June 22, 1994. Phytochemical voucher V-14, authenticated by Dr. J. Maze, Dept. of Botany, U.B.C.

***Juncus effusus* L. (Juncaceae) - Bog Rush, Common Rush, Soft Rush.**

Collection - Chesterman's Beach (west coast of Vancouver Island between Pacific Rim National Park and Tofino, B.C.). Growing in marshy area approximately 50 m. from the beach, in full sun. June 22, 1994. Phytochemical voucher V-4, var. *gracilis* Hook., authenticated by Dr. J. Maze, Dept. of Botany, U.B.C.

Collection - Chesterman's Beach (west coast of Vancouver Island between Pacific Rim National Park and Tofino, B.C.). Growing in marshy area approximately 50 m. from the beach, in full sun. June 22, 1994. Phytochemical voucher V-4, var. *pacificus* Fern. et Wieg., authenticated by Dr. J. Maze, Dept. of Botany, U.B.C.

***Juncus falcatus* E. Meyer (Juncaceae) - Sickle-leaved Rush.**

syn. *J. covillei* Piper, *J. menziesii* R. Br.

Collection - Near Tofino, B.C.. Boggy ditch along Hwy 4, just north of the north entrance to Pacific Rim National Park. June 22, 1994. Phytochemical voucher V-12, authenticated by Dr. J. Maze, Dept. of Botany, U.B.C.

***Juncus lesuerii* Boland. (Juncaceae) - Salt Rush, Brewer's Rush.**

syn. *J. balticus* Willd. var. *lesuerii* (Boland.) Willd., *J. balticus* Willd. var. *pacificus* Engelm., *J. breweri* Engelm.

Collection - Chesterman's Beach (west coast of Vancouver Island between Pacific Rim National Park and Tofino, B.C.). Growing on sandy beach, in full sun. June 22, 1994. Phytochemical voucher V-2, authenticated by Dr. J. Maze, Dept. of Botany, U.B.C.

***Lepidium virginicum* L. var. *pubescens* (Greene) Hitchc. (Cruciferae) - Birds Pepper, Peppergrass, Pepperweed, Poor Man's Pepper, Wild Peppergrass.**

syn. *L. bernardinum* Abrams, *L. hirsutum* Rydb., *L. intermedium* Gray var. *pubescens* Greene, *L. medium* Greene var. *pubescens* (Greene) Robins, *L. occidentale*

Collection - Darke Lake, B.C.. Waste area alongside gravel road. August 13, 1994. Phytochemical voucher N-25.

***Leptarrhena pyrolifolia* (D. Don) R. Br. (Saxifragaceae) - False Saxifrage, Leather-leaf Saxifrage.**

syn. *Saxifraga amplexifolia* R. Br., *S. pyrolifolia* D. Don

Collection - Mount Seymour in North Vancouver, B.C., along the trail to Goldie Lake.

September 27, 1994. Phytochemical voucher V-24.

***Leucanthemum vulgare* Lam. (Compositae) - Marguerite, Ox-eye Daisy.**

syn. *Chrysanthemum leucanthemum* L., *L. ircutianum*, *L. leucanthemum* (L.) Rydb., *L. vulgare* Lam. var. *pinnatifidum* (Lec. et Lam.) Moldenke

Collection - Monashee Summit, B.C.. Growing in waste area along the margins of a dry coniferous forest, full sun. August 12, 1994. Phytochemical voucher N-21

***Lilium columbianum* hort. ex Baker (Liliaceae) - Columbia Lily, Orange Lily, Oregon Lily, Tigerlily.**

syn. *L. bakeri* Purdy, *L. canadense* L. var. *minor* Wood., *L. canadense* L. var. *parviflorum* Hook., *L. canadense* L. var. *walkeri* Wood., *L. lucidum* Kell., *L. parviflorum* Holz., *L. purdyi* Waugh.

Collection - Green Mountain Road (near Penticton, B.C. - road to Apex Alpine Ski Resort). Openings in forest, plants growing in full sun and partial shade. June 9, 1994. Phytochemical voucher P-50.

***Lilium philadelphicum* L. (Liliaceae) - Lis de Philadelphie, Philadelphia Lily, Woodlily.**

syn. *L. andinum* Nutt., *L. montanum* Nels., *L. umbellatum* Pursh

Collection - Monashee Summit, B.C.. Growing along the margins of a dry coniferous forest, partial sun. August 12, 1994. Phytochemical voucher N-23.

***Linnaea borealis* L. (Caprifoliaceae) - Twinflower.**

syn. *L. americana* Forbes, *L. longiflora* (Torr.) Howell, *L. serpyllifolia* Rydb.

Collection - Rest area 46 km. west of Port Alberni, B.C. on Hwy. 4. Growing in shady coniferous forest. June 22, 1994. Phytochemical voucher V-15.

***Linum lewisii* Pursh (Linaceae) - Linasa, Linseed, Western Blue Flax.**

syn. *Adenolinum lewisii* (Pursh) A. et D. Love, *L. decurrens* Kell., *L. lepagei* Boivin, *L. lewisii* var. *alpicola* Jeps., *L. lyallanum* Alef., *L. perenne* L. var. *lepagei* (Boivin) Boivin, *L. perenne* var. *lewisii* (Pursh) Eat. et Wright, *L. perenne* ssp. *lewisii* (Pursh) Hult.

Collection - Lassen Co., California, 5 mi. east of Eagle Lake on Hwy 139. Dry, open pine forest. Growing in full sun in sandy soil. May 29, 1994. Phytochemical voucher Ca-22.

Lithospermum ruderale **Dougl. ex Lehm. (Boraginaceae) - Columbia Puccoon, Stone Seed, Western Gromwell.**

syn. *L. laxum* Greene, *L. pilosum* Nutt., *L. torreyi* Nutt.

Collection - 16 km. east of Princeton, B.C. on Hwy 3. Open sandy waste area alongside the highway. June 8, 1994. Phytochemical voucher P-43.

Luetkea pectinata **(Pursh) Kuntze (Rosaceae) - Partridge Foot.**

syn. *Eriogynia pectinata* (Pursh) Hook., *Luetkea sibbaldioides* Bong., *Saxifraga pectinata* Pursh, *Spiraea pectinata* (Pursh) T. et G.

Collection - Blackcomb Mountain at Whistler, B.C.. Rock outcropping just above the Rendezvous. Elev.~ 6200 ft. August 20, 1994. Phytochemical voucher N-31.

Malus fusca **(Raf.) C.K. Schneid. (Rosaceae) - Oregon Crabapple, Wild Crabapple.**

syn. *M. macounii* Greene, *Pyrus diversifolia* Bong., *P. fusca* Raf., *P. rivularis* Dougl. ex Hook.

Collection - Vancouver, B.C. at the U.B.C. Botanical Gardens - Native Garden. Alongside pond. September 28, 1994. Phytochemical voucher N-47.

Malva neglecta **Wallr. (Malvaceae) - Dwarf Mallow.**

syn. *M. rotundifolia* L., *M. vulgaris* Fries

Collection - Upper Arrow Lake, B.C. at the Fauquier Ferry landing. Small population on gravel/sand beach north of the dock, full sun. August 12, 1994. Phytochemical voucher N-20.

Matricaria discoidea **DC. (Compositae) - Dog Fennel, May-apple, Pineapple Weed.**

NB. The name May-apple is also used to refer to *Podophyllum peltatum.*

syn. *Artemisia matricarioides* Less., *Chamomilia sauveolens* (Pursh) Rydb., *Leptidanthus suaveolens* (Pursh) Nutt., *Lepidotheca suaveolens* (Pursh) Nutt., *Matricaria matricarioides* (Less.) Porter, *M. suaveolens* (Pursh) Buch., *Santolina suaveolens* Pursh, *Tanacetum suaveolens* (Pursh) Hook.

Collection - Mount Seymour in North Vancouver, B.C. at the Deep Cove lookout. Waste area around parking lot. September 2, 1994. Phytochemical voucher N-36.

Menyanthes trifoliata L. (Menyanthaceae) - **Bogbean, Buckbean, Herbe à Canards.**

syn. *M. verna* Raf.

Collection - Sarita Lake, B.C (near Bamfield). Growing along margins of the lake, in and out of the water, full sun. July 28, 1994. Phytochemical voucher V-32.

Mertensia paniculata (Ait.) G. Don var. *paniculata* (Boraginaceae) - **Tall Lungwort, Tall Bluebells, Panicle Bluebells.**

syn. *Lithospermum corymbosum* Lehm., *L. paniculatum* Lehm., *M. alaskana* Britt., *M. brachycalyx* Piper, *M. eastwoodiae* Macbr., *M. laevigatus* Piper, *M. leptophylla* Piper, *M. palmeri* A. Nels. et Macbr., *M. pilosa* (Cham.) DC., *M. platyphylla* Heller, *M. pratensis* Macbr., *M. subcordata* Greene, *Pulmonaria paniculata* Ait.

Collection - Moberly Lake, B.C. (between Hudson's Hope and Chetwynd). Openings in moist mixed forest in partial shade. August 7, 1994. Phytochemical voucher N-5.

Mimulus guttatus DC. (Scrophulariaceae) - **Common Large Monkey-flower, Roper's Relief.**

syn. *M. arvensis* Greene, *M. bakeri* Gandog., *M. brachystylis* Greene, *M. clementinus* Greene, *M. cordatus* Greene, *M. cuspidata* Greene, *M. decorus* (Grant) Suksdorf, *M. equinnus* Greene, *M. glabratus* Kunth, *M. glareosis* Greene, *M. grandiflorus* Howell, *M. grandis* (Greene) Heller, *M. hallii* Greene, *M. langsdorfii* Donn, *M. laxus* Pennell ex Peck, *M. longulus* Greene, *M. luteus* L., *M. lyratus* Benth., *M. maguirei* Pennell, *M. marmoratus* Greene, *M. micranthus* Heller, *M. microphylla* Benth., *M. minimus* Henry, *M. nasutus* Greene, *M. paniculatus* Greene, *M. pardalis* Pennell, *M. parishii* Gandog., *M. petiolaris* Greene, *M. prionophyllus* Greene, *M. procerus* Greene, *M. puberulus* Greene ex Rydb., *M. puncticalyx* Gandog., *M. rivularis* Nutt., *M. scouleri* Hook., *M. subreniformis* Greene, *M. tenellus* Nutt. ex Gray, *M. thermalis* A. Nels., *M. unimaculatus* Pennell

Collection - Vancouver, B.C. on the south side of English Bay at Spanish Banks. Growing on steep, wet, sandy slope with northern exposure, partially shaded. September 25, 1994. Phytochemical voucher V-26.

***Mitella brewerii* Gray (Saxifragaceae) - Brewer's Mitrewort.**

syn. *Pectiantia brewerii* (Gray) Rydb.

Collection - Blackcomb Mountain at Whistler, B.C.. Rock outcropping just above the Rendezvous. Elev. ~ 6200 ft. August 20, 1994. Phytochemical voucher N-30.

***Oenothera villosa* Thunb. ssp. *strigosa* (Rydb.) Dietrich et Raven (Onagraceae) - Common Evening Primrose.**

syn. *O. biennis* L. var. *hirsutissima* Gray, *O. biennis* var. *strigosa* (Rydb.) Piper, *O. cheradophila* Bartlett, *O. depressa* Greene ssp. *strigosa* (Rydb. Taylor et MacBryde, *O. procera* Woot. et Standl., *O. rydbergii* House, *O. strigosa* Rydb.

Collection - Shuswap Lake, B.C. at Cottonwood Campground. Growing along edge of small pond, full sun. August 11, 1994. Phytochemical voucher N-14.

Collection - 8 mi. north of Kelowna, B.C. on Glenmore Road, 1/2 mi. north of the junction with McKinley. Dry waste area alongside road, sandy soil, full sun. August 12, 1994. Phytochemical voucher N-24.

***Oxalis oregana* Nutt. (Oxalidaceae) - Oregon Oxalis, Oregon Wood-sorrel, Redwood Sorrel.**

syn. *O. acetosella* L. var. *oregana* (Nutt.) Trel., *O. acetosella* ssp. *oregana* (Nutt.) D. Love, *O. acetosella* L. var. *tracyi* Jeps., *O. macra* Small, *O. smalliana* Kunth, *Oxys oregana* Greene

Collection - Del Norte Co., California, 2 mi. off Hwy. 101 on the Avenue of the Giants (north entrance). Very abundant in redwood forest, growing in dense forest litter in full and partial shade. May 24, 1994. Phytochemical voucher Ca-2.

***Oxyria digyna* (L.) Hill (Polygonaceae) - Mountain Sorrel.**

syn. *Donia* R. Br., *Rumex* L., *O. reniformis* Hook.

Collection - Blackcomb Mountain at Whistler, B.C.. Rock outcropping just below the Rendezvous. Elev. ~ 6200 ft. August 20, 1994. Phytochemical voucher N-34.

***Paxistima myrsinites* (Pursh) Raf. (Celastraceae) - Box, False Boxwood, Mountain Boxwood, Mountain Love, Oregon Box-bush, Oregon Boxwood.**

syn. *Ilex myrsinites* Pursh, *I. paxistima* Pursh, *Myginda myrtifolia* Nutt., *Oreophila myrinifolia* Nutt. ex

T. et G., *Paxistima macrophylla* Farr, *P. myrtifolia* Wheeler, *P. schafferi* Farr

Alternate spellings = Pachistima, Pachystima.

Collection - West end of the Baden-Powell trail, 1 km. northeast of Horseshoe Bay, B.C. on the east side of Hwy 1. On a rock cliff overlooking the highway, full sun. September 3, 1994. Phytochemical voucher N-38.

Paeonia brownii **Dougl. ex Hook. (Paeoniaceae) - Brown's Peony, California Peony, Western Peony, Wild Peony.**

syn. *P. californica* Nutt. ex T. et G., *P. brownii* ssp. *californica* (Nutt.) Abrams

Collection - Lassen Co., California, 5 mi. east of Eagle Lake on Hwy 139. Growing in dense litter of dry, open pine forest, in dapple shade. May 29, 1994. Phytochemical voucher Ca-21.

Petasites frigidus **(L.) Fries var.** ***palmatus*** **(Ait.) Cronq. (Compositae) - Sweet Coltsfoot, Palmate Coltsfoot, Salt Plant.**

syn. *Nardosmia (P.) hookeriana* Nutt., *N. palmata* Hook., *N. (P.) speciosa* Nutt., *P. palmatus* (Ait.) A. Gray, *Tussilago palmata* Ait.

Collection - Charlie Lake, B.C. (13 mi. north of Fort St. John). Understory of moist deciduous forest, with *Spiraea betulifolia* and *Cornus canadensis.* August 8, 1994. Phytochemical voucher N-2.

Phacelia ramosissima **Dougl. (Hydraphyllaceae) - Branching Phacelia.**

syn. *P. decumbens* Greene, *P. eremophila* Greene, *P. hispida* Macoun, *P. suffrutescens* Parry

Collection - Sierra Co., California, 20 mi. north of Truckee. Dry coniferous forest near Sulphur Creek. May 29, 1994. Phytochemical voucher Ca-17.

Phyllodoce empetriformis **(Smith) D. Don (Ericaceae) - Pink Mountain Heather.**

syn. *Bryanthus* Gray, *Menziesia* Sm., *M. grahamii* Hook.

Collection - Blackcomb Mountain at Whistler, B.C.. Rock outcropping just above the Rendezvous. Elev. ~ 6200 ft. August 20, 1994. Phytochemical voucher N-33.

Physocarpus capitatus **(Pursh) Kuntze (Rosaceae) - Ninebark.**

syn. *Neillia* Greene, *N. opulifolia* B. et W., *Opulaster* Kuntze, *O. opulifolius* Jeps., *P. opulifolius* (L.) Maxim. var. *tomentellus* (Ser.) Boivin, *P. tomentosa* Raf., *Spiraea* Pursh, *Spiraea opulifolia* L. var.

mollis T. et G.

Collection - U.B.C. Research Forest at Maple Ridge, B.C.. Growing around margins of Marion Lake. June 27, 1994. Phytochemical voucher M-10.

Platanthera dilatata **(Pursh) Lindl. ex Beck (Orchidaceae) - Bog Candle, Boreal Bog Orchid, Leafy White Orchis, Scent-bottle, White Bog-orchid, White Rein-orchid.**

syn. *Habenaria borealis* Cham., *H. dilatata* (Pursh) Hook., *H. graminifolia* Pursh, *H. leptoceratitis* Pursh, *H. leucostachys* (Lindl.) Wats., *Limnorchis borealis* (Cham.) Rydb., *L. dilata* (Pursh) Rydb., *L. leucostachys* (Lindl.) Rydb., *Orchis dilatata* Pursh

Collection - 10 km. east of Birkenhead Lake, B.C. in moist, shady coniferous forest. July 7, 1994. Phytochemical voucher P-53.

Platanthera orbiculata **(Pursh) Lindl. (Orchidaceae) - Large Round-leaved Orchis.**

syn. *Habenaria macrophylla* Goldie, *Habenaria orbiculata* (Pursh) Torr., *Lysias orbiculata* (Pursh) Rydb., *Orchis orbiculata* Pursh, *Platanthera macrophylla* (Goldie) Lindl.

Collection - Shelter Bay Provincial Campground, B.C. on Upper Arrow Lake. Dry coniferous forest north of the campground. August 11, 1994. Phytochemical voucher N-17.

Platystemon californicus **Benth. (Papaveraceae) - Cream Cups.**

syn. *P. arizonicus* Greene, *P. conformis* Greene, *P. crinitus* Greene, *P. horridulus* Greene, *P. mohavensis* Greene, *P. nutans* Greene

NB. Greene recognized some 46 other segregates - see Jepson (1922).

Collection - Near Bodega Bay in Sonoma Co., California. Growing on sandy coastal bluffs at Bodega Head, full sun. May 25, 1995. Phytochemical voucher Ca-5.

Plectritis congesta **(Lindl.) DC. (Valerianaceae) - Rosy Plectritis, Sea-blush.**

syn. *Betckea samolifolia* DC., *P. anphanoptera* (Gray) Suksd., *P. magna* (Greene) Jones, *P. microptera* Suksd., *P. samolifolia* (DC.) Hoeck., *P. racemulosa* Gand., *P. suksdorfii* Gand., *Valerianella congesta* Lindl.

Collection - Sonoma Co., California, 5 mi. south of Marshall on Hwy. 1. Sandy cliff overlooking Tomales Bay. May 25, 1994. Phytochemical voucher Ca-6.

***Polemonium pulcherrimum* Hook. ssp. *lindleyi* (Wherry) Grant (Polemoniaceae) - Showy Polemonium, Skunk-leaved Polemonium, Skunky Jacob's Ladder.**

syn. *P. berryi* Eastw., *P. caeruleum* L. var. *pulcherrimum* Hook., *P. delicatum* Rydb., *P. fasciculatum* Eastw., *P. haydenii* A. Nels., *P. humile* Lindl. var. *pulchellum* Gray, *P. lindleyi* Wherry, *P. montrosensis* A. Nels., *P. pilosum* (Greenm.) Jones, *P. rotatum* Eastw., *P. shatense* Baker ex Eastw.

Collection - 4 mi. east of Princeton, B.C. on Hwy 3. Northern face of rocky slope. Growing in rock crevices. August 12, 1994. Phytochemical voucher N-27.

***Polygonum amphibium* L. (Polygonaceae) - Knotweed, Water Persicaria, Water Smartweed.**

syn. *Persicaria amphibia* (L.) S.F. Gray, *P. canadensis* Greene, *P. coccinea* (Muhl. ex Willd.) Greene, *P. insignis* Greene, *P. mesochora* Greene, *P. muehlenbergii* (S. Wats.) Small, *P. nebraskensis* Greene, *P. psycrophila* Greene, *P. purpurea* Greene, *Polygonum coccineum* Muhl. ex Willd., *P. fluitans* Eat., *P. hartwrightii* Gray, *P. inundatum* Raf., *P. muehlenbergii* S. Wats., *P. natans* (Michx.) Eat.

Collection - Paul Lake, B.C. (north of Kamloops). Growing along sandy shore and in water up to 4 feet deep. August 11, 1994. Phytochemical voucher N-12.

***Potamogeton richardsonii* (Benn.) Rydb. (Potamogetonaceae) - Clasping Leaved Pondweed, Herbes a Brochets, Potamot, Richardson's Pondweed.**

syn. *Potamogeton perfoliatus* L. ssp. *richardsonii* (Bennett) Hult., *P. perfoliatus* var. *richardsonii* Bennett

Collection - Paul Lake, B.C. (north of Kamloops). Plant mostly submerged, rooted in mud, only inflorescence above water. August 11, 1994. Phytochemical voucher N-13.

***Potentilla norwegica* L. (Rosaceae) - Norwegian Cinquefoil, Rough Cinquefoil.**

syn. *P. grossa* Dougl. ex Hook., *P. hirsuta* Michx., *P. labradorica* Lehm., *P. flexosus* Raf., *P. monspeliensis* L., *Tridophyllum monspeliensis* Greene

Collection - Nakusp, B.C.. Marshy area west of government dock, full sun. August 12, 1994. Phytochemical voucher N-18.

Prunella vulgaris **L. (Labiatae) - All-heal, Carpenterweed, Heal-all, Self-heal.**

Collection - Rest area 46 km. west of Port Alberni, B.C. on Hwy 4. Growing in shady coniferous forest. June 22, 1994. Phytochemical voucher V-17.

Purshia tridentata **(Pursh) DC. (Rosaceae) - Antelope Brush, Antelope Bush, Bitter-brush.**

syn. *Kunzia* Spr., *Tigarea* Pursh

Collection - June Lake in Mono Co., California. In sagebrush scrub east of Fern Lake Lodge. May 26, 1994. Phytochemical voucher Ca-10.

Pyrola picta **Smith (Ericaceae) - White Veined Pyrola, Shinleaf, or Wintergreen.**

syn. *P. asphylla* Small, *P. blanda* Andres, *P. conardiana* Andres, *P. dentata* Sm., *P. pallida* Greene, *P. paradoxa* Andres, *P. septentrionales* Andres, *P. sparsifolia* Suksdorf

Collection - Shelter Bay Provincial Campground, B.C. on Upper Arrow Lake. Dry coniferous forest north of the campground. August 11, 1994. Phytochemical voucher N-15.

Rosa canina **L. (Rosaceae) - Dog Rose, European Wild Rose.**

syn. - 238 listed in *Index Kewensis*

Collection - Inyo Co., California, 1/4 mi. west of Paradise Valley turnoff from Hwy 395. Growing along the banks of a stream. May 27, 1994. Phytochemical voucher Ca-11.

Rosa woodsii **Lindl. (Rosaceae) - Desert Rose, Rosa Cimarron, Rosa Del Campo, Wood's Rose.**

syn. *R. adenosepala* Woot. et Standl., *R. arizonica* Rydb., *R. blanda* Wats. not Ait., *R. californica* Wats., *R. covillei* Greene, *R. fendleri* Crep., *R. gratissima* Greene, *R. hypoleuca* Woot. et Standl., *R. lapwaiensis* St. John, *R. macounii* Greene, *R. mohavensis* Parish, *R. neomexicana* Cockerell, *R. pecosensis* Cockerell, *R. puberulenta* Rydb., *R. pyrifera* Rydb., *R. salictorum* Rydb., *R. standleyii* Rydb., *R. terrens* Lunell, *R. ultramontana* Muhl.

Collection - North of Osoyoos, B.C. on Hwy 3, 1/2 mi. north of the lookout over Osoyoos. Dry, rocky hillside in full sun and partial shade. June 8, 1994. Phytochemical voucher P-48.

Sagittaria latifolia **Willd. (Alismataceae) - Broad-leaf Arrowhead, Tule Potato, Wapato.**

syn. *S. diversifolia* Engelm., *S. engelmanii* J.G. Sm., *E. esculenta* Howell, *S. gracilis* Pursh, *S. hastata* Pursh, *S. longinostra* (Micheli) J.G. Sm., *S. ornithorhyncha* Small, *S. planipes* Fern., *S. pubescens* Muhl., *S. sagittifolia* Hook., *S. variabilis* Engelm., *S. viscosa* C. Mohr

Collection - Paul Lake, B.C. (north of Kamloops). Growing along sandy lakeshore in water 1-3 feet deep. August 11, 1994. Phytochemical voucher N-11.

***Scirpus cyperinus* (L.) Kunth (Cyperaceae) - Bulrush, Woolgrass.**

syn. *Eriophorum* L., *S. atrocinctus* Fern., *S. eriophorum* Michx., *S. longii* Fern., *S. rubicosus* Fern., *Trichophorum* Pers.

Collection - Sarita Lake, B.C (near Bamfield). Growing along margins of the lake, full sun. July 28, 1994. Phytochemical voucher V-30, authenticated by Dr. J. Maze, Dept. of Botany, U.B.C.

***Solidago canadensis* L. var. *salebrosa* (Piper) Jones (Compositae) - Canada Goldenrod, Mariquilla, Meadow Goldenrod.**

syn. *S. altissima* L., *S. caurina* Piper, *S. dumetorum* Lunell, *S. elongata* Nutt., *S. gilvocanescens* Rydb., *S. hirsutissima* Mill., *S. lepida* DC. var. *elongata* (Nutt.) Fern., *S. lunellii* Rydb., *S. prinosa* Greene, *S. salebrosa* (Piper) Rydb., *S. scabra* Muhl., *S. serotina* var. *minor* Hook., *Aster elongatus* Kuntze

Collection - Mount Seymour in North Vancouver, B.C. at the Deep Cove lookout. Waste area at base of rock cliff west of the parking lot. September 2, 1994. Phytochemical voucher N-35.

***Solidago spathulata* DC. var. *neomexicana* (Gray) Cronq. (Compositae) - Dune Goldenrod, Spikelike Goldenrod.**

syn. *S. confertiflora* DC., *S. decumbens* Greene var. *oreophilla* (Rydb.) Fern., *S. glutinosa* Nutt., *S. humilis* var. *gillmanii* Gray, *S. oreophilla* Rydb., *S. racemosa* Greene var *gillmanii* (Gray) Fern., *S. randii* (Porter) Britt., *S. spiciformis* T. et G., *Aster candollei* Kuntze, *Homopappus spthulatus* Nutt.

Collection - 8 km. west of Valemont, B.C. on Hwy 5. Growing in open meadow alongside road in full sun and dry, sandy soil. August 10, 1994. Phytochemical voucher N-10.

***Sorbus sitchensis* Roemer var. *grayi* (Wenzig) C.L. Hitchc. (Rosaceae) - Sitka Mountain-ash.**

syn. *Pirus sambucifolia* B. et W., *Pyrus americana* Rich., *P. occidentalis* Wats., *S. californica* Greene, *S. occidentalis* Greene, *S. sambucifolia* Wenzig, *S. tillingii* Gandog.

Collection - Mount Seymour in North Vancouver, B.C., along the trail to Goldie Lake.

September 27, 1994. Phytochemical voucher P-54.

***Stachys bullata* Benth. (Labiatae) - Beach Hedge Nettle, California Hedge Nettle.**

syn. *S. acuminata* Greene, *S. californica* Benth.

Collection - Near Bodega Bay in Sonoma Co., California. Growing on coastal sandy bluffs of Bodega Head, full sun. May 25, 1995. Phytochemical voucher Ca-7.

***Stachys ciliata* Epling (Labiatae) - Cooley's Hedge-nettle, Great Betony, Great Hedge Nettle.**

syn. *S. caurina* Piper, *S. confertiflora* Piper, *S. cooleyae* Heller

Collection - Sarita Lake, B.C (on road to Bamfield). Growing along margins of the lake and roadway, full and partial shade. July 28, 1994. Phytochemical voucher V-31.

***Tiarella trifoliata* L. var. *laciniata* (Hook.) Wheel. (Saxifragaceae) - Foamflower, Laceflower, False Miterwort.**

syn. *Blondia trifoliata* Raf., *T. californica* (Kellogg) Rydb., *T. laciniata* Hook., *T. macrophylla* Small, *T. rhombifolia* Nutt. in T. et G., *T. stenopetala* Presl,

T. unifoliata Hook., *T. wherryi* Lakela

Collection - Sarita Lake, B.C (near Bamfield). Growing along margins of roadway and in forest, full and partial shade. July 28, 1994. Phytochemical voucher V-27.

***Tragopogon pratensis* L. (Compositae) - Goat's Beard, Jack Go-To-Bed-At-Noon, Meadow Salisfy.**

syn. *T. orientalis* L.

Collection - Eagle Lake in Lassen Co., California. Waste area along Hwy 139. May 29, 1994. Phytochemical voucher Ca-20.

***Trauvetteria caroliniensis* (Walt.) Vail (Ranunculaceae) - False Bugbane, Tassel-rue.**

syn. *Cimicifuga palmata* Michx., *Hydrastis* Walt., *T. fimbriata* Greene, *T. grandis* Nutt., *T. palmata* (Michx.) Greene, *T. rotundata* Greene, *T. saniculifolia* Greene

Collection - Sarita Lake, B.C (near Bamfield). Growing in forest opening, full and partial shade. July 28, 1994. Phytochemical voucher V-28.

***Trillium ovatum* Pursh (Liliaceae) - Coast or Western Trillium, Western Wake-robin or Wood Lily, White Trillium.**

syn. *T. californicum* Kellogg, *T. crassifolium* Piper, *T. grandiflorum* Hook., *T. obovatum* Hook., *T. scouleri* Rydb., *T. venosum* Gates

Collection - U.B.C. Research Forest at Maple Ridge, B.C. Along the Red Trail, northwest of the office in coniferous forest. July 13, 1994. Phytochemical voucher M-20.

***Typha latifolia* L. (Typhaceae) - Aguapá, Bulrush, Cat-tail.**

Collection - 6 mi. east and 2 mi. south of Abbottsford, B.C.. Growing in deep irrigation ditches alongside road. August 27, 1994. Phytochemical voucher M-19.

***Valeriana sitchensis* Bong. (Valerianaceae) - Mountain or Sitka Valerian, Mountain Heliotrope.**

syn. *V. anomala* Eastw., *V. frigidorum* Greene, *V. hookeri* Shuttlw., *V. suksdorkii* Gand., *V. sylvatica* var. *uliginosa* T. et G., *V. uliginosa* (T. et G.) Rydb.

Collection - Blackcomb Mountain at Whistler, B.C.. Rock outcropping just below the Rendezvous. Elev. ~ 6200 ft. August 20, 1994. Phytochemical voucher N-29.

***Veratrum viride* Ait. (Liliaceae) - CornLily, False Hellebore, Green Hellebore, Green False Hellebore, Indian Poke, Itchweed, Tabac du Diable, While Hellebore.**

syn. *V. album* Michx., *V. eschscholtzii* Gray, *V. eschscholtzianum* (Schultes) Rydb. ex Heller, *V. lobelianum* R. et S.

Collection - Mount Seymour in North Vancouver, B.C., along the trail to Goldie Lake. September 27, 1994. Phytochemical voucher N-28.

***Viburnum edule* (Michx.) Raf. (Caprifoliaceae) - Highbush Cranberry, Mooseberry, Pimbina, Squashberry.**

syn. *V. acerfolium* Bong., *V. opulus* L. var. *edule* Michx., *V. oxycoccus* Rydb., *V. pauciflorum* La Pylaie ex T. et G.

Collection - 2 km. south of Taylor, B.C. at Taylor Landing. Moist deciduous forest along the Peace River. August 8, 1994. Phytochemical voucher N-4.

***Viola glabella* Nutt. (Violaceae) - Pioneer Violet, Smooth Yellow Violet, Stream Violet.**

syn. *V. canadensis* L. var. *sitchensis* Ledeb., *V. canadensis* Bong. not L.

Collection - Sierra Co., California, 20 mi. north of Truckee on Hwy 89. Growing along the banks of Sulphur Creek. May 29, 1994. Phytochemical voucher Ca-16.

***Wyethia mollis* A. Gray (Compositae) - Big Woolly Sunflower, Woolly Mule's Ears.**

Collection - Sierra Co., California, 10 mi. north of Truckee on Hwy 89. Open pine forest and grassy meadows. Elev. ~ 6200 feet. May 28, 1994. Phytochemical voucher Ca-15.

Key to collection sites: Ca, California; M, Maple Ridge research forest; N, northern British Columbia; P, Princeton-Penticton region; V, Vancouver Island. All specimens were collected and identified by A.R. McCutcheon.

6.3 Appendix 3 - Summary of *Artemisia* taxonomic treatments.

Artemisia L. is one of the largest and most widely distributed genera within the Anthemideae tribe of the Compositae family. It is a fairly distinct and well defined genus distributed mainly in the northern temparate regions of the world. Within the genus, the taxonomic delineations are not as clear cut and therefore the number of species attributed to the genus ranges from 200 - 400. Artemisia's well-founded reputation as a taxonomically difficult genus is due to the fact that there is a great deal of morphological plasticity within taxa and morphological intergradation between taxa.

Artemisia is generally considered to be a highly evolved genus due to it's wide range of life forms, floral diversity in terms of sex expression, and broad range of habitats. *Artemisia* species are the predominant species in the steppe communities of Asia, the sage-brush communities of North America, and the Karoo scrub of South Africa. They also occupy a range of other habitats from arctic alpine to mesic lowlands to dry desert. The most common life forms in the genus are perennial herbs and shrubs. Characteristic of members of the Anthemideae tribe, most *Artemisia* species have a very distinctive aroma and eye catching silver-grey foliage while the inflorescences are fairly inconspicuous. Sex expression in the discoid heads ranges from sterile homogamous to fertile heterogamous.

Sex expression and other floral characteristics have been used as the basis for subdividing the genus by a number of taxonomists. Tournefort (1700) separated *Artemisia*, *Abrotanum*, and *Absinthium* based in part on floral characters and proposed their recognition as distinct genera. This treatment was not followed by taxonomists due to the extremely close resemblance between the species separated by Tournefort's grouping. In another early treatment of the genus, Besser (1829) used the differences in sex expression and the presence or absence of receptacle hairs to divided the genus into four sections: *Abrotanum, Absinthium, Dracunculus,* and *Seriphidium.* The features used for their differentiation are outlined in the following key:

Heads heterogamous, marginal florets pistillate	
Central florets fertile, achenes develope normally	
Receptacle not hairy	*Abrotanum*
Receptacle long hairy	*Absinthium*
Central flowers sterile, achenes aborted	*Dracunculus*
Heads homogamous, marginal florets absent	*Seriphidium*

Besser did not complete his treatment of the genus before his death, however some of his work was subsequently published by de Candolle (1837) and Hooker (1840). Prompted by criticisms that Besser's subdivisions did not form natural groups, there have been a number of alternative treatments proposed (ie. Rydberg, 1916; Poljakov, 1961; Flora Europa). However, most taxonomists have continued to follow Besser's arrangement with some accepting the elevation of the sections to subgeneric status as proposed by Rydberg (1916) and Poljakov (1961).

Besser's sections were retained in the treatment of the genus by Hall and Clements (1923) which placed *Abrotanum* and *Absinthium* as the phylogenetically more primitive sections and *Dracunculus* and *Seriphidium* as more advanced. It is generally conceded that the genus originated in mesic habitats of Central Asia and then expanded into more xeric habitats, giving rise to the *Seriphidium* and *Dracunculus*. Subsequent migration via the Bering land bridge may have then provided the opportunity for the genus to become established in the New World. However, there are two taxa very central to this pharmacological investigation which do not neatly conform to this scenario: the *Tridentatae* and the Vulgares complex.

The *Tridentatae* are a group of New World endemic shrubs which Hall and Clements (1923) originally assigned to the section *Seriphidium*. In his cytotaxonomic study of the *Tridentatae*, Ward (1953) also treated this group as members of the section *Seriphidium*. Considering the close relations apparent within this group, Rydberg (1916) treated these species as members of the section *Tridentatae* of the subgenus *Seriphidium*.

Members of the *Tridentatae* inhabit the dry interior regions of Western North America with no representatives north of 55°N. While many members of the subgenera *Abrotanum, Absinthium,* and *Dracunculus* have a Holarctic distribution, members of the *Seriphidium* are found mainly in southern Europe and northern Africa with no representatives in eastern Russia or northern regions of North America. This distribution pattern makes the Bering land bridge migration scenario a very dubious explanation for the origin of the *Tridentatae* in North America and puts their relationship with the Old World *Seriphidium* in question.

In 1960, Beetle published a treatment of the section *Tridentatae* Rydb. in which he suggested that the group was probably of monophyletic origin with the original ancestor having arrived along the northwesterly coast during the Paleocene. He then revised his position in a subsequent publication (Beetle, 1979), in which he proposed that the genus *Artemisia* may have arisen in the Americas. In contradiction to either of Beetle's scenarios, MacArthur and Plummer (1979) argued that the *Tridentatae* had arisen independantly from the *Seriphidium*, from an ancestral member of the *Abrotanum*.

In reviewing the chemotaxonomic evidence, both Greger (1981) and Kelsey and Shafizadeh (1979) concluded that the *Tridentatae* appeared to be more closely related to the members of the New World *Abrotanum* than to the members of the *Seriphidium* in the Old World. The *Tridentatae* and the *Abrotanum* are also linked by the morphologically intermediate species *A. bigelovii* which Beetle (1960) placed in the *Tridentatae* although previous authors placed it in the *Abrotanum* (Rydberg, 1916; Hall and Clement, 1923; Ward, 1953).

Kelsey and Shafizadeh (1979) also concluded that there was little chemical evidence in the sesquiterpene lactone data to support Besser's separation of *Abrotanum* and *Absinthium.* However, Greger (1981) argued that the polyacetlyene accumulation patterns supported the separation. Considering that the sesquiterpene lactone data only indicates that there are no major differences in the skeletal types produced in these two groups, while the polyacteylene data provides evidence that there are clearly distinguishable biogenetic differences between the two groups, it seems reasonable to maintain the separation. Regardless of whether or not forthcoming chemical evidence supports this separation as natural, most taxonomists will probably continue to use these subgeneric divisions for pragmatic reasons, given the large number of species involved.

Another taxon which has been criticized as an unnatural grouping is the Vulgares complex. Polyploidy is very common within members of this group, giving rise to complex hybrid swarms which completely intergrade morphologically. In their morphologically based monograph of the genus *Artemisia*, Hall and Clement (1923) treated the Vulgares complex as one species, *A. vulgares*, with fifteen subspecies. In contrast, Rydberg (1916) treated the complex as fifty-four distinct species, based on slight morphological differences.

Using morphological, distribution, and cytological data for his revision of the Vulgares complex, Keck (1946) took an intermediate position and recognized eleven species and nine subspecies. Keck also acknowledged the close relationships among the species in this group by placing them in the subsection *Vulgares* of the section *Abrotanum.* He argued that the cytological difference in base chromosome number of the European *A. vulgares* (n=8) and the North American *A. vulgares* complex (n=9) alone justified their treatment as a separate group.

However, in their review of the chemotaxonomic data, Kelsey and Shafizadeh (1979) found that there were greater differences between the Old and New World members of the subgenus *Abrotanum* than there were between the members and non-members of the subsection Vulgares. They concluded that the species in the subsection Vulgares are phylogenetically a closely related group but not entirely distinct from other New World *Abrotanum* species outside this subsection.

The investigations of *Artemisia* species contained in this work were not designed to tackle the complex taxonomic problems inherent in the genus. Therefore, with a few exceptions, the most recent treatments of these two problematic groups were followed in this study: Keck's (1946) treatment of the Vulgares, Beetle's (1960) and Beetle and Young's (1965) treatment of the *Tridentatae*. It is interesting to note that among all the species of the subgenera *Abrotanum* and *Seriphidium* found in North America, only members of the *Tridentatae* and the Vulgares complex were used medicinally by the First Nations peoples.

References - please see Appendix 5.

Appendix 4 - Annotated list of *Artemisia* species vouchers

All *Artemisia* voucher specimens were authenticated by Dr. L. Schultz at Harvard University Herbarium and have been filed in the U.B.C. Herbarium. As this genus has been revised numerous times, a complete list of synonyms is also given for each species.

***A. absinthium* L. - Absinthe, Wormwood.**

syn. *A. absinthia* St. Lag., *Absinthium vulgare* Lam.

All samples had a very distinctive "absinthium" aroma, which the author would term unpleasant.

A-5 sample was collected 7 km. west of Princeton, B.C. along Hwy 3. Growing in a gravelly waste area at the edge of a gravel pit, dry site in full sun. ~ 3,000 ft. Small local population bordered by more abundant *A. tridentata*. July 2, 1990.

B-13 sample was collected in Kittitas Co., Washington, 5 km. southwest of Swauk Pass along Hwy 97. Growing in gravelly/sandy soil in the ditch, in full sun. ~ 4,000 ft. Sporadic populations for about 10 km. southwest of this site alongside the highway. July 21, 1990.

C-1 sample was collected in Glacier Co., Montana, 15 km. west of Babb towards Many Glaciers. Growing along the edge of Appekunny Creek and on small hummocks in the creek, sandy/gravelly soil, full sun. August 1, 1990.

C-13 sample was collected from the same plants at the same site as sample A-5. August 6, 1990.

***A. arbuscula* Nutt. ssp. *arbuscula* - Dark or Dwarf Sagebrush, Little or Low Sagebrush, Scabland Sagebrush.** syn. *A. tridentata* Nutt. var. *arbuscula* McMinn, *A. tridentata* ssp. *arbuscula* H. et C., *Seriphidium arbusculum* (Nutt.) Weber

All samples were fairly aromatic.

B-7 sample was collected in Harney Co., Oregon at Sagehen Hill Nature Trail (rest area 16 mi. west of Hines on Hwy 20). Growing in dry, open sagebrush scrub, poor shallow gravelly soil with *Juniperus occidentalis, Chrysothamnus nauseosus* and *C. viscidiflorus*. ~ 3,000 ft. July 20, 1990.

E-5 sample was collected in Mono Co., California, along the road to Brodie, 7 km. east from junction with Hwy 395 (near Bridgeport). Growing on slope of brick red sand, in full sun. ~ 7500 ft. August 27, 1991.

***A. bigelovii* Gray - Bigelow's sage-bush, Bigelow Sagebrush, Flat Sagebrush.**

syn. *A. petrophila* Woot. et Standl.

E-22 sample was collected in Garfield Co., Utah, viewpoint 27 km. southwest from Boulder on Hwy 12. Dry, open, sandy sagebrush scrub. 1840 m. Frequently sighted along this road between Boulder and Esculenta. Plants mildly aromatic. Sept. 3, 1991.

***A. californica* Less. - Coast Sagebrush, Old Man.**

syn. *A. abrotanoides* Nutt., *A. fisheriana* Bess., *A. foliosa* Nutt., *Chrossostephium foliosum* Rydg., *C. californicum* Rydb.

E-12 sample was collected in San Diego Co., California, 12 km. east of Jamul on Hwy 94. Only one plant (~4.5 ft. high, spreading 5 ft.) sited on a shaded, sandy creek embankment. Plant mildly aromatic. August 30, 1991.

***A. campestris* L. ssp. *caudata* (Michx.) H. et C. - Tall Wormwood, Western Sagebrush.**

syn. *A. campestris* var. *caudata* (Michx.) Palmer et Stey., *A. caudata* Michx., *A. caudata* Michx. var. *calvens* Lunell, *A. forwoodii* S. Wats., *Oligosporus campestris* (L.) Cass. ssp. *caudatus* (Michx.) Weber
Other *A. campestris* synonyms - *A. canadensis* Michx., *A. camporum* Rydb., *A. desertorum* Nutt., *A. pacifica* Nutt., *A. scouleriana* Rydb.

C-9 sample was collected at Little Fish Lake, Alberta. Growing in a dry open waste area on sandy flat, 220 m. from the lakeshore. Plants only slightly aromatic. Locally common. August 3, 1990.

***A. cana* Pursh ssp. *bolanderi* (Gray) Ward - Bolander Sagebrush, Bolander Silver Sagebrush, White Sagebrush.** syn. *A. bolanderi* Gray, *A. tridentata* var. *bolanderi* (Gray) McMinn, *A. tridentata* ssp. *bolanderi* (Gray) H. et C., *Seriphidium canum* (Pursh) Weber ssp. *bolanderi* (Gray) Weber

E-9 sample was collected in Mono Co., California, 20.5 km. east on Hwy 120 from the intersection with Hwy 395, 6 km. east of Mono Mills. Growing in dry creekbed through open sagebrush scrubland. plants quite aromatic. August 28, 1991.

***A. cana* Pursh ssp. *cana* - Blue Sage, Hoary Sagebrush, Hoary Silver Sagebrush, Silver Sagebrush, White Sagebrush.**

syn. *A. columbiensis* Nutt., *Seriphidium canum* (Pursh) Weber

F-6 sample was collected in Sonora Pass, Mono Co., California, 2.5 mi. west of the pass on Hwy 108. Growing in an open grassy meadow, alongside a small stream. Elev. ~ 9,000 ft. Plants mildly aromatic. August 24, 1992.

***A. carruthii* Wood ex. Carruth - Kansas Mugwort.**

syn. *A. bakerii* Greene, *A. carruthii* var. *wrightii* (Gray) Blake, *A. coloradensis* Osterh., *A. kansana* Britt., *A. mexicana bakeri* A. Nels., *A. pringlei* Greenm., *A. wrightii* Gray, *A. wrightii coloradensis* A. Nels., *A. vulgaris caruthii* Gates, *A. vulgaris* var. *wrightii* Palmer et Stey., *A. vulgaris* ssp. *wrighti* H. et C.

E-19 sample was collected in Kaibab Forest, Cococino Co., Arizona, 5 km. east of Jacob's Lake on Hwy 89 (alt.). Growing in sandy soil in open pine forest. Plants were mildly aromatic. September 3, 1991.

A. douglasiana **Bess. - California Mugwort, Douglas's Mugwort, Sagewort.**

syn. *A. heterophylla* Nutt. not Bess., *A. integrifolia* Less., *A. kennedyi* A. Nels., *A. ludoviciana* var. *douglasiana* Eat., *A. vulgares* L. var. *californica* Bess., *A. vulgaris* var. *douglasiana* (Bess.) St. John, *A. vulgaris* var. *heterophylla* Jeps., *A. vulgaris* ssp. *heterophylla* H. et C.

All samples of this species were mildly aromatic.

B-3 sample was collected in Yakima Co., Washington, 7 mi. southwest of White Swan on Hwy 220. Open sagebrush scrub (*A. tridentata* and *A. tripartita*). Growing in gravel ditch, full sun. Occasional clumps of plants in ditches between White Swan and Fort Simpson. July 18, 1990.

E-14 sample was collected at Running Springs in San Bernadino Co., California, intersection of Hwy 18 and City Creek Road. Growing in sandy soil at the edge of the road in full sun. 1735 m. August 31, 1991.

E-31 sample was collected alongside gravel road, between Bamfield, B.C. and Sarita Lake. Growing in waste area beside the road, gravelly, full sun. July 4, 1994.

A. dracunculus **L. - Dragon Sage or Sagewort, Dragonwort, False Tarragon, Linear-leaved Wormwood, Silky Wormwood, Sweet Sagebrush, Wild Tarragon, Yerba niso.**

syn. *A. dracunculoides* Pursh, *A. dracunculoides* var *brevifolia* T. et G., *A. dracunculoides* var. *dracunculina* (S. Wats.) Blake, *A. dracunculoides* var. *glauca* Munz, *A. dracunculoides* var. *incana* T. et G., *A. dracunculus* var. *glauca* (Pall. ex Willd.) Bess., *A. dracunculus* ssp. *glauca* H. et C., *A. dracunculus* ssp. *typica* H. et C., *A. glauca* Pall. ex Willd. var. *fastigata* Bess., *A. glauca* Pall. ex Willd. var. *dracunculina* (S. Wats.) Fern., *A. inodora* Willd. not Mill., *A. nutans* Fraser, *A. nuttalliana* Bess., *Oligosporus condimentarius* Cass., *O. dracunculus* (L.) Poljakov, *O. dracunculus* ssp. *dracunculinus* (S. Wats.) Weber, *O. dracunculus* ssp. *glauca* (Pallas ex Willd.) A. et D. Love

B-9 sample was collected in the town of Rome, Malheur Co., Oregon at the boat launch on the north side of the Owyhee River. Plants were mildly aromatic and imparted a slight tarragon flavor. Locally abundant only along the sandy riverbank in full sun. July 20, 1990.

C-16 sample was collected from a three year old plant growing in the author's garden at 4078 West 17, Vancouver, B.C. This horticultural cultivar breed from European stock was originally purchased from a commercial greenhouse grower under the name "Russian Tarragon". The plant was not aromatic and it's leaves imparted no flavor. October 6, 1990.

E-13 sample was collected at the same site as sample E-14 of *A. douglasiana.* August 31, 1991. Plants were very slightly aromatic and imparted a barely perceptible tarragon flavor.

F-1 sample was collected at Shumway Lake, B.C. (between Merritt and Kamloops). Growing on dry, sandy slopes on the northwest side of the lake with *Chrysothamnus, A. frigida* and *Verbascum thapsum.* Plants were mildly aromatic and imparted a slight tarragon flavor. August 19, 1992.

F-4 sample was collected from the same site as sample B-9, two years later on August 22, 1992.

***A. filifolia* Torrey - Romerillo, Sand Sagebrush, Sand Wormwood, Silver Sage, Silvery Wormwood.**

syn. *A. plattensis* Nutt., *Oligosporus filifolius* (Torr.) Weber

E-20 sample was collected in Cococino Co., Arizona, 45 km. east of Jacob's Lake on Hwy 89 (alt). Growing in red desert sand alongside road and in desert flats at the foot of the Vermillion Cliffs. Plant were slightly aromatic. September 3, 1991.

A. *frigida* Willd. - Colorado Sage, Estafiata, Fringed Sagebrush, Mountain Ball Sage, Mountain Wormwood, Prairie Sagewort, Pasture Sage, Pasture Sagebrush, Rocky Mountain Sage, Sierra Salvia, Wild Sage, Wormwood Sage.

syn. *Absinthium frigidum* Bess., *A. jeniseensis* Willd., *A. procumbens* Schrad., *A. pumila* Link, *A. sericea* Nutt., *A. virgata* Richards

All samples of this species were fairly aromatic.

A-2 sample was collected in the Okanogan, 25 km. southwest of Penticton, B.C. on Green Mountain Road (road up to Apex Alpine ski area). Growing in Ponderosa pine - sagebrush scrublands, sandy soil, full sun. July 1, 1990.

A-3 sample was collected in the Okanogan, 10 km. southwest of Penticton, B.C. on Green Mountain Road (road up to Apex Alpine ski area) near intersection with Single Creek Road. Growing in Ponderosa pine - sagebrush scrublands, sandy soil, full sun. July 1, 1990.

C-5 sample was collected near Red Rock Canyon, Waterton National Park, Alberta, 0.5 mi. past Grandell Camp on the road into the canyon. Growing on top of a rock retaining wall with southern exposure in sandy soil, full sun. August 2, 1990.

E-23 sample was collected in Wayne Co., Utah, 100 m. north of the intersection of Highway 12 and Teasdale Road, on Teasdale road. Growing in sandy soil of sagebrush scrub with *A. dracunculus* and *A. tridentata*. September 3, 1991.

E-27 sample was collected 35 km. west of Lytton, B.C. on Hwy 12. Growing on open dry hillside. September 20, 1991.

A. lindleyana Bess. in Hook. - Columbia (River) Mugwort, Columbia Sagebrush.

syn. *A. arachnoidea* Sheldon, *A. leibergii* Rydb., *A. prescottiana* Bess., *A. pumila* Nutt. not Link, *A. tenuis* var. *integerrima* Rydb., *A. vulgaris* L. var. *lindleyana* Jeps., *A. vulgaris* ssp. *lindleyana* H. et C.

B-4 sample was collected at Lyle, Klickitat Co., Washington along the north bank of the Columbia River. Growing in very rocky ground, full sun. July 19, 1990.

B-5 sample was collected at The Dalles, Wasco Co., Oregon, along the south bank of the Columbia River. Growing under the toll bridge to Washington, in the cracks of black volanic rock, full sun. Plants found locally only along the riverbanks within 20 feet of the water. July 19, 1990.

F-2 sample was collected at Savonna, B.C. along the south bank of the Columbia River. Growing only in the sandy floodplains within 30 feet of the water. August 19, 1992.

F-3 sample was collected at the same site as sample B-5, two year laters. August, 1992.

A. longifolia Nutt. - Long-leaved Mugwort.

syn. *A. falcata* Rydg., *A. integrifolia* Pursh not L., *A. ludoviciana* Nutt. var. *integrifolia* A. Nels., *A. natronensis* A. Nels.

C-10 sample was collected in the Hoodoos, 17.8 km. southeast of Drumheller, Alberta. Growing in very dry, open "badlands". Locally abundant. August 3, 1990.

C-12 sample was collected in Osoyoos, B.C. at Harborn Park on Osoyoos Spit. Growing in shaded, sandy areas along either side of the spit. Plants very spindly. August 6, 1990.

***A. ludoviciana* Nutt. - Alcanfor, Anisote, Cud-weed Mugwort, Dark-leaved Mugwort, Louisiana Sage, Mariola, Prairie or Western Mugwort, Prairie or Western Sage, Rosabari, Small Sagebrush.**

***A. ludoviciana* Nutt. ssp. *candicans* (Rydb.) Keck**

syn. *A. candicans* Rydb., *A. flocosa* Rydb., *A. gracilenta* A. Nels., *A. latiloba* Rydb., *A. ludoviciana* var. *latiloba* Nutt., *A. paucicephala* A. Nels., *A. platyphylla* Rydb., *A. vulgaris* var. *candicans* Peck, *A. vulgaris* ssp. *candicans* H. et C.

All samples of this subspecies were fairly aromatic.

B-11 sample was collected at Succor Creek campground, Malheur Co., Oregon (25 km. southwest of Homedale, Idaho). Sagebrush scrublands, plants growing only along edges of creek, within 15 feet of the water, sandy soil, full sun. July 21, 1990.

C-2 sample was collected in Glacier Co., Montanta, 15 km. west of Babb towards Many Glaciers. Growing in sandy/gravelly soil, full sun. August 1, 1990.

E-1 sample was collected at Meadowcliffe Lodge, Alpine Co., California (9 km. south of Coleville, 4 km. north of Walker). Growing at the edge of sagebrush scrublands behind lodge, sandy soil, full sun. August 27, 1991.

E-15 sample was collected in San Bernadino Co., California, 4 mi. east of Running Springs on the Rim of the World Highway (#8). Growing at the edge of an open pine forest in partial shade. Elev. 1980 m. September 1, 1991.

***A. ludoviciana* Nutt. ssp. *incompta* (Nutt.) Keck**

syn. *A. atomifera* Piper, *A. discolor* var. *incompta* (Nutt.) Gray, *A. flodmanii* Rydb., *A. incompta* Nutt., *A. ludoviciana* var. *atomifera* (Piper) Jones, *A. ludoviciana* var. *incompta* (Nutt.) Cronq., *A. potens*

A. Nels., *A. vulgaris* var. *flodmanii* (Rydb.) Peck, *A. vulgaris* ssp. *flodmanii* (Rydb.) H. et C., *A. vulgaris* ssp. *michauxiana* var. *incompta* (Nutt.) St. John

All samples of this subspecies were fairly aromatic.

C-11 sample was collected at Moyie Lake, B.C., 25 km. west of Cranbrook on Hwy 95. Growing alongside road in sandy soil, full sun and partial shade. August 5, 1990.

A. ludoviciana* Nutt. ssp. *ludoviciana

syn. *A. argophylla* Rydb., *A. brittonii* Rydb., *A. cuneata* Rydb., *A. diversifolia* Rydb., *A. gnaphalodes* Nutt., *A. gnaphalodes diversifolia* A. Nels., *A. herriotii* Rydb., *A. ludoviciana* ssp. *typica* Keck, *A. ludoviciana* var. *americana* (Bess.) Fern., *A. ludoviciana* var. *brittonii* (Rydb.) Fern., *A. ludoviciana* var. *cuneata* (Rydb.) Fern., *A. ludoviciana* var. *gnaphalodes* (Nutt.) T. et G., *A. ludoviciana* var. *latifolia* (Bess.) T. et G., *A. ludoviciana* var. *pabularis* (A. Nels.) Fern., *A. mexicana silicola* Osterh., *A. pabularis* (A. Nels.) Rydb., *A. pudica* Rydb., *A. purshiana* Bess., *A. rhizomata* A. Nels. var. *pabularis* A. Nels., *A. vulgaris* var. *gnaphalodes* Kuntze, *A. vulgaris* ssp. *gnaphalodes* H. et C., *A. vulgaris* var. *ludoviciana* (Nutt.) Kuntze, *A. vulgaris* ssp. *ludoviciana* (Nutt.) H. et C.

All samples of this subspecies were quite aromatic with the exception of C-15 which was only mildly aromatic.

B-8 sample was collected along Succor Creek Road in Malheur Co., Oregon (0.25 mi. west of Hwy 95 turnoff to Succor Creek, 20 mi. north of Jordan Valley). Sagebrush scrublands, plants growing only along the ditches, sandy soil, full sun. July 21, 1990.

B-12 sample was collected in Yakima Co., Washington, 11 km. southeast of Toppenish on Hwy 22. Growing in gravel ditch, full sun. July 22, 1990.

C-8 sample was collected 3 mi. south of Craigmyle, Alberta. Growing in dry, sandy slope at the edge of a pasture. Occasionally sited in local ditches. August 3, 1990.

C-15 sample was collected on Osoyoos Hill above, Osoyoss, B.C. Growing in Ponderosa pine - sagebrush scrubland, sandy soil, full sun. August 6, 1990.

W-5 sample was collected 20 km. north of Creston, B.C. on Hwy 3A, dike turnoff. Along dike between Duck Lake and Kootenay River in open areas with grasses. May 19, 1991.

***A. michauxiana* Bess. ex. Hook. - Michaux's Mugwort.**

syn. *A. discolor* Gray, *A. discolor* var. *glandulifera* Hend., *A. graveolens* Rydb., *A. subglabra* A. Nels., *A. tenuis* Rydg., *A. vulgaris* var. *discolor* (Gray) Jeps., *A. vulgaris* ssp. *discolor* (Gray) H. et C., *A. vulgaris* var. *glandulifera* Peck, *A. vulgaris* ssp. *michauxiana* (Bess.) St. John, *A. vulgaris* ssp. *michauxiana* var. *typica* St. John

None of the samples of this species were aromatic.

C-3 sample was collected in Glacier Co., Montanta, 15 km. west of Babb towards Many Glaciers. Common along Appekenny Creek, growing in tall grasses, sandy/gravelly soil, in full sun and in full shade under the bridge. August 1, 1990.

C-4 sample was collected in Glacier Co., Montanta, 15 km. west of Babb towards Many Glaciers. Very occasional in slightly drier and rockier sites than C-3. August 1, 1990. Schultz recognized C-4 as an introgression with *A. ludoviciana.*

C-6 sample was collected at Red Rock Canyon in Waterton National Park, Alberta. Locally found only along the walls on the canyon, growing in shallow soil over red rocks, full sun and part shade. Leaves glabrous on upper surface. Elev. ~ 5,000 ft. August 2, 1990.

C-7 sample was collected at the same site as C-6, leaves pubescent on upper surface. August 2, 1990.

P-29 sample was collected near Penticton, B.C. at the south end of Apex Alpine road, 2 km. from Hwy 97. Growing on dry, gravelly slope. June 6, 1991.

A. nova **A. Nels. - Black Sagebrush, Little Black Sagebrush.**

syn. *A. arbuscula* ssp. *nova* (A. Nels.) Ward, *A. arbuscula* var. *nova* (A. Nels.) Cronq., *A. tridentata* ssp. *nova* (A. Nels.) H. et C., *A. tridentata* var. *nova* (A. Nels.) McMinn

Both samples were fairly aromatic.

E-17 sample was collected at the Grand View viewpoint at the Grand Canyon, Cococino Co., Arizona. Growing in red, sandy soil at the edge of the parking lot in full sun. ~7,000 ft. September 2, 1991.

E-18 sample was collected at the same site as sample E-19 of *A. carruthii*. ~ 7500 ft. September 3, 1991.

A. pycnocephala **(Less.) DC. - Beach Sagewort, Beach Sagebrush.**

syn. *A. campestris* ssp. *pycnocephala* H. et C., *A. campestris* var. *pycnocephala* Peck, *A. pachystachya* DC., *A. pycnostachya* Nutt., *Oligosporus pycnocephalus* Less.

Both samples had a barely perceptible aroma.

C-18 sample was collected at Monterey, California. Growing in open, sandy waste area along beachfront road. December 15, 1990.

E-29 sample was collected near Bodega Bay in Sonoma Co., California. On the west end of Bodega Head on a sandy coastal bluff, full sun. May 25, 1995.

A. rothrockii **Gray - Rothrock Sagebrush, Timberline Sagebrush.**

syn. *A. tridentata* Nutt. var. *rothrockii* (Gray) McMinn., *A. tridentata* ssp. *rothrockii* (Gray) H. et C., *A. trifida* Gray, *Seriphidium rothrockii* (Gray) Weber

E-16 sample was collected in San Bernadino Co., California, at the west end of Big Bear Lake City on the south side of Hwy 18, 3 blocks east of Boulder Bay. Growing at the edge of a large sandy empty lot. Elev. ~ 2,000 m. Plants extremely resinous and fairly aromatic. September 1, 1991.

F-5 sample was collected in Tioga Pass, Mono Co., California. One mile east of the pass in an open grassy meadow. Elev. ~ 9,900 ft. Plants only slightly resinous and mildly aromatic. August 25, 1992.

A. spiciformis **Osterh. - Sub-alpine Sagebrush.**

syn. *A. tridentata* ssp. *vaseyana* f. *spiciformis* (Osterh.) Beetle

E-8 sample was collected in Mono Co., California at Mammoth Lakes, one block south of Hwy 203 on Mammoth Vista. Understory of open pine forest. Elev. ~ 9,000 ft. Plants were fairly aromatic. August 27, 1991.

A. spinescens **D.C. Eaton - Bud Sage, Bud Sagebrush, Spring Sagebrush.**

syn. *Picrothamnus desertorum* Nutt.

D-1 sample was collected in Owyhee Co., Idaho, 8 mi. southwest of Marsing. Open sagebrush scrublands, sandy soil. Plants were mildly aromatic. May 22, 1991.

A. suksdorfii **Piper. - Coastal or Suksdorf Mugwort.**

syn. *A. heterophylla* Nutt. not Bess., *A. vulgaris* L. var. *litoralis* Suksd., *A. vulgaris* ssp. *litoralis* H. et C. Both samples were mildly aromatic.

B-1 sample was collected in Wenatchee National Forest, King Co., Washington, 40 km. from Easton on Hwy 90 at the Denny Creek exit. Growing in west gravelly ditch in partial shade and full sun. July 18, 1990.

E-11 sample was collected in Ventura Co., California at Leo Carillo State Beach. Growing in sand at the edge of the vegetation zone fronting the beach. August 29, 1991.

***A. tilesii* Ldb. - Aleutian Mugwort, Cariboo Weed, Raychlook.**

syn. *A. elatior* (T. et G.) Rydb., *A. gormanii* Rydb., *A. hookeriana* Bess. in Hook., *A. ludoviciana* var. *americana* Fern., *A. obtusa* Rydb., *A. tilesii* var. *arctica* Bess., *A. tilesii* var. *elatior* T. et G., *A. tilesii* var. *unalaschkensis* Bess., *A. tilesii* ssp. *unalaschkensis* Hult., *A. vulgaris* var. *americana* Bess., *A. vulgaris* var. *kamtschatica* Bess., *A. vulgaris* var. *tilesii* Ledeb., *A. vulgaris* ssp. *tilesii* H. et C., *A. vulgaris* var. *vulgatissima* Bess. in Hook.

All samples were slightly aromatic.

A-7 sample was collected at Dease River Drossing, B.C. Growing along the flat banks of the river in the understory of sparse coniferous forest, sandy soil, partial and full shade. August 20, 1989.

A-8 sample was collected at Eddington Lake, B.C. (near Iskut). Spindly plants growing in amongst grasses along the forest margin and in the forest understory. August 19, 1989.

B-14 sample was collected in Chelan Co., Washington, 12 mi. northwest of Chelan along Chelan Lake Road (south side of the lake). Growing in partially shaded culvert drainage area, sandy soil. July 22, 1990.

***A. tridentata* Nutt. ssp. *parishii* (Gray) H. et C. - Parish Sagebrush.**

syn. *A. parishii* Gray, *A. tridentata* var. *parishii* Jeps., *A. tridentata* ssp. *tridentata* f. *parishii* (Gray) Beetle

Both samples were fairly aromatic.

E-6 sample was collected at the same site as sample E-5 of *A. arbuscula* and sample E-7 of *A. tridentata.* Elev. ~ 7500 ft. August 27, 1991.

E-10 sample was collected in San Bernadino Co., California, 3 mi. north of Lanchester on Hwy 14. Edge of the Mohave Desert - arid, sandy waste area alongside road. August 28, 1991.

***A. tridentata* Nutt. ssp. *tridentata* - Basin Big Sagebrush, Big Black or Common Black Sagebrush, Common Big Sagebrush, Narrow-leaved Big Sagebrush, Rama ceniza.**

syn. *A. angusta* Rydb., *A. angustifolia* (Gray) Rydb., *A. tridentata* var. *angustifolia* Gray, *A. tridentata* var. *typica* H. et C., *Seriphidium tridentatum* (Nutt.) Weber

All samples were strongly aromatic.

A-6 sample was collected 10 km. west of Princeton, B.C. on Hwy 3. Sagebrush scrub pasture, full sun, sandy soil. Elev. ~ 3,000 ft. July 2, 1990.

B-2 sample was collected in Kittitas Co., Washington along Hwy 821, 3 mi. south of the junction with Hwy. 82. Open sagebrush scrublands, gravelly soil, full sun. July 18, 1990.

C-14 sample was collected at the same site as A-6. August 6, 1990.

E-2 sample was collected at the same site as sample E-1 of *A. ludoviciana* and samples E-3 and E-4 of *A. tridentata.* August 27, 1991.

E-3 sample was collected at the same site as sample E-1 of *A. ludoviciana* and samples E-2 and E-4 of*A, tridentata.* August 27, 1991. The subspecific identifications of E-2 and E-3 are questionable, Schultz speculated that they may be hybrids.

E-21 sample was collected at a viewpoint in Kaibab Forest, Cocoino Co., Arizona, 19 km. north of Jacob's Lake. Growing in the understory of an open pine forest in sandy soil and dapple shade. Elev. ~ 7,000 ft. September 3, 1991.

E-24 sample was collected at the same site as sample B-10 of *A. tridentata* ssp. *wyomingensis* amd sample B-11 of *A. ludoviciana*, one year latter. September 4, 1991.

E-28 sample was collected 15 km. east of Spences Bridge, B.C. on Hwy 8. Growing in dry open flats (flood plains) along the Nicolas River with *A. tripartita* and *Opuntia fragilis*. September 30, 1991.

W-19 sample was collected near Osoyoos, B.C., half-way up to the viewpoint on Osoyoos hill. Growing in dry sandy soil alongside road. May 21, 1991.

***A. tridentata* Nutt. ssp. *vaseyana* (Rydb.) Beetle - Mountain Big Sagebrush, Purple Sagebrush.**

syn. *A. tridentata* var. *pauciflora* Winward et Goodr., *A. tridentata* var. *vaseyana* (Rydb.) Boivin, *A. vaseyana* Rydb., *Seriphidium tridentatum* ssp. *vaseyanum* (Rydb.) Weber, *S. vaseyanum* (Rydb.) Weber

All samples were strongly aromatic.

A-1 sample was collected Nickel Plate Mine near Hedley, B.C. Ponderosa pine - sagebrush scrublands, full sun, gravelly soil. Elev. ~ 5600 ft. July 1, 1990.

B-15 sample was collected in Okanogan Co., Washington, 3 mi. northeast of Carlton on Hwy 20. Open arid hillside with southern exposure and sandy soil. Elev. ~ 1700 ft. July 23, 1990.

E-4 sample was collected at the same site as sample E-1 of *A. ludoviciana* and samples E-2 and E-3 of *A. tridentata* ssp. *tridentata*. August 27, 1991. The subspecific identification of E-4 is questionable, Schultz speculated that it may be a hybrid.

E-7 sample was collected at the same site as sample E-5 of *A. arbuscula.* August 27, 1991.

***A. tridentata* Nutt. ssp. *wyomingensis* Beet. et Young - Wyoming Big Sagebrush.**

syn. *A. tridentata* var. *wyomingensis* (Beet. et Young) Welsh, *Seriphidium tridentatum* ssp. *wyomingense* (Beet. et Young) Weber

Both samples were fairly aromatic.

B-6 sample was collected at the same site as sample B-7 of *A. arbuscula.* July 20, 1990.

B-10 sample was collected at the same site as sample B-11 of *A. ludoviciana.* Predominant species in the area (dry, rolling hills in full sun). July 21, 1990.

***A. tripartita* Rydb. ssp. *tripartita* - Cutleaf Sagebrush, Three-tip Sagebrush, Tall Three-tip Sagebrush.**

syn. *A. trifida* Nutt., *A. tridentata* var. *trifida* (Nutt.) McMinn, *A. tridentata* ssp. *trifida* (Nutt.) H. et C., *Seriphidium tripartitum* (Rydb.) Weber

All samples were quite aromatic.

A-4 sample was collected at the same site as sample A-3 of *A. frigida.* July 1, 1990.

E-25 sample was collected in Yakima Co., Washington, 27 mi. west of Toppenish on Hwy. 20, Open sandy waste area at the entrnce to Fort Simcoe. September 5, 1991.

E-26 sample was collected in Chelan Co., Washington, 2 km. from Chelan on Chelan South Shore Road. Growing on sandy hillside with northern exposure, directly across the road from the Lake Chelan Legend sign. September 5, 1991.

E-30 sample was collected in Sonoma Co., California, near Marshall. Sandy bluff overlooking Tomales

Bay, in full sun. May 25, 1991.

A. vulgaris **L. - Ajenjo, Common Mugwort.**

syn. *A. indica canadensis* Bess., *Absinthium vulgare* Dulac

Plants had a very slight aroma.

C-17 sample was collected in North Vancouver, B.C. along the north shore of Burrard inlet, underneath the Lion's Gate Bridge. Growing in waste area along the margins of Capilano Trailer park. Sept. 27, 1990.

6.5 Appendix 5 - Taxonomy and Systematics Bibliography for Appendices 1-4.

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6.6 Appendix 6 - Abbreviated summary of the ethnopharmacology of phase one plants

A comprehensive survey of the North American ethnobotanical literature was made to compile a list of the traditional medicinal uses of each plant. A glossary of the terms used in this summary is located at the end of this thesis. The reported usages were transcribed verbatim in order to preserve as far as possible the intended meanings. The age of some of the sources is reflected in the archaic language used. In other cases, the interpretation of the aboriginal informants's practice through the filter of a European perception of health and medicine is made equally obvious by the language used.

The numbers in brackets following the usage refer to the number of reports of that usage in the source material. In the citations of Compton (1993) and all of Turner's work except Turner (1982), these digits refer to the number of informants who reported that usage. In the remaining literature citations, the digits refer to the number of tribes from which that usage was reported.

The alphanumerical encoding that follows each entry details how the data was scored for use in the ethnobotanical analyses. The keys to these three systems are given below.

Systematic classification

C = Cardiovascular, D = Dermal - mucosal, G = Gastrointestinal, L = Liver, M = Muscular-skeletal, N = Neurological, O = Ophthalmic, P = Respiratory, R = Reproductive, S = Systemic, U = Urinary.

Symptomatic classification

1 = Abortifacient, 2 = Analgesic, 3 = Antidiarrheal, 4 = Antiemetic, 5 = Antihelminthic, 6 = Antinflammatory, 7 = Antipyretic, 8 = Antirheumatic, 9 = Antiscorbutic, 10 = Antiseptic, 11 = Antispasmotic, 12 = Antisyphilitic, 13 = Antitussive, 14 = Astringent, 15 = Carminative, 16 = Cathartic, 17 = Cholagogue, 18 = Colds, 19 = Decongestant, 20 = Diaphoretic, 21 = Digestive, 22 = Diuretic, 23 = Emetic, 24 = Emmenogogue, 25 = Expectorant, 26 = Febrifuge, 27 = Hair growth, 28 = Heart, 29 = Hemorrhoids, 30 = Hemostat, 31 = Insect bites, 32 = Lacteal stimulant, 33 = Laxative, 34 = Liver, 35 = Opthalmic, 36 = Other, 37 = Oxytocic, 38 = Purgative, 39 = Sedative, 40 = Sore throat, 41 = Stimulant, 42 = Stomachic, 43 = Tonic, 44 = Urinary System, 45 = Women's medicines, 46 = Wounds and sores, 47 = other skin ailments, 48 = Other pulmonary complaints, 49 = Viral infections, 50 = Diabetes, 51 = Cancer, 52 = Rubefacients and counter-irritants, 53 = Venom and poison antidotes.

Infectious disease classification

B = Bacterial infection, B2 = Bacterial infection symptoms, F = Fungal infection, F2 = Fungal infection symptoms, V = Viral infection, V2 = Viral infection symptoms, T = Tuberculosis, T2 = Tuberculosis symptoms, P = Physics, tonics, general medicines, unspecified medicines, O = Other ailments.

Summary of the medicinal uses of phase one plants

ANACARDIACEAE

Rhus glabra Diuretic (Evans, 1859). Astringent, tonic (Pitcher, 1860). Cure for watery blisters which break out in summer, make mother's milk flow abundantly (Mooney, 1932). Wounds (Fenton, 1941). Coughs and colds (Weslager, 1943). Make old women's milk flow, convulsions when the brain has been affected, clapps (gonorrhea), kidney trouble, stop children's bedwetting, bowel trouble, tonsilitis, sores on the arm or in the mouth, blisters (Banks, 1953). Cure a rash (Harbinger, 1964). Tuberculosis (Stubbs, 1966). Pyorrhea, canker sores, ease aching teeth, sore throat gargle, colds and coughs (Weslager, 1973). Tuberculosis, laxative (Hart, 1974). Confined women who are not entirely delivered (stimulate passage of afterbirth); chest, head or arm wound patients who lose blood by the mouth; dropsy (3), injured gums, burns, frost-bite, venereal disease (2), diarrhea (2), wounds, sore throat, ulcer, inflammation, astringent, whooping cough, cough medicine (Erichsen-Brown, 1979). Gonorrhea, childbirth, frost-bitten limbs, itchy scalp, tight chest, sores, poison ivy rashes (Turner, 1980). Colds, emetic, increase milk flow, stop bedwetting, stop vomiting, sunburn blisters, blisters, mouthwash for teething children, asthma, all cephalic and pectoral complaints, dysentery (2), tuberculosis, sore eyes, sore mouth or tongue, painful urination, retention of urine, poisoning, poisoning of the skin, post-partum styptic wash, bloody flux, dysmenorrhea, earache, rubefacient, astringent, hemostatic, syphilis, sore mouth, sores, wounds, open sores, sore lips, sore gums (Moerman, 1986). Eye problems, tuberculosis, venereal disease, kidneys (Hunn, 1990). Ulcers and heal internal wounds (Turner, 1990).

C = 2, D = 31, G = 9, L = 0, M = 1, N = 2, P = 17, O = 3, R = 7, S = 9, U = 10

1 = 0, 2 = 6, 3 = 5, 4 = 1, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 6, 13 = 3, 14 = 3, 15 = 0, 16 = 0, 17 = 0, 18 = 3, 19 = 0, 20 = 0, 21 = 2, 22 = 2, 23 = 1, 24 = 1, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 2, 31 = 0, 32 = 3, 33 = 1, 34 = 0, 35 = 2, 36 = 3, 37 = 2, 38 = 0, 39 = 0, 40 = 3, 41 = 0, 42 = 0, 43 = 1, 44 = 6, 45 = 0, 46 = 6, 47 = 16, 48 = 8, 49 = 0, 50 = 0, 51 = 0, 52 = 1, 53 = 3

B = 9, B2 = 24, F = 0, F2 = 2, V = 0, V2 = 2, V3 = 8, T = 4, T2 = 0, P = 1, O = 44,

Total = 91

ARACEAE

Lysichiton americanum Strengthen general debility (Eells, 1877 under skunk-cabbage). Local treatment of bruises, sores, fractures (Buchanan, 1899 under syn. *L. kamtschatcensis*). Draw out any infection or poison (Smith, 1940 under skunk cabbage). Cure boils, sores, wounds (Harbinger, 1964 under skunk cabbage). Stomach trouble (Turner, 1973). Boils, carbuncles, sores, swellings, draw out thorns and splinters, make child's hair grow, compounded for general weakness or undefined sickness (Turner and Bell, 1973). Cooling poultice for bad burns (Turner and Efrat, 1982). Burns, chest pain, abortifacent (Turner, 1983). Rheumatism (2), stomach trouble, influenza, bad dreams, carbuncles, blood poisoning, boils, scrofula soreness, sores, abortifacient, chest pain, blood purifier, soothe stomach after an emetic, headache (3), fevers (3), easy delivery, clean out bladder, wash for invalids (2), poultice for pain, particularily in the knees, physic, cuts (2), swellings (2), any sickness, many ailments (Moerman, 1986). Swellings, pain of the joints (Hunn, 1990). Swellings from animal bites or infections (Turner, 1990). Soothe and help heal burns (Compton, 1993).

C = 0, D = 18, G = 3, L = 0, M = 9, N = 7, P = 2, O = 0, R = 3, S = 13, U = 1

1 = 2, 2 = 8, 3 = 0, 4 = 0, 5 = 0, 6 = 6, 7 = 3, 8 = 2, 9 = 0, 10 = 3, 11 = 0, 12 = 0, 13 = 0, 14 = 2, 15 = 1, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 1, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 1, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 9, 44 = 1, 45 = 0, 46 = 7, 47 = 6, 48 = 0, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 19, F = 0, F2 = 0, V = 1, V2 = 6, V3 = 0, T = 0, T2 = 1, P = 9, O = 24,

Total = 56

ARALIACEAE

Oplopanax horridus Venereal disease (Brown, 1868 under syn. *Echinopanax horridum*). Purgative, expel afterbirth (Morice, 1894). Unspecified medicine (Gorman, 1896 under syn. *Fatsia horrida*). Childbirth (Morice, 1900 under syn. *Fatsia horrida*). Cathartic (Darby, 1933 under "devil's club"). Unspecified medicine (Reagan, 1934a under syn. *Echinopanax horridum*). Fever, tuberculosis (7), tuberculosis of the bone, lung hemorrhage, stop internal hemorrhage, dry cough, clear throat, coughs, colds (7), boils (2), burns, sores (3), skin abrasions, skin tonic, skin disease, lice, dandruff, measles, other infections, prevent blood poisoning, blood purifier (2), influenza, weight loss, indigestion (2), stomach trouble (4), stomach pain, gallstones, ulcers (2), stomach and intestinal cramps, constipation (2), laxative (3), cathartic, emetic (3), purgative (5), purgative for gonorrhea, purgative before and after childbirth, purgative for stranguary, rupture or any sickness, drive away sickness, unspecified illness (5), tonic (3), general tonic, general sickness, many illnesses (2), general strength, wound pain (2), sore area, headache (2), toothache pain, pain (5), chest pains, reduce pain and swelling of a fracture, knit broken bones, swollen glands, black eyes, bruises, swellings (3), arthritis (7), rheumatism (8), counter-irritant for rheumatic limbs, lameness (2), diuretic, diabetes (3), cancer (2), expel afterbirth, start post-partum menstrual flow, stop excessive lactation, after childbirth (Turner, 1983). Colds (2) (Moerman, 1986). Lower a fever, infections, tuberculosis, stomach trouble, coughs, colds, diaphoretic; swollen glands, boils, sores and other infections to draw out the infection (Kari, 1987). Tuberculosis (Hunn, 1990). Diabetes, ulcers, give one good appetite, laxative (Turner, 1990). Shock medicine to begin serious illness turnaround, kidney disorders, tumors, stimulate immune system, relax high stress, mental illness, stomach and intestinal cancer (Forlines, 1992). Colds (2), general aches and pains, any kind of sickness, head lice, rheumatism, laxative, eyewash for catarracts, wounds, sores, hypotension, any blood disorder such as blood in one's stool, sickness in the stomach, arthritic joints (Compton, 1993).

C = 2, D = 18, G = 36, L = 0, M = 25, N = 18, P = 25, O = 2, R = 6, S = 45, U = 2

1 = 0, 2 = 14, 3 = 0, 4 = 0, 5 = 0, 6 = 8, 7 = 2, 8 = 17, 9 = 0, 10 = 6, 11 = 0, 12 = 1, 13 = 2, 14 = 1, 15 = 2, 16 = 2, 17 = 0, 18 = 12, 19 = 0, 20 = 1, 21 = 12, 22 = 1, 23 = 3, 24 = 1, 25 = 1, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 2, 31 = 0, 32 = 1, 33 = 7, 34 = 0, 35 = 1, 36 = 5, 37 = 4, 38 = 11, 39 = 1, 40 = 2, 41 = 0, 42 = 0, 43 = 24, 44 = 1, 45 = 0, 46 = 4, 47 = 7, 48 = 10, 49 = 2, 50 = 4, 51 = 4, 52 = 1, 53 = 0

B = 7, B2 = 22, F = 1, F2 = 2, V = 2, V2 = 7, V3 = 15, T = 10, T2 = 1, P = 22, O = 96,

Total = 179

ARISTOLOCHIACEAE

Asarum caudatum Stomachic (Cooney, 1832). Female complaints (Johnson, 1907). Poultice (Gifford, 1939). Poultice to draw a boil to a head (Gifford, 1967). Pain in the stomach, emetic, antiseptic, cuts, boils (Merriam, 1967 under *Asarum*). Colds and as a laxative (Turner, 1980). Fevers and convulsions in infants (Black, 1980). Stomach pain (Hebda, 1981). Headache, knee pain, intestinal pain, stomach pain, stomach troubles, stomach tonic, indigestion, colic, increase appetite, tonic, tuberculosis, boils, quiet baby and cure illness (Moerman, 1986). Deodorant (Turner, 1990). Open sinuses, compounded in cold or flu teas to reduce sinus swelling (Forlines, 1992). Stomach pains, emetic, settle the stomach, intestinal pains, headaches, knee pains, arthritis, tuberculosis (Turner in Pojar and MacKinnon, 1994).

C = 0, D = 7, G = 13, L = 0, M = 1, N = 8, P = 5, O = 0, R = 1, S = 5, U = 0

1 = 0, 2 = 10, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 1, 9 = 0, 10 = 1, 11 = 1, 12 = 0, 13 = 0, 14 = 1, 15 = 3, 16 = 0, 17 = 0, 18 = 1, 19 = 3, 20 = 0, 21 = 2, 22 = 0, 23 = 2, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 1, 40 = 0, 41 = 0, 42 = 1, 43 = 3, 44 = 0, 45 = 1, 46 = 1, 47 = 1, 48 = 2, 49 = 0, 50 = 0, 51 = 0, 52 = 2, 53 = 0

B = 3, B2 = 13, F = 0, F2 = 1, V = 0, V2 = 3, V3 = 1, T = 2, T2 = 0, P = 3, O = 17,

Total = 40

BERBERIDACEAE

Mahonia aquifolium Venereal disease, inflammatory swellings (Brown, 1868 under syn. *Berberis aquifolium*). Skin diseases (Eells, 1877 under Oregon Grape). Venereal remedy, tonic (Gibbs, 1877). General debility, create an appetite (Palmer, 1878). Skin diseases, syphilis, strengthen the body (Boas, 1890). Sore eyes, purgative (Chamberlain, 1892). Purgative (Buchanan, 1899). Alterative (Johnson, 1907 syn. *Berberis aquifolium*). Tonic (Ring, 1930 under Oregon grape). Preventative medicine (Swank, 1932 under syn. *Berberis aquifolium*). Tonic (Culley, 1936). Good for the blood, physic, compounded for colds (Smith, 1940 under Oregon grape). Dysentery, blood thickener for bleeders (Nickerson, 1966). Blood medicine (Merriam, 1967 under *Berberis*). Eyewash (Smith, 1972). Blood cleanser, tonic, general health builder, prevents arthritis, compounded for liver and bowels (Melgrave, 1973; under "Oregon grape"). Skin diseases, syphilis, general strengthener, tonic, detergent lotion (Turner and Bell, 1973). Tonic (2), blood purifier (2), eyewash (4), tuberculosis, compounded for bad kidneys when one has to urinate often, relieve upset stomach, stop vomiting, alone or compounded for blood tonic (Turner, 1980). Unspecified medicine (Turner, 1983). Stomach trouble, hemorrhages, yellow fever, sore throat, all kinds of sickness, general tonic (2), purify the blood (Moerman, 1986). Upset stomach (Hunn, 1990 under syn. *Berberis aquifolium*). Arthritis, syphilis, tonic, tonic for the blood (2), eyewash for red, itchy eyes (2), laxative (Turner, 1990).

C = 2, D = 4, G = 9, L = 1, M = 3, N = 0, P = 3, O = 8, R = 0, S = 35, U = 1

1 = 0, 2 = 0, 3 = 1, 4 = 1, 5 = 0, 6 = 1, 7 = 0, 8 = 2, 9 = 0, 10 = 0, 11 = 0, 12 = 5, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 4, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 1, 34 = 1, 35 = 8, 36 = 0, 37 = 0, 38 = 2, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 30, 44 = 1, 45 = 0, 46 = 0, 47 = 4, 48 = 1, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 6, B2 = 10, F = 0, F2 = 4, V = 1, V2 = 6, V3 = 2, T = 1, T2 = 0, P = 30, O = 19,
Total = 66

BETULACEAE

Alnus rubra For a cut with a bruise (Josselyn, 1860 under syn. *A. incana*). Colds and biliousness, tonic (Eells, 1877 under alder). Burns (Boas, 1890). Bellyache (Chamberlain, 1892). Stop cholera (Tantaquidgeon, 1932 under red alder). Unspecified medicine (Reagan, 1934a under syn. *A. oregana*). Emetic, laxative (Tantaquidgeon, 1941 under syn. *A. incana*). Tonic good for the stomach, purify the blood, sores, wounds, burns (Turner and Bell, 1971). Purgative (2), children's mouth sores (Turner, 1973). Tuberculosis and blood spitting (2), asthma, sores, eczema, aches (Turner and Bell, 1973). Tuberculosis and other internal ailments (Turner and Efrat, 1982). Internal injuries, broken bones, bruises, tuberculosis and other lung ailments, undiagnosed injuries from falls or accidents (Turner, 1983). Many maladies (Moerman, 1986). Purify blood (Hunn, 1990 under syn. *A. incana*). Sore eyes, eczema (2), skin sores (3), scabby skin (2), allergic reactions (Turner, 1990). Catkins used in poultice for toothache (Turner, 1990). Heart pain (Forlines, 1992). Cleanse boils, unspecified medicine (Compton, 1993). Sore eyes (Turner, unpublished Haida mss.).

C = 1, D = 16, G = 8, L = 0, M = 3, N = 1, P = 8, O = 2, R = 0, S = 10, U = 0

1 = 0, 2 = 2, 3 = 1, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 1, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 1, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 2, 36 = 0, 37 = 0, 38 = 2, 39 = 0, 40 = 0, 41 = 0, 42 = 1, 43 = 7, 44 = 0, 45 = 0, 46 = 7, 47 = 12, 48 = 8, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 15, F = 0, F2 = 2, V = 0, V2 = 4, V3 = 1, T = 4, T2 = 2, P = 7, O = 17,

Total = 50

Betula papyrifera Compounded for dusting powder for children and remedy for chafed surfaces (Holmes, 1884). Sore eyes (Chamberlain, 1892). Gonorrhea, lung trouble (Strath, 1903). Diaper rash, skin rash (Black, 1980). Back pain, induce sweating, ensure adequate milk supply, "women's troubles", sickness associated with teething, persistant scabs, rashes (2), skin sores, rotten birch wood considered best for baby powder to put in folds of skin where rash likely to occur, gonorrhea (2), consumption, lung trouble (Leighton, 1985). Enema, dysentery, tonic, internal blood diseases, alleviate stomach cramps, pain, shrivel the womb, seasoner for medicines (Moerman, 1986). Spring tonic, colds, laxative (Turner, 1990). Stimulant chewing gum (Turner in Pojar and MacKinnon, 1994).

C = 0, D = 9, G = 4, L = 0, M = 0, N = 2, P = 4, O = 1, R = 3, S = 9, U = 0

1 = 0, 2 = 2, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 3, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 1, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 1, 33 = 1, 34 = 0, 35 = 1, 36 = 1, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 1, 42 = 0, 43 = 3, 44 = 0, 45 = 2, 46 = 0, 47 = 9, 48 = 3, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 4, B2 = 5, F = 3, F2 = 7, V = 0, V2 = 4, V3 = 1, T = 1, T2 = 2, P = 3, O = 11,

Total = 32

CACTACEAE

Opuntia fragilis Eye medicine, aids old men to urinate more freely, compounded with pine pitch for skin sores and infections (Turner, 1980). Heated quill poultice for cuts, sores, boils, swollen throats (Moerman, 1986).

C = 0, D = 5, G = 0, L = 0, M = 0, N = 0, P = 1, O = 1, R = 0, S = 0, U = 1

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 2, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = , 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 0, 44 = 1, 45 = 0, 46 = 1, 47 = 2, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 7, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 0, O = 1,

Total = 8

CAPRIFOLIACEAE

Lonicera ciliosa Diseases of the bladder (Bell, 1885). Unspecified medicine (Turner and Bell, 1971). Contraceptive, hair wash for hair growth, bruises, tuberculosis, strengthening tonic, womb trouble, stimulate lacteal flow, colds and sore throats (Moerman, 1986). General medicine, treatment for epilepsy especially in babies and young children to induce sound sleep (Turner, 1990).

C = 0, D = 1, G = 0, L = 0, M = 1, N = 1, P = 3, O = 0, R = 3, S = 3, U = 1

1 = 1, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 1, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 1, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 1, 40 = 1, 41 = 0, 42 = 0, 43 = 3, 44 = 1, 45 = 1, 46 = 0, 47 = 0, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 1, T = 1, T2 = 0, P = 3, O = 6,

Total = 13

Lonicera involucrata Sores, sore mouth (Willoughby, 1886). Powerful laxative (Stubbs, 1966). Itchy areas (2), boils (2), gonorrhea, sores, coughs (Turner, 1973). Swollen shoulders or feet, sores, sore feet and legs, alone or compounded to make milk flow (2), compounded for swellings and sores (2), compounded for arthritis and rheumatism (Turner and Bell, 1973). Expel worms, powerful laxative (Hart, 1974). Cathartic, emetic, chest and stomach troubles (Hellson, 1974). Physic, medicine for mother after childbirth (Turner, 1980). "Medicine", strengthening tonic (Turner, 1983). Medicine for women during confinement, body sores, constitutional weakness or paralysis, emetic (2), sores, sore mouth, eye wash, sore eyes, painful places, swellings, liniment (Moerman, 1986). Emetic (Hunn, 1990). Broken bones, scabs, sores and swellings, swollen feet, tonic, sore throats, bladder ailments (Turner, 1990). Burns, toothache, ophthalmia (Turner, unpublished Haida mss.).

C = 0, D = 16, G = 9, L = 0, M = 12, N = 1, P = 3, O = 3, R = 4, S = 7, U = 1

1 = 0, 2 = 5, 3 = 0, 4 = 0, 5 = 1, 6 = 7, 7 = 0, 8 = 2, 9 = 0, 10 = 2, 11 = 0, 12 = 1, 13 = 1, 14 = 0, 15 = 0, 16 = 1, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 4, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 2, 33 = 2, 34 = 0, 35 = 3, 36 = 1, 37 = 2, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 5, 44 = 1, 45 = 0, 46 = 2, 47 = 11, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 15, F = 0, F2 = 4, V = 0, V2 = 3, V3 = 1, T = 0, T2 = 0, P = 5, O = 28,

Total = 56

Sambucus caerulea Winter colds, diaphoretic (Hagenbuck, 1894 under syn. *S. glauca*). Sudorific in fevers and colds (Johnson, 1907 syn. *S. glauca*). Cure women's diseases (Kroeber, 1925 under syn. *S. glauca*). Ague, diaphoretic (Barrett and Gifford, 1933 under syn. *S. glauca*). Cure colds and coughs, women during confinement (Reagan, 1934a under syn. *S. glauca*). Emetic (Olson, 1936 under elderberry = kwe'lap which Gunther (1945) gives as *S. cerulea*). Colds (Carter, 1947 under syn. *S. glauca*). Caked breast, any inflammation (Murphy, 1959 under syn. *S. glauca*). Headache, fever, influenza, stomachache, eye infection (Owen, 1963 under syn. *S. mexicana*). Febrifuge, "cure" heart trouble, cuts, bruises (Pennington, 1963a). Boils (Harbinger, 1964). Cataplasm for hemorrhoids, colds, bronchitis, inflammations of the throat, sudorific, febrifuge, relief for a paralytic (Curtin, 1965 under syn. *S. mexicana*). Cure unspecified female disorders (Moriarty, 1965 under syn. *S.*

glauca). Eye wash for new babies (Moriarty, 1965 under *S. caerulea*). Help deliver the placenta (Hart, 1974). Steam bath for arthritis or rheumatism (Turner, 1980). Children' fever (Peri, 1982). Purgative, new colds, colds, headache, wash for sick child, blood poisoning, fevers (3), diaphoretic, measles, lung hemorrhage in consumption, female complaints, sprains, bruises, antiseptic wash for itch and sores, antiseptic wash (2), stomachaches (2), emetic (3), toothache, diarrhea (Moerman, 1986). Loss of appetite (Hunn, 1990). Syphilis, arthritis (Turner, 1990).

C = 1, D = 6, G = 9, L = 0, M = 6, N = 4, P = 10, O = 1, R = 6, S = 17, U = 0

1 = 0, 2 = 3, 3 = 1, 4 = 0, 5 = 0, 6 = 5, 7 = 6, 8 = 3, 9 = 0, 10 = 6, 11 = 0, 12 = 1, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 6, 19 = 0, 20 = 5, 21 = 3, 22 = 0, 23 = 4, 24 = 0, 25 = 0, 26 = 2, 27 = 0, 28 = 1, 29 = 1, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 2, 36 = 1, 37 = 1, 38 = 1, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 3, 44 = 0, 45 = 4, 46 = 1, 47 = 0, 48 = 1, 49 = 2, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 6, B2 = 22, F = 0, F2 = 5, V = 2, V2 = 13, V3 = 7, T = 0, T2 = 1, P = 2, O = 24,

Total = 65

Sambucus racemosa Wounds, lacerations, astringent (Swan, 1868 under elder). Laxative (Morice, 1894). Childbirth (Morice, 1900). Emetic antidote for poisoning, boils, abcesses (Densmore, 1939). Emetic (Mechling, 1959). Caked breast, any inflammation (Murphy, 1959). Open sores and cuts (Gifford, 1967). Purgative, emetic for stomach pain (3) (Turner, 1973). Emetic, relax woman's body after childbirth (2), compounded for aching legs and feet (Turner and Bell, 1973). Help deliver the placenta (Hart, 1974). Purgative (Turner, 1980). Clean out the stomach, emetic, laxative, topically to relieve aching and tired muscles (Turner and Efrat, 1982). Emetic, purgative, laxative (Turner, 1983). Emetic for weakness, general illness and inability to eat, tuberculosis (Gottesfeld, 1988). Reduce swelling of sore joints, rheumatism, physic, cathartic, emetic for poisoning, drastic purgative for severe constipation, purgative (6), emetic (4), erysipelas, measles, abscess, boils, toothache, open sores and cuts, wash on area infected with blood poisoning, start milk flow after childbirth (Moerman, 1986). Cold, flu, high fever, tuberculosis (2), infections (Kari, 1987). Liver disease (Turner, 1990). Tonic for women after childbirth, liver fluke treatment, intestinal problems, serious wound infections and tumors

(Forlines, 1992). Aid childbirth, abortifacient, arthritic and other types of pain, lance boils, stomach problems (Compton, 1993). Female medicine (Turner, unpublished Haida mss.).

C = 0, D = 15, G = 32, L = 2, M = 6, N = 2, P = 4, O = 0, R = 9, S = 8, U = 0

1 = 1, 2 = 5, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 1, 8 = 1, 9 = 0, 10 = 7, 11 = 2, 12 = 0, 13 = 0, 14 = 1, 15 = 0, 16 = 1, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 18, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 1, 33 = 3, 34 = 2, 35 = 0, 36 = 0, 37 = 3, 38 = 10, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 1, 46 = 4, 47 = 6, 48 = 2, 49 = 2, 50 = 0, 51 = 1, 52 = 0, 53 = 0

B = 7, B2 = 11, F = 0, F2 = 1, V = 2, V2 = 2, V3 = 1, T = 2, T2 = 0, P = 1, O = 53,

Total = 78

Symphoricarpos albus Colds (Brown, 1868 under syn. *S. racemosus*). Sores, sore throat (Boas, 1890 under syn. *S. racemosus*). Alleviate colds and stomachache (Barrett and Gifford, 1933). Leaves chewed by person who was unable to pass his water (Densmore, 1939). Cure fevers (Harbinger, 1964). Help deliver the placenta, venereal disease, prevent scabs of cuts and burns from scarring (Stubbs, 1966). Eyewash, emetic, cathartic, stomachache, colds, sores (2), sore throat, rashes, burns (Turner and Bell, 1971). Diuretic for gonorrhea (Turner, 1973). Inflammed eyes, sore eyes, cauterization (Turner and Bell, 1973). Wet sores, chapped or injured skin, scabs of cuts or burns to promote healing, cuts, eyewash (Hart, 1974). Urine retention problems, children's skin sores, relieve itching, sore and running eyes, eyewash, physic to clean out the system, illness of an indefinite character, antiperspirant (Turner, 1980). Bad headache accompanied by dizzy spells, person who was unable to urinate (Turner, 1983). Sore eyes, skin rash, compounded to treat fever associated with teething and venereal disease (Leighton, 1985). Wash for injuries, general weakness or illness, venereal disease (2), stoppage of urine, disinfect festering sore, colds, moxa for headache, inflammed eyes, clear up the afterbirth and hasten convalescence, poison antidote, babies with coated tongues, sores, tuberculosis, stomach trouble (Moerman, 1986). Eyes, bedwetting, tuberculosis (Hunn, 1990). Diarrhea (3), sore eyes (2), impending blindness, eye medicine, antiseptic wash on the breasts of a nursing mother and for sores (2), purgative after childbirth, laxative, stomachache, stomach medicine (Turner, 1990). Settle the stomach after too much fatty food (Turner in

Pojar and MacKinnon, 1994).

C = 0, D = 23, G = 13, L = 0, M = 0, N = 2, P = 8, O = 13, R = 2, S = 11, U = 6

1 = 0, 2 = 1, 3 = 3, 4 = 0, 5 = 0, 6 = 0, 7 = 2, 8 = 0, 9 = 0, 10 = 4, 11 = 0, 12 = 4, 13 = 0, 14 = 0, 15 = 1, 16 = 1, 17 = 0, 18 = 4, 19 = 0, 20 = 0, 21 = 5, 22 = 1, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 13, 36 = 3, 37 = 2, 38 = 1, 39 = 0, 40 = 2, 41 = 0, 42 = 0, 43 = 5, 44 = 5, 45 = 0, 46 = 4, 47 = 12, 48 = 2, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 1

B = 7, B2 = 21, F = 1, F2 = 5, V = 0, V2 = 11, V3 = 4, T = 2, T2 = 0, P = 3, O = 33,

Total = 78

COMPOSITAE

Achillea millefolium Agues (Josselyn, 1860). Stimulant, tonic and secernent (Pitcher, 1860). Weak and disordered stomachs (Palmer, 1878). Headaches (Boas, 1890). Cauterization (Dunbar, 1890). Neuralgia, toothache, sore gums, stomach troubles (Johnson, 1907). Wound medicine, bruises, sickness (Chamberlain, 1909). Fevers (Speck, 1909b under yarrow). Poultice for swellings, bruises, sprains, diaphoretic for colds (Wallis, 1922). Taken for the stomach, appetizer, for the liver and kidneys (Tantaquidgeon, 1925). Bad colds, influenza, stop pain (Barrett and Gifford, 1933). Back pain (Carson, 1935 under syn. *A. lanulosa*). Broken bones, wounds, cuts, sores, stomach trouble, rheumatic and other pains (Nomland, 1938 under yarrow). Colds, tuberculosis, childbirth medicine (Densmore, 1939). All sorts of cuts (Kinietz, 1940). Summer complaint (Fenton, 1941). Catarrh (Banks, 1953 under *Achillea* sp.). Sprains and bruises (Mechling, 1959). Felon, gas pains, toothache, earache (Murphy, 1959 under syn. *A. lanulosa*). Toothache (Harbinger, 1964). Burns, cuts, bruises, sprains, broken bones, stop flow of blood, dissipate a cough, compounded with plantain to reduce fever and as purgative (Curtin, 1965 under syn. *A. lanulosa*). Poultice for sores (Moriarty, 1965) under syn. *A. lanulosa*). Sores, mild laxative (Nickerson, 1966 under syn. *A. lanulosa*). Colds, wounds, stop bleeding (Stubbs, 1966). Burns, boils, open sores, toothache, abscessed gums (Toineeta, 1970). Lame back, summer flu, headache or migraine, swelling (Jolicoeur, 1971). Colds, sore throats, headache, toothache, skin rash, indigestion, tonic (Turner and Bell, 1971). Cuts, swellings, bruises, wounds, stomach upset (Smith, 1972). Mumps, colds, chest problems, builds up health, quick healer, soothes womb after childbirth, cleans up afterbirth, compounded for hemorrhage (Melgrave, 1973; under "Yarrow"). Bronchitis, breast abscesses, boils, burns (Turner, 1973). Rheumatism, swellings, sores, general sickness, compounded for colds or hardened breasts following childbirth (2) (Turner and Bell, 1973). Stop excessive menstruation, wounds, disordered stomachs (Weslager, 1973). Cuts (8), bad bruises (8), open wounds to stop bleeding and to act as a disinfectant (8), soothe pain of toothache, on aching legs for rheumatism (Hart, 1974). Childbirth, expel afterbirth, swollen parts, swellings, sores, sore throat, diuretic, soothe pain of gastroenteritis and liver trouble (Hellson, 1974). Cuts, burns, swellings, bruises, fever (2), coughs, colds (3), earache, nausea (2), stomach cramps, diarrhea (2), prevent vomiting, sickness of the head, summer complaint (Erichsen-Brown, 1979). Colds and other respiratory disorders, snuff for headaches, poultices, headaches, fever, grippe (Black, 1980). Headache, stomachache, relieve toothache pain, soothe pain of arthritis and rheumatism, burns, rashes, colds (3), diarrhea (2), compounded for laxative, compounded for physic, eyewash, abortifactant (Turner, 1980). Burns, blisters, sprains, infant chills (Arnason, 1981). Aromatic bitter (tonic), diaphoretic, emmenagogue (Meyer, 1981). Toothache (Munson, 1981). Internal pain, prolonged cough, heal stomach and internal organs (Turner and Efrat, 1982). Colds (Turner, 1983). Teething related sickness, sores on the gums, toothache, backache, lessen pain of burns, compounded in wash to clean pus from gums of teething child (Leighton, 1985). Bloody diarrhea, diarrhea (2), diarrhea or fever caused by sunstroke, hemorrhages and bowel complaints, stomach troubles (2), stomachache, stomach aid, appetizer, stop vomiting, cramps, biliousness, emetic for sunstroke, summer complaint, catarrh, spitting blood, bloody piles, bloody urine, flooding, stop nose bleed, heart trouble, chest pains, liver and kidney disorders (2), venereal disease, gonorrhea, prevent mumps, bath for invalids, fever (4), diaporetic (2), nausea, headaches (5), toothaches (3), sore eyes, earache, coughs, colds (6), cold in the chest, tickling in the throat, sore throat, respiratory diseases, tuberculosis (3), skin sores (2), saddle sores, skin problems, eczema, insect or snake bites, rashes, chapped hands, skin eruptions, pimples, poison ivy, hair wash, cuts, wounds, bruises (2), swellings (5), sprains (4), neuralgia, rheumatism, reduce fever of rheumatic limbs, sore through the joints, body aches, bath for sick infants, babies with any kind of sickness or fever, babies with convulsions, children's worms, children's diarrhea, children's rash, abortifacient, during childbirth, induce sweating at childbirth, heal uterus after childbirth, stimulant, smudged to revive comatose patient, unconscious patient who has fallen, blood purifier (3), life medicine for impaired viltality, tonic for slight indisposition, tonics (4) restful sleep (Moerman, 1986). Diarrhea, eye wash, catarracts, swellings, barrenness (Hunn, 1990). Influenza, colds (2), bladder trouble, venereal disease (2), antidote for dysentery (2), bad stomach cramps and diarrhea, children's diarrhea, wounds, sores, cuts, broken bones, bathing arthritic limbs, sciatica, toothache (Turner, 1990). Women's medicine, aid to birthing, diarrhea (Forlines, 1992). Medicinal steambath for unspecified illness (Compton, 1993). Cuts, medicine (Turner, unpublished Haida mss.).

C = 15, D = 75, G = 49, L = 4, M = 52, N = 37, P = 39, O = 7, R = 15, S = 56, U = 6

1 = 2, 2 = 45, 3 = 16, 4 = 5, 5 = 1, 6 = 38, 7 = 13, 8 = 6, 9 = 0, 10 = 14, 11 = 1, 12 = 3, 13 = 4, 14 = 0, 15 = 4, 16 = 0, 17 = 0, 18 = 22, 19 = 2, 20 = 5, 21 = 13, 22 = 1, 23 = 1, 24 = 1, 25 = 0, 26 = 0, 27 = 0, 28 = 2, 29 = 1, 30 = 13, 31 = 1, 32 = 1, 33 = 2, 34 = 4, 35 = 4, 36 = 9, 37 = 6, 38 = 1, 39 = 1, 40 = 4, 41 = 4, 42 = 2, 43 = 23, 44 = 5, 45 = 4, 46 = 33, 47 = 23, 48 = 9, 49 = 5, 50 = 0, 51 = 0, 52 = 0, 53 = 2

B = 19, B2 = 120, F = 0, F2 = 7, V = 5, V2 = 35, V3 = 29, T = 4, T2 = 3, P = 23, O = 160,

Total = 355

Ambrosia chamissonis Rheumatism and internal pains (Turner, unpublished Haida mss.). Minor skin eruptions, sores, infected toes, scalp disease, hives, insect stings, bloody flux (2), fever (2), menstrual troubles, nausea, prevent blood poisoning (Moerman, 1986 under *Ambrosia* species).

C = 0, D = 6, G = 2, L = 0, M = 1, N = 1, P = 0, O = 0, R = 1, S = 4, U = 0

1 = 0, 2 = 1, 3 = 2, 4 = 1, 5 = 0, 6 = 0, 7 = 2, 8 = 1, 9 = 0, 10 = 2, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 1, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 1, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 4, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 6, F = 1, F2 = 1, V = 0, V2 = 3, V3 = 0, T = 0, T2 = 0, P = 0, O = 5,

Total = 15

Antennaria microphylla Colds and coughs (2), sore throats, antidote for poisoning (Turner, 1990). Snowblindness (Moerman, 1986). Increase male virility (Turner, 1980; under syn. *A. rosea*).

C = 0, D = 0, G = 0, L = 0, M = 0, N = 0, P = 3, O = 1, R = 1, S = 1, U = 0

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 1

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 2, T = 0, T2 = 0, P = 0, O = 3,

Total = 6

Arnica cordifolia Sore eyes (Moerman, 1986). Swellings, bruises, cuts, tuberculosis, unspecified medicine (Turner, 1990; under *Arnica* species).

C = 0, D = 1, G = 0, L = 0, M = 2, N = 0, P = 1, O = 1, R = 0, S = 1, U = 0

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 1, 47 = 0, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 1, T2 = 0, P = 1, O = 3,

Total = 6

Arnica sororia Genus - swellings, bruises, cuts, tuberculosis (Turner, 1990; under *Arnica* species).

C = 0, D = 1, G = 0, L = 0, M = 2, N = 0, P = 1, O = 0, R = 0, S = 0, U = 0

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 1, 47 = 0, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 1, T2 = 0, P = 0, O = 2,

Total = 4

Artemisia ludoviciana - see Appendix 8 for ethnopharmacology.

C = 3, D = 24, G = 13, L = 0, M = 8, N = 10, P = 22, O = 8, R = 6, S = 21, U = 0

1 = 0, 2 = 11, 3 = 3, 4 = 1, 5 = 0, 6 = 4, 7 = 5, 8 = 2, 9 = 0, 10 = 6, 11 = 0, 12 = 1, 13 = 1, 14 = 1, 15 = 2, 16 = 0, 17 = 0, 18 = 11, 19 = 1, 20 = 0, 21 = 5, 22 = 0, 23 = 0, 24 = 1, 25 = 1, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 3, 31 = 1, 32 = 0, 33 = 0, 34 = 0, 35 = 6, 36 = 6, 37 = 1, 38 = 0, 39 = 1, 40 = 4, 41 = 0, 42 = 0, 43 = 6, 44 = 0, 45 = 4, 46 = 1, 47 = 14, 48 = 4, 49 = 3, 50 = 0, 51 = 0, 52 = 0, 53 = 3

B = 8, B2 = 36, F = 0, F2 = 9, V = 3, V2 = 20, V3 = 12, T = 0, T2 = 3, P = 6, O = 41,

Total = 115

A. michauxiana - see Appendix 8 for ethnopharmacology.

C = 0, D = 4, G = 0, L = 0, M = 2, N = 1, P = 0, O = 0, R = 0, S = 2, U = 1

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 2, 44 = 1, 45 = 0, 46 = 0, 47 = 2, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0

B = 0, B2 = 2, F = 0, F2 = 1, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 2, O = 5,

Total = 10

A. tridentata - see Appendix 8 for ethnopharmacology.

C = 3, D = 27, G = 32, L = 0, M = 16, N = 17, P = 55, O = 4, R = 4, S = 32, U = 0

1 = 0, 2 = 20, 3 = 3, 4 = 0, 5 = 1, 6 = 5, 7 = 11, 8 = 6, 9 = 0, 10 = 7, 11 = 3, 12 = 0, 13 = 8, 14 = 0, 15 = 10, 16 = 0, 17 = 0, 18 = 28, 19 = 1, 20 = 5, 21 = 15, 22 = 0, 23 = 1, 24 = 0, 25 = 1, 26 = 0, 27 =

0, 28 = 0, 29 = 0, 30 = 4, 31 = 0, 32 = 0, 33 = 2, 34 = 0, 35 = 4, 36 = 2, 37 = 1, 38 = 0, 39 = 0, 40 = 4, 41 = 3, 42 = 0, 43 = 7, 44 = 0, 45 = 0, 46 = 9, 47 = 10, 48 = 11, 49 = 3, 50 = 0, 51 = 0, 52 = 0, 53 = 3

B = 8, B2 = 59, F = 5, F2 = 1, V = 3, V2 = 34, V3 = 37, T = 2, T2 = 1, P = 7, O = 66,

Total = 190

Balsamorhiza sagittata Leaves - Swellings, burns (2) (Hart, 1974). Ease pain and promote healing of severe burns (Turner, 1980). Pains in the stomach, headache, head wash, colds, arrow or gunshot wound hemorrhage, poison ivy, running sores (Moerman, 1986). Sedative, seeds eaten for dysentery (Turner, 1990). C = 1, D = 6, G = 2, L = 0, M = 1, N = 3, P = 1, O = 0, R = 0, S = 0, U = 0

1 = 0, 2 = 3, 3 = 1, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 1, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 3, 47 = 3, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 6, F = 0, F2 = 1, V = 0, V2 = 2, V3 = 1, T = 0, T2 = 0, P = 0, O = 5,

Total = 14

Roots - Wounds, cuts, bruises (Chamberlain, 1892). Open wounds, fractures, injuries of any kind (Hrdlicka, 1908; identification uncertain, "black medicine"). Rheumatism, headache or other pain (Barrett and Gifford, 1933). Emetic (Murphy, 1959). Tuberculosis, whooping cough, increase urinary flow, physic (Hart, 1974). Blisters, sores, body ache (Hellson, 1974). Rheumatism, sores, boils, bruised or painful body area, hair and scalp tonic for hair growth (Turner, 1980). Pains in the stomach (2), toothache, headache, fever, sore throat, sore mouth and throat, colds, consumption, venereal disease, syphilitic sores (2), fresh wounds, arrow or gunshot wounds/hemorrhages, insect bites or swellings (2), eyewash, relieve hunger, ease delivery, any sickness, fumigant in sickroom (Moerman, 1986). Fever, chills (Hunn, 1990).

C = 1, D = 15, G = 4, L = 0, M = 9, N = 4, P = 6, O = 1, R = 1, S = 7, U = 1

1 = 0, 2 = 6, 3 = 0, 4 = 0, 5 = 0, 6 = 4, 7 = 3, 8 = 2, 9 = 0, 10 = 1, 11 = 0, 12 = 3, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 1, 28 = 0, 29 = 0, 30 = 0, 31 = 2, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 2, 37 = 1, 38 = 0, 39 = 0, 40 = 2, 41 = 0, 42 = 0, 43 = 2, 44 = 1, 45 = 0, 46 = 7, 47 = 4, 48 = 3, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 5, B2 = 19, F = 0, F2 = 0, V = 0, V2 = 9, V3 = 1, T = 2, T2 = 0, P = 2, O = 20,

Total = 49

Chaenactis douglasii Slowing up heartbeat in children (Nickerson, 1966). Preventative medicine "to avoid contracting consumption" (Turner, 1980). Wash for chapped or cracked hands, pimples, boils, tumors, swellings (3), swollen limbs, sprains, soreness or aching, insect and snake bites (2), coughs and colds, rattlesnake bite, heart depressant, emetic for indigestion or sour stomach, dropsical conditions, skin conditions (Moerman, 1986). Burns, wounds, sores, rash, pimples, spider bite (Hunn, 1990).

C = 2, D = 17, G = 2, L = 0, M = 7, N = 0, P = 2, O = 0, R = 0, S = 1, U = 1

1 = 0, 2 = 2, 3 = 0, 4 = 0, 5 = 0, 6 = 5, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 2, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 2, 29 = 0, 30 = 0, 31 = 3, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 1, 45 = 0, 46 = 2, 47 = 7, 48 = 0, 49 = 0, 50 = 0, 51 = 1, 52 = 0, 53 = 3

B = 2, B2 = 4, F = 0, F2 = 4, V = 0, V2 = 0, V3 = 2, T = 0, T2 = 1, P = 0, O = 19,

Total = 32

Chrysothamnus nauseosus Raise blisters (Coville, 1897) under syn. *Chondrophora nauseosus*). Pains in the chest (Hrdlicka, 1905 under *Chrysothamnus* sp.). Gargle, colds on the chest (Cook, 1930 under *Chrysothamnus* sp.). Fever, cure venereal diseases, relieve toothache, gargle, colds in chest (Jones, 1931 under *Chrysothamnus* sp.). Rheumatism (Wyland and Harris, 1941; under syn. *Bigelovia graveolens*). Febrifuge (Curtin, 1965 under syn. *C. graveolens*). Help heal a woman's insides after childbirth (Turner, 1980). Antidiarrheal, stomachic (Meyer, 1981 under syn. *C. graveolens*). Colds (3), coughs (4), tuberculosis, heal eruptions or sores, smallpox, blisters, ceremonial emetic, cathartic, headache, menstrual pain, chest pain, fever, stop bloody diarrhea, stomach disorders, general tonic, stop baby's dribbling, nightmares (Moerman, 1986). Colds, venereal disease, bladder trouble, stomach cramps, diarrhea, tuberculosis (Turner, 1990).

C = 2, D = 4, G = 8, L = 0, M = 1, N = 3, P = 14, O = 0, R = 2, S = 8, U = 1

1 = 0, 2 = 4, 3 = 3, 4 = 0, 5 = 0, 6 = 0, 7 = 2, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 2, 13 = 4, 14 = 0, 15 = 0, 16 = 1, 17 = 0, 18 = 6, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 1, 27 = 0, 28 = 1, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 1, 40 = 2, 41 = 0, 42 = 1, 43 = 1, 44 = 1, 45 = 0, 46 = 0, 47 = 3, 48 = 2, 49 = 1, 50 = 0, 51 = 0, 52 = 1, 53 = 0

B = 2, B2 = 14, F = 0, F2 = 0, V = 1, V2 = 4, V3 = 10, T = 2, T2 = 0, P = 1, O = 13,

Total = 43

Erigeron filifolius Abate fever and ague, toothache (Barrett and Gifford, 1933 under syn. *E. foliosus* Nutt.). Sores, cuts, wounds (Moerman, 1986). Pains, swellings, swollen glands, sore throat, wounds, sores, ulcers, cuts (Turner, 1990; under *Erigeron* species).

C = 0, D = 7, G = 0, L = 0, M = 1, N = 2, P = 1, O = 0, R = 0, S = 3, U = 0

1 = 0, 2 = 2, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 2, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 2, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 4, 47 = 3, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 12, F = 0, F2 = 0, V = 0, V2 = 4, V3 = 0, T = 0, T2 = 0, P = 0, O = 2,

Total = 14

Gaillardia aristata Unspecified medicine (Stubbs, 1966). Gastroenteritis, eyewash, nose drops, nursing mother's sore nipples, foot wash, skin disorders (Hellson, 1974). Kidney problems, backache, pain, venereal disease (Turner, 1980). Headache, general indisposition (Moerman, 1986). Wounds, fever (Hunn, 1990). Tuberculosis, cancer (Turner, 1990).

C = 0, D = 4, G = 1, L = 0, M = 1, N = 2, P = 2, O = 1, R = 0, S = 5, U = 1

1 = 0, 2 = 4, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 1, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 2, 44 = 1, 45 = 0, 46 = 1, 47 = 2, 48 = 1, 49 = 0, 50 = 0, 51 = 1, 52 = 0, 53 = 0

B = 1, B2 = 5, F = 0, F2 = 2, V = 0, V2 = 3, V3 = 0, T = 1, T2 = 0, P = 2, O = 6,

Total = 17

CONOCEPHALACEAE [BRYOPHYTA]

Conocephalum conicum Cankers, rashes (Turner and Bell, 1973). Kidney medicine, eye medicine (Turner, 1983). Sunburn treatment (Compton, 1993). Eye medicine (Turner in Pojar and MacKinnon, 1994). Cold medicine (Turner, unpublished Haida mss.).

C = 0, D = 3, G = 0, L = 0, M = 0, N = 0, P = 1, O = 2, R = 0, S = 0, U = 1

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 2, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 1, 45 = 0, 46 = 0, 47 = 3, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 1, V = 0, V2 = 0, V3 = 1, T = 0, T2 = 0, P = 0, O = 4,

Total = 7

CORNACEAE

Cornus canadensis Bruises and aches upon stroakes (Josselyn, 1860). Stop bleeding of cuts and wounds (Wallis, 1922; under "pigeon berry"). Tonic (Reagan, 1934a). Stop bleeding on a fresh cut wound (Van Wart, 1948). Fits (Mechling, 1959). Heart disease (Jolicoeur, 1971). Kidney ailments; that is child's bedwetting, stomach medicine, general medicine (Lacey, 1976). Cathartic, stitch in the side, compounded in cold remedy and for women's stomachaches (Black, 1980). Body pain, coughs, fever, tuberculosis, fits, paralysis, infant colic, eyewash, sores, unspecified malady (Moerman, 1986). Insanity (Turner, 1990).

C = 3, D = 1, G = 4, L = 0, M = 2, N = 4, P = 3, O = 1, R = 1, S = 4, U = 1

1 = 0, 2 = 2, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 1, 14 = 0, 15 = 0, 16 = 1, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 1, 29 = 0, 30 = 2, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 6, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 3, 44 = 0, 45 = 1, 46 = 0, 47 = 1, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 3, F = 0, F2 = 0, V = 0, V2 = 2, V3 = 2, T = 1, T2 = 0, P = 3, O = 15,

Total = 24

Cornus sericea Fluxes (Josselyn, 1860). Coughs, colds, fever, emetic (Spaydon, 1884). Diarrhea, emetic, fevers, colds, cough (Bell, 1885 under syn. *C. stolonifera*). Sore eyes (Chamberlain, 1892 under syn. *C. stolonifera*). Swellings, non-running sore (Morice, 1894). Antiseptic for wounds (Mettel, 1935 under red willow bark). Emetic, respiratory ailments (Fenton, 1941 under syn. *C. stolonifera*). Sore eyes, catarrh, headache, improve breathing (Turner and Bell, 1971 under syn. *C. stolonifera*). Sties, infections (Turner, 1973 under syn. *C. stolonifera*). Liver trouble and related disorders, chest colds (Hellson, 1974 under syn. *C. stolonifera*). Dysentery, dyspepsia, sore eyes, sore throat, catarrh, headache (Erichsen-Brown, 1979 under syn. *C. stolonifera*). Stop bleeding, colds, eye maladies (Black, 1980 under syn. *C. stolonifera*). Any kind of sickness, heal body, clear the blood, help circulation, heal sores and rashes, heart conditions, clean out the womb and heal it after childbirth, keeps one from having children too frequently, coughing caused by consumption, poison ivy rash, induce vomiting to relieve upset stomach, colds, irritated skin, rashes, cuts, old sores which would not heal, compounded for skin wash for sores and scabs which would not heal, bruises, chest colds in babies (2), headache, toothaches, steaming sore throats, compounded for hair and scalp tonic to eliminate dandruff, falling hair and itchy scalp caused by little worms in the hair roots (Turner, 1980 under syn. *C. stolonifera*). Snowblindness, cataracts, emetic in coughs and fever (Leighton, 1985 under syn. *C. stolonifera*). Eruptions caused by poison ivy, sore eyes (2), catarrh, headache, sore throat, skin ulcers, body sores, compounded for constitutional weakness, paralysis, emetic, flux, diarrhea, weak kidneys, children's bedwetting, after childbirth, narcotic (Moerman, 1986 under syn. *C. stolonifera*). Eye problems, colds, bleeding (Hunn, 1990 under syn. *C. stolonifera*). Compounded for vomiting, diarrhea, tonic especially for intestinal worms, colds (2), wash to make baby strong, bright and good natured (Turner, 1990 under syn. *C. stolonifera*).

C = 4, D = 17, G = 16, L = 1, M = 2, N = 7, P = 21, O = 10, R = 4, S = 8, U = 2

1 = 1, 2 = 6, 3 = 6, 4 = 1, 5 = 1, 6 = 2, 7 = 2, 8 = 0, 9 = 0, 10 = 2 , 11 = 0, 12 = 0, 13 = 2, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 10, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 7, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 1, 29 = 0, 30 = 2, 31 = 0, 32 = 0, 33 = 0, 34 = 1, 35 = 10, 36 = 4, 37 = 1, 38 = 0, 39 = 0, 40 = 3, 41 = 0, 42 = 0, 43 = 5, 44 = 1, 45 = 2, 46 = 1, 47 = 15, 48 = 6, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 24, F = 0, F2 = 6, V = 0, V2 = 13, V3 = 13, T = 0, T2 = 1, P = 4, O = 41,

Total = 92

CRASSULACEAE

Sedum lanceolatum Laxative, clean out the womb after childbirth (Turner, 1980). Hemorrhoids, cure for sore gums (2) (Turner, 1990; *Sedum* species).

C = 0, D = 3, G = 1, L = 0, M = 0, N = 0, P = 0, O = 0, R = 1, S = 0, U = 0

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 1, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 0, 36 = 0, 37 = 1, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 2, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 3,

Total = 5

CRUCIFERAE

Capsella bursa-pastoris No reference to medicinal uses in B.C. Kill internal worms, general benefit of the stomach (Tantaquidgeon, 1925 under syn. *Bursa bursa-pastoris*). Head pains, dysentery cramps, stomach cramps, dysentery (3), diarrhea, posion ivy, kills internal worms, relieve stomach pains (Moerman, 1986).

C = 0, D = 1, G = 10, L = 0, M = 0, N = 1, P = 0, O = 0, R = 0, S = 0, U = 0

1 = 0, 2 = 1, 3 = 4, 4 = 0, 5 = 2, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 3, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 1, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 8,

Total = 12

Cardamine angulata Roots compounded with water lily medicine (*Nuphar polysepalum*) in a poultice for sores (Turner, unpublished Haida mss.).

C = 0, D = 1, G = 0, L = 0, M = 0, N = 0, P = 0, O = 0, R = 0, S = 0, U = 0

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 0,

Total = 1

CUPRESSACEAE [Gymnospermae]

Juniperus communis Strengthen weak members, scald heads (Josselyn, 1860). Astringent, antiseptic, cleans foul wounds well (Spaydon, 1884). Diuretic, poultice for foul sores (Bell, 1885). Colds (Jenner, 1901 under juniper). Diuretic, cystitis, Bright's disease, calculus, eczema, psoriasis (Strath, 1903). Poultice to decrease pain (Skinner, 1911). Rapidly heals cuts and wounds, sprains, compounded for tuberculosis (Wallis, 1922). Diuretic (Darby, 1933 under Juniper). Postpartum pain (Wyland and Harris, 1941). Ulcers, heals cuts quickly (Van Wart, 1948). Good for anything, valued as a tonic (Wallis, 1955). Hair wash, compounded with *Chimaphila umbellata* for consumption (Mechling, 1959). Birth control, rheumatism, tonic (Murphy, 1959 under *Juniper* ssp.). Disinfectant, bowel trouble (Nickerson, 1966). Lung and venereal diseases (Johnston, 1970). Takes away rheumatic aches (Melgrave, 1973; under "juniper"). Colds (2), aches and pains (Nelson, 1973 under *Juniper* sp.). Lung cough, stomach pains, ulcers, heartburn (Turner, 1973). Medicine for short breath, purify the blood, compounded for diarrhea (Turner and Bell, 1973). General medicine, colds, rheumatism, burns, stomach ulcers, urinary tract medicine, compounded for flu or cold (Lacey, 1976). Wounds, rheumatism, colds, cough, irritation of the throat, bad cough (Erichsen-Brown, 1979). Colds, consumption, tonic (Turner, 1980). Antiseptic, boils, tonic for female weakness (Arnason, 1981). Diuretic, stimulant (Meyer, 1981). Lung disease, venereal disease (Johnston, 1982). Diarrhea, sore chest associated with lung infections, sickness associated with teething, sickness after giving birth, asthma, sore back (kidney trouble), compounded for "women's troubles" (Leighton, 1985). "Cold" conditions, colds and coughs caused by overheating and chills, colds, coughs, big cough, tuberculosis, cough from the lungs, tickling in throat, asthma, tonsilitis, high fevers, fever, purgative, emetic, pain in stomach, ulcers, stomach tonic, rheumatism, lumbago, arthritis, sprains, headache, chest pain, sore eyes (3), antiseptic on wounds, wounds, hair wash, kidney disorders, urinary tract diseases, venereal disease, women's diseases, promote delivery, sedative, tonic (3), blood tonic (2), any sickness (Moerman, 1986). Colds, sore throat, tuberculosis, difficult urination (Kari, 1987). Ward off flu or respiratory ailments, tuberculosis (2), stomach ulcers, hemorrhage of the mouth, kidney trouble, purgative, diuretic, make one strong (Gottesfeld, 1988). Respiratory ailments, heart medicine, stomach medicine, weight loss, eyewash (Turner, 1988). Fever (Hunn, 1990). Tuberculosis, colds, heart troubles, respiratory problems (MacKinnon, 1992). Colds (2), leakage of the heart, stomach tonic to make your insides nice, aching muscles (2), kidney ailments, high blood pressure, tuberculosis, physic, tonic (Turner, 1990).

Urinary infections, childbirth (induce uterine contractions), can cause miscarriage (Turner in Pojar and MacKinnon, 1994). Stomach and bladder problems, male plants thought more potent (Turner, unpublished Haida mss.).

C = 5, D = 20, G = 16, L = 0, M = 12, N = 5, P = 42, O = 4, R = 7, S = 28, U = 17

1 = 2, 2 = 10, 3 = 2, 4 = 0, 5 = 0, 6 = 2, 7 = 3, 8 = 6, 9 = 0, 10 = 5, 11 = 0, 12 = 3, 13 = 4, 14 = 1, 15 = 1, 16 = 0, 17 = 0, 18 = 14, 19 = 0, 20 = 0, 21 = 8, 22 = 4, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 3, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 4, 36 = 3, 37 = 2, 38 = 2, 39 = 1, 40 = 4, 41 = 1, 42 = 2, 43 = 16, 44 = 13, 45 = 4, 46 = 7, 47 = 6, 48 = 19, 49 = 2, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 12, B2 = 37, F = 1, F2 = 4, V = 2, V2 = 16, V3 = 17, T = 7, T2 = 6, P = 16, O = 57,

Total = 156

ELAEAGNACEAE

Shepherdia canadensis Rheumatism, stomachic (Allison, 1901 under Soapberry). Purgative (Murphy, 1927). Cathartic (Honigmann, 1948 under soapberry). Heart problems, slows down heartbeat (Melgrave, 1973; under "soopalalie"). Eyewash (4) (Hart, 1974). Heart attack, indigestion (Turner, 1978). Stomach aches, problems associated with gall bladder (Cruikshank, 1979). Laxative, tonic, stomach medicine, compounded in temporary contraceptive for women after childbirth (Turner, 1980). Purgative (3), laxative (2), diarrhea, stomach wash, stomach tonic, stomach cancer, high blood pressure, physic, tuberculosis, chronic cough, gonorrhea, childbirth, amennorrhea, reduce fever especially in babies, sore lips, sore tongue especially babies, swellings, rheumatism, sores, cuts, skin wash, sore face, acne, eyewash (2), compounded in plaster casts, medicinal tea (Turner, 1981). Aching limbs, arthritis, sores on the head and face, prevent miscarriage, compounded for venereal disease and coughing up blood (Leighton, 1985). Diarrhea, cathartic (Moerman, 1986). Cuts, swellings, tuberculosis (Kari, 1987). Diuretic, bladder and uterine infections, speed childbirth, constipation (Gottesfeld, 1988). Ulcers, sedative, acne, boils, digestive problems, gallstones, laxative, compounded for gonorrhea, dandruff, compounded for broken bones (Turner, 1990). Clean blood and filtering system, high blood pressure (Forlines, 1992). Birthing aid to make baby come out easy and the women won't suffer so much (Compton, 1993).

C = 5, D = 12, G = 24, L = 0, M = 8, N = 2, P = 4, O = 6, R = 6, S = 8, U = 2

1 = 1, 2 = 4, 3 = 2, 4 = 0, 5 = 0, 6 = 2, 7 = 1, 8 = 3, 9 = 0, 10 = 0, 11 = 0, 12 = 3, 13 = 1, 14 = 0, 15 = 1, 16 = 2, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 8, 22 = 1, 23 = 0, 24 = 1, 25 = 0, 26 = 0, 27 = 0, 28 = 5, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 5, 34 = 0, 35 = 6, 36 = 1, 37 = 3, 38 = 4, 39 = 1, 40 = 0, 41 = 0, 42 = 1, 43 = 4, 44 = 1, 45 = 2, 46 = 3, 47 = 7, 48 = 3, 49 = 0, 50 = 0, 51 = 1, 52 = 0, 53 = 0

B = 6, B2 = 13, F = 0, F2 = 2, V = 0, V2 = 5, V3 = 0, T = 2, T2 = 2, P = 4, O = 48,

Total = 77

EMPETRACEAE

Empetrum nigrum Compounded for stomach trouble (Reagan, 1921; 1927 under crowberry). Purgative (Turner, 1973). Diuretic, especially for children with fever (Leighton, 1985). Diarrhea, stomach problems, kidney trouble, remove a growth on an eye, heal sore eyes (Kari, 1987). Compounded for tuberculosis (Turner in Pojar and MacKinnon, 1994, under *Nuphar polysepalum*). Tuberculosis and other ailments (Turner, unpublished Haida mss.).

C = 0, D = 0, G = 4, L = 0, M = 0, N = 0, P = 2, O = 2, R = 0, S = 1, U = 2

1 = 0, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 2, 36 = 0, 37 = 0, 38 = 1, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 1, 45 = 0, 46 = 0, 47 = 0, 48 = 2, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 4, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 2, T2 = 0, P = 1, O = 4,

Total = 11

EQUISETACEAE [Lycopsida]

Equisetum arvense Sore mouths (Murphy, 1959). Good for the blood (Turner and Bell, 1971). Cuts and sores (Turner and Bell, 1973). Diuretic (2) (Hart, 1974). Diuretic, rash under the arm and in the groin

(Hellson, 1974). Teething infants (Erichsen-Brown, 1979). Sluggishness due to colds, backache, lumbago, diuretic to stimulate kidneys, poison ivy, compounded for syphilis and gonorrhea, compounded for children's colds (Turner, 1980). Kidney and bladder trouble (2), lumbago, dysuria, dropsy, constipation, rheumatism, joint aches, headaches, pains, teething (Moerman, 1986). Sores, aching teeth (Kari, 1987). Burns, stoppage of urine, post partum medicine (Turner, 1990).

C = 0, D = 9, G = 1, L = 0, M = 5, N = 3, P = 1, O = 0, R = 1, S = 4, U = 9

1 = 0, 2 = 6, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 3, 9 = 0, 10 = 0, 11 = 0, 12 = 2, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 2, 19 = 0, 20 = 0, 21 = 0, 22 = 4, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 0, 36 = 2, 37 = 1, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 5, 45 = 0, 46 = 2, 47 = 4, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 7, F = 0, F2 = 1, V = 0, V2 = 1, V3 = 1, T = 0, T2 = 0, P = 1, O = 21,

Total = 33

Equisetum hyemale Retention of urine (Morice, 1894). Childbirth (Morice, 1900). Pains in the kidneys (Zingg, 1932). Gonorrhea (Curtin, 1965). Compounded in medicine to correct menstrual irregularities (Johnston, 1970; 1982). Parturifacients, stop hemorrhage, used by old men when urine is too red (Erichsen-Brown, 1979). Children's skin sores, sluggishness due to colds, backache, lumbago, diuretic to stimulate kidneys, compounded for syphilis and gonorrhea, poison ivy (Turner, 1980). Astringent, diuretic, expectorant (Meyer, 1981). Kidneys (3), too frequent urination, bladder ailments, too infrequent urination, urinating too much, women with excessive urination who are ruptured, prostrate gland troubles, backache, constipation, disinfectant, contraceptive, retarded menstruation, regulate menses, after childbirth to clear up the system, hair wash, hair vermin, gonorrhea (2), white spot on eye, eye wash, sore eyes (2), "summer complaint", diarrhea, "lightening infection" (Moerman, 1986). Diuretic, venereal disease (Hunn, 1990). Bladder trouble (inability to urinate), speed difficult labor, speed expulsion of afterbirth, sore eyes (4), itchy eyes (2), impending blindness, cataracts, burns (Turner, 1990). Kidney problems, diuretic (Turner in MacKinnon and Pojar, 1992).

C = 1, D = 7, G = 2, L = 0, M = 3, N = 0, P = 2, O = 12, R = 9, S = 8, U = 18

1 = 1, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 3, 9 = 0, 10 = 1, 11 = 0, 12 = 6, 13 = 0, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 4, 23 = 0, 24 = 3, 25 = 1, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 12, 36 = 2, 37 = 5, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 2, 44 = 15, 45 = 0, 46 = 1, 47 = 4, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 5, B2 = 15, F = 0, F2 = 1, V = 0, V2 = 0, V3 = 1, T = 0, T2 = 0, P = 0, O = 41,

Total = 63

ERICACEAE

Arctostaphylos uva-ursi Aerial - Childbirth (Engelmann, 1881). Toothache (Speck, 1909b under barberry). Compounded for pain in the stomach, fainting, trembling fits, bad sore, cuts, general remedy, rheumatism and kindred diseases, internal blood diseases (Reagan, 1921; 1927 under bearberry, kinnikinnik). "Cold blood" (anaemia) or stomach trouble (Curtin, 1965). Promote rapid healing of burns, earache (Stubbs, 1966). Canker sores in the mouth, open sores (Toineeta, 1970). Protection and prevention of arthritis and colds (Melgrave, 1973; under "kinnikinnik"). Help promote rapid healing of burns (3), colds and coughs (2), earaches, eyewash (Hart, 1974). Mouthwash for canker and sore gums, itching peeling scalp, rash, skin sores (Hellson, 1974). Tonic (Lacey, 1976). Cure child's diarrhea, bring menstruation, compounded to prevent miscarriage and speed woman's recovery after childbirth (Leighton, 1985). Diarrhea, sore eyes, kidneys and bladder tonic, spitting blood, dandruff and scalp disease, skin sores (Turner, 1980). Sprained backs, back pain, headache, narcotic, ceremonial emetic, drive away bad spirits in people going crazy, internal blood diseases, seasoner to make female remedies taste good, hair growth (Moerman, 1986). Spitting up blood, alleviate thirst, prevent thirst, sore eyes, diuretic, tonic for bladder and kidneys, disorders of urinary passages, bladder and kidneys, antiseptic, astringent, canker sores, weak gums (Turner, 1990). Diuretic in kidney disease and infections of the urinary passage (Pojar and MacKinnon, 1994).

C = 0, D = 21, G = 5, L = 0, M = 4, N = 4, P = 5, O = 5, R = 5, S = 9, U = 6

1 = 0, 2 = 7, 3 = 2, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 3, 9 = 0, 10 = 1, 11 = 1, 12 = 0, 13 = 1, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 2, 19 = 0, 20 = 0, 21 = 1, 22 = 2, 23 = 1, 24 = 1, 25 = 0, 26 = 0, 27 =

1, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 3, 36 = 2, 37 = 1, 38 = 0, 39 = 0, 40 = 0, 41 = 1, 42 = 0, 43 = 6, 44 = 5, 45 = 0, 46 = 4, 47 = 13, 48 = 2, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 21, F = 0, F2 = 5, V = 0, V2 = 1, V3 = 2, T = 0, T2 = 2, P = 2, O = 33,

Total = 64

Plant - Gravel, liver obstruction (Pitcher, 1860 under syn. *Arbutus uva-ursi*). Purify the blood (Eells, 1877 under Barberry). Cathartic (Buchanan, 1899 under bearberry). Unspecified medicine (Reagan, 1934a; 1934b). Syphilis, gonorrhea, reduce fever, rheumatism (Curtin, 1965). Canker sores, sore gums, itching and peeling scalp, rash, skin sores (Hellson, 1974). Dropsy, congested kidneys, sprained backs, back pain, urinary diseases, rheumatism, general illnesses, internal blood diseases (Moerman, 1986). Broken bones (?) (Turner, 1990).

Root - slow excesive menstruation (Leighton, 1985). Spitting up blood, sore eyes, diuretic, tonic for bladder and kidneys (Turner, 1990).

C = 0, D = 5, G = 1, L = 1, M = 5, N = 0, P = 1, O = 1, R = 1, S = 7, U = 6

1 = 0, 2 = 2, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 1, 8 = 2, 9 = 0, 10 = 0, 11 = 0, 12 = 2, 13 = 0, 14 = 0, 15 = 0, 16 = 1, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 1, 23 = 0, 24 = 1, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 1, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 4, 44 = 5, 45 = 0, 46 = 1, 47 = 4, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 7, F = 0, F2 = 3, V = 0, V2 = 2, V3 = 0, T = 0, T2 = 1, P = 3, O = 12,

Total = 28

Kalmia microphylla Compounded for general remedy, rheumatism and kindred diseases (Reagan, 1921; 1927 under swamp tea). Bowel complaints, diarrhea, stomach complaints, ulcers, tonic, pains, colds, backache, headache, syphilis, falling hair, mange (Erichsen-Brown, 1979). Blood spitting, open sores and wounds which would not heal (Moerman, 1986, under syn. *K. polifolia*). Unspecified medicine (Turner, 1990). Skin ailments, open sores which would not heal, spitting of blood, medicinal drink (Pojar and MacKinnon, 1994).

C = 0, D = 6, G = 4, L = 0, M = 2, N = 2, P = 3, O = 0, R = 0, S = 5, U = 0

1 = 0, 2 = 3, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 3, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 1, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 4, 44 = 0, 45 = 0, 46 = 1, 47 = 4, 48 = 2, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 7, F = 0, F2 = 1, V = 0, V2 = 3, V3 = 1, T = 0, T2 = 2, P = 4, O = 5,

Total = 22

Ledum groenlandicum Tonic and astringent (Pitcher, 1860 under syn. *L. palustre*). Wounds (Holmes, 1884). Diarrhea, wounds, skin affections, chafing, dust for new-born infants (Bell, 1885). Consumptives (Allison, 1901 under Labrador Tea). Reducing temperature and cooling the blood in fevers, spring disorders, scrofula, poultice for chills (Hawkes, 1916 under syn. *L. latifolium* and *L. palustre*). Sore throat, scrofula, reducing temperature and cooling the blood in fevers, general spring disorders (Carson, 1935). Burns, scalds, diuretic, emetic (Beardsley, 1941). Tonic (Stowe, 1942 under Labrador tea). Good for anything, valued as a tonic (Wallis, 1955). Kidney trouble (Mechling, 1959). Heal baby's red and sore navel (Rogers, 1962). Asthma, common cold (Bock, 1966 under Labrador leaves). Relieve sickness caused by eating the fat of a young bald eagle (Johnston, 1970). Tonic, general medicine, kidney ailments (Lacey, 1976). Compounded for bitters, and spring tonic (Jolicoeur, 1971). Wounds, women take when delivery is near (Erichsen-Brown, 1979). Tonic, colds, head colds, women before childbirth, headaches (2), compounded for severe burns, ulcers, or similar sores where the flesh is exposed (Black, 1980). Kidneys (Turner, 1980). Skin ulcers, colds, tonic, headache (2), nasal congestion, burns, scalds, emetic (Arnason, 1981). Tonic for people who are run down or lacking an appetite, blood purifier, tuberculosis, women who have miscarried (Turner, 1983). Burns (2), itchy skin, sores on the hands, chapped skin, cracked nipple, umbilical scab to promote healing, rashes in folds of baby's skin, diuretic, pneumonia, wound dressing, compounded for whooping cough (Leighton, 1985). Pain in stomach, ulcers, insect sting pain, burns, rheumatism (2), wounds, chafed skin, tender feet, diuretic (2), kidney trouble, jaundice in children, narcotic, blood purifier, asthma, common cold, fever, chills, tonic, poison ivy, blindness, sore eyes, scurvy, unspecified ailment (Moerman, 1986). Weak blood, colds, tuberculosis, arthritis, dizziness, stomach problems, heartburn, relieve hangover, laxative, wash for sores (Kari, 1987 under syn. *L. palustre* ssp. *decumbens* and ssp. *groenlandicum*). Diabetes, clean the blood (Forlines, 1992). Cold medicine (3), other respiratory ailments, tuberculosis, appetite stimulant (Compton, 1993). Colds and sore throat (Turner in Pojar and MacKinnon, 1994).

C = 0, D = 32, G = 11, L = 1, M = 3, N = 6, P = 22, O = 2, R = 3, S = 27, U = 8

1 = 0, 2 = 8, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 5, 8 = 3, 9 = 1, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 1, 15 = 2, 16 = 0, 17 = 0, 18 = 10, 19 = 1, 20 = 0, 21 = 2, 22 = 4, 23 = 2, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 1, 32 = 0, 33 = 1, 34 = 1, 35 = 2, 36 = 1, 37 = 2, 38 = 0, 39 = 0, 40 = 2, 41 = 0, 42 = 0, 43 = 19, 44 = 4, 45 = 1, 46 = 15, 47 = 16, 48 = 8, 49 = 0, 50 = 1, 51 = 0, 52 = 0, 53 = 1

B = 0, B2 = 43, F = 2, F2 = 5, V = 0, V2 = 16, V3 = 9, T = 4, T2 = 3, P = 19, O = 32,

Total = 115

Moneses uniflora Colds, poultice for abcesses (Densmore, 1939). Cancer, draw out pus from boils and abscesses (Turner and Bell, 1971). Swellings and pains, draw blisters (Turner and Bell, 1973). Astringent (2), colds, wounds, ophthalmia, bad humors, weak nerves, blisters, diseases of the breast, sudorfic, anodyne, nervine (Erichsen-Brown, 1979). Coughs, colds, paralysis (Moerman, 1986). Sore throats (2), healing cuts (Kari, 1987). Sore throat (Compton, 1993). Sores and swellings (Turner in Pojar and MacKinnon, 1994). Cancer (Turner, unpublished Haida mms.).

C = 0, D = 11, G = 0, L = 0, M = 2, N = 5, P = 7, O = 1, R = 0, S = 4, U = 0

1 = 0, 2 = 2, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 1, 14 = 5, 15 = 0, 16 = 0, 17 = 0, 18 = 3, 19 = 0, 20 = 1, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 1, 37 = 0, 38 = 0, 39 = 1, 40 = 3, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 1, 46 = 2, 47 = 2, 48 = 0, 49 = 0, 50 = 0, 51 = 2, 52 = 0, 53 = 0

B = 1, B2 = 9, F = 0, F2 = 0, V = 0, V2 = 3, V3 = 0, T = 0, T2 = 0, P = 1, O = 16,

Total = 30

Monotropa uniflora Sore eyes, cure bunions or warts (Banks, 1953). Sore eyes (Erichsen-Brown, 1979). Toothache (Leighton, 1985). Fits, epilepsy, convulsions, bunions, warts, sore eyes, pain due to colds, colds, fever, female troubles (Moerman, 1986). Sores which would not heal (Turner, 1990).

C = 0, D = 5, G = 0, L = 0, M = 0, N = 4, P = 2, O = 3, R = 1, S = 1, U = 0

1 = 0, 2 = 2, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 3, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 3, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 1, 46 = 0, 47 = 5, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 3, F = 0, F2 = 1, V = 2, V2 = 1, V3 = 1, T = 0, T2 = 0, P = 0, O = 9 ,

Total = 16

GROSSULARIACEAE

Ribes sanguineum Genus - Charley horse and other ailments, skin boils, removing splinters (Turner and Bell, 1971; under *Ribes* species). Any kind of illness, tuberculosis, colds, stomach troubles, sore throats (Turner, 1990; under *Ribes* species). Diuretic, diarrhea, open wounds, open running sores, paralysis, body sores, constitutional weakness (Moerman, 1986; under *Ribes* species).

C = 0, D = 5, G = 2, L = 0, M = 1, N = 1, P = 3, O = 0, R = 0, S = 2, U = 1

1 = 0, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 1, 12 = 0, 13 = 0, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 1, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 0, 46 = 1, 47 = 2, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 5, F = 0, F2 = 1, V = 0, V2 = 2, V3 = 1, T = 1, T2 = 0, P = 2, O = 4,

Total = 15

HYDRANGEACEAE

Philadelphus lewisii Physic (Turner, 1980). Sores (Moerman, 1986). Eyes, irritated skin (Hunn, 1990). Sores, swellings, infected breasts of women, sore chest, bleeding hemorrhoids, eczema (Turner, 1990).

C = 0, D = 6, G = 0, L = 0, M = 1, N = 0, P = 1, O = 1, R = 0, S = 1, U = 0

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 1, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 4, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 2, F = 0, F2 = 1, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 5,

Total = 10

HYLOCOMIACEAE [BRYOPHYTA]

Hylocomium splendens Sores (Turner, 1990).

C = 0, D = 1, G = 0, L = 0, M = 0, N = 0, P = 0, O = 0, R = 0, S = 0, U = 0

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 0 ,

Total = 1

HYPERICACEAE

Hypericum perforatum No B.C. ethnobotanical reference. Wounds, aches, toothache, herpes miliaris (Josselyn, 1860). Bloody flux, bowel complaint, compounded to promote menstruation (Banks, 1953). Astringent, diuretic, sedative (Meyer, 1981). Promote menstruation, bloody flux, bowel complaint, sores, venereal disease, fever, nosebleed, snake bite, cough medicine, give infants strength (Moerman, 1986).

C = 1, D = 5, G = 4, L = 0, M = 1, N = 2, P = 1, O = 0, R = 2, S = 3, U = 1

1 = 0, 2 = 2, 3 = 2, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 1, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 1, 23 = 0, 24 = 2, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 1, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 1, 47 = 1, 48 = 0, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 1

B = 1, B2 = 8, F = 0, F2 = 0, V = 1, V2 = 1, V3 = 1, T = 0, T2 = 0, P = 1, O = 8,

Total = 20

LEGUMINOSAE

Lupinus sericeus Genus - eye medicine (Turner, 1980; under *Lupinus* species) Unspecified medicine (Turner, 1990; under *Lupinus* species). Boils, bladder troubles, failure to urinate (2) (Moerman, 1986; under *Lupinus* species).

C = 0, D = 1, G = 0, L = 0, M = 0, N = 0, P = 0, O = 1, R = 0, S = 1, U = 3

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 3, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 3, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 1,

Total = 6

LILIACEAE

Disporum trachycarpum Clear matter from eye, snowblindness (Hellson, 1974). Stop wound bleeding, wound healing, unspecified medicine (Turner, 1980).

C = 1, D = 1, G = 0, L = 0, M = 0, N = 0, P = 0, O = 2, R = 0, S = 1, U = 0

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 2, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 1, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 3,

Total = 5

Maianthemum racemosa For swollen legs (Josselyn, 1860). Cough medicine, medicine to strengthen the stomach, compounded for spring tonic (Tantaquidgeon, 1925). Sore eyes (Banks, 1953 under syn. *Smilacina racemosa*). Rash or itch (Mechling, 1959 under syn. *S. racemosa*). Poultice (Turner and Bell, 1971 under syn. *Smilacina racemosa*). Sore back, bleeding from the mouth (Black, 1980 under syn. *Smilacina racemosa*). Colds, increase appetite (Turner, 1980 under syn. *Smilacina racemosa*). Overexertion (Arnason, 1981 under syn. *Smilacina racemosa*). Sore eyes, back pain (2), headache (2), pain, fits, insanity, revive patients (3), hush crying child, prevent sickness during plagues, prevent hog cholera, kidney trouble, swellings, cuts, foot soak, rashes, itch, tape worms, poison antidote, snake bites, "rooster fighting medicine", catarrh, cough, loosen bowels, purgative, stronger stomach, stomach disorders, blood remedy, blood purifier, spring tonic, tonic, contraceptive, female weakness, miscarriage, used by lying in women, keep kidneys open in pregnancy, child's navel after umbilical cut, stop bleeding (Moerman, 1986 under syn. *Smilacina racemosa*). Sore or ulcerated throat, cancer, heart trouble, rheumatism, stomach medicine, internal pains, internal injuries, woman's medicine, taken during menstrual periods, heal insides after childbirth (Turner, 1990 under syn. *Smilacina racemosa*). Unspecified medicine (Compton, 1993 under syn. *Smilacina racemosa*).

C = 3, D = 9, G = 7, L = 0, M = 6, N = 7, P = 5, O = 2, R = 7, S = 17, U = 2

1 = 1, 2 = 7, 3 = 0, 4 = 0, 5 = 1, 6 = 2, 7 = 0, 8 = 1, 9 = 0, 10 = 0, 11 = 1, 12 = 0, 13 = 2, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 1, 29 = 0, 30 = 2, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 2, 36 = 2, 37 = 0, 38 = 1, 39 = 1, 40 = 1, 41 = 3, 42 = 2, 43 = 10, 44 = 2, 45 = 6, 46 = 3, 47 = 6, 48 = 1, 49 = 0, 50 = 0, 51 = 1, 52 = 0,

53 = 2

B = 0, B2 = 12, F = 0, F2 = 6, V = 0, V2 = 7, V3 = 3, T = 0, T2 = 1, P = 8, O = 35,

Total = 65

Maianthemum stellata Stop wound bleeding (Murphy, 1959). Wounds to cause clotting of the blood (Johnston, 1970 under syn. *Smilacina stellata*). Boils, sores; ease earache, sore throat and swollen glands (Smith, 1972 under syn. *Smilacina stellata*). Regulate menstrual disorders, prevent conception, cathartic (Erichsen-Brown, 1979 under syn. *Smilacina stellata*). Increase appetite, colds (Turner, 1980 under syn. *Smilacina stellata*). Cleanse the system, stimulate stomach, stomach trouble, internal pains, emetic, leucorrhea, venereal disease (2), stricture when a woman has her change, regulate menstrual disorders, contraceptive, tonic, stop wound bleeding, antiseptic wash for blood poisoning, cough syrup, earache, boils, scrofula, sprains, swellings, eye inflammations (Moerman, 1986 under syn. *Smilacina stellata*). Rheumatism, internal pains, colds (Turner, 1990 under syn. *Smilacina stellata*).

C = 3, D = 5, G = 4, L = 0, M = 3, N = 2, P = 4, O = 3, R = 6, S = 6, U = 0

1 = 2, 2 = 4, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 1, 9 = 0, 10 = 3, 11 = 0, 12 = 2, 13 = 1, 14 = 0, 15 = 0, 16 = 1, 17 = 0, 18 = 2, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 1, 24 = 2, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 3, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 2, 41 = 0, 42 = 1, 43 = 3, 44 = 0, 45 = 2, 46 = 0, 47 = 2, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 5, B2 = 5, F = 1, F2 = 0, V = 0, V2 = 3, V3 = 3, T = 0, T2 = 1, P = 3, O = 18,

Total = 36

LOBARIACEAE [EUMYCOTA]

Lobaria oregana Pains in the stomach, eyewash, poultice (Turner, 1973). Coughing up blood (Pojar and MacKinnon, 1994). Compounded with *Moneses uniflora* for cough medicine (Turner, unpublished Haida mss.).

C = 0, D = 1, G = 1, L = 0, M = 0, N = 0, P = 2, O = 1, R = 0, S = 0, U = 0

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 1, T = 0, T2 = 1, P = 0, O = 1,

Total = 5

LYCOPODIACEAE [Lycopsida]

Lycopodium clavatum Antipyretic (Van Wart, 1948; under *Lycopodia*). Spores dusted on open raw wounds and chafed infants (Lloyd, 1964). Make hair grow (Hunn, 1990). Cold medicine (Turner, unpublished Haida mss.).

C = 0, D = 3, G = 0, L = 0, M = 0, N = 0, P = 1, O = 0, R = 0, S = 1, U = 0

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 1, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 1, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 0, F2 = 1, V = 0, V2 = 1, V3 = 1, T = 0, T2 = 0, P = 0, O = 1,

Total = 5

MENYANTHACEAE

Fauria crista-galli Medicine for any type of sickness (Turner, unpublished Haida mss.).

C = 0, D = 0, G = 0, L = 0, M = 0, N = 0, P = 0, O = 0, R = 0, S = 1, U = 0

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 =

0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 0,

Total = 1

NYMPHAEACEAE

Nuphar lutea ssp. *polysepala* Applied to the seat of a pain, especially rheumatic pains (Olson, 1936 under waterlily). Stomach remedy (Barrett, 1952 under syn. *Nymphaea polysepala*). Infected sores (Stubbs, 1966 under *Nuphar* sp.). Tuberculosis, rheumatism, heart disease, gonorrhea, tonic for the blood (Turner, 1973 under *N. polysepalum*). Swellings in the body, sickness in the bones, asthma, chest pain (Turner and Bell, 1973 under *N. polysepalum*). Toothache (Turner, 1980). Unspecified medicine (Turner and Efrat, 1982 under *N. polysepalum*). Preventative medicine, unspecified medicine (Turner, 1983 under *N. polysepalum*). Lung hemorrhage, consumption, sickness in the bones, body pain, internal swellings, rheumatism (2), pain of rheumatism, asthma, pain, sores, sore back pain, good for the blood, heart disease, gonorrhea (Moerman, 1986). Arthritic joints, fractures, skin ulcers, compounded for tuberculosis, appetite stimulant for weak and sickly persons such a tuberculosis patients, cleans the lungs and the insides, cancer, stomach complaints, hot plaster, birth control, tonic (Gottesfeld, 1988 under *N. polysepalum*). Ulcers, bites, swellings, infections (Turner, 1990). Internal medicine, tuberculosis, coughing, respiratory ailments, unspecified women's illness (Compton, 1993 under *N. polysepalum*). Tuberculosis (3), bleeding of the lungs, colds, asthma, internal pains, ulcers, rheumatism (3), chest pains (2), heart conditions, heart disease, gonorrhea, contraceptive, bodily swellings, sickness in the bones, and cancer (Pojar and MacKinnon, 1994 under *N. polysepalum*).

C = 4, D = 5, G = 4, L = 0, M = 16, N = 10, P = 16, O = 0, R = 3, S = 15, U = 0

1 = 2, 2 = 10, 3 = 0, 4 = 0, 5 = 0, 6 = 4, 7 = 0, 8 = 8, 9 = 0, 10 = 2, 11 = 0, 12 = 3, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 4, 29 = 0, 30 = 2, 31 = 1, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 2, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 10, 44 = 0, 45 = 1, 46 = 1, 47 = 5, 48 = 12, 49 = 0, 50 = 0, 51 = 2, 52 = 0,

53 = 0

B = 5, B2 = 9, F = 0, F2 = 1, V = 0, V2 = 3, V3 = 2, T = 6, T2 = 8, P = 9, O = 35,

Total = 73

ONAGRACEAE

Epilobium minutum Diarrhea in children (Turner, 1980).

C = 0, D = 0, G = 1, L = 0, M = 0, N = 0, P = 0, O = 0, R = 0, S = 0, U = 0

1 = 0, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 0,

Total = 1

PINACEAE [Gymnospermae]

Larix occidentalis Wash for ulcers, etc. (Hrdlicka, 1905 under tamarack). Colds and coughs, soothe sore throat (Harbinger, 1964 under larch). Medicine for changing of the blood, blood purifier, antiseptic wash for cuts and sores, severe skin sores, cancer, arthritis (2), arthritic limb soak (Turner, 1980). Healthful, strengthening wash for infants (Moerman, 1986). Laryngitis, tuberculosis (Hunn, 1990). Wounds, tuberculosis, dry cough, respiratory diseases, sores (2), cuts, burns, bone setter for broken bones which would not heal (2), breast cancer, ulcers, stimulate appetite, contraceptive after childbirth (Turner, 1990).

C = 0, D = 8, G = 1, L = 0, M = 5, N = 0, P = 7, O = 0, R = 1, S = 6, U = 0

1 = 1, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 3, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 2, 41 = 0, 42 = 0, 43 = 4, 44 = 0, 45 = 0, 46 = 5, 47 = 5, 48 = 3, 49 = 0, 50 = 0, 51 = 2, 52 = 0,

53 = 0

B = 1, B2 = 11, F = 0, F2 = 0, V = 0, V2 = 3, V3 = 2, T = 2, T2 = 1, P = 4, O = 8,

Total = 28

Pinus contorta Cathartic (Dixon, 1903). Compounded for psoriasis and other ailments, prevent too rapid family increase (Turner and Bell, 1971). Stomachache, cough (Turner and Bell, 1973). Cuts, infections, rheumatism, heart trouble, consumption (Turner, 1973). Burns, boils (Hart, 1974). Tubercular coughs (Hellson, 1974). Stomach troubles such as ulcers (3), sores, aching muscles, sore throat, abortifacient, spring tonic for aches and pains (Turner, 1980). Heart trouble, rheumatic or other pains, rheumatism (2), muscle and joint aches, aches, soreness in muscles and joints, colds (3), coughs (6), congestion, consumption, paralysis, gonorrhea, diuretic, cathartic, purgative, stomachaches, stomach pain, sores on body, broken skin, remove white scum from eye, snow blindness, constitutional weakness (Moerman, 1986). Wounds (2), burns (2), sores (2), baby salve (Turner, 1988). Spring tonic, boils, swellings (Hunn, 1990). Influenza (2), disinfectant cold cream (Turner, 1990). Moxa for swollen areas such as arthritic or injured knuckles (Compton, 1993). Colds, tuberculosis, sores, and sore throat (Turner, unpublished Haida mss.).

C = 2, D = 17, G = 10, L = 0, M = 13, N = 1, P = 18, O = 2, R = 2, S = 6, U = 1

1 = 2, 2 = 7, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 3, 9 = 0, 10 = 4, 11 = 0, 12 = 1, 13 = 7, 14 = 0, 15 = 0, 16 = 2, 17 = 0, 18 = 4, 19 = 1, 20 = 0, 21 = 5, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 2, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 2, 36 = 3, 37 = 0, 38 = 1, 39 = 0, 40 = 2, 41 = 0, 42 = 0, 43 = 3, 44 = 0, 45 = 0, 46 = 6, 47 = 9, 48 = 4, 49 = 2, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 5, B2 = 20, F = 1, F2 = 1, V = 2, V2 = 6, V3 = 11, T = 3, T2 = 1, P = 3, O = 24,

Total = 72

Pinus ponderosa Brush dance medicine for chronic trouble, delicate constitution or to safeguard child (Goddard, 1903). Relieve muscular pain, backache, rheumatism (Stubbs, 1966). Influenza (Pennington, 1969 under syn. *P. engelmanni*). Boils, dandruff, help deliver the placenta, rheumatism, backache (Hart, 1974).

Boils, high fever, internal hemorrhaging, stomach medicine, make mothers' milk flow, sleep inducing baby salve, eyewash for sore or infected eyes, can cause miscarriage (Turner, 1980). Scabby skin, sores, sore and inflammed eyes, fever, bad coughs, emetic, underarm odors, wash for sick babies (Moerman, 1986). Salve for umbilical cord, cancer (Turner, 1988). Boils, flu (Hunn, 1990). Sores, earache, boils, old running sores, cuts, chapped skin, inflamed eyes, aching back, joints and limbs (Turner, 1990).

C = 1, D = 13, G = 2, L = 0, M = 7, N = 1, P = 1, O = 5, R = 3, S = 9, U = 0

1 = 1, 2 = 6, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 2, 8 = 2, 9 = 0, 10 = 4, 11 = 0, 12 = 0, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 1, 33 = 0, 34 = 0, 35 = 4, 36 = 1, 37 = 1, 38 = 0, 39 = 1, 40 = 0, 41 = 0, 42 = 0, 43 = 4, 44 = 0, 45 = 0, 46 = 1, 47 = 7, 48 = 0, 49 = 2, 50 = 0, 51 = 1, 52 = 0, 53 = 0

B = 4, B2 = 11, F = 0, F2 = 3, V = 2, V2 = 4, V3 = 1, T = 0, T2 = 0, P = 4, O = 17,

Total = 42

PLANTAGINACEAE

Plantago major Compounded for uterine prolapse (Evans, 1859). Hemostatic, toothache (Flexon, 1897 under Plantago or plantain). Rattlesnake bite, insect stings, poisons (Andros, 1898). Snakebite (Chamberlain, 1901 under Plantain). Boils, inflammed swellings (Goddard, 1903 under "Lanten"). Antiseptic, burns, scalds, internal hemorrhaging, toothache, earache (Strath, 1903). Reducing swellings from poisonous insect bites, gargle in diphtheria (Johnson, 1907). Cuts (Speck, 1909b under plantain). Stings, burns, bruises, and snake bites to draw out the poison (Tantaquidgeon, 1925). Snakebite (Swanton, 1926 under wild plantain). Dropsy, compounded in tonic for tuberculosis (Parker, 1928 under plantain). Stomach tonic (Jones, 1931). Blood medicine (Swank, 1932). Diarrhea, dysentery, febrifuge, astringent, rattlesnake bite (Zingg, 1932). Headache (Mettel, 1935 under plantain). Skin poultice (Densmore, 1939). Skin injuries (Fenton, 1941). Heal swellings and wounds, draw out swelling or soreness (Tantaquidgeon, 1941). Indigestion or abdominal pain, diuretic (Wyland and Harris, 1941). Diarrhea (Steggerda, 1943). Hydrophobia or mad dog bite, bruises, urinary diseases (Steggerda, 1943). Rheumatism, headache, yellow jacket sting, draws up a sore, snakebite (Banks, 1953 under

Plantago sp.). Battle bruises, wounds (Murphy, 1959). Wounds, bruised area, aching joint, headache (Owen, 1963). Headache (Curtin, 1965). Fever (Pennington, 1963a under *Plantago* sp.). Infected sores and tumors to draw out the pus (Stubbs, 1966). Relieve stomach cramps (Pennington, 1969 under *Plantago* sp.). Bealings, infections, bruises, sores, blood poisoning, hemmorrhage, boils, cuts, bumble-bee stings, splinters (Jolicoeur, 1971). Heal wound after blister opened (Turner and Bell, 1973). Summer complaints (Weslager, 1973 under Plantain). Cuts (7), sores (7), infected cuts to draw out pus (Hart, 1974). Cuts, sores, salve for sores, poultice to draw out poison and effectively heal wounds (Lacey, 1976; under "plantain"). Poultices, sores, contusions, burns, stop bleeding, rheumatism, swellings, analgesic, febrifuge, astringent (Black, 1980). Kill germs on sores (Turner, 1980). Poultices, internal hemorrhage, swellings, rheumatism, inflammation, bruises, infected wounds, wounds, burns (2), scalds, earache, toothache (Arnason, 1981). Demulcent, emollient, laxative (Meyer, 1981). Drawing out the pus of sores, cuts and infections (Turner and Efrat, 1982). Suck the pus out of sores, infections, boils, abcesses, open sores, cuts; stomach ulcers (Turner, 1983). Headache, sore eyes (2), poisonous bites, insect stings (3), snakebites (4), burns (4), blisters, ulcers, promote healing without scars, sores (2), cuts (2), wounds (2), boils, infections, draw blisters on sores and swellings, draw out thorns and splinters (2), draw out poison, bowel complaints, bloody urine, check discharge, bowel troubles, check babies bowels, dysentery, fever (2), diaphoretic, constipation, rheumatism (2), swellings (4), sprains, bruises (4), inflammations (3), dropsical swellings, urinary, earaches, "lightening infection", "life medicine", scalds, pneumonia, lubricate throat for removal of lodged bone, douche, female diseases, strengthen child, unspecified ailments (Moerman, 1986). Carbuncles, hemorrhoids, sores (Turner, 1990). Poultice (Turner, unpublished Haida mss.).

C = 5, D = 106, G = 17, L = 0, M = 33, N = 9, P = 3, O = 5, R = 4, S = 13, U = 6

1 = 0, 2 = 15, 3 = 6, 4 = 0, 5 = 0, 6 = 26, 7 = 3, 8 = 5, 9 = 0, 10 = 8, 11 = 0, 12 = 0, 13 = 0, 14 = 21, 15 = 1, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 1, 21 = 4, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 2, 27 = 0, 28 = 0, 29 = 1, 30 = 5, 31 = 7, 32 = 0, 33 = 2, 34 = 0, 35 = 2, 36 = 5, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 1, 43 = 5, 44 = 5, 45 = 3, 46 = 34, 47 = 22, 48 = 2, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 13

B = 11, B2 = 91, F = 0, F2 = 1, V = 0, V2 = 10, V3 = 0, T = 0, T2 = 1, P = 4, O = 93,

Total = 201

POLEMONIACEAE

Ipomopsis aggregata Leaves - Indigestion or abdominal pain, facilitate delivery of placenta (Wyland and Harris, 1941). Venereal disease, blood disease, blood purifier, cure gonorrhea, raises the fever (Murphy, 1959). Blood disease (Nickerson, 1966). "Clean out your system", constipation, eyewash, face and head wash to improve skin and hair (Turner, 1980). Stomach troubles, cathartic, spider bites, emetic (3), stomach disease, rheumatic aches, physic (2), blood tonic, disinfecting wash for itch, gonorrhea, syphilis (Moerman, 1986). Kidneys, hair and scalp (Hunn, 1990).

C = 0, D = 4, G = 9, L = 0, M = 1, N = 0, P = 0, O = 1, R = 1, S = 12, U = 1

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 4, 13 = 0, 14 = 0, 15 = 1, 16 = 1, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 3, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 1, 32 = 0, 33 = 1, 34 = 0, 35 = 1, 36 = 0, 37 = 1, 38 = 1, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 6, 44 = 1, 45 = 0, 46 = 0, 47 = 3, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 4, B2 = 3, F = 1, F2 = 2, V = 0, V2 = 3, V3 = 0, T = 0, T2 = 0, P = 6, O = 13,

Total = 29

Roots - Indigestion or abdominal pain, facilitate delivery of placenta (Wyland and Harris, 1941). Venereal disease, blood disease, blood purifier, cure gonorrhea, raises the fever (Murphy, 1959). Blood disease (Nickerson, 1966). Laxative, high fever (Turner, 1980). Cathartic, spider bites, emetic (3), stomach disease, colds, rheumatic pains, physic (3), blood tonic, disinfecting wash for itch, gonorrhea, syphilis (Moerman, 1986). Kidneys, hair and scalp (Hunn, 1990).

C = 0, D = 3, G = 8, L = 0, M = 1, N = 0, P = 1, O = 0, R = 1, S = 13, U = 1

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 2, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 4, 13 = 0, 14 = 0, 15 = 1, 16 = 1, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 3, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 1, 32 = 0, 33 = 1, 34 = 0, 35 = 0, 36 = 0, 37 = 1, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 7, 44 = 1, 45 = 0, 46 = 0, 47 = 2, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 4, B2 = 3, F = 0, F2 = 2, V = 0, V2 = 3, V3 = 1, T = 0, T2 = 0, P = 7, O = 12,

Total = 28

POLYGONACEAE

Eriogonum heracleoides Leaves - Infected cuts, colds, blood poisoning, tuberculosis, cancer, all types of sickness, cuts, sores (Turner, 1980). Rheumatism, stiff, aching joints and muscles, sprains, general indisposition (Moerman, 1986). Running sores, sores, sore eyes, swellings, syphilis, tuberculosis, sickness on the lung, cold medicine, internal pains of any kind, especially stomach (Turner, 1990).

C = 0, D = 5, G = 0, L = 0, M = 4, N = 1, P = 5, O = 10, R = 0, S = 5, U = 0

1 = 0, 2 = 2, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 2, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 0, 46 = 1, 47 = 3, 48 = 3, 49 = 0, 50 = 0, 51 = 1, 52 = 0, 53 = 0

B = 3, B2 = 5, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 2, T = 2, T2 = 1, P = 2, O = 8,

Total = 21

Roots - Infected cuts, colds, blood poisoning, tuberculosis, cancer, all types of sickness (Turner, 1980). Diarrhea, rheumatism, stiff, aching joints and muscles, sprains, general indisposition (Moerman, 1986). Running sores, sores, swellings, syphilis, tuberculosis, sickness on the lung, cold medicine, internal pains of any kind, especially stomach (Turner, 1990).

C = 0, D = 3, G = 1, L = 0, M = 4, N = 1, P = 5, O = 0, R = 0, S = 5, U = 0

1 = 0, 2 = 2, 3 = 1, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 1, 9 = 0, 10 = 1, 11 = 0, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 2, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 3, 44 = 0, 45 = 0, 46 = 0, 47 = 2, 48 = 3, 49 = 0, 50 = 0, 51 = 1, 52 = 0, 53 = 0

B = 3, B2 = 4, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 2, T = 2, T2 = 1, P = 2, O = 6,

Total = 19

POLYPODIACEAE [Filicinae]

Polypodium glycyrrhiza Inflammatory swellings (Brown, 1868 under syn. *P. vulgare*). Alterative, venereal complaints (Swan, 1868 under syn. *P. falcatum*). Cough medicine (Olson, 1936 under licorice root = tsumana'amats which Gunther (1945) gives as *P. glycyrrhiza*). Pleurisy (Mechling, 1959 under syn. *P. vulgare*). Stomach trouble, sore throat, colds (Turner and Bell, 1971). Sore throat (2), compounded for stomach pain (Turner, 1973). Vomiting blood, diarrhea (Turner and Bell, 1973). Heart disease, dyspepsia, stomachache, pleurisy, kidney problems, neuralgia (Arnason, 1981; under syn. *P. vulgare*). Coughs and sore throat (Turner and Efrat, 1982). Cough, colds (2), sore throat, sore chest (Turner, 1983). Measles, cough medicine, diarrhea, stop vomiting blood (Moerman, 1986). Colds, sore throats, sore gums (Turner, 1990). Sore throat, diabetes, eye wash, wash for baby's bottom, skin and scalp (Forlines, 1992). Cough (3), sore throat (3), colds, shortness of breath, chest pain (Compton, 1993). Colds and coughs (Turner, unpublished Haida mss.).

C = 1, D = 2, G = 8, L = 0, M = 1, N = 1, P = 29, O = 1, R = 0, S = 4, U = 1

1 = 0, 2 = 5, 3 = 2, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 8, 14 = 0, 15 = 1, 16 = 0, 17 = 0, 18 = 6, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = , 29 = 0, 30 = 2, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 10, 41 = 0, 42 = 0, 43 = 1, 44 = 1, 45 = 0, 46 = 0, 47 = 1, 48 = 3, 49 = 1, 50 = 1, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 18, F = 1, F2 = 0, V = 1, V2 = 13, V3 = 14, T = 0, T2 = 0, P = 1, O = 12,

Total = 48

Polystichum munitum Sores and boils to dry up the flowing pus (Boas, 1890 under syn. *Aspidium munitum*). Sores and boils (Turner and Bell, 1971). Cancer of the womb (Turner and Efrat, 1982). Sores, facilitate childbirth, boils, burns, dandruff, sore throat, tonsilitis (Moerman, 1986). Toothache (Forlines, 1992). Diarrhea (Turner in Pojar and MacKinnon, 1994). Poultice (Turner, unpublished Haida mss.).

C = 0, D = 8, G = 1, L = 0, M = 0, N = 1, P = 2, O = 0, R = 2, S = 0, U = 0

1 = 0, 2 = 1, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 2, 11 = 0, 12 = 0, 13 = 0, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 =

0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 1, 38 = 0, 39 = 0, 40 = 2, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 1, 47 = 4, 48 = 0, 49 = 0, 50 = 0, 51 = 1, 52 = 0, 53 = 0

B = 2, B2 = 9, F = 1, F2 = 0, V = 0, V2 = 2, V3 = 0, T = 0, T2 = 0, P = 0, O = 2,

Total = 14

POLYPORACEAE [EUMYCOTA]

Ganoderma applanatum No references to the medicinal use of this genus.

RANUNCULACEAE

Clematis ligusticifolia Promote hair growth (Hough, 1898). Headache (Wyland and Harris, 1941). Eyewash, itchiness, sores, hair restorer (Hart, 1974). Skin sores and boils, contraceptive, shampoo to kill germs in hair roots (Turner, 1980). Headache (Rogers, 1980). Headaches (Munson, 1981). Sore throats, colds, headaches, chest pains, pain, backache, stomachache, stomach pains, cramps, tired feet, swollen legs or arms, dropsical conditions (2), swellings, bruises, counter-irritant for sore or painful areas, rheumatic pains, wounds, heal syphilitic sores, skin eruptions, boils, severe burns, scabs, eczema, sores, spider bites, sand cricket bites, tonic after deliverance, general tonic, out-of-sorts feeling, general disorder (Moerman, 1986). Make hair grow, dandruff, hair loss, colds (Hunn, 1990). Head wash, toothache, boils (2), bedwetting (Turner, 1990).

C = 0, D = 22, G = 2, L = 0, M = 4, N = 12, P = 3, O = 1, R = 2, S = 3, U = 3

1 = 1, 2 = 10, 3 = 0, 4 = 0, 5 = 0, 6 = 3, 7 = 0, 8 = 1, 9 = 0, 10 = 4, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 2, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 4, 28 = 0, 29 = 0, 30 = 0, 31 = 2, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 3, 44 = 2, 45 = 1, 46 = 2, 47 = 11, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 1, 53 = 0

B = 4, B2 = 15, F = 1, F2 = 4, V = 0, V2 = 7, V3 = 2, T = 0, T2 = 0, P = 3, O = 24,

Total = 52

Delphinium nuttallianum Tonic (Turner, 1990).

C = 0, D = 0, G = 0, L = 0, M = 0, N = 0, P = 0, O = 0, R = 0, S = 1, U = 0

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 0,

Total = 1

RHAMNACEAE

Ceanothus velutinus Loosen mucus from colds, healing poultice for sores, cuts, etc. (Ring, 1930 under snow-brush). Burns and sores (Stubbs, 1966). Fever, coughs (Merriam, 1967). Burns (4), sores (4) (Hart, 1974). Sores, eczema (2), cure dandruff, prevent diaper rash, skin conditioner, baby powder, blood purifier, heal broken bones (Turner, 1980). Dull body pains, flu, gonorrhea, deodorant, (Moerman, 1986). Colds, flu, fever (Hunn, 1990). Rheumatism (3), arthritis (3), broken limbs, loss of weight, cancer, general illness, diarrhea (Turner, 1990). Tuberculosis (Turner in Pojar and MacKinnon, 1994).

C = 0, D = 19, G = 1, L = 0, M = 8, N = 1, P = 4, O = 0, R = 0, S = 9, U = 0

1 = 0, 2 = 1, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 2, 8 = 6, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 1, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 3, 44 = 0, 45 = 0, 46 = 8, 47 = 12, 48 = 1, 49 = 2, 50 = 0, 51 = 1, 52 = 0, 53 = 0

B = 1, B2 = 16, F = 2, F2 = 1, V = 2, V2 = 2, V3 = 1, T = 1, T2 = 0, P = 4, O = 14,

Total = 42

ROSACEAE

Amelanchier alnifolia Check too frequent menstruation (Gifford, 1967). Arthritis, general good health (Melgrave, 1973; under "saskatoon"). Compounded for gonorrhea (Turner, 1973). Ear drops, eye drops, upset stomach, mild laxative (Hellson, 1974). Colds, general tonic, contraceptive after childbirth, babies after weaning (Turner, 1980). Flu, bad colds, compounded for: sickness associated with teething, chest pain, cough, lung infection, fever by causing sweating (Leighton, 1985). Tonic, particularly for stomach troubles, improve lose of appetite in children, healing, check too frequent menstruation, wash after childbirth (Moerman, 1986). Hasten the afterbirth, clean out womb and help healing inside after childbirth, stop menstrual periods after baby's birth (Turner, 1990). Reduce blood pressure (Forlines, 1992).

C = 1, D = 0, G = 2, L = 0, M = 1, N = 0, P = 5, O = 2, R = 8, S = 10, U = 0

1 = 1, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 1, 14 = 0, 15 = 1, 16 = 0, 17 = 0, 18 = 2, 19 = 0, 20 = 1, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 1, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 1, 36 = 3, 37 = 3, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 5, 44 = 0, 45 = 4, 46 = 0, 47 = 0, 48 = 1, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 3, F = 0, F2 = 0, V = 1, V2 = 1, V3 = 3, T = 0, T2 = 1, P = 5, O = 17,

Total = 29

Argentina egedii Spider bites (Wyland and Harris, 1941 under *Potentilla* sp.). Sores, swellings, inflammed eyes (Turner and Bell, 1973 under *P. pacifica*). Emetic for stomach disorders (Hellson, 1974 under syn. *P. anserina*). Diarrhea, poultice for painful places (Moerman, 1986 under syn. *P. anserina*). Unspecified medicine (Compton, 1993 under *P. pacifica*). Purgative, poultice, inflammed eyes, compounded for medicinal preparations (Pojar and MacKinnon, 1994 under *P. anserina.* ssp *pacifica*).

C = 0, D = 3, G = 3, L = 0, M = 1, N = 1, P = 0, O = 2, R = 0, S = 2, U = 0

1 = 0, 2 = 1, 3 = 1, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 1, 32 = 0, 33 = 0, 34 = 0, 35 = 2, 36 = 0, 37 = 0, 38 = 1, 39 = 0, 40

= 0, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 0, 46 = 0, 47 = 2, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 3, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 2, O = 7,

Total = 12

Aruncus dioicus Pain in the region of the kidney, person spitting blood and showing a tendency towards tuberculosis (Densmore, 1939 under *A. sylvester*). Stop excessive urination, bee stings in the face or eye, swollen feet, prevent pregnant women from losing too much blood at childbirth and relieve suffering (Banks, 1953). Stomach pain, diarrhea, compounded for smallpox (Turner, 1973 under *A. sylvester*). Coughing (Turner and Bell, 1973 under *A. sylvester*). Bad fever, rash illness something like measles or possible a form of measles (Turner, 1983 under *A. sylvester*). Gonorrhea (2), smallpox (2), sores (4), diuretic, kidney trouble, colds, coughing, sore throat, throat swellings, general tonic (Moerman, 1986). Flu (4), colds (3), internal ailments (2), swellings, indigestion, general stomach disorders, grippe, Spanish influenza, swollen body parts, internal injuries, internal wounds, internal bleeding, broken ribs, stomach problems, paralysis (Turner, 1990).

C = 0, D = 6, G = 6, L = 0, M = 4, N = 1, P = 9, O = 0, R = 2, S = 18, U = 4

1 = 0, 2 = 3, 3 = 1, 4 = 0, 5 = 0, 6 = 3, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 2, 13 = 2, 14 = 0, 15 = 1, 16 = 0, 17 = 0, 18 = 4, 19 = 0, 20 = 0, 21 = 3, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 2, 31 = 1, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 2, 41 = 0, 42 = 0, 43 = 3, 44 = 2, 45 = 0, 46 = 3, 47 = 5, 48 = 1, 49 = 9, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 15, F = 0, F2 = 1, V = 8, V2 = 7, V3 = 6, T = 0, T2 = 1, P = 1, O = 16,

Total = 50

Crataegus douglasii Venereal disease (Turner, 1973). Swellings (Turner and Bell, 1973). Mouth sores in babies, diarrhea in children (2), moxa for arthritic pain (Turner, 1980). Diarrhea (2), dysentery (2), stomach medicine, pains especially in the chest, general sickness (Turner, 1990). Venereal disease, thin the blood, strengthen the heart, reduce swellings (Pojar and MacKinnon, 1994).

C = 2, D = 1, G = 7, L = 0, M = 2, N = 1, P = 1, O = 0, R = 0, S = 3, U = 0

1 = 0, 2 = 1, 3 = 6, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 2, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 1, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 2, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 4, B2 = 6, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 1, O = 6,

Total = 17

Fragaria chiloensis Burns (Moerman, 1986). Burns, diarrhea, female tonic (Pojar and MacKinnon, 1994).

C = 0, D = 2, G = 1, L = 0, M = 0, N = 0, P = 0, O = 0, R = 1, S = 0, U = 0

1 = 0, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 1, 46 = 2, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 3, F = 0, F2 = 1, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 0,

Total = 4

Fragaria vesca Agues (Josselyn, 1860). Astringent (Allison, 1901 under wild strawberry). Astringent, compounded for tuberculosis (Parker, 1928 under strawberry). Astringent, diuretic (Stowe, 1942 under wild strawberry). Sores, raw spots on babies, diarrhea, upset stomach, eye infections, compounded for diabetes (Melgrave, 1973; under "wild strawberry"). Cure diarrhea and cramps in the stomach (Weslager, 1973 under wild strawberry). Tonic (Lacey, 1976; under "wild strawberry"). Astringent (2), diuretic, depurative, gout (Erichsen-Brown, 1979). Disinfectant for open sore, sore baby's mouth, help heal and prevent infection in newborn's navel (Turner, 1980). Rheumatism, bladder, gout, liver (Meyer, 1981). Stomach complaints

(Moerman, 1986). Hurt eyes, blindness, fever (Hunn, 1990). Diarrhea especially in children (3), dysentery, body wash, deodorant (Turner, 1990).

C = 0, D = 14, G = 9, L = 1, M = 1, N = 0, P = 1, O = 3, R = 0, S = 6, U = 3

1 = 0, 2 = 1, 3 = 6, 4 = 0, 5 = 0, 6 = 0, 7 = 2, 8 = 1, 9 = 0, 10 = 3, 11 = 0, 12 = 0, 13 = 0, 14 = 5, 15 = 1, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 2, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 1, 35 = 2, 36 = 4, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 1, 45 = 0, 46 = 1, 47 = 3, 48 = 1, 49 = 0, 50 = 1, 51 = 0, 52 = 0, 53 = 0

B = 4, B2 = 14, F = 1, F2 = 2, V = 0, V2 = 3, V3 = 0, T = 0, T2 = 1, P = 1, O = 15,

Total = 38

Geum macrophyllum Universal remedy, "good for everything" (Willoughby, 1886). Cough or croup (Mechling, 1959 under syn. *G. strictum*). Protect one from harmful germs (Turner and Bell, 1971). Stomach pain, boils (Turner, 1973). After childbirth (Turner, 1980). Stomach pains, excess stomach acid, heal womb after childbirth (Turner and Efrat, 1982). Compounded for sickness associated with teething (Leighton, 1985). Contraceptive, labor (2), female remedy, bruises, boils (2), cuts, good for everything, any sickness (Moerman, 1986). Measles, smallpox, chicken pox, any rash causing disease (Turner, 1990). Straighten out women's womb and aid delivery, diuretic, eyewash, rheumatism (Pojar and MacKinnon, 1994).

C = 0, D = 4, G = 3, L = 0, M = 2, N = 0, P = 2, O = 1, R = 8, S = 10, U = 1

1 = 1, 2 = 2, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 1, 9 = 0, 10 = 3, 11 = 0, 12 = 0, 13 = 1, 14 = 0, 15 = 1, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 1, 37 = 3, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 5, 44 = 0, 45 = 4, 46 = 1, 47 = 1, 48 = 1, 49 = 3, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 3, F = 0, F2 = 2, V = 3, V2 = 1, V3 = 1, T = 0, T2 = 0, P = 5, O = 14,

Total = 31

Holodiscus discolor Healing sores, burns (Turner, 1980). Blood purifier, smallpox, black measles, chicken pox, healing sores, diarrhea (2), eye wash, sore lips, sore feet, convalescents' tonic, stomach disorders, colds, antiseptic wash, emetic, stomachache, venereal disease, undefined illness (Moerman, 1986). Diarrhea (Hunn, 1990). Kidney medicine (Forlines, 1992). Blood tonic, chickenpox, measles, diarrhea, especially in children (Pojar and MacKinnon, 1994).

C = 0, D = 5, G = 7, L = 0, M = 1, N = 0, P = 1, O = 1, R = 0, S = 10, U = 1

1 = 0, 2 = 2, 3 = 4, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 4, 44 = 1, 45 = 0, 46 = 1, 47 = 2, 48 = 0, 49 = 5, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 10, F = 0, F2 = 0, V = 5, V2 = 2, V3 = 1, T = 0, T2 = 0, P = 4, O = 4,

Total = 26

Potentilla arguta Check bleeding, after fall or back injury it prevents blood from settling in one place, persons who seemed to have too much blood (headache ?), convulsions, dysentery, cuts (Erichsen-Brown, 1979, under syn. *Drymocallis arguta*). Headache (Moerman, 1986). After childbirth (Turner, 1990).

C = 2, D = 1, G = 1, L = 0, M = 0, N = 2, P = 0, O = 0, R = 1, S = 0, U = 0

1 = 0, 2 = 2, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 1, 46 = 1, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 0, O = 4,

Total = 7

Prunus virginiana Diarrhea (Spaydon, 1884 under syn. *Padus virginiana*). Tonic (Evans, 1859). Fluxes (Josselyn, 1860 under syn. *Cerasus virginiana*). Tonic, dyspepsia, intermittants, consumption (Stacey, 1875). Diarrhea (Holmes, 1884). Stimulant tonic (Morice, 1894). Venereal disease (Barton, 1900). Post-partum hemorrhage (Gilmore, 1930). Astringent (Jones, 1931). Medicine for the big chill (fever), medicine for an aggravated form of hoarseness intended to make patient vomit the phlegm which clogs the throat passages and impedes utterances, compounded to cure the chill, compounded for a form of indigestion or biliousness attended by a swelling of the abdomen and yellowness of skin (Mooney, 1932). Diarrhea (Van Wart, 1948). Dysentery (Murphy, 1959 under syn. *P. demissa*). Blood purifier, inflammation of the stomach, rheumatism (Curtin, 1965). Eye drops (Stubbs, 1966). Stop wounds bleeding (Johnston, 1970). Cleanse sores, ulcerated sores or burns before medication applied, check diarrhea (Toineeta, 1970). Diarrhea (4), stomachache, intestinal worms, sore eyes (Hart, 1974). Diarrhea, sore throat, purge, enema (Hellson, 1974). Diarrhea, inflammation of the bowels, aid digestion (Erichsen-Brown, 1979). Cough remedy (Black, 1980). Colds, coughs, diarrhea, general tonic (3), stomachic, laxative, smallpox, stretch marks (Turner, 1980). Unspecified medicine (Munson, 1981). Colds, stop bleeding of wounds, compounded for dysentery (Johnston, 1982). Diarrhea (2) (Leighton, 1985). Headache, fevers, great chill, chills, ague, thrash, break out measles, colds (2), coughs (2), baby's colds, headcold, sore throat, laryngitis, loosen phlem for hoarseness, cough syrup, lung trouble (2), compounded for lung hemorrhage, nose hemorrhage, hemorrhages, consumption (2), compounded in cathartic blood cleanser for scrofula sores, dry sores, wounds (2), galls, old sores and ulcers, disinfectant wash, astringent, diarrhea (8), children's diarrhea, children's loss of appetite, stomach troubles, stomachache, stomach cramps, emetic, laxative, indigestion, cramps, biliousness, upset stomach, bowel trouble, blood discharged from bowels, piles, compounded for cholera, jaundice, prenatal care (2), labor, prevent hemorrhage after childbirth, strengthening tonic after childbirth, sedative, nervous excitability, snowblindness (2), eye wash, hair growth, strengthen hair, "life medicine", blood purifier, blood tonic, tonic (2) (Moerman, 1986). Diarrhea (Hunn, 1990). Influenza, colds (3), cough (2), sick feeling, laxative (Turner, 1990).

C = 6, D = 16, G = 51, L = 1, M = 1, N = 3, P = 27, O = 5, R = 4, S = 27, U = 0

1 = 0, 2 = 2, 3 = 26, 4 = 0, 5 = 1, 6 = 0, 7 = 7, 8 = 1, 9 = 0, 10 = 1, 11 = 0, 12 = 1, 13 = 7, 14 = 2, 15 = 5, 16 = 1, 17 = 0, 18 = 9, 19 = 0, 20 = 0, 21 = 10, 22 = 0, 23 = 1, 24 = 0, 25 = 2, 26 = 0, 27 =

2, 28 = 0, 29 = 1, 30 = 7, 31 = 0, 32 = 0, 33 = 4, 34 = 1, 35 = 5, 36 = 1, 37 = 1, 38 = 1, 39 = 2, 40 = 3, 41 = 0, 42 = 1, 43 = 16, 44 = 0, 45 = 2, 46 = 3, 47 = 7, 48 = 5, 49 = 3, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 49, F = 0, F2 = 1, V = 3, V2 = 20, V3 = 16, T = 3, T2 = 2, P = 16, O = 46,

Total = 141

Rosa nutkana Syphilitic sores (Olson, 1936 under wild rose). Severe pain, any kind of abcess, sore eyes (Densmre, 1939). Eye wash, stomach pains (Turner, 1973). Reduce swelling and pain of bee stings (2) (Turner, 1980). Unspecified medicine (Turner, 1983). Ease labor pains, strengthen babies, swellings, syphilitic sores, eye wash, sore throats (Moerman, 1986). Sore eyes, colds, fever, stomach trouble, weak blood, induce vomiting, used when a woman has difficulty menstruating (Kari, 1987). Cough, flu (Hunn, 1990). Syphilis, athletes foot, colds, coughs, compounded for diarrhea, vomiting, women after childbirth, women's illnesses (Turner, 1990). Eyewash for cataracts, enhance eyesight, sore eyes, abscesses, beestings, babies' diarrhea (Turner in Pojar and MacKinnon, 1994).

C = 0, D = 7, G = 6, L = 0, M = 1, N = 1, P = 5, O = 7, R = 4, S = 7, U = 0

1 = 0, 2 = 3, 3 = 2, 4 = 1, 5 = 0, 6 = 1, 7 = 1, 8 = 0, 9 = 0, 10 = 2, 11 = 0, 12 = 3, 13 = 2, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 2, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 1, 24 = 1, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 3, 32 = 0, 33 = 0, 34 = 0, 35 = 7, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 3, 44 = 0, 45 = 2, 46 = 0, 47 = 1, 48 = 0, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 7, F = 1, F2 = 1, V = 1, V2 = 3, V3 = 3, T = 0, T2 = 0, P = 4, O = 18,

Total = 38

Rubus parviflorus Swellings (Boas, 1890 under syn. *R. nutkanus*). Antiscorbutic (Yager, 1911 under thimbleberry). Cure of sore or infected eyes, injured eye (Ring, 1930 under thimbleberry). Draw out pus and heal sores and boils (Nomland, 1938 under thimbleberry). Ease stomachaches, stop diarrhea (Turner and Bell, 1971). Unduly long periods, make wounds heal, internal disorders, compounded for vomiting and spitting blood (Turner and Bell, 1973). Chest disorders (Hellson, 1974). Acne, pimples, blackheads, stomach ailments (Turner, 1980). Burns, appetizer, tonic for thin person, anemia, strengthen blood, swellings (Moerman, 1986). Babies navels which would not heal (Turner, 1990). Help adults sleep, compounded for colds and flu (Forlines, 1992).

C = 0, D = 10, G = 4, L = 0, M = 2, N = 1, P = 3, O = 3, R = 1, S = 7, U = 0

1 = 0, 2 = 0, 3 = 1, 4 = 1, 5 = 0, 6 = 2, 7 = 0, 8 = 0, 9 = 1, 10 = 1, 11 = 0, 12 = 0, 13 = 0, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 3, 36 = 0, 37 = 0, 38 = 0, 39 = 1, 40 = 0, 41 = 0, 42 = 0, 43 = 5, 44 = 0, 45 = 1, 46 = 2, 47 = 5, 48 = 1, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 11, F = 0, F2 = 0, V = 0, V2 = 6, V3 = 1, T = 0, T2 = 2, P = 4, O = 10,

Total = 31

Spiraea betulifolia Bellyache (Chamberlain, 1892). Menstrual pain, heavy or prolonged menstruation, poor kidneys, ruptures, colds, abdominal pains (Turner, 1980). Diarrhea, for the stomach (Moerman, 1986). Venereal disease, internal medicine, colds (2), internal stomach problems (2) (Turner, 1990).

C = 0, D = 0, G = 6, L = 0, M = 0, N = 0, P = 3, O = 0, R = 2, S = 3, U = 1

1 = 0, 2 = 2, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 3, 19 = 0, 20 = 0, 21 = 3, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 1, 43 = 1, 44 = 1, 45 = 1, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 5, F = 0, F2 = 0, V = 0, V2 = 2, V3 = 3, T = 0, T2 = 0, P = 1, O = 5,

Total = 15

Spiraea pyramidata Tonic (Moerman, 1986).

C = 0, D = 0, G = 0, L = 0, M = 0, N = 0, P = 0, O = 0, R = 0, S = 1, U = 0

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 0,

Total = 1

SALICACEAE

Populus tremuloides Good for sore eyes (Thoreau, 1847). Fever and ague (Hoffman, 1879). Tonic for fever (Andros, 1883). Wounds, cuts, bruises, burns (Chamberlain, 1892). Cuts, bruises, stop bleeding (Morice, 1894). Astringent for deep cut, wound or amputation (Morice, 1900). Ague, fevers, gonorrhea (Reagan, 1930). Worms (Tantaquidgeon, 1932). Febrifuge (Culley, 1936). Colds (Van Wart, 1948; under *P. tremuloides*, "bitterwood"). Alleviate menstruation pains, stimulate parturition, tonic after parturition (Pennington, 1963a). Help reduce ruptures (Stubbs, 1966). Sore throat, swollen glands, tuberculosis (Smith, 1972). Eye wash, make baby come quick, clean out the womb (Melgrave, 1973; under "trembling aspen"). Gonorrhea medicine to stop urethral hemorrhage (Turner, 1973). Ruptures (Hart, 1974). Symptoms resembling heartburn or general discomfort, childbirth (Hellson, 1974). Worms (Lacey, 1976; under "bitterwood"). Stiff, swollen or rheumatic joints, coughs, mild purgative, vermifuge (Black, 1980). Coughs, eaten in spring as a mild purgative, styptic, wound dressing, reduce irritation of bee sting, venereal disease (2) (Leighton, 1985). Wounds (2), rheumatic or painful joints, gives back strength when tired, vermifuge (Erichsen-Brown, 1979). Rheumatism, indigestion, syphilis, blackeye, deodorant (2), antiperspirant (2) (Turner, 1980). Worms (2), boils (Arnason, 1981). Heart trouble, venereal disease (2), syphilis (2), measles, wounds (2), cuts (3), diaphoretic for colds, colds (4), coughs (2), pleurisy, stimulate appetite, antiscorbutic food, dyspepsias, stomach pain, purgative, worms (2), children's worms (2), cramps caused by worms, excessive flowing during confinement, rheumatism (2), sore arm or leg, swellings, urinary trouble, bedwetting, splint (Moerman, 1986). Sore throats (Kari, 1987). Running sores, swellings, insanity from excessive drinking (Turner, 1990). Stop bleeding from wounds (Turner in MacKinnon and Pojar, 1992). Mouth abscesses, laxative (Compton, 1993).

C = 4, D = 22, G = 19, L = 0, M = 12, N = 0, P = 15, O = 3, R = 7, S = 23, U = 2

1 = 0, 2 = 3, 3 = 0, 4 = 0, 5 = 11, 6 = 6, 7 = 5, 8 = 5, 9 = 1, 10 = 2, 11 = 0, 12 = 8, 13 = 4, 14 = 2, 15 = 3, 16 = 0, 17 = 0, 18 = 5, 19 = 0, 20 = 1, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 1, 27 = 0, 28 = 1, 29 = 0, 30 = 4, 31 = 1, 32 = 0, 33 = 1, 34 = 0, 35 = 2, 36 = 9, 37 = 5, 38 = 3, 39 = 0, 40 = 3, 41 = 1, 42 = 0, 43 = 2, 44 = 1, 45 = 0, 46 = 12, 47 = 1, 48 = 2, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 10, B2 = 23, F = 0, F2 = 0, V = 1, V2 = 9, V3 = 9, T = 1, T2 = 0, P = 2, O = 59,

Total = 105

Salix bebbiana Stop bleeding and promote healing without infection of deep cuts (Leighton, 1985). Unspecified medicine (Moerman, 1986). Genus - heal women's insides after childbirth, increase blood flow and speed recovery after childbirth, diarrhea, heal broken bones, stop wounds and cuts from bleeding (Turner, 1980; under *Salix* species). Toothache, relieve tired or sore feet, sores (Turner, 1990; under *Salix* species). Headache (Forlines, 1992; under *Salix* species).

C = 3, D = 2, G = 1, L = 0, M = 2, N = 2, P = 0, O = 0, R = 1, S = 2, U = 0

1 = 0, 2 = 4, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 2, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 2, 46 = 2, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 5, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 1, O = 7,

Total = 13

SAXIFRAGACEAE

Heuchera cylindrica Boils (Brown, 1868). Eyewash (Murphy, 1959 under syn. *H. glabella*). Heal sores (Nickerson, 1966 under syn. *H. glabella*). Diarrhea (Stubbs, 1966). Astringent, particularly as a remedy for diarrhea (Johnston, 1970). Stomachache (3), diarrhea (3) (Hart, 1974). Fastest healing of all medicines, sores, cuts, diaper rash, sore throat, tonic for changing the blood (2) (Turner, 1980). Diarrhea, sores (Moerman, 1986). Liver trouble, wounds, skin ailments, any sores, boils, sores which would not heal, mouth sores, gum boils, sore throat (Turner, 1990).

C = 0, D = 13, G = 9, L = 1, M = 0, N = 0, P = 2, O = 1, R = 0, S = 3, U = 0

1 = 0, 2 = 0, 3 = 5, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 3, 11 = 0, 12 = 0, 13 = 0, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 3, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 1, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 2, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 0, 46 = 1, 47 = 5, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 20, F = 1, F2 = 1, V = 0, V2 = 5, V3 = 0, T = 0, T2 = 0, P = 2, O = 2,

Total = 29

SCROPHULARIACEAE

Penstemon fruticosus Consumption, severe toothache, flu, colds, headaches, internal disorders, acne, pimples, heal sore and itchy scalp (Turner, 1980). Bladder (Moerman, 1986). Kidney trouble, sore back, eye wash (2), sore eyes (2), ulcers, "clean out your insides", rheumatism, arthritis, broken bones, any kind of aching or sores (Turner, 1990).

C = 0, D = 5, G = 2, L = 0, M = 5, N = 0, P = 2, O = 4, R = 0, S = 2, U = 2

1 = 0, 2 = 4, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 2, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 4, 36 = 0, 37 = 0, 38 = 1, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 2, 45 = 0, 46 = 1, 47 = 5, 48 = 1, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 6, F = 0, F2 = 1, V = 1, V2 = 1, V3 = 1, T = 1, T2 = 0, P = 1, O = 10,

Total = 23

Verbascum thapsus Colds, asthma (Jenner, 1901 under mullein). Asthma, sore throat, cough remedy (Tantaquidgeon, 1925). Relieve pain in sore spots, diphtheria or swollen throat (Mooney, 1932). Swellings and sores (Fenton, 1941). Coughs, colds, asthma (Tantaquigeon, 1941). Diuretic (Wyland and Harris, 1941). Rheumatism (Weslager, 1943). Female trouble, prickly rash, "take down" swelling of sores (2), kidney medicine (2), dropsy, swollen glands, catarrh, coughs, compounded for cough syrup, compounded for miscarriage (Banks, 1953). Sores and cuts, catarrh (Mechling, 1959). Pulmonary diseases, sprains, asthma, scrofula, lung troubles (Curtin, 1965). Asthma, colds, cough medicine, pleurisy (Jolicoeur, 1971). Ague, dysentery, relief from rheumatic pains, reduce swellings, sprains, reduce severe swellings in sprained joints, bruises, wounds, headache poultice (Weslager, 1973). Asthma (Lacey, 1976). Consumption (Turner, 1980). Eye medicine (Peri, 1982). Sores, rashes, skin infections, athlete's foot infections (Camazine, 1980). Heart stimulant (Arnason, 1981). Eye medicine (Peri, 1983). Anodyne, antidiarrheal, dysentery, diuretic (Meyer, 1981). Rheumatism, rheumatic pain, swellings (3), sprains, pains (3), bruises, wounds, cuts (2), sores (3), abcesses, erypipelas, prickly rash, baby's rash, female trouble, fever (3), diptheria, mumps (2), swollen glands, sore throat, cough syrup, colds (4), croup, coughs (4), catarrh (4), pulmonary disease, lung trouble, asthma (4), consumption (2), fits, craziness, clear mind if lost, persons not in their right mind, hiccoughs, diarrhea with blood, piles, regulate babies' bowels, kidneys, dropsy, baby's broken coccyx, earaches, toothache, reviver, blood purifier, strength (Moerman, 1986). Warts, colds (3), coughs (2) (Turner, 1990).

C = 1, D = 21, G = 5, L = 0, M = 18, N = 12, P = 53, O = 3, R = 3, S = 11, U = 7

1 = 0, 2 = 10, 3 = 5, 4 = 0, 5 = 0, 6 = 13, 7 = 4, 8 = 2, 9 = 0, 10 = 2, 11 = 1, 12 = 0, 13 = 12, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 10, 19 = 0, 20 = 0, 21 = 0, 22 = 2, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 1, 29 = 1, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 2, 36 = 4, 37 = 0, 38 = 0, 39 = 0, 40 = 7, 41 = 1, 42 = 0, 43 = 2, 44 = 5, 45 = 3, 46 = 6, 47 = 13, 48 = 25, 49 = 3, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 6, B2 = 33, F = 2, F2 = 4, V = 3, V2 = 15, V3 = 29, T = 3, T2 = 5, P = 2, O = 47,

Total = 134

UMBELLIFERAE

Glehnia littoralis Medicinal plant (French, 1971). Bladder infections (Turner, unpublished Haida mss.).

C = 0, D = 0, G = 0, L = 0, M = 0, N = 0, P = 0, O = 0, R = 0, S = 1, U = 1

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 1, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 0,

Total = 2

Heracleum lanatum Aerial - Rheumatism, infected cuts (Harbinger, 1964). Diarrhea, removal of warts (Hellson, 1974). Prevent grey hair, prevent dandruff (Turner, 1980). Headache, colds, sore throats, sore muscles, sore limbs, boils, minor cuts, wounds, fainting, convulsions (Moerman, 1986, under syn. *H. maximus*).

Plant - Toothache, boils, chancres, reduce swellings (Beardsley, 1941). Influenza (2) (Erichsen-Brown, 1979). Headache (2), rheumatism (2), chancres or lumps on penis (Moerman, 1986, under syn. *H. maximus*).

C = 0, D = 10, G = 1, L = 0, M = 6, N = 6, P = 2, O = 0, R = 0, S = 2, U = 0

1 = 0, 2 = 6, 3 = 1, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 3, 9 = 0, 10 = 3, 11 = 1, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 1, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 1, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 2, 47 = 3, 48 = 0, 49 = 3, 50 = 0, 51 = 0, 52 = 3, 53 = 0

B = 3, B2 = 10, F = 1, F2 = 0, V = 3, V2 = 6, V3 = 1, T = 0, T2 = 0, P = 0, O = 9,

Total = 27

Roots - Stop hemorrhaging from cuts (Morice, 1894). Unspecified medicine (Coville, 1897). Earache, deafness, hemorrhage of the ear (Spier, 1930). Boils and sores (Stowe, 1942 under Cow parsnip). Prevent and cure smallpox (Mechling, 1959). Diphtheritic throats, reduce fever, rubbed on gums when teeth are loose, paralytic patients, rheumatic pains, tremors in the heart (Curtin, 1965). Swellings and rheumatism (Gifford, 1967). Poultice for chronic swellings and bruises (Johnston, 1970). Tuberculosis, diabetes, stomach disorders (Smith, 1972). Boils (Turner, 1973). Hair ointment (Turner and Bell, 1973). Swellings, especially of the feet (Hart, 1974). General medicine, colds, tuberculosis, preventative medicine (Lacey, 1976; under "cow parsnip"). Sore backs, eyes, and other painful areas, boils, compounded to cleanse scalp to kill germs and little worms (Turner, 1980). Smallpox, cholera, toothache, boils, swellings (Arnason, 1981). Compounded for painful limbs, severe headache, worms in the flesh (Leighton, 1985). Syphilis, smallpox, colds (2), sore throats, ulcerated sore throat, cough, tuberculosis, kill all internal germs, lung pain, hip pain, painful parts, rheumatic pain, rheumatism (5), swellings (3), swellings of neuralgia, bruises, erypipelas, boils (2), sores (3), heal wounds, bruises on the back of the stomach, colic, stomach cramps, intestinal pains, stop diarrhea, cholera, purgative (2), hair ointment, eliminate dandruff, sore eyes, toothaches (2), bladder, physic, tonic (2), unspecified medicine (2) (Moerman, 1986, under syn. *H. maximus*). Colds, sore throat, mouth sores, tuberculosis, arthritis and other body aches, swellings, cuts, sores, draw pus out of infection, cures toothaches by killing the nerve, worm medicine (Kari, 1987). Rheumatism (2) (Gottesfeld, 1988). Sores, swellings (Hunn, 1990). Compounded to treat wounds (Compton, 1993).

C = 2, D = 22, G = 10, L = 0, M = 24, N = 15, P = 14, O = 4, R = 0, S = 16, U = 1

1 = 0, 2 = 16, 3 = 3, 4 = 0, 5 = 2, 6 = 14, 7 = 1, 8 = 9, 9 = 0, 10 = 7, 11 = 0, 12 = 1, 13 = 1, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 4, 19 = 0, 20 = 0, 21 = 3, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 2, 28 = 1, 29 = 0, 30 = 2, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 2, 36 = 3, 37 = 0, 38 = 2, 39 = 0, 40 = 4, 41 = 0, 42 = 0, 43 = 8, 44 = 1, 45 = 0, 46 = 3, 47 = 10, 48 = 4, 49 = 3, 50 = 1, 51 = 0, 52 = 0, 53 = 0

B = 11, B2 = 26, F = 1, F2 = 1, V = 3, V2 = 9, V3 = 5, T = 4, T2 = 1, P = 8, O = 49,

Total = 108

Lomatium dissectum Wounds, bruises (Chamberlain, 1909 under syn. *Ferula multifida*). Cure for various ailments (Lowie, 1933 under syn. *Leptotaenia multifida*). Coughs and colds, pneumonia, consumption, asthma, congestion of respiratory passages, sore throat (Chamberlain, 1950). Cold, sores, aching tooth, headache, swelling, cough medicine (Lowie, 1956 under *Leptaenia multifida*). Coughs, flu, trachoma (Murphy, 1959 under syn. *Leptotaenia multifida*). Compounded with yarrow for venereal disease (Murphy, 1959 under Indian Balsam = *L. dissectum*). Sores, cure sinus trouble, sore eye, tuberculosis, increase appetite (Harbinger, 1964). Sores, general tonic, asthma or bronchial trouble, colds, flu (Nickerson, 1959). Lung diseases (French, 1971). Colds and flu, head and lung congestion, headache, rheumatic pain, variety of external ailments from dandruff to skin abrasions (Smith, 1972). Sores, open cuts, bruises, boils, pneumonia, tuberculosis (3), arthritis (3), rheumatism, sprains, pains of any sort, sore back, dandruff, run down and no appetite, changing the blood, general illness (4) (Turner, 1980). Trachoma (Johnston, 1982). Tonic for weakened people to gain weight, sore limbs, rheumatism (2), swellings (2), sprains (2), sores (5), cuts (4), wounds (2), burns, rashes, antiseptic (2), antiseptic wash for smallpox (2), lung or nasal congestion, asthma (3), hayfever (3), sore throat (3), colds (3), coughs (3), pneumonia (3), bronchitis (3), tuberculosis (4), influenza (3), venereal disease (2), trachoma, gonorrheal eye infections, infant's severed umbilical cord (Moerman, 1986). Itching scalp, dandruff, lice, infected wounds, sores, boils, upper respiratory infections, colds, sore throat, fever, emetic, rheumatism, muscle pains, sprains, pneumonia (Hunn, 1990). Sprains, broken bones, burns, boils, skin eruptions, sores, wounds, heal fresh sores, raw spots caused by chafing, colds (Turner, 1990).

C = 0, D = 42, G = 1, L = 0, M = 17, N = 8, P = 56, O = 4, R = 0, S = 19, U = 0

1 = 0, 2 = 8, 3 = 0, 4 = 0, 5 = 0, 6 = 10, 7 = 1, 8 = 7, 9 = 0, 10 = 6, 11 = 0, 12 = 4, 13 = 6, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 9, 19 = 5, 20 = 0, 21 = 0, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 4, 36 = 2, 37 = 0, 38 = 0, 39 = 0, 40 = 5, 41 = 0, 42 = 0, 43 = 10, 44 = 0, 45 = 0, 46 = 13, 47 = 20, 48 = 29, 49 = 8, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 12, B2 = 48, F = 0, F2 = 6, V = 8, V2 = 21, V3 = 16, T = 9, T2 = 1, P = 10, O = 39,

Total = 148

Osmorhiza chilensis Purgative, emetic, pneumonia (Turner, 1973; under *Osmorhiza* species). Headache, colds (2), tickling in throat, "bring one around", any illness, prevent sickness, ingredient in all medicines, emetic (Moerman, 1986).

C = 0, D = 0, G = 3, L = 0, M = 0, N = 2, P = 4, O = 0, R = 0, S = 2, U = 0

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 2, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 2, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 1, 39 = 0, 40 = 1, 41 = 1, 42 = 0, 43 = 3, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 3, F = 0, F2 = 0, V = 0, V2 = 3, V3 = 2, T = 0, T2 = 0, P = 3, O = 4,

Total = 11

URTICACEAE

Urtica dioica Various troubles of the abdomen and bowels, counterirritant for various disturbances of the sexual powers and the venereal functions (impotence, lack of power of complete erection, stimulate rapid growth of penis) (Buchanan, 1899 under syn. *U. lyallii*). Rheumatism, counterirritant for rheumatism, relieve certain pains (Barrett and Gifford, 1933 under syn. *U. gracilis*). Eruptive conditions (Darby, 1933 under common nettle). Hot poultice, cure for headache or nosebleed (Olson, 1936 under nettles). Counterirritant for rheumatism (Barrett, 1952 under nettle). Medicine for upset stomach, ague (Bank, 1953 under syn. *U. gracilis*). Sore muscles, rheumatism (Harbinger, 1964 under syn. *U. lyalli*). Rheumatism (Osgood, 1966). Fits, epileptic seizures, temper tantrums, rheumatism (Stubbs, 1966). Counterirritant for rheumatic pains and other such complaints (Gifford, 1967). Retention of urine (Johnston, 1970 under syn. *U. gracilis*). Counter-irritant for bruises, aches, rheumatism (Turner and Bell, 1971). Used in sweathouse to sweat out disease (Smith, 1972). Rheumatism, stimulate nerves of paralyzed or rheumatic limbs, stomach trouble, cauterize sores and swellings (Turner, 1973). Overdue women to make baby come faster, chest pains, prevent hair loss, cauterize skin for various ailments, locomotor ataxia, (Turner and Bell, 1973). Fits (apparently epilepsy), insanity, temper tantrums, rheumatism, backaches (Hart, 1974). Vomiting, bleeding piles, hoarseness, pleurisy, old running sore or ulcer, toothache (Erichsen-Brown, 1979). Stomach pains (Rogers, 1980). Rheumatic pain, arthritic pain (Turner, 1980). Stomach pains (Munson, 1981). Topically over any sore area to kill the pain, poultice for sore and swollen arthritic joints (Turner and Efrat, 1982). Tonic, counterirritant for pain of arthritis and rheumatism

(Turner, 1983). Keep blood flowing after childbirth (Leighton, 1985). Upset stomach, ague, heat rash, intermittant fever, headaches, nosebleed, paralysis (2), rheumatism (2), body soreness, body stiffness, relax muscles during childbirth, childbirth (2), difficult childbirth, general tonic, tuberculosis (Moerman, 1986). Counterirritant for arthritis, rheumatism, backache, paralysis (Hunn, 1990). Bleeding hemorrhoids, skin disease, counterirritant poultice for paralyzed limbs, stiff and sore joints, stiff and sore muscles, hair tonic, arthritis, rheumatism (Turner, 1990). Swollen ankles (Forlines, 1992). Aches and pain, contraceptive (Turner, unpublished Haida mss.).

C = 2, D = 12, G = 6, L = 0, M = 18, N = 37, P = 4, O = 0, R = 7, S = 6, U = 1

1 = 1, 2 = 16, 3 = 0, 4 = 1, 5 = 0, 6 = 2, 7 = 3, 8 = 9, 9 = 0, 10 = 0, 11 = 4, 12 = 0, 13 = 0, 14 = 0, 15 = 2, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 1, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 2, 28 = 0, 29 = 2, 30 = 2, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 10, 37 = 4, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 2, 44 = 1, 45 = 1, 46 = 0, 47 = 6, 48 = 2, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 19

B = 0, B2 = 15, F = 0, F2 = 1, V = 0, V2 = 8, V3 = 0, T = 1, T2 = 0, P = 2, O = 74, Total = 93

References - see Appendix 9.

6.7 Appendix 7 - Abbreviated summary of ethnopharmacology of phase two plants

A comprehensive search of the ethnobotanical literature was made to compile a summary of the traditional medicinal uses of each plant. The numbers in brackets following the usage refer to the number of reports of that usage in the source material. In the citations of Compton (1993) and all of Turner's work except Turner (1982), these digits refer to the number of informants who reported that usage. In the remaining literature citations, the digits refer to the number of tribes from which that usage was reported. The alphanumerical encoding that follows each entry details how the data was scored for use in the ethnobotanical analyses. The keys to the encoding are given below.

Systematic classification

C = Cardiovascular, D = Dermal - mucosal, G = Gastrointestinal, L = Liver, M = Muscular-skeletal, N = Neurological, O = Ophthalmic, P = Respiratory, R = Reproductive, S = Systemic, U = Urinary.

Symptomatic classification

1 = Abortifacient, 2 = Analgesic, 3 = Antidiarrheal, 4 = Antiemetic, 5 = Antihelminthic, 6 = Antinflammatory, 7 = Antipyretic, 8 = Antirheumatic, 9 = Antiscorbutic, 10 = Antiseptic, 11 = Antispasmotic, 12 = Antisyphilitic, 13 = Antitussive, 14 = Astringent, 15 = Carminative, 16 = Cathartic, 17 = Cholagogue, 18 = Colds, 19 = Decongestant, 20 = Diaphoretic, 21 = Digestive, 22 = Diuretic, 23 = Emetic, 24 = Emmenogogue, 25 = Expectorant, 26 = Febrifuge, 27 = Hair growth, 28 = Heart, 29 = Hemorrhoids, 30 = Hemostat, 31 = Insect bites, 32 = Lacteal stimulant, 33 = Laxative, 34 = Liver, 35 = Opthalmic, 36 = Other, 37 = Oxytocic, 38 = Purgative, 39 = Sedative, 40 = Sore throat, 41 = Stimulant, 42 = Stomachic, 43 = Tonic, 44 = Urinary System, 45 = Women's medicines, 46 = Wounds and sores, 47 = other skin ailments, 48 = Other pulmonary complaints, 49 = Viral infections, 50 = Diabetes, 51 = Cancer, 52 = Rubefacients and counter-irritants, 53 = Venom and poison antidotes.

Infectious disease classification

B = Bacterial infection, B2 = Bacterial infection symptoms, F = Fungal infection, F2 = Fungal infection symptoms, V = Viral infection, V2 = Viral infection symptoms, T = Tuberculosis, T2 = Tuberculosis symptoms, P = Physics, tonics, general medicines, unspecified medicines, O = Other ailments.

Phase two ethnopharmacological literature summary

ACERACEAE

Acer macrophyllum M-17a, b Hair tonic (Turner and Bell, 1973). Tuberculosis (Moerman, 1986). Compounded for kidney problems, liver deterioration, ulcers, digestive tract (Turner and Hebda, 1990). Tonic (Turner, 1990). Internal medicine, sore throats (Pojar and MacKinnon, 1994).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 1, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 1, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 2, 44 = 1, 45 = 0, 46 = 0, 47 = 0, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 3, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 0, T = 1, T2 = 0, P = 2, O = 3, Total = 9

AIZOACEAE

Carpobrotus edulis Ca-3 Dermatitis (Watt and Breyer-Brandwijk, 1962). Easy labor (Darius, 1989).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 1, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 1, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 1, Total = 2

ALISMATACEAE

Alisma plantago-aquatica N-40a Plant - Snake bites and insect stings, hydrophobia (Pitcher, 1860). Burns and scalds, draw water out of swollen legs (dropsy) (Cobb, 1917). Womb trouble, tuberculosis. Leaves - liniment (Moerman, 1986). Heart "troubles", including heart burn, stomachaches, cramps, stomach flu, constipation, prevent fainting during childbirth, compounded to treat various ailments (Leighton, 1985).

1 = 0, 2 = 2, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 1, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 3, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 1, 29 = 0, 30 = 0, 31 = 1, 32 = 0, 33 = 1, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 1, 42 = 0, 43 = 0, 44 = 0, 45 = 1, 46 = 2, 47 = 0, 48 = 1, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 5, F = 0, F2 = 0, V = 0, V2 = 3, V3 = 0, T = 1, T2 = 0, P = 1, O = 10, Total = 17

Roots - Lame back or kidneys, strengthen veins, tuberculosis (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 1, 45 = 0, 46 = 0, 47 = 0, 48 = 1, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 1, T2 = 0, P = 0, O = 2, Total = 4

Sagittaria latifolia N-11 Baby' fever (Banks, 1953). Children who cry suddenly in the night (Erichsen-Brown, 1979). Tuberculosis (Black, 1980). Unspecified medicine (Rogers, 1980). Unspecified medicine (Munson, 1981). Boils around the abdomen of children, Italian itch, wounds, sores, feverish baby, constipation, indigestion, rheumatism (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 2, 8 = 1, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 1, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 1, 40 = 0, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 0, 46 = 1, 47 = 1, 48 = 1, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 5, F = 0, F2 = 0, V = 0, V2 = 2, V3 = 0, T = 1, T2 = 0, P = 2, O = 4, Total = 13

APOCYNACEAE

Apocynum androsaemifolium P-47a Plant - Bloody flux (Fenton, 1941). Contraceptive (Ford, 1951). Aphrodesiac (Turner, 1980). Sore eyes, increase lactation (Leighton, 1985).

1 = 0, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 1, 33 = 0, 34 = 0, 35 = 1, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 4, Total = 5

Apocynum androsaemifolium P-47b Roots - contraceptive (Turner, 1980). Headache (2), convulsions, sore ear, heart palpitations, nosebleed, infant colds, throat trouble, dizziness, insanity, injured womb, stomach cramps and worms, warts, evacuation of placenta, diuretic during pregnancy, coated tongue, kidney medicine, urinary medicine, dropsy, diuretic, liver medicine, heart medicine (Moerman, 1986).

1 = 1, 2 = 3, 3 = 0, 4 = 0, 5 = 1, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 1, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 1, 22 = 3, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 2, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 1, 35 = 0, 36 = 3, 37 = 1, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 0, 44 = 2, 45 = 1, 46 = 0, 47 = 0, 48 = 0, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 5, F = 1, F2 = 0, V = 1, V2 = 1, V3 = 1, T = 0, T2 = 0, P = 0, O = 16, Total = 24

ARALIACEAE

Aralia nudicaulis N-3a Plant - Purgative, emetic (Hrdlicka, 1905 under wild sasparilla). Compounded in blood nostrum (Fenton, 1939). Fainting, fits, blood medicine (Reagan, 1921 under sasparilla). Wounds (2), ulcers, sores (Erichsen-Brown, 1979). Stimulate lactation (Leighton, 1985). Tonic, blood purifier, blood medicine, cancer, colds, sugar diabetes, sore throat, tuberculosis cough medicine, pimples, compounded in poultice for cuts, sores and leg ulcers (Moerman, 1986). Leaves - fainting, fits, blood medicine (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 2, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 1, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 1, 39 = 0, 40 = 1, 41 = 2, 42 = 0, 43 = 6, 44 = 0, 45 = 0, 46 = 3, 47 = 4, 48 = 1, 49 = 0, 50 = 1, 51 = 1, 52 = 0, 53 = 0

B = 1, B2 = 8, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 1, T = 0, T2 = 1, P = 6, O = 9, Total = 26

Aralia nudicaulis N-3b Root - Close and heal wounds (Loskiel, 1794 under sasparilla). Fluxes (Josselyn, 1860). Venereal diseases (Brown, 1868). Recent wounds (Pickering, 1879). Sore eyes (Whitebread, 1924). Compounded in spring tonic (Tantaquidgeon, 1925). Sores and cuts (Kinietz, 1940 under *Aralia* - sasparilla). Colds, blood remedies, vulneraries, stomachic, dysentery (Fenton, 1941). Feelings of high blood pressure, blood purifier (Speck, 1941 under sasparilla). Stimulant (Stowe, 1942 under sasparilla). Tonic (Speck, 1944). Compounded for cough (Van Wart, 1948). For the blood (Banks, 1953). Headaches, cramps, relief of pains in the side, compounded for cough medicine (Mellinger, 1965 under *Aralia* ssp.). Spring tonic, compounded for rheumatism (Jolicoeur, 1971). Pain in stomach (Turner, 1973). Coughing and spitting blood (Turner and Bell, 1973). Colds, influenza, salve for general usage (Lacey, 1976; under "wild sasparilla"). Wounds (2), sores, ulcers, depurative, coughs, weakness, sore ears, spring tonic, compounded for rheumatism (Erichsen-Brown, 1979). Kidney disorders, earache, tonic for the blood (Black, 1980). Venereal disease, to promote healing and draw out infection of wounds, pneumonia, wash for teething child's infected gums to prevent spread of infection, compounded for sickness associated with teething and various ailments (Leighton, 1985). Spring tonic, lassitude, general debility, tonic (3), blood tonic, stoppage of periods, humor in the blood, blood medicine (2), blood purifier (3), remedy for the blood, sores (3), pimples (2), boils, carbuncles, cuts, ulcers on legs, nosebleed, cure burns and sores, split skin between the toes, fever sores, venereal disease skin cracks, upset stomach, sore throat, lung trouble, tuberculosis, consumption cough medicine, cure infections, sore eyes, reduce swellings (Moerman, 1986).

1 = 0, 2 = 5, 3 = 2, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 2, 9 = 0, 10 = 3, 11 = 1, 12 = 3, 13 = 5, 14 = 1,

15 = 1, 16 = 0, 17 = 0, 18 = 2, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 1, 25 = 0, 26 = 0,

27 = 0, 28 = 1, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 2, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 1, 41 = 2, 42 = 1, 43 = 23, 44 = 1, 45 = 0, 46 = 9, 47 = 13, 48 = 4, 49 = 2, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 8, B2 = 25, F = 1, F2 = 0, V = 1, V2 = 4, V3 = 7, T = 1, T2 = 2, P = 23, O = 16, Total = 87

ASCLEPIADACEAE

Asclepias speciosa P-45 Venereal disease, warts (Barrett and Gifford, 1933). Boils and abcesses (Wyland and Harris, 1941). Emetic (Barrett, 1952 under milkweed). Sore breasts, faulty lactation (Curtin, 1965). Stomachache (Hart, 1874). Unspecified medicine (Rogers, 1980). Warts, skin sores, rheumatism (Turner, 1980). Emetic, physic, out-of-sorts feeling, emaciation, general debility (2), headaches (2), rheumatism, reduce swellings, cough, tubercular cough, antiseptic, healing agent on sores (2), cuts, ringworm, bring out the rash of measles, rash, stop bloody diarrhea, draw poison from snake bites, remove corns and calluses, heal syphlitic sores, blindness, snowblindness (Moerman, 1986). Face lightener (Turner, 1990).

1 = 0, 2 = 3, 3 = 1, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 2, 9 = 0, 10 = 3, 11 = 0, 12 = 2, 13 = 1, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 2, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 1, 33 = 0, 34 = 0, 35 = 2, 36 = 1, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 6, 44 = 0, 45 = 0, 46 = 0, 47 = 7, 48 = 1, 49 = 3, 50 = 0,

51 = 0, 52 = 0, 53 = 1

B = 4, B2 = 7, F = 1, F2 = 1, V = 2, V2 = 1, V3 = 1, T = 0, T2 = 1, P = 6, O = 14, Total = 38

BALSAMINACEAE

Impatiens capensis M-18 Wounds (Josselyn, 1860 under syn *I. fulva*). Aches (Pickering, 1879 under syn. *I. biflora*). During pregnancy, labor (Olbrechts, 1931 under syn. *I. biflora*). Green corn medicine ingredient, during pregnancy (2), difficult labor, child's sour stomach, measles, "bold hives", cure "poison oak" (Banks, 1953 under syn. *I. biflora*). Jaundice (Mechling, 1959 under syn. *I. biflora*). Skin eruptions and ivy poisoning (Mellinger, 1965 under *Impatiens* - jewelweed). Ivy poisoning, poison ivy rash, baby's hives, bold hives, rashes (2), measles, skin troubles, liverspots, cure sores, burns (3), cuts (3), eczema, nettle stings (2), bruises, soreness, sprains, sore or raw eyelids, fevers, increase urination, kidney problems, dropsy, stricture or difficult urination, jaundice, headache, stomach cramps, child's sour stomach, aid in delivery, ease childbirth, chest cold, unspecified medicine (Moerman, 1986).

1 = 0, 2 = 3, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 1, 12 = 0, 13 = 0, 14 = 0, 15 = 2, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 2, 36 = 1, 37 = 4, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 4, 45 = 3, 46 = 7, 47 = 10, 48 = 0, 49 = 2, 50 = 0, 51 = 0, 52 = 0, 53 = 6

B = 0, B2 = 13, F = 0, F2 = 3, V = 4, V2 = 1, V3 = 1, T = 0, T2 = 0, P = 1, O = 29, Total = 51

BERBERIDACEAE

Achyls triphylla V-20 Pain in the breast (Brown, 1868). Tuberculosis (2), emetic, hair wash (2) (Moerman, 1986). Cataracts (Hunn, 1990). Lice (Turner, 1990). Sore or swollen throat, skin and scalp wash, compounded for tuberculosis and to remove phlem from lungs (Forlines, 1992).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 1, 24 = 0, 25 = 1, 26 = 0, 27 = 0, 28 = 2, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 3, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 1, V = 0, V2 = 1, V3 = 0, T = 2, T2 = 1, P = 0, O = 7, Total = 12

BETULACEAE

Corylus cornuta N-41 Sore mouthes, falling of the pallet (Josselyn, 1860). Astringent (2), febrifuge (2), ulcers, tumors, convulsions, teething, rheumatism, heart trouble, toothache (Erichsen-Brown, 1979; under "Hazelnut"). Emetic, teething, worms, close and heal cuts, astringent, compounded for lung hemorrhage (Moerman, 1986).

1 = 0, 2 = 2, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 1, 9 = 0, 10 = 0, 11 = 1, 12 = 0, 13 = 0, 14 = 3,
15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 1,
27 = 0, 28 = 1, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 3, 37 = 0, 38 = 0,
39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 1, 47 = 2, 48 = 1, 49 = 0, 50 = 0,
51 = 1, 52 = 0, 53 = 0

B = 0, B2 = 4, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 1, P = 0, O = 14, Total = 19

BORAGINACEAE

Lithospermum ruderale P-43 Diuretic (Chamberlain, 1909 under syn. *L. pilosum*). Contraceptive (Ford, 1951). Permanent birth control (Murphy, 1959). Diarrhea (Stubbs, 1966). Pleurisy and similar ailments, diarrhea (Hart, 1974). Stop internal hemorrhage (Turner, 1980). Sores, clean germs off body, rheumatic pain (Moerman, 1986). Itching piles (Turner, 1990).

1 = 2, 2 = 1, 3 = 2, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 0, 14 = 0,
15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0,
27 = 0, 28 = 0, 29 = 1, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,
39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 1, 49 = 0, 50 = 0,
51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 5, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 6, Total = 11

Mertensia paniculata N-5 Genus - smallpox, measles, whooping cough, tuberculosis, venereal disease, poison antidote, increase milk flow (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 0, 14 = 0,
15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,
27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 1, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,
39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 2, 49 = 2, 50 = 0,
51 = 0, 52 = 0, 53 = 1

B = 2, B2 = 0, F = 0, F2 = 0, V = 2, V2 = 0, V3 = 0, T = 1, T2 = 0, P = 0, O = 2, Total = 7

BRYIDAE

Homalothecium nevadense P-51 No references to the medicinal use of this genus.

Hookeria lucens V-37 No references to the medicinal use of this genus.

Plagiothecium undulatum M-11 Genus - drawing boils, blood blisters, and breast abcesses (Turner, 1973). Reduce swelling of injured area, sores and swollen joints, speed healing, internal ailments (Compton, 1993).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 1, Total = 4

Pogonatum contortum M-14 No references to the medicinal use of this genus.

Polytrichum commune V-13 Genus - diuretic, emmenogogue (Belkin and Fitzgerald, 1952).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 1, 23 = 0, 24 = 1, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 2, Total = 2

Racomitrium elongatum V-18 No references to the medicinal use of this genus.

Rhizomnium glabrescens M-13 Drawing boils, blood blisters, and breast abcesses (Turner, 1973).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 0, Total = 1

Rhytidiadelphus loreus V-23 No references to the medicinal use of this genus.

Scapania bolanderi M-16 No references to the medicinal use of this genus.

Sphagnum henryense V-9 No references to the medicinal use of this genus.

CAPRIFOLIACEAE

Linnaea borealis V-15 Insomnia (Erichsen-Brown, 1979). Menstrual difficulties, during pregnancy (Black, 1980). Children's cramps, fever, or crying, inflammation of the limbs, colds, female troubles (Moerman, 1986). Unspecified medicine (Turner, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 1, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 2, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 3, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 1, V = 0, V2 = 1, V3 = 1, T = 0, T2 = 0, P = 1, O = 6, Total = 10

Viburnum edule N-4 Whooping cough, cold on the lungs (Turner, 1973). Swollen glands and mumps, sore eyes (Erichsen-Brown, 1979). Sores on the lips, sore throat (2), compounded for sickness associated with teething (Leighton, 1985). Sore throat, headache, weak eyes, cough, tuberculosis, dysentery, purgative (Moerman, 1986). Sore throats (2), laryngitis, colds, stomach troubles (Kari, 1987). Unspecified medicine (Turner, 1990). Eye medicine (Turner, unpublished Haida mss.).

1 = 0, 2 = 1, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 2, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 3, 36 = 1, 37 = 0, 38 = 1, 39 = 0, 40 = 7, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 2, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 9, F = 0, F2 = 0, V = 1, V2 = 7, V3 = 3, T = 1, T2 = 0, P = 1, O = 6, Total = 23

CELASTRACEAE

Paxistima myrsinites N-38 Unspecified medicine (Turner, 1973). Syphilis (Hart, 1974). Permanent contraceptive, compounded for venereal disease, tuberculosis, kidney trouble, colds (Turner, 1980). Body pains, allay pain in any part of the body, pain, swellings, emetic (Moerman, 1986). Healing broken bone and internal ailments, tuberculosis (Turner, 1990).

1 = 1, 2 = 3, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 2, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 2, 44 = 1, 45 = 0, 46 = 1, 47 = 0, 48 = 2, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 1, T = 2, T2 = 0, P = 2, O = 0, Total = 15

COMPOSITAE

Adenocaulon bicolor N-19 Draw out boils, scrofula sores (Moerman, 1986). Poultice (Pojar and MacKinnon, 1994).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 2, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 3, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 0, Total = 3

Anaphalis margaritacea V-40a Leaves - Bad colds, "phthysic" - a hanging bronchial cough, catarrh, summer headache or blindness caused by the sun's radiance (Banks, 1953). Reviver (Erichsen-Brown, 1979). Compounded for common cold (11) and cough (11), bronchitis, fever, worms (Encarnacion and Agundez, 1986). Catarrh, bronchial cough, diarrhea, dysentery (Moerman, 1986). Coughs (Turner, 1990).

Plant - Fluxes (Josselyn, 1860 under *Anaphalis margaritacea*). Colds (Tantaquidgeon, 1925). Coughs and colds (Tantaquidgeon, 1941). Flu, throat infection (Banks, 1953). Tuberculosis (Turner, 1973). Sores, swellings, internal disease (Turner and Bell, 1973). Revive consciouness, bring back a loss of mind, various diseases, stomach sickness, colds, wounds (Erichsen-Brown, 1979). Poison stomach with lose of appetite and can't keep food down, laxative, emetic (Turner, 1980). Cough, colds (2), tuberculosis, sore eyes (Moerman, 1986). Influenza, soften hands, poultice (Pojar and MacKinnon, 1994).

1 = 0, 2 = 1, 3 = 3, 4 = 0, 5 = 1, 6 = 1, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 16, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 17, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 1, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 2, 42 = 0, 43 = 3, 44 = 0, 45 = 0, 46 = 1, 47 = 2, 48 = 5, 49 = 2, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 9, F = 0, F2 = 0, V = 2, V2 = 1, V3 = 35, T = 2, T2 = 0, P = 3, O = 9, Total = 63

Anaphalis margaritacea V-40b Roots - Headache, blindness caused by the sun's radiance (Banks, 1953). Compounded for common cold (11) and cough (11), bronchitis, fever, worms (Encarnacion and Agundez, 1986). Diarrhea, dysentery, bruise on back of stomach, tonic (Moerman, 1986).

1 = 0, 2 = 1, 3 = 2, 4 = 0, 5 = 1, 6 = 1, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 11, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 11, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 1, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 22, T = 0, T2 = 0, P = 1, O = 3, Total = 30

Anaphalis margaritacea V-40c Flowers - Cure for coughs (Barrett, 1952 under wild everlasting flower). Burns, dermatitis, compounded for asthma (Erichsen-Brown, 1979). Compounded for common cold (11) and cough (11), bronchitis, fever, worms (Encarnacion and Agundez, 1986). Sores, rheumatism, stroke paralysis, swellings, internal disorders, bruise on back of stomach, bronchial cough, protect and strengthen warrior, tonic (Moerman, 1986). Rheumatic fever (Turner, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 1, 6 = 1, 7 = 1, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 13, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 11, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 3, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 3, 44 = 0, 45 = 0, 46 = 1, 47 = 2, 48 = 2, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 3, F = 0, F2 = 1, V = 0, V2 = 1, V3 = 24, T = 0, T2 = 0, P = 3, O = 6, Total = 39

Artemisia cana F-6 - see Appendix 8.

1 = 0, 2 = 20, 3 = 3, 4 = 0, 5 = 1, 6 = 5, 7 = 11, 8 = 6, 9 = 0, 10 = 7, 11 = 3, 12 = 0, 13 = 8, 14 = 1, 15 = 10, 16 = 0, 17 = 0, 18 = 28, 19 = 1, 20 = 5, 21 = 15, 22 = 0, 23 = 1, 24 = 0, 25 = 1, 26 = 0, 27 = 1, 28 = 0, 29 = 0, 30 = 4, 31 = 0, 32 = 0, 33 = 2, 34 = 0, 35 = 4, 36 = 3, 37 = 1, 38 = 0, 39 = 0, 40 = 4, 41 = 3, 42 = 0, 43 = 10, 44 = 0, 45 = 0, 46 = 9, 47 = 13, 48 = 11, 49 = 3, 50 = 0, 51 = 0, 52 = 0, 53 = 3

B = 8, B2 = 59, F = 5, F2 = 3, V = 3, V2 = 34, V3 = 37, T = 2, T2 = 1, P = 10, O = 70, Total = 199

A. douglasiana E-31 - see Appendix 8.

1 = 0, 2 = 13, 3 = 3, 4 = 0, 5 = 0, 6 = 2, 7 = 2, 8 = 6, 9 = 0, 10 = 0, 11 = 2, 12 = 0, 13 = 0, 14 = 0, 15 = 1, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 4, 22 = 0, 23 = 0, 24 = 2, 25 = 0, 26 = 0, 27 = 1, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 1, 37 = 2, 38 = 0,

39 = 0, 40 = 0, 41 = 2, 42 = 0, 43 = 2, 44 = 2, 45 = 2, 46 = 7, 47 = 5, 48 = 2, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 2

B = 2, B2 = 22, F = 0, F2 = 2, V = 0, V2 = 2, V3 = 1, T = 0, T2 = 0, P = 2, O = 37, Total = 66

A. pycnocephala E-29 - see Appendix 8.

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 2, Total = 4

A. tripartita E-30 - see Appendix 8.

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 1, 14 = 0, 15 = 2, 16 = 0, 17 = 0, 18 = 1, 19 = 1, 20 = 3, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 2, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 1, 47 = 0, 48 = 1, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 3, F = 0, F2 = 0, V = 1, V2 = 2, V3 = 2, T = 1, T2 = 0, P = 0, O = 7, Total = 15

Aster modestus N-7 Genus - panacea, stimulant, blood remedy, blood tonic, physic, leucorrhea, pimples, snakebite, stomachache, internal injury, swollen jaw or neck glands, headaches, eyewash, wash for pain, used to quiet the baby, aid a sore nose (Moerman, 1986).

1 = 0, 2 = 3, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 1, 40 = 1, 41 = 0, 42 = 0, 43 = 5, 44 = 0, 45 = 1, 46 = 0, 47 = 1, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 1

B = 1, B2 = 2, F = 1, F2 = 0, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 5, O = 7, Total = 16

Grindelia integrifolia V-38 Cleanse cuts (Cook, 1930 under *Grindelia* ssp.). Blood purifier, colds, colic, open bowels (Moerman, 1986; under "Rosin weed").

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 1, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 1, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 7, B2 = 16, F = 0, F2 = 0, V = 3, V2 = 11, V3 = 11, T = 7, T2 = 0, P = 0, O = 17, Total = 61

Grindelia nana N-1 Cure colds (Palmer, 1878 under syn. *G. squarrosa*). Cough medicine (Chamberlain, 1909 under syn. *G. squarrosa*). Cleanse cuts (Cook, 1930 under *Grindelia* ssp.). Prevent childbearing, gonorrhea, compounded for pains in the kidneys (Beardsley, 1941 under syn. *G. squarrosa*). Cough medicine, dropsy, smallpox, liver medicine (Murphy, 1959 under syn. *G. squarrosa*). Tuberculosis, liver trouble (Stubbs, 1966). Cough and catarrh, after-birth pains, reduce swellings (Toineeta, 1970 under syn. *G. squarrosa*). Colds (5), pneumonia (5), fever (5), whooping cough (5), tuberculosis (5), perk one up (5) (Hart, 1974 under syn. *G. squarrosa*). Easing and lessening the menses, (Black, 1980 under syn. *G. squarrosa*). Expectorant, cough medicine, emetic, stomachaches, broken leg bones, antiseptic wash to heal broken bones, swellings, bladder trouble (2), venereal disease, tuberculosis, pneumonia, smallpox, measles (Moerman, 1986).

1 = 1, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 5, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 2, 13 = 4, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 6, 19 = 0, 20 = 0, 21 = 1, 22 = 1, 23 = 1, 24 = 1, 25 = 1, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 2, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 5, 42 = 0, 43 = 0, 44 = 3, 45 = 0, 46 = 3, 47 = 0, 48 = 19, 49 = 3, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 7, B2 = 16, F = 0, F2 = 0, V = 3, V2 = 11, V3 = 11, T = 7, T2 = 0, P = 0, O = 17, Total = 61

Hieracium albiflorum V-16 Genus - tonic (Turner, 1980). Tuberculosis, sore close to the bone (Moerman, 1986). Mouth cleaner (Turner, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 1, T2 = 0, P = 1, O = 0, Total = 4

Leucanthemum vulgare N-21a Flowers - Compounded in spring tonic (Tantaquidgeon, 1925). Fever, tonic, wash for chapped hands (Moerman, 1986 under *Chrysanthemum leucanthemum*).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 1, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 2, O = 0, Total = 4

Leucanthemum vulgare N-21b Plant (vegetative) - Colds (Jenner, 1901) under ox-eye daisy). Fever, spring tonic (Moerman, 1986 under *Chrysanthemum leucanthemum*).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 1, T = 0, T2 = 0, P = 1, O = 0, Total = 3

Matricaria discoidea N-36 Stomach and bowel complaints especially among children, relieve vomiting, colic, cholera morbus and other gastrointestinal disorders, compounded for stoppage of food in the stomach and other forms of indigestion (Blochman, 1894). Infantile colic (Johnson, 1907). Unspecified medicine (Chamberlain, 1909). Fever, cramps (Gayton, 1950a under syn. *M. suavolens*). Menstruation (Owen, 1963). Reduction of fever in babies, influenza, colds, stomach disorders (Moriarty, 1965). Help deliver placenta, menstrual cramps (Stubbs, 1966). Colds (4), fevers (2), perspiration, diarrhea, upset stomach (2), menstrual cramps, give women at childbirth: energy, build up their blood and help deliver the placenta (Hart, 1974 under syn. *M. matricarioides*). Diarrhea (Johnston, 1982 under *M. matricarioides*). Stomach pain (2), gas, laxative, constipation, indigestion (2), fever, tonic, colds (2), heart medicine, diarrhea, keep regular, cure all, infant convulsions, infected sores (Moerman, 1986 under *M. matricarioides*). For new mothers and infants, to cleanse and heal the system and help the mother's milk start, good for menstruating women, wash for skin and eyes especially snowblindness (Kari, 1987). Relax the mind, adult sleeping tonic (Forlines, 1992 under *M. matricarioides*).

1 = 0, 2 = 2, 3 = 5, 4 = 1, 5 = 0, 6 = 0, 7 = 5, 8 = 0, 9 = 0, 10 = 1, 11 = 2, 12 = 0, 13 = 0, 14 = 0, 15 = 7, 16 = 0, 17 = 0, 18 = 7, 19 = 0, 20 = 0, 21 = 5, 22 = 0, 23 = 0, 24 = 4, 25 = 0, 26 = 0, 27 = 0, 28 = 2, 29 = 0, 30 = 0, 31 = 0, 32 = 1, 33 = 3, 34 = 0, 35 = 1, 36 = 1, 37 = 3, 38 = 0, 39 = 2, 40 = 0, 41 = 0, 42 = 0, 43 = 5, 44 = 0, 45 = 1, 46 = 0, 47 = 1, 48 = 0, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 15, F = 0, F2 = 0, V = 1, V2 = 5, V3 = 7, T = 0, T2 = 0, P = 6, O = 24, Total = 60

Petasites frigidus **var.** ***palmatus*** N-2a Plant - Bruises, sprains (Gibbs, 1877 under colt's foot). Sores, cuts (Ring, 1930 under colt's foot). Severe bruises (Turner, 1983). Lung trouble, catarrh, cough, sickly babies, sores, diseases from rheumatism to tuberculosis (Moerman, 1986 under *P. palmatus*).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 3, 7 = 0, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 1, 47 = 2, 48 = 3, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 3, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 2, T = 1, T2 = 1, P = 1, O = 4, Total = 12

Petasites frigidus* var. *palmatus N-2b Roots - Blood in sputum due to tuberculosis, makes the blood soft (Osgood, 1966). Colds, ease nervous tension, reduce fevers (Weslager, 1973 under Colt's foot). Boils, running sores, sores, itch, tuberculosis, grippe, sickly babies (Moerman, 1986 under *P. palmatus*). Tuberculosis (2), chest ailments, sore throats, stomach ulcers, stop an appearance of blood in the sputum resulting from tuberculosis (Kari, 1987).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 1, 40 = 1, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 0, 46 = 0, 47 = 2, 48 = 6, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 7, F = 0, F2 = 1, V = 0, V2 = 3, V3 = 1, T = 3, T2 = 2, P = 2, O = 1, Total = 17

Solidago canadensis N-35 Febrifuge (Parker, 1928 under goldenrod). Bloody discharge from bowels (Mooney, 1953 under *Solidago* sp.). Summer complaint, tuberculosis, neuralgia, fevers (Banks, 1953 under *Solidago* ssp.). Sore throat (2) (Curtin, 1965). Cold and fever medicine (Jordan, 1965 under *Solidago* ssp.). Relieves colds (Jolicoeur, 1971). Sore throat, throat constrictions (Hellson, 1974 under *Solidago* ssp.). Pains in the side (Erichsen-Brown, 1979). Baby's fever (2) when it wouldn't stop crying, diarrhea, influenza (Turner, 1980). Emetic for too much gall, love medicine, fevers, sore throat, body pain, child who does not talk or laugh, babies that start suddenly in their sleep (Moerman, 1986). Crying sleepless baby, diarrhea (2), crippled people, cuts, unspecified medicine, compounded for sores (Turner, 1990).

1 = 0, 2 = 3, 3 = 3, 4 = 0, 5 = 0, 6 = 0, 7 = 5, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 2, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 1, 27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 4, 37 = 0, 38 = 0, 39 = 2, 40 = 5, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 1, 47 = 1, 48 = 1, 49 = 1, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 16, F = 0, F2 = 0, V = 1, V2 = 10, V3 = 2, T = 1, T2 = 0, P = 1, O = 11, Total = 32

Solidago spathulata N-10a Leaves - mumps, tonic for loss of appetite, syphilis (Turner, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 1, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 0, F = 0, F2 = 0, V = 1, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 1, Total = 3

Solidago spathulata N-10b Roots - Summer complaint, tuberculosis, neuralgia, fevers (Banks, 1953 under *Solidago* ssp.). Syphilis, tonic (Turner, 1990).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 1, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 0, T = 1, T2 = 0, P = 1, O = 2, Total = 6

Tragopogon pratensis Ca-20a,b Plant - Boils, throat trouble (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 0, O = 0, Total = 2

Wyethia mollis Ca-15a Plant - Fever, produces profuse perspiration (Barrett and Gifford, 1933 under *W. angustifolia*). Swellings, sprains, broken bones (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 1, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 1, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 0, O = 4, Total = 5

Wyethia mollis Ca-15b Roots - Swellings (Coville, 1897). Tuberculosis, swellings, blood tonic, physic (3), emetic (3), colds, fevers, venereal disease, running sores, burns (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 3, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 4, 44 = 0, 45 = 0, 46 = 1, 47 = 1, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 3, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 1, T = 1, T2 = 0, P = 4, O = 5, Total = 15

CRUCIFERAE

Lepidium virginicum N-25 Flatulence, childbirth, swollen knees, itching pustules, wounds and cuts (Roys, 1931). Compounded for tuberculosis (Speck, 1941). Diarrhea, dysentery (Owen, 1963). Febrifuge (Pennington, 1963a; 1969). Medicine for women (Lacey, 1976; under "pepper plant" a common house and barn yard weed). Tuberculosis, croup, poison ivy, draw blisters (Moerman, 1986).

1 = 0, 2 = 0, 3 = 2, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 1, 15 = 1, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 1, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 1, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 1, 46 = 2, 47 = 1, 48 = 3, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 1

B = 1, B2 = 3, F = 0, F2 = 2, V = 0, V2 = 0, V3 = 1, T = 1, T2 = 2, P = 0, O = 6, Total = 15

Cakile edentula V-1 No references to the medicinal use of this genus.

CUPRESSACEAE

Thuja plicata M-2 Healing wounds and injuries (Niblack, 1888 under cedar). Moxa for swellings (Boas, 1890 under syn. *T. gigantea*). Swellings, boils, swollen joints and muscles, swollen face and limbs (Speck, 1909a under cedar). Unspecified medicine (Reagan, 1934b under cedar). Kidney medicine (Olson, 1936 under cedar). Colds (Smith, 1940 under cedar). Cure a cold or flu, diarrhea (Harbinger, 1964). Stomach pains, heart trouble, rheumatism, swollen neck, bronchitis, wounds (Turner, 1973). Cauterize sores and swellings, carbuncles, compounded for sore back (Turner and Bell, 1973). Hair wash to eliminate dandruff and kill germs in one's scalp, ease joint pain of arthritis and rheumatism (Turner, 1980). Cough, gargle, dandruff, colds, sore lungs, toothache, tuberculosis, venereal disease sores, fever, kidney troubles, induce menstruation (Moerman, 1986). Hemorrhage, belly ache, cough syrup, eyes, hair tonic (Hunn, 1990). Post-partum, leprosy (Turner, 1990).

1 = 0, 2 = 3, 3 = 1, 4 = 0, 5 = 0, 6 = 6, 7 = 1, 8 = 1, 9 = 0, 10 = 1, 11 = 0, 12 = 1, 13 = 2, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 3, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 1, 25 = 0, 26 = 0, 27 = 0, 28 = 3, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 1, 37 = 1, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 1, 44 = 2, 45 = 0, 46 = 3, 47 = 3, 48 = 3, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 12, F = 2, F2 = 0, V = 1, V2 = 3, V3 = 5, T = 1, T2 = 1, P = 1, O = 16, Total = 42

CYPERACEAE

Carex lyngbyei V-6 Genus - emetic, snake bite, eagle infections, discomfort of overeating, check bowels, milk flow (Moerman, 1986).

1 = 0, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 1, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 1, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 1

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 5, Total = 6

Carex muricata M-7 See previous entry for generic references.

Carex sitchensis M-8 See previous entry for generic references.

Scirpus cyperinus V-30 Genus - emetic, abscess, sore throat, snakebite, tuberculosis, spoiled saliva, weak legs, nervous fretful crying child, hair growth (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 1, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0,

39 = 1, 40 = 1, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 1, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 1

B = 1, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 0, T = 1, T2 = 0, P = 0, O = 6, Total = 9

DROSERACEAE

Drosera rotundifolia V-8 Warts, corns, bunions (Turner, 1973).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 2, 48 = 0, 49 = 1, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 1, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 2, Total = 3

EPHEDRACEAE

Ephedra nevadensis Ca-13 Gonorrhea, cough (Hrdlicka, 1908). Diuretic, sexual infections, stop postpartum hemorrhage (Wyland and Harris, 1941). Stomach trouble (MacLeish, 1943 under Mormon tea). Venereal disease (2) (Murphy, 1959). Diarrhea, sore eyes (Moriarty, 1965). Stomach and bowel disorders and general "crummy" feeling (Smith, 1972; under *Ephedra* species). Diuretic, stimulant (Meyer, 1981). Venereal disease (3), venereal trouble, gonorrhea, first stages of syphilis, syphilis sores, sores, kidney troubles, stimulate urination, burns (Moerman, 1986).

1 = 0, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 11, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 2, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 1, 42 = 0, 43 = 1, 44 = 2, 45 = 0, 46 = 1, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 10, B2 = 7, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 1, T = 0, T2 = 0, P = 1, O = 6, Total = 25

EQUISETACEAE

Equisetum fluviatile N-48 Genus - contraceptive, burns, bladder ailments, kidney trouble, hair wash (Moerman, 1986). Stoppage of urine, stimulate or help speed birth, to deliver afterbirth and clean out insides, sore or itchy eyes, impending blindness from cataracts, burns (Turner, 1990).

1 = 1, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 1, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 20, 36 = 0, 37 = 2, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 3, 45 = 0, 46 = 2, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 4, F = 0, F2 = 1, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 6, Total = 11

Equisetum pratense V-11 Stomach and bowel trouble, constipation, sick stomach (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 1, Total = 3

Equisetum scirpoides N-46 Genus - contraceptive, burns, bladder ailments, kidney trouble, hair wash (Moerman, 1986). Stoppage of urine, stimulate or help speed birth, to deliver afterbirth and clean out insides, sore or itchy eyes, impending blindness from cataracts, burns (Turner, 1990).

1 = 1, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 1, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 20, 36 = 0, 37 = 2, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 3, 45 = 0, 46 = 2, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 4, F = 0, F2 = 1, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 6, Total = 11

Equisetum variegatum P-46 Sore eyes (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 1, Total = 1

ERICACEAE

Arbutus menziesii V-39a Leaves - ease a bad cold, burns, rheumatism (Turner and Bell, 1971). Sore throat (Turner, 1983). Colds (2), sores (2), cuts, sore throat, ulcerated stomach (Moerman, 1986). Chewed like aspirin to keep up strength (Turner, 1990). Plant - Emetic (2) (Moerman, 1986). Stomach problems, colds, post-partum contraceptive, compounded for tuberculosis and spitting up blood (Turner and Hebda, 1990).

1 = 1, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 4, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 2, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 2, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 2, 47 = 2, 48 = 2, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 8, F = 0, F2 = 0, V = 0, V2 = 2, V3 = 4, T = 0, T2 = 2, P = 1, O = 4, Total = 19

Arbutus menziesii V-39b,c Bark - Skin sores, except those from poison oak (Gifford, 1967). Diabetes, cuts, wounds (Turner and Bell, 1971). Skin sores (2), stomachache, cuts (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 3, 47 = 4, 48 = 0, 49 = 0, 50 = 1, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 7, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 1, Total = 8

Arctostaphylos patula Ca-19 Burns, venereal disease, cuts, emetic (Moerman, 1986). Cathartic, appetite (Hunn, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 1, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 2, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 2, Total = 6

Cassiope mertensiana N-32 Tuberculosis (Turner, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 1, T2 = 0, P = 0, O = 0, Total = 1

Chimaphila umbellata Ca-18 Stomachic (Loskiel, 1794 under syn. *Pyrola umbellata*). Diuretic (Pitcher, 1860). Increase the flow of urine (Andros, 1883). Blisters (Tantaquidgeon, 1925). Compounded in blood nostrum (Fenton, 1939). For the blood, kidneys (Fenton, 1941). Consumption, purification of the blood, cold in the bladder (Mechling, 1959). Sore muscles (Turner and Bell, 1971). Eyewash for sore eyes especially due to heat, smoke or perspiration (Hart, 1974). Sudorfic, anodyne especially in chest trouble, colds, etc.; astringent, diuretic, cold in the bladder, consumption, smallpox, stomach trouble, blood purifier, spring tonic, rheumatism (Erichsen-Brown, 1979). Chest trouble, colds, head colds (Black, 1980). Clean out kidneys (2), blood purifier (4), tuberculosis (2), long lasting colds, appetizer, compounded in tonic and blood purifier good for acne (Turner, 1980). Stabbing pain in the chest, backache, stop coughing up blood, relieve pain or fever caused by chest ailments due to heart ailments such as angina pectoris (Leighton, 1985). Scrofula, tuberculosis, venereal disease, gonorrhea, sores, sores on face and neck, pimples, blisters (4), backache (2), sore eyes, blood purifier (3), clear the blood, benefit blood, tonic, tonic for feeling low, stomach cancer, fever, ague, blood chills, induce sweating, stomach trouble (2), stomach, appetite, laxative, baby's worms, seasoner to make female remedies taste good, feverish and drowsy pregnant woman, ease confinement at childbirth, aid internal healing after childbirth, before and after childbirth, induce pregnancy, prevent miscarriage, dropsy, cold in the bladder, inflammation of the bladder, urinating pain, kidneys, kidney trouble, diuretic, leg and foot swellings, rheumatism (2), medicine strengthener (Moerman, 1986). Tuberculosis (Hunn, 1990). Shock medicine for vital organs to clean blood, liver, kidneys and urinary system (Forlines, 1992). Colds, inflammation (Turner in Pojar and MacKinnon, 1994).

1 = 0, 2 = 6, 3 = 0, 4 = 0, 5 = 1, 6 = 3, 7 = 3, 8 = 3, 9 = 0, 10 = 0, 11 = 0, 12 = 2, 13 = 0, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 4, 19 = 0, 20 = 2, 21 = 4, 22 = 4, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 2, 36 = 3, 37 = 2, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 1, 43 = 13, 44 = 19, 45 = 2, 46 = 0, 47 = 9, 48 = 8, 49 = 1, 50 = 0, 51 = 1, 52 = 0, 53 = 0

B = 2, B2 = 18, F = 0, F2 = 0, V = 1, V2 = 2, V3 = 4, T = 6, T2 = 2, P = 20, O = 42, Total = 96

Ellottia pyroliflorus P-55 Appetite stimulant (Compton, 1993).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 0, Total = 1

Gaultheria shallon V-35 Coughs, compounded for colds (Smith, 1940). Burns, sores, diarrhea, tuberculosis, coughs, cuts, tonic (Moerman, 1986).

1 = 0, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 2, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 2, 47 = 1, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 4, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 3, T = 1, T2 = 0, P = 1, O = 0, Total = 9

Phyllodoce empetriformis N-33 Tuberculosis (Turner, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 1, T2 = 0, P = 0, O = 0, Total = 1

Pyrola picta N-15 Laxative, diuretic, coughing children, swollen neck glands, eye and ear disorders, wounds (Hellson, 1974 under *Pyrola* ssp.). Wash for sick child (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 1, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 1, T = 0, T2 = 0, P = 1, O = 3, Total = 7

EUMYCOTA

Peltigera brittanica V-19 Genus - Sore mouth or gums, canker, swollen gums, decayed teeth, open sores (Wyland and Harris, 1941; under *Peltigera* sp.). Compounded to dress wounds, gynecological aid (Compton, 1993).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 1, 46 = 1, 47 = 2, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 5, F = 0, F2 = 1, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 1, Total = 7

GENTIANACEAE

Gentianella amarella N-6 Genus (*Gentian*) - Tonic, diarrhea, sore chest, stimulant, laxative, headache, muscular soreness, caked breast, sore eyes, chills, liver medicine, (Moerman, 1986).

1 = 0, 2 = 3, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 1, 35 = 1, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 1, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 3, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 1, O = 7, Total = 11

GRAMINAE

Ammophila arenaria V-3 No references to the medicinal use of this genus.

HIPPOCASTANACEAE

Aesculus californica Ca-8 Antidote for snakebite (Barrett, 1952). Toothache, piles (Moerman, 1986).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 1, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 1

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 2, Total = 3

HYDROPHYLLACEAE

Phacelia ramoisissima Ca-17a,b Venereal disease, emetic (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 1, Total = 2

HYPERICACEAE

Hypericum anagalloides V-7 Genus - sores, wounds, cuts, aching feet, toothache, venereal disease, tuberculosis (Moerman, 1986).

1 = 0, 2 = 2, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 2, 47 = 1, 48 = 1, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 4, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 1, T2 = 0, P = 0, O = 1, Total = 7

IRIDACEAE

Iris tenuissima Ca-25 Genus - coughs, sores, earaches, toothache, venereal disease, stomachache, liver and kidney disorders, burns, cholera, disease prevention, hay fever, pain, emetic, bruises, inflammation (Moerman, 1986).

1 = 0, 2 = 3, 3 = 1, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 1, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 1, 45 = 0, 46 = 1, 47 = 1, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 7, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 1, T = 0, T2 = 0, P = 0, O = 6, Total = 16

JUNCACEAE

Juncus bufonius V-14 Body wash, emetic, give strength (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 2, Total = 3

Juncus effusus* var. *gracilis V-4 Emetic for "spoiled" saliva (Mooney, 1932). Bruises (Mellinger, 1965). Emetic, prevent lameness, give babies strength (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 2, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 5, Total = 5

Juncus effusus* var. *pacificus V-5 Same as generic references listed above.

Juncus falcatus V-12 Same as generic references listed above.

Juncus lesuerii V-2 Same as generic references listed above.

LABIATAE

Prunella vulgaris V-17 Swellings (Brown, 1868). Sore throats (Spaydon, 1884). "Snake" illnesses (Mooney, 1890). Unspecified medicine (Swanton, 1918). Bruises, bathe burns, flavor other medicines (Banks, 1953). Sore and bleeding gums (Pennington, 1963a; 1969). For the heart (Turner and Bell, 1971). Boils, neck sores, eyewash to keep eyes moist on cold or windy days (Hellson, 1974). Fever, sore throat (Black, 1980).

Boils (2), burns, bruises, cuts, sores, diabetic sores, sugar diabetes, shortness of breath, tuberculosis, venereal disease, certain diseases, stiff knees, sore legs, backache, ache, sore throat, colds, cough, fever (3), female remedy, strengthen the womb, blood purifier, physic, tonic, any ailment, general indisposition, especially good for babies, stomach cramps, upset stomach, biliousness, piles, diarrhea, dysentery, heaves, vomiting, emetic, babies that cry too much, sickness caused by grieving (Moerman, 1986).

1 = 0, 2 = 4, 3 = 2, 4 = 2, 5 = 0, 6 = 4, 7 = 4, 8 = 0, 9 = 0, 10 = 3, 11 = 1, 12 = 1, 13 = 1, 14 = 0, 15 = 1, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 1, 29 = 1, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 3, 37 = 0, 38 = 0, 39 = 1, 40 = 3, 41 = 0, 42 = 0, 43 = 7, 44 = 0, 45 = 2, 46 = 3, 47 = 3, 48 = 2, 49 = 0, 50 = 1, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 17, F = 0, F2 = 1, V = 0, V2 = 7, V3 = 2, T = 1, T2 = 1, P = 7, O = 21, Total = 54

Stachys bullata Ca-7 Cough medicine (Johnson, 1907). Infected or swollen sores, earache, stomachache, sore throat (Moerman, 1986).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 3, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 1, T = 0, T2 = 0, P = 0, O = 1, Total = 6

Stachys cooleyae V-31 Boils (2) (Moerman, 1986). Spring tonic (Turner and Bell, 1971). Rheumatism, boils (Turner in Pojar and MacKinnon, 1994).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 1, 9 = 0, 10 = 3, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 1, Total = 5

LILIACEAE

Clintonia uniflora N-9 Body wash, wash for cuts, sore eyes (Turner, 1971). Wash for eyes, wounds (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 2, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 2, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 0, F2 = 1, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 2, Total = 5

Lilium columbianum P-50a,b Make baby fleshy and fat (Olbrechts, 1931 under *L. canadense*). Rheumatic joints (Banks, 1953 under *L. canadense*). Irregular menstruation (Mechling, 1959 under syn. *L. canadense*). Flux, rheumatism, snake bite, irregular menstruation, make child fleshy and fat (Moerman, 1986 under *L. canadense*).

1 = 0, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 2, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 2, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 1

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 2, O = 5, Total = 8

Lilium philadelphicum N-23a Plant - Spider bites, bring away placenta after childbirth (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 1, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 1, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 2, Total = 2

Lilium philadelphicum N-23b Bulbs - Swellings, bruises, consumption, cough, fever (Mechling, 1959). Stomach disorders (Black, 1980). Wounds, bruises, dog bites, sores, cough, tuberculosis, fever, swellings, contusions, emetic (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 5, 7 = 2, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 2, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 2, 47 = 1, 48 = 2, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 6, F = 0, F2 = 0, V = 0, V2 = 2, V3 = 2, T = 2, T2 = 0, P = 0, O = 6, Total = 16

Trillium ovatum M-20 Poultice (Brown, 1868). Boils (2), sore eyes (3) (Moerman, 1986). Eye problems, remove object from eye (Hunn, 1990). Leucorrhea, itch, chapped hands, eye medicine (Turner, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 2, 11 = 0, 12 = 0, 13 = 0, 14 = 1,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 6, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 1, 46 = 0, 47 = 2, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 1, F = 1, F2 = 2, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 6, Total = 12

Veratrum viride N-28 Burns, scalds, draw water out of swollen legs, cure wounds, aches, toothache, herpes milliaris (Josselyn, 1860). Wounds, aches (Pickering, 1879). Emetic for fever, snuff to reduce hernia by inducing violent sneezing while another plunges back the rupture with his fist (Flexon, 1897). Reduce fever (Strath, 1903). Rheumatism, languor and kindred ailments, shifting pains (Mooney, 1932). Emetic, purgative, common colds, influenza, headaches, neuralgia, sprained joints, remove rheumatic pains, given to newborns to remove meconium, counterirritant (Darby, 1933). Catarrh (Fenton 1941). Emetic, snake bite (Murphy, 1959). Decongestant (causes violent sneezing which clears the nasal passages), head colds (Stubbs, 1966). Snuffed for headache (Johnston, 1970). Gonorrhea, chronic cough, stomach pain, constipation, sprains and bruises (Turner, 1973). Laxative, emetic for internal pain, abortificient, back pain, pains in the chest, swellings, bad colds, dandruff (Turner and Bell, 1973). Snuff to cause sneezing to clear nasal passages (4) (Hart, 1974). Indigestion, induce sneezing (Hellson, 1974). Wounds, ache, toothache (Erichsen-Brown, 1979). Typhoid fever, variola (smallpox), scarlation (scarlet fever), pertusssis (whooping cough) (Black, 1980). Counterirritant for backache, snuff to clear sinuses, ease arthritic or rheumatic pain (Turner, 1980). Headache (Johnston, 1982). Break open boils, tuberculosis, dandruff, colds (2), blood disorders, languor, emetic for sickness, rheumatism (3), pains (2), make hair grow on bald head, heart trouble, cough, aches, sore muscles, catarrh, headaches, swellings, blood disorders (Moerman, 1986). Body aches and pains, blood poisoning, cuts, sores, rashes and other skin problems, cause rotten tooth to fall out, induce vomiting (Kari, 1987). Skin conditions, scalp conditions, scalp disease, baldness, skin wash, sprains, bruises and fractures, influenza, snuff for sinus infections, arthritis, tranquilizer, insanity, pain killer, menstrual cramps, compounded with devil's club for pneumonia (Gottsfield and Anderson, 1988). Wounds, pain, scurvy sores (Josselyn in Lindholdt, 1988). Arthritis (3), sore feet, phlebitis, broken bones, painful break in leg which would not heal (Turner, 1990). Internal medicine (unspecified), colds, any blood pressure related disorder, high blood pressure, respiratory afflictions, sore areas, swellings, arthritis (2), rheumatism (2), sedative, laxative, emetic, compounded for wounds (Compton, 1993). Colds (2), tuberculosis, chest pain, fever, rheumatic pain, toothache, sprains, bruises, sores, kidney and bladder trouble (Turner in Pojar and MacKinnon, 1994).

1 = 1, 2 = 27, 3 = 0, 4 = 0, 5 = 0, 6 = 11, 7 = 2, 8 = 12, 9 = 1, 10 = 0, 11 = 1, 12 = 1, 13 = 2, 14 = 1, 15 = 1, 16 = 0, 17 = 0, 18 = 8, 19 = 6, 20 = 0, 21 = 1, 22 = 1, 23 = 7, 24 = 0, 25 = 0, 26 = 0,

27 = 2, 28 = 3, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 3, 34 = 0, 35 = 0, 36 = 8, 37 = 0, 38 = 1, 39 = 2, 40 = 0, 41 = 0, 42 = 0, 43 = 6, 44 = 1, 45 = 0, 46 = 11, 47 = 6, 48 = 5, 49 = 0, 50 = 0, 51 = 0, 52 = 2, 53 = 1

B = 4, B2 = 18, F = 3, F2 = 5, V = 9, V2 = 3, V3 = 11, T = 2, T2 = 0, P = 5, O = 90, Total = 144

LINACEAE

Linum lewisii Ca-22 Disordered stomach, gas, eye medicine (Murphy, 1959). Any kind of inflammation, infected wounds, reduce swellings mumps, boils, sore throat (Curtin, 1965). Eye medicine (Nickerson, 1966). Goiter, swellings due to bruises, reduce swelling (2), headache, eyewash (2), gall trouble, heartburn, hair and skin wash (Moerman, 1986). Hair tonic for children (Hunn, 1990). Hair, skin and scalp wash (Turner, 1990).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 5, 7 = 0, 8 = 0, 9 = 0, 10 = 2, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 2, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 3, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 4, 36 = 2, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 1, F = 0, F2 = 2, V = 1, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 0, O = 16, Total = 22

LYCOPODIACEAE

Lycopodium annotinum N-22 Make hair grow (Hunn, 1990). Genus - Inducing labor, ease childbirth, bladder trouble in children (Black, 1980). Purgative (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 1, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 2, 38 = 1, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 1, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 1, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 4, Total = 5

MALVACEAE

Malva neglecta N-20 Sores, swellings (2), emetic, broken bones, injury, baby's swollen stomach, baby's sore back (Moerman, 1986).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 2, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 7, Total = 8

MENYANTHACEAE

Menyanthes trifoliata V-32 Influenza, person who was sick to his stomach, made one put on weight, spitting blood (Turner and Bell, 1973). Looseness of the bowels, bloody flux (Kinietz, 1940). Febrifuge, laxative, rheumatism, tonic (Erichsen-Brown, 1979). Gas pain, constipation, rheumatism, tonic, unspecified (3) (Moerman, 1986). Fever and spitting blood, promote appetite, eliminate intestinal worms, emetic, cathartic, migraine headache, indigestion, worms, healing of ulcerous wounds (Turner in Pojar and MacKinnon, 1994).

1 = 0, 2 = 1, 3 = 2, 4 = 0, 5 = 2, 6 = 0, 7 = 1, 8 = 2, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 2, 16 = 1, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 1, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 2, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 7, 44 = 0, 45 = 0, 46 = 1, 47 = 0, 48 = 2, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 5, F = 0, F2 = 0, V = 1, V2 = 1, V3 = 0, T = 0, T2 = 2, P = 7, O = 12, Total = 27

ONAGRACACEAE

Camissonia brevipes Ca-12 No references to the medicinal use of this genus.

Epilobium angustifolium V-36a Plant - Fluxes (Josselyn, 1860). Blistering agent, internal medicine (Olson, 1936 under fireweed). Wounds (Fenton, 1941). Skin irritation (Honigmann, 1949). Relieve muscular pains (Honigmann, 1954 under fireweed). Heal wounds made when tumors cut open (Turner and Bell, 1973). Protect hands and face from the cold (Hellson, 1974). Bruises (Leighton, 1985). Bowel hemorrhage, bruises, body pain, gastritis, stomachache, intestinal discomfort (Moerman, 1986). Pus filled boils or cuts (Kari, 1987). Piles, dry up sores (2), eczema, ulcerated mouth, poison ivy (Turner, 1990). Female ailments, laxative for males (Turner, 1974).

1 = 0, 2 = 2, 3 = 1, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 3, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 1, 30 = 1, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 1, 46 = 2, 47 = 5, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 1, 53 = 1

B = 1, B2 = 9, F = 0, F2 = 2, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 1, O = 11, Total = 24

Epilobium angustifolium V-36b Roots - Boils (Turner, 1973). Enema for babies with difficulty eliminating (Hellson, 1974). Good for bowels, cure diarrhea, astringent, piles and hemorrhoids (Melgrave, 1973). Enema for babies which had difficulty elininating (Hellson, 1974). Skin diseases, scrophula, boils (Black, 1980). Poultice for boil, abscess or other surface wound to draw out infection, dress cuts and wounds (Leighton, 1985). Kidneys, male urinary problems, urination problems, tuberculosis (2), burning urination, swellings (2), pain, sore throat, bowel hemorrhage, swollen knees, internal injury from lifting, carbuncles, boils, unspecified (Moerman, 1986).

1 = 0, 2 = 1, 3 = 1, 4 = 0, 5 = 0, 6 = 4, 7 = 0, 8 = 0, 9 = 0, 10 = 3, 11 = 0, 12 = 0, 13 = 0, 14 = 2, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 1, 30 = 1, 31 = 0, 32 = 0, 33 = 2, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 1, 44 = 4, 45 = 0, 46 = 1, 47 = 3, 48 = 2, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 9, F = 0, F2 = 1, V = 0, V2 = 1, V3 = 0, T = 2, T2 = 1, P = 1, O = 11, Total = 28

Oenothera villosa N-14a Leaves - obesity, boils, bruises, laziness (Moerman, 1986). Unspecified (Turner, 1990). Plant - Fluxes (Josselyn, 1860 under *O. biennis*). Pain in the bowels (Tantaquidgeon, 1932 under syn. *O. biennis*). Soothe gastrointestinal disturbances, antispasmodic in whooping cough and asthma, skin diseases (Erichsen-Brown, 1979). Sore throat, venereal disease, physic, pain, skin diseases, wound healing, piles, boils, bruises, obesity, laziness, (Moerman, 1986; references under syn. *O. biennis*).

1 = 0, 2 = 1, 3 = 1, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 0, 9 = 0, 10 = 2, 11 = 1, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 1, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 4, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 0, 46 = 1, 47 = 2, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 5, F = 0, F2 = 2, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 2, O = 9, Total = 21

Oenothera villosa N-14b Roots - piles, boils, skin disease, wound healing, increase strength (Moerman, 1986). Plant - Fluxes (Josselyn, 1860 under *O. biennis*). Pain in the bowels (Tantaquidgeon, 1932 under syn. *O. biennis*). Soothe gastrointestinal disturbances, antispasmodic in whooping cough and asthma, skin diseases (Erichsen-Brown, 1979). Sore throat, venereal disease, physic, pain, skin diseases, wound healing, piles, boils, bruises, obesity, laziness, (Moerman, 1986; references under syn. *O. biennis*).

1 = 0, 2 = 1, 3 = 1, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 2, 11 = 1, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 2, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 2, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 0, 46 = 2, 47 = 3, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 6, F = 0, F2 = 3, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 2, O = 7, Total = 21

Oenothera villosa N-24 Plant - Fluxes (Josselyn, 1860 under *O. biennis*). Pain in the bowels (Tantaquidgeon, 1932 under syn. *O. biennis*). Soothe gastrointestinal disturbances, antispasmodic in whooping cough and asthma, skin diseases (Erichsen-Brown, 1979). Sore throat, venereal disease, physic, pain, skin diseases, wound healing, piles, boils, bruises, obesity, laziness, (Moerman, 1986; references under syn. *O. biennis*).

1 = 0, 2 = 1, 3 = 1, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 1, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 1, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 2, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 1, 47 = 2, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 5, F = 0, F2 = 2, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 1, O = 6, Total = 16

ORCHIDACEAE

Goodyera oblongifolia N-16 Nervousness (Parker, 1928 under rattlesnake plantain). Burns (Stubbs, 1966). Sore, stiff muscles, cuts, bruises (Turner and Bell, 1971). Draw pus out of: burns (7), cuts (8), sores (8), boils (7) (Hart, 1974). Tonic, childbirth (Moerman, 1986). Boils (Hunn, 1990). Antiseptic salve (Forlines, 1992). Cuts and sores (Turner in Pojar and MacKinnon, 1994).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 0, 9 = 0, 10 = 2, 11 = 0, 12 = 0, 13 = 0, 14 = 30, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 1, 38 = 0, 39 = 1, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 3, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 34, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 5, Total = 42

Platanthera dilatata P-53 Rheumatism, sprains, joint and muscle pain or stiffness, gravel (Moerman, 1986).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 1, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 5, Total = 5

Platanthera orbiculata N-17 Scrofula sores, cuts, blisters on hands or feet (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 1, 47 = 2, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 1, Total = 3

OXALIDACEAE

Oxalis oregana Ca-2 Soften phlegm in the throat (Ring, 1930 under wood sorrel). Rheumatism (Gifford, 1967). Boils, sore eyes, rheumatism, loss of appetite, "summer complaint" (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 2, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 1, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 1, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 6, Total = 7

PAEONIACEAE

Paeonia brownii Ca-21a Plant - indigestion, constipation (Bocek, 1984). Stomachache, indigestion, constipation (Moerman, 1986). Seeds - Eye medicine (Murphy, 1959). Cough (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 1, 14 = 0,

15 = 2, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 2, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 3, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 3, Total = 7

Paeonia brownii Ca-21b,c Roots - Compounded for stoppage of food in the stomach and other forms of indigestion (Blochman, 1897). Lung trouble (Murphy, 1959). Pneumonia, stomachaches (Bocek, 1984). Tuberculosis, burns, venereal disease, stomachache, indigestion, pneumonia, complicated lung fevers, swellings, sore eyes, kidney troubles, boils, sores, diarrhea, deep cuts and wounds, coughs, cough medicine, sore throat, headache (Moerman, 1986). Eye problems (Hunn, 1990).

1 = 0, 2 = 1, 3 = 1, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 1, 13 = 2, 14 = 0,

15 = 2, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 2, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 0, 44 = 1, 45 = 0, 46 = 2, 47 = 1, 48 = 5, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 12, F = 0, F2 = 0, V = 0, V2 = 5, V3 = 2, T = 1, T2 = 2, P = 0, O = 6, Total = 23

PAPAVERACEAE

Argemone munita Ca-14a,b Seeds used for: sores, physic (Murphy, 1959 under syn. *A. hispida*). Plant used for rheumatism, dropsy, swellings (Curtin, 1965 under syn. *A. hispida*). Seeds used for piles (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 1, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 4, Total = 6

Eschscholzia californica Ca-1 Unspecified (Mason, 1886). Toothache (Murphy, 1959). Cleanse hair and scalp (Johnson, 1907). Tuberculosis, infected sores, stomachache, headache, children's sedative, emetic, suppurating sores, stop milk flow, head lice, toothache (Moerman, 1986).

1 = 0, 2 = 3, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 2, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 1, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 2, 37 = 0, 38 = 0, 39 = 1, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 3, F = 0, F2 = 1, V = 0, V2 = 0, V3 = 0, T = 1, T2 = 0, P = 1, O = 5, Total = 13

Platystemon californicus Ca-5 No references to the medicinal use of this genus.

PINACEAE

Abies grandis N-42 Pains of the stomach or sides (Boas, 1890). Purgative, emetic (Hrdlicka, 1905 under silver fir). Colds, eyewash (Stubbs, 1966). Hair tonic for falling hair and dandruff, psoriasis, skin diseases, cuts, bruises, stomach pain (Turner and Bell, 1971). Stomach trouble, tuberculosis, sore throat, infected eyes (Turner, 1973). Tonic (2), laxative, constipation, coughs, tuberculosis, coughs, sores, boils, gum boils, cankers (Turner and Bell, 1973). Whooping cough, colds, baby powder, eyewash (Hart, 1974). Tuberculosis, ulcers, appendicitis, general weakness and loss of appetite, goitre (2), purgative, emetic for bad stomach with loss of appetitie and weight loss, cough, allergy, reviver (Turner, 1980; used the same way as *A. lasiocarpa*) Prevent hair from falling out (Turner and Efrat, 1982). Medicine for internal injuries (Turner, 1983). Boils, sore eyes, rheumatism, ulcers, colds (2), lung hemorrhage, tuberculosis, sores, physic, tonic (Moerman, 1986). Colds, fever, chest colds (Hunn, 1990). Talcum powder, sores, sore eyes, cuts, bruises, sprains, broken bones, colds (2), cough, tuberculosis (3), stomach troubles, gonorrhea, tonic (Turner, 1990).

1 = 0, 2 = 2, 3 = 0, 4 = 0, 5 = 0, 6 = 3, 7 = 1, 8 = 1, 9 = 0, 10 = 3, 11 = 0, 12 = 1, 13 = 4, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 8, 19 = 0, 20 = 0, 21 = 3, 22 = 0, 23 = 2, 24 = 0, 25 = 0, 26 = 0, 27 = 3, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 2, 34 = 0, 35 = 5, 36 = 3, 37 = 0, 38 = 2,

39 = 0, 40 = 1, 41 = 1, 42 = 0, 43 = 6, 44 = 0, 45 = 0, 46 = 4, 47 = 9, 48 = 9, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 6, B2 = 13, F = 3, F2 = 1, V = 0, V2 = 2, V3 = 12, T = 7, T2 = 1, P = 6, O = 25, Total = 73

Picea sitchensis M-3,4, V-10 Cuts and wounds (Olson, 1936 under spruce). Gonorrhea, laxative, internal pains, rheumatism, stomach trouble, cuts, infections, tuberculosis (Turner, 1973). Kidney swellings, colds and coughs (4), boils, cuts, swellings, abrasions, compounded for diarrhea (Turner and Bell, 1973). Sores, sunburn, aches and pains (Turner and Efrat, 1982). Stomach pain, broken skin, suppurating sores, cuts, wounds, heal infant's navel, throat problems, cough, tuberculosis, syphilis, diuretic for gonorrhea, take out bad blood, snowblindness (Moerman, 1986). Spring tonic, tuberculosis (3), colds (2), cough, sore throats, mouth sores, heal burns or cuts (2), sores, cure growth in the eye, sore eyes (2), ear troubles, dry up the infection that causes running ears, kidney troubles, heart troubles, ulcers, stomach disorders, cure weak blood, purgative, emetic, bone aches, thinning one's blood in the spring (Kari, 1987). Chest colds (Hunn, 1990 under *Picea* ssp.). Dysentery, sores, poor eyesight, blindness, cancer, cough, eczema, unspecified (4), any illness (2) (Turner, 1990). Gastrointestinal difficulties, soreness (2), dermatitis, wounds (2), boils, cuts, colds, coughs, constipation, arthritic joints, unspecified (Compton, 1993). Boils and infections (Turner, unpublished Haida mss.).

1 = 0, 2 = 6, 3 = 2, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 2, 9 = 0, 10 = 6, 11 = 0, 12 = 2, 13 = 7, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 9, 19 = 0, 20 = 0, 21 = 3, 22 = 1, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 1, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 2, 34 = 0, 35 = 6, 36 = 2, 37 = 0, 38 = 1, 39 = 0, 40 = 2, 41 = 0, 42 = 0, 43 = 10, 44 = 2, 45 = 0, 46 = 12, 47 = 9, 48 = 5, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 7, B2 = 26, F = 0, F2 = 2, V = 0, V2 = 2, V3 = 16, T = 5, T2 = 0, P = 11, O = 26, Total = 93

Pseudotsuga menziesii N-43 Venereal disease (Brown, 1868 under syn. *Abies douglasii*). Emetic (Buchanan, 1899 under hemlock). Brush dance medicine for person with chronic trouble, delicate constitution or safeguarding child (Goddard, 1903). Rheumatism, paralysis (Jones, 1931 under syn. *P. mucronata*). Easing of rheumatic pains and muscle cramps, tonic (Guie, 1939). Colds (Stubbs, 1966). Diarrhea, carbuncles (Turner and

Bell, 1973). Colds (Hart, 1974). High fever and anemia accompanied by loss of weight, energy and appetite, emetic, allergy remedy (Turner, 1980). Venereal disease, sores (3), rheumatism (2), draw out the pain from chest, colds (3), coughs, sore throat, sores in mouth, purgative, diuretic, diuretic for gonorrhea, kidney and bladder remedy, antiseptic for infections, antiseptic, general tonic, tonic (Moerman, 1986). Moxa for chest colds, rheumatism, and warts (Hunn, 1990). Pains, soreness, stiffness, injured or dislocated bones, cuts, boils, skin ailments, prevent athletes foot, colds, colic, cramps in bowels or stomach (Turner, 1990). Gastrointestinal disorders such as bleeding bowels and stomach troubles, excessive menstruation, sore throat (Compton, 1993).

1 = 0, 2 = 4, 3 = 1, 4 = 0, 5 = 0, 6 = 2, 7 = 1, 8 = 4, 9 = 0, 10 = 3, 11 = 2, 12 = 2, 13 = 1, 14 = 0, 15 = 1, 16 = 0, 17 = 0, 18 = 7, 19 = 0, 20 = 0, 21 = 1, 22 = 2, 23 = 2, 24 = 1, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 2, 37 = 0, 38 = 1, 39 = 0, 40 = 2, 41 = 0, 42 = 0, 43 = 5, 44 = 1, 45 = 0, 46 = 1, 47 = 7, 48 = 0, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 5, B2 = 12, F = 1, F2 = 1, V = 1, V2 = 3, V3 = 7, T = 0, T2 = 0, P = 5, O = 22, Total = 54

Tsuga heterophylla M-1 Stop bleeding, wounds, lacerations, astringent (Swan, 1868 under hemlock). Emetic (Reagan, 1934a under hemlock). Internal injuries (Densmore, 1939). Prevent or cure wound infection, colds, tuberculosis (Smith, 1940 under hemlock). Babies cough and respiratory congestion, pneumonia, mild children's laxative, colds and coughs (Toineeta, 1970). Sunburn salve (Turner and Bell, 1971). Cauterize skin for internal ailments, skin troubles (Turner, 1973). Women's sores or burns, burns, skin sores, inflammed eyes, eyewash, diarrhea, cauterize warts and moles (Turner and Bell, 1973). Heal injuries such as bruises, broken bones or internal injuries (Turner, 1983). Healing sores, burns, rheumatic fever, tuberculosis, phlebitis (Turner and Efrat, 1982). Tuberculosis (3), venereal disease, rheumatism, sores, cuts, burns, prevent chapping, obstinate sores, hemorrhage, stop bleeding, internal injuries, reduce swelling, various internal ailments, heart troubles, child's cold, sore throat, laxative (Moerman, 1986). Disinfectant, colds, influenza (Turner, 1990).

1 = 0, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 2, 7 = 1, 8 = 1, 9 = 0, 10 = 2, 11 = 0, 12 = 1, 13 = 2, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 4, 19 = 1, 20 = 0, 21 = 0, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 1, 29 = 0, 30 = 3, 31 = 0, 32 = 0, 33 = 2, 34 = 0, 35 = 2, 36 = 5, 37 = 0, 38 = 0,

39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 11, 47 = 7, 48 = 6, 49 = 1, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 4, B2 = 16, F = 0, F2 = 3, V = 1, V2 = 3, V3 = 6, T = 5, T2 = 0, P = 0, O = 22, Total = 57

PLUMBAGINACEAE

Armeria maritima Ca-4 Astringent (Gastaldo, 1974).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 1,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 1, Total = 1

POLEMONIACEAE

Polemonium pulcherrimum N-27 Wash for head and hair (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 1, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 0, Total = 1

POLYGONACEAE

Eriogonum umbellatum Ca-24 Soothe pain of burns (Coville, 1897 under syn. *E. stellatum*). Colds (Murphy, 1959). Colds (2), coughs, rheumatism (2), lameness (2), stomachache, fumigant or emetic for biliousness, gonorrheal sores, ptomaine poisoning (Moerman, 1986).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 2, 7 = 0, 8 = 2, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 1, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 3, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 4, T = 0, T2 = 0, P = 0, O = 6, Total = 13

Oxyria digyna N-34 Antiscorbutic (2), antiseptic, sores, ulcers, cutaneous eruptions, diarrhea, putrid and inflammatory disorders, itch, wens, ringworm, cancer (Erichsen-Brown, 1979).

1 = 0, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 2, 10 = 2, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 6, 48 = 0, 49 = 0, 50 = 0,

51 = 1, 52 = 0, 53 = 0

B = 2, B2 = 5, F = 1, F2 = 1, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 4, Total = 13

Polygonum amphibium N-12 Stomach pain, blood purifier (Erichsen-Brown, 1979). Chest colds (Turner, 1980). Blisters in the mouth, compounded to treat various ailments (Leighton, 1985). Unspecified ailments (Moerman, 1986).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 3, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 1, T = 0, T2 = 0, P = 3, O = 2, Total = 6

POLYPODIACEAE

Adiantum pedatum V-25 Agues, fluxes (Josselyn, 1860). Rheumatism, chills, fever (Mooney, 1885). Cure for chills (ague?) (Mooney, 1932). Stomach trouble, sore chest, internal hemorrhaging (Densmore, 1939). Restore falling hair (Smith, 1940 under maidenhair fronds). Hemostatic in women's disorders, labor pains, consumption, cough, all sorts of pectoral diseases (Fenton, 1941). Heart trouble, sudden paralytic attacks as in bad pneumonia in children, cure fevers, rheumatism (Banks, 1953). Pectoral medicine (Duffy, 1958 under maidenhair). Pulmonary afflictions (Black, 1980). Shortness of breath, give strength and endurance (Turner and Efrat, 1982). Venereal disease, gonorrhea, fever, emetic for ague or fever, sores, dysentery, internal hemorrhage from wounds, rheumatism (2), asthma, sore chest (2), heart trouble, emetic, snake bite, blood purifier, cessation of urine due to gall, stomach trouble (2), fits, hair wash (2), excessive menstruation, ladies take to get period, cleans out, abortifiacient or for labor pains, childbirth pain, female maladies, caked breasts, sudden paralytic attacks as in bad pneumonia of children, cure children who turn black, cramps in child, babies sore back, (Moerman, 1986). Medicine for strength and endurance (Turner in Pojar and MacKinnon, 1994).

1 = 1, 2 = 5, 3 = 2, 4 = 0, 5 = 0, 6 = 0, 7 = 6, 8 = 4, 9 = 0, 10 = 0, 11 = 2, 12 = 2, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 3, 22 = 0, 23 = 2, 24 = 3, 25 = 0, 26 = 0, 27 = 1, 28 = 2, 29 = 0, 30 = 3, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 4, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 3, 44 = 0, 45 = 2, 46 = 0, 47 = 1, 48 = 10, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 1

B = 3, B2 = 14, F = 0, F2 = 4, V = 0, V2 = 9, V3 = 1, T = 1, T2 = 3, P = 3, O = 32, Total = 58

Blechnum spicant M-6 Distress in the stomach, lung trouble (Densmore, 1939). Diarrhea (Turner and Bell, 1973). Skin sores, internal cancer (Turner and Efrat, 1982). Tonic (Turner, 1983). Lung trouble, colic, stomach distress, general ill health, paralysis (Moerman, 1986). Skin sores (Turner in Pojar and MacKinnon, 1994).

1 = 0, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 1, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 0, 46 = 0, 47 = 2, 48 = 2, 49 = 0, 50 = 0,

51 = 1, 52 = 0, 53 = 0

B = 0, B2 = 7, F = 0, F2 = 0, V = 0, V2 = 2, V3 = 0, T = 0, T2 = 2, P = 2, O = 3, Total = 12

Cryptogramma crispa N-39 Eye wash, gallstones (Turner, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 1, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 2, Total = 2

Dryopteris austriaca M-5 Emetic, rheumatism, relieve toothache (Banks, 1953 under *Dryopteris* sp.). Medicine for internal ailments (Turner and Efrat, 1982). Cuts, hair wash (Moerman, 1986). Eye wash, wash for cuts, tuberculosis, kidney troubles, breathing problems such as asthma (Kari, 1987). Antidote for food poisoning, poisonous plants and shellfish (Compton, 1993 under genus).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 1, 45 = 0, 46 = 2, 47 = 1, 48 = 2, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 4, F = 0, F2 = 1, V = 0, V2 = 0, V3 = 0, T = 1, T2 = 0, P = 1, O = 5, Total = 14

Gymnocarpium dryopteris P-52 No references to the medicinal use of this genus.

Onoclea sensibilis N-45 Infection, arthritis, deep cuts, hair wash, intestinal ailments, inflated and sore intestines after catching cold, tuberculosis, venereal disease, gonorrhea, sores, blood which causes the hair to fall out, make blood, menstrual swelling and cramps, non-flowing full breasts, milk flow in patient with caked breasts, cold in the blood, female fertility, pain and/or strength after childbirth, start menses (Moerman, 1986).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 1, 9 = 0, 10 = 1, 11 = 1, 12 = 2, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 1, 25 = 0, 26 = 0, 27 = 1, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 2, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 3, 44 = 0, 45 = 1, 46 = 1, 47 = 2, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 4, F = 0, F2 = 1, V = 0, V2 = 11, V3 = 0, T = 1, T2 = 0, P = 3, O = 7, Total = 21

Polypodium scouleri V-33a,b Alterative, venereal complaints (Swan, 1868 under *Polypodium* with stout, fleshy leaf growing on the immediate seacoast on rocks). Genus - venereal disease, sore throat, cough, stomach pain, inflammation, cholera, pleurisy, pneumonia, rheumatism, thrush, fever, tuberculosis, etc. (Moerman, 1986).

1 = 0, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 1, 7 = 1, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 2, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 3, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 4, B2 = 14, F = 1, F2 = 0, V = 0, V2 = 3, V3 = 1, T = 1, T2 = 0, P = 1, O = 2, Total = 14

Pteridium aquilinum M-15 Agues (Josselyn, 1860). For weak babies and old people (Van Wart, 1948). Compounded for rheumatism (Fenton, 1949). Diuretic (Mahr, 1955). Medicine for "troubles with one's insides" such as cancer of the womb (Turner and Efrat, 1982). Tuberculosis, venereal disease, infections, antiseptic, diarrhea, caked breasts, burns, cholera-morbus, men's urine retention, uterine prolapse, women's stomach cramps, chest pain, liver, rheumatism (2), headache, strength, weak babies and old people, weak blood, make good blood after menses, after childbirth, pain after childbirth, hair growth, anti-emetic, tonic (Moerman, 1986). Poultice for broken bones (3), arthritis, sores, internal injuries, vomiting blood, colds, lack of appetite

(Turner, 1990).

1 = 0, 2 = 2, 3 = 2, 4 = 1, 5 = 0, 6 = 0, 7 = 1, 8 = 4, 9 = 0, 10 = 3, 11 = 1, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 1, 28 = 1, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 1, 35 = 0, 36 = 1, 37 = 1, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 7, 44 = 1, 45 = 0, 46 = 5, 47 = 1, 48 = 1, 49 = 0, 50 = 0, 51 = 1, 52 = 0, 53 = 0

B = 4, B2 = 6, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 1, T = 1, T2 = 0, P = 7, O = 20, Total = 39

Woodsia scopulina N-26 Genus - injury, life medicine (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 1, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 1, Total = 2

PORTULACACEAE

Claytonia sibirica V-29 Headaches (Boas, 1890). Hasten or induce labor, constipation (Densmore, 1939). Headache (Turner and Bell, 1971). Cuts, sores; sore, red eyes (Turner and Efrat, 1982 under syn. *Montia sibirica*). Dandruff, hair wash (3), sore throat, eye wash, urinative, women during pregnancy, general tonic (Moerman, 1986 under syn. *Montia sibirica*). Syphilitic sores, constipation, hasten or induce labor (Turner in Pojar and MacKinnon, 1994).

1 = 0, 2 = 2, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 3, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 2, 34 = 0, 35 = 2, 36 = 0, 37 = 2, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 1, 44 = 1, 45 = 1, 46 = 1, 47 = 2, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 5, F = 0, F2 = 3, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 1, O = 9, Total = 19

POTAMOGETONACEAE

Potamogeton perfoliatus N-13 No references to the medicinal use of this genus.

RANUNCULACEAE

Actaea rubra P-56a Plant - Neuralgia ("air in the head"), diarrhea, vomiting, tenesmus (Curtin, 1965). Purgative (Erichsen-Brown, 1979). Stomach complaints, purgative (Leighton, 1985). Purgative, increase milk flow, give young men the right sense (Moerman, 1986). Bronchial or lung trouble, stomach pains (Turner, 1990). Bring boil to a head, wounds (Turner in Pojar and MacKinnon, 1994).

1 = 0, 2 = 1, 3 = 1, 4 = 1, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 1, 12 = 0, 13 = 0, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 1, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 3, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 1, 47 = 0, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 7, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 0, O = 7, Total = 14

Actaea rubra P-56b Roots - Unduly delayed delivery, inflammation and abcess of the breast, increase milk flow, expel afterbirth, wash eyes, mouth and nostrils of new born (Gilmore, 1930). Rheumatic limbs (Curtin, 1965). Coughs and colds (Johnston, 1970). Slow heavy menstrual flow, stomach complaints, purgative (Leighton, 1985). Syphilis, colds, coughs, sores, emaciation (2), improves appetite, internal hemorrhage, stomach troubles, stomach pain caused by having swallowed hair, rheumatism (3), excessive flow at menstruation, purging of afterbirth, after childbirth to clear up the system (Moerman, 1986). Arthritis, bronchial or lung trouble, emaciation, pox, snakebite (Turner, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 5, 9 = 0, 10 = 1, 11 = 0, 12 = 1, 13 = 2, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 2, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 2, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 1, 33 = 0, 34 = 0, 35 = 1, 36 = 1, 37 = 4, 38 = 1,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 4, 44 = 0, 45 = 0, 46 = 0, 47 = 2, 48 = 1, 49 = 1, 50 = 0,

51 = 0, 52 = 0, 53 = 1

B = 2, B2 = 5, F = 0, F2 = 1, V = 1, V2 = 1, V3 = 4, T = 0, T2 = 0, P = 4, O = 17, Total = 34

Anemone multifida N-8a Leaves - nose bleed, head or lung cold, any sickness (Moerman, 1986). Nosebleed (Turner, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 1, T = 0, T2 = 0, P = 1, O = 1, Total = 3

Anemone multifida N-8b Plant - Headache (Johnston, 1970; 1982). Abortifacient (Hellson, 1974). Counterirritant for cuts and bruises (Turner, 1980). Rheumatism, kill lice or fleas (Moerman, 1986).

1 = 1, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 1, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 5, Total = 5

Aquilegia formosa P-49a Plant - Chant lotion ingredient to relieve headache, fever, lameness, general body aches and pains, colds, coughs and chills (Wyland and Harris, 1941). Stop the flux (Banks, 1953 under syn. *A. canadensis*). Hair wash, sores, colds, cough, sore throat, stomachache, variety of maladies, bee stings (Moerman, 1986). Sores to help form scar, aching joints, dizziness, diarrhea, possible venereal disease (Turner in Pojar and MacKinnon, 1994).

1 = 0, 2 = 3, 3 = 2, 4 = 0, 5 = 0, 6 = 1, 7 = 2, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 2, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 2, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 1, 28 = 0, 29 = 0, 30 = 0, 31 = 1, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 2, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 8, F = 0, F2 = 1, V = 0, V2 = 2, V3 = 5, T = 0, T2 = 0, P = 1, O = 6, Total = 21

Aquilegia formosa P-49b Roots - Swellings, bites, boils, stomach and intestinal problems (Smith, 1972). Beestings, sores (Moerman, 1986). Increase stamina (Turner, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 2, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 3, Total = 7

Trauvetteria caroliniensis V-28 Counterirritant for boils (Turner, 1973).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 1, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 1, Total = 1

ROSACEAE

Geum triflorum Ca-23a Plant - Aches, rheumatism, stiff and sore muscles, stiff and sore joints, sprains (Moerman, 1986). Tuberculosis (Hunn, 1990). Unspecified medicine (Turner, 1990).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 3, 7 = 0, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 1, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 1, T2 = 0, P = 1, O = 5, Total = 7

Geum triflorum Ca-23b Roots - Sore or swollen eyes, tonic (Johnston, 1970). Sore eyes, blood building (Nickerson, 1966 under syn. *Sieversia ciliata*). Chills (Hart, 1974). Canker sores, sore throat, general tonic for severe cough, clear the head, sores, rashes, blisters, flesh wounds, wounds (Hellson, 1974). Aches, rheumatism, body pain, body stiffness and pain, tonic (Moerman, 1986). Unspecified medicine (Turner, 1990).

1 = 0, 2 = 4, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 2, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 5, 44 = 0, 45 = 0, 46 = 2, 47 = 4, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 5, F = 0, F2 = 1, V = 0, V2 = 2, V3 = 0, T = 0, T2 = 0, P = 5, O = 9, Total = 20

Horkelia fusca Ca-26a,b Genus - stomach troubles, fever, colds (Timbrook, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 1, T = 0, T2 = 0, P = 0, O = 0, Total = 3

Luetkea pectinata N-31 Sores (2), abdominal pains (3), profuse or prolonged periods (2) (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 2, 22 = 0, 23 = 0, 24 = 2, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 2, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 5, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 2, Total = 7

Malus fusca N-47 Sore eyes (Eells, 1877 under crab-apple). Spitting blood (Willoughby, 1886). Wounds (Buchanan, 1899 under syn. *M. rivularis*). Gonorrhea, unspecified medicine (Reagan, 1934a under *Pyrus diversifolia*). Sore eyes (Olson, 1936 under crab apple). Tonic, healing wash for sores, boils and bleeding piles (Densmore, 1939). Cure all tonic (Turner and Bell, 1971). Tonic, general sickness, when a person is losing weight and coughing, cough medicine (Turner, 1983). Eye wash for soreness, eye wash (2), eye medicine, tuberculosis, rheumatism, laxative, diuretic, blood spitting, eczema, skin troubles, intestinal disorders, dysentery, diarrhea, wounds, lung trouble, cuts (2), stomach disorders (Moerman, 1986; reference under syn. *Pyrus fusca*). Sciatica (Turner, 1990). Ulcers and intestinal disorders (Forlines, 1992). Kills poison in muscles after long day hunting (Compton, 1993).

1 = 0, 2 = 1, 3 = 2, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 1, 9 = 0, 10 = 1, 11 = 0, 12 = 1, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 4, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 1, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 6, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 5, 44 = 0, 45 = 0, 46 = 3, 47 = 3, 48 = 3, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 3, B2 = 11, F = 0, F2 = 1, V = 0, V2 = 1, V3 = 1, T = 1, T2 = 3, P = 5, O = 13, Total = 36

Physocarpus opulifolius M-10 Laxative, purgative, emetic if too much taken, constipation, locomotor ataxia (Turner and Bell, 1971). Emetic to clean out the bile in your stomach for stomachache, internal pain and as general tonic, gonorrheal sores and scrofulous glands in the neck (Turner, 1973). Rheumatic pain, laxative, purgative, emetic (Turner and Efrat, 1982). Emetic (Moerman, 1986 under *P. capitatus*).

1 = 0, 2 = 2, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 4, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 3, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 2, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 0, 47 = 1, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 1, P = 1, O = 12, Total = 15

Potentilla norwegica N-18 Spider bite (Wyland and Harris, 1941). Sore throat, sexual infections, physic, unspecified, pain (Moerman, 1986).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 1, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 1, 41 = 0, 42 = 0, 43 = 2, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 2, O = 2, Total = 6

Purshia tridentata Ca-10 Coughs and other lung and bronchial troubles, emetic (Coville, 1897 under syn. *Kunzia tridentata*). Clear pus from the eyes, emetic, venereal disease, smallpox (Murphy, 1959). Snowblindness, cause measles to erupt on the skin and thus reduce fever (Smith, 1972). Hemorrhage (Turner, 1980). Colds, tuberculosis, venereal disease, tubercular lung pain, lung troubles (2), heal internal ruptures, bronchial troubles, coughs, fever, emetic (5), constipation, physic (3), tonic, skin problems, diseases with rashes, measles, smallpox, chickenpox, liver trouble, pneumonia, constipation, deliver placenta, facilitate delivery of the placenta, during confinement (Moerman, 1986). Emetic for flu and fever, laxative, wash for itch (Hunn, 1990).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 2, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 2, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 8, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 2, 34 = 1, 35 = 1, 36 = 0, 37 = 2, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 5, 44 = 0, 45 = 1, 46 = 1, 47 = 3, 48 = 6, 49 = 4, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 2, B2 = 7, F = 0, F2 = 3, V = 4, V2 = 7, V3 = 3, T = 1, T2 = 4, P = 4, O = 18, Total = 42

Rosa canina Ca-11 People weakened by long sickness (Josselyn, 1860). Genus - see next entry.

1 = 0, 2 = 1, 3 = 3, 4 = 1, 5 = 0, 6 = 2, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 1, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 3, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 6, 36 = 2, 37 = 2, 38 = 0, 39 = 0, 40 = 3, 41 = 0, 42 = 0, 43 = 5, 44 = 1, 45 = 1, 46 = 7, 47 = 9, 48 = 0, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 18, F = 1, F2 = 2, V = 1, V2 = 4, V3 = 4, T = 0, T2 = 0, P = 5, O = 17, Total = 49

Rosa woodsii P-48 Sore mouth, salve, given to newborn before mother's milk is given (Jones, 1931 under syn. *R. fendleri*). Sore throats, mouth or throat sores, skin troubles, eczema, fever blisters, physic (Curtin, 1965 under syn. *R. fendleri*). Drawing effect for muscle pains (Nickerson, 1966). Eyewash (Stubbs, 1966). Sore eyes caused by excessive exposure to the sun (5) (Hart, 1974). Burns (2), opened boils, diarrhea (2), intestinal influenza, colds (3), cuts (2), sores (2), swellings (2), wounds (2), blood tonic, spring tonic, general debility, failure of urination (Moerman, 1986). Burns, sore navel (Hunn, 1990). Sore throat, itchy throat, cough especially in babies, syphilis, athlete's foot, after childbirth, women's illness, hasten delivery, compounded for diarrhea and vomiting (Turner, 1990).

1 = 0, 2 = 1, 3 = 3, 4 = 1, 5 = 0, 6 = 2, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 1, 13 = 1, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 3, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 6, 36 = 2, 37 = 2, 38 = 0, 39 = 0, 40 = 3, 41 = 0, 42 = 0, 43 = 4, 44 = 1, 45 = 1, 46 = 7, 47 = 9, 48 = 0, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 18, F = 1, F2 = 2, V = 1, V2 = 4, V3 = 4, T = 0, T2 = 0, P = 4, O = 17, Total = 48

Sorbus sitchensis P-54 Enuresis (Turney-High, 1941 under mountain ash). Stomach troubles, rheumatism, eye wash, head lice (Turner, 1973). Bedwetting in young children (Turner, 1980). Sore throats, tonsilitis, flu, cough, tuberculosis (2), mouth sores, difficult urination, constipation (Kari, 1987). Fever (Hunn, 1990 under *Sorbus* ssp.). Earache, weak kidneys with too frequent urination (Turner, 1990).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 1, 36 = 2, 37 = 0, 38 = 0, 39 = 0, 40 = 2, 41 = 0, 42 = 0, 43 = 0, 44 = 3, 45 = 0, 46 = 0, 47 = 1, 48 = 2, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 8, F = 0, F2 = 0, V = 1, V2 = 3, V3 = 1, T = 2, T2 = 0, P = 0, O = 6, Total = 18

RUBIACEAE

Galium trifidum M-9 Ague, rheumatism (Mason, 1886 under *Galium* ssp.). Kidney troubles (Johnson, 1907). Diuretic, benefical effect on respiratory organs (Erichsen-Brown, 1979). Skin diseases like ringworm, scrofula, eczema (Moerman, 1986). Aches and pains (Kari, 1987).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 1, 45 = 0, 46 = 0, 47 = 3, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 1, F2 = 0, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 1, P = 0, O = 5, Total = 9

Galium triflorum V-21 Ague, rheumatism (Mason, 1886 under *Galium* ssp.). Kidney troubles (Johnson, 1907). Dropsy (Barrett and Gifford, 1933). Chest pains (Turner and Bell, 1973). Kidney trouble, hair growth (3), gallstones, baby's backache, swollen testicles or ruptures (Moerman, 1986). Aches and pains (Kari, 1987).

1 = 0, 2 = 3, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 3, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 2, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 3, F = 0, F2 = 3, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 0, O = 7, Total = 13

SAXIFRAGACEAE

Boykinia elata N-44 Tuberculosis (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 1, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 1, T2 = 0, P = 0, O = 0, Total = 1

Leptarrhena pyrolifolia V-24 Sickness such as influenza, wounds, sores (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 1, 47 = 1, 48 = 0, 49 = 1, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 0, F2 = 0, V = 1, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 0, Total = 3

Mitella breweri N-30 Genus - intestinal disorders, purgative, emetic, colic, hasten elimination, sore eyes (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 1, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 1, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 1, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 1, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 5, Total = 6

Tiarella trifoliata V-27 Cough medicine (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 1, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 1, T = 0, T2 = 0, P = 0, O = 0, Total = 1

SCROPHULARIACEAE

Castilleja affinis Ca-27 Non-menstrual bleeding, diuretic, spitting blood (Hellson, 1974 under *Castilleja* ssp.). Infected sores (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 1, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 1, P = 0, O = 2, Total = 4

Castilleja thompsonii P-44 On open cut to draw out germs (Turner, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 0, Total = 1

Euphrasia officinalis M-16 Head cold, hay fever (Moore, 1993).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 1, T = 0, T2 = 0, P = 0, O = 1, Total = 2

Mimulus guttatus V-26 Astringent, cure for diarrhea (Barrett and Gifford, 1933 under *Mimulus* ssp.). Rope burns (Murphy, 1959). Febrifuge (Pennington, 1963a; 1969). Cuts, skin sores, colds, flu and many other ailments (Smith, 1972). Sore chest and back, wounds, rope burns (Moerman, 1986). Wounds, eyes (Hunn, 1990).

1 = 0, 2 = 1, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 1, 15 = 0, 16 = 0, 17 = 0, 18 = 1, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 1, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 5, 47 = 1, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 5, F = 0, F2 = 0, V = 1, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 6, Total = 14

SELAGINELLACEAE

Selaginella wallacei N-37 Genus - wounds, fever, very sick (Alcorn, 1984). Vaginal hemorrhage, compounded for urinary tract infections (uretritis (10), cystitis (2), kidney pain) (Encarnacion and Agundez, 1986; under *S. lepidophylla*).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 1, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 1, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 12, 45 = 0, 46 = 1, 47 = 0, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 14, F = 0, F2 = 0, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 1, O = 2, Total = 17

THALLOPHYTA (Algae)

Enteromorpha clathrata V-41 No references to the medicinal use of this genus.

Fucus gardneri (Fucaceae) V-34 Locomotor ataxia, rheumatism, generally sick, feminine medicine, compounded for aches and pains such as swollen feet, itchy scabs, sores (Turner and Bell, 1973). Demulcent, emollient (Meyer, 1981). Sore eyes (Turner, unpublished Haida manuscript).

1 = 0, 2 = 1, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 3, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 1, 46 = 0, 47 = 2, 48 = 0, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 1, F = 0, F2 = 2, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 1, O = 6, Total = 10

Laminaria saccharina V-43 No references to the medicinal use of this genus.

Mazzaella splendens V-45 No references to the medicinal use of this genus.

Nereocystis luetkeana V-42 Scabs, burns, non-pigmented spots, hair growth, swollen feet (Turner and Bell, 1973).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 1, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0,

19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 1, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 1, 47 = 1, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 2, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 3, Total = 5

Ulva fenestrata (Ulvaceae) V-44 Woman's cold or sore, hard breasts after childbirth (Turner and Bell, 1973).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0,

19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0,

39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 1, 46 = 0, 47 = 0, 48 = 0, 49 = 0, 50 = 0,

51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 0, F = 0, F2 = 0, V = 0, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 1, Total = 1

TYPHACEAE

Typha latifolia M-19 Whooping cough (Speck, 1941). Sores (Mechling, 1959). Poultice for wounds, sores and infections (Black, 1980). Diuretic, insect bites (Meyer, 1981). Down used for: wound dressing on burns and scalds (7), prevent chafing (5), poultice old sores on neck, poultice for small pox pustules, young flowering heads eaten to stop diarrhea (Moerman, 1986).

1 = 0, 2 = 0, 3 = 1, 4 = 0, 5 = 0, 6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 1, 11 = 0, 12 = 0, 13 = 0, 14 = 0,

15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 1, 23 = 0, 24 = 0, 25 = 0, 26 = 0,

27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 1, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 8, 47 = 9, 48 = 1, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = , B2 = 13, F = 0, F2 = 5, V = 0, V2 = 1, V3 = 0, T = 0, T2 = 0, P = 0, O = 2, Total = 22

VALERIANACEAE

Plectritis congesta Ca-6 No references to the medicinal use of this genus.

Valeriana sitchensis N-29a Plant - Rheumatism (Brown, 1868 under Valeriana - kunko). Cuts, wounds, bruises, inflammation (Moerman, 1986). Flu, ulcers, stomach troubles, cuts and bruises (Turner, 1990).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 3, 7 = 0, 8 = 1, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 3, 47 = 1, 48 = 0, 49 = 1, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 5, F = 0, F2 = 0, V = 1, V2 = 0, V3 = 0, T = 0, T2 = 0, P = 0, O = 4, Total = 10

Valeriana sitchensis N-29b Roots - Unspecified medicine (Niblack, 1888). Pains (2), colds (2), cuts, wounds, bruises, inflammed regions, swellings (Moerman, 1986). Colds (4), flu, ulcers, stomach troubles, diarrhea, shadow on your lung (3), wash for galls, sores and wounds, reduce swelling (Turner, 1990). Sore muscles (Turner in Pojar and MacKinnon, 1994).

1 = 0, 2 = 3, 3 = 1, 4 = 0, 5 = 0, 6 = 4, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 6, 19 = 0, 20 = 0, 21 = 1, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0, 36 = 1, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 1, 44 = 0, 45 = 0, 46 = 3, 47 = 2, 48 = 4, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 6, F = 0, F2 = 0, V = 1, V2 = 0, V3 = 6, T = 0, T2 = 3, P = 1, O = 9, Total = 26

VIOLACEAE

Viola glabella Ca-16 Genus - Children's colds, mumps (Stubbs, 1966). Colds (4), flu (4), chills (4), fever (4), mumps (Hart, 1974 under *Viola* ssp.). Sores, wounds, eyes (Moerman, 1986).

1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 8, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 5, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 1, 36 = 0, 37 = 0, 38 = 0, 39 = 0, 40 = 0, 41 = 0, 42 = 0, 43 = 0, 44 = 0, 45 = 0, 46 = 1, 47 = 1, 48 = 6, 49 = 0, 50 = 0, 51 = 0, 52 = 0, 53 = 0

B = 0, B2 = 10, F = 0, F2 = 0, V = 6, V2 = 8, V3 = 5, T = 0, T2 = 0, P = 0, O = 1, Total = 22

References - see Appendix 9.

6.8 Appendix 8 - Summary of *Artemisia* Ethnobotanical Literature.

***A. absinthium* L. - Absinthe, Wormwood.**

Stop postpartum hemorrhage, postpartum pain, wounds, boils and abcesses, chant lotion ingredient to relieve headache, fever, lameness, general body aches and pains, coughs, colds, and chills (Wyland and Harris, 1941). Children with worms (Banks, 1953). Heal the mother's insides after childbirth, draw out the pain and quickly heal the wound (3) (broken limbs), tuberculosis (3), head colds (3), chest cold, flu, diaphoretic, venereal disease, stomach ailments (Turner, 1980). Stimulant, antihelminthic, emmenagogue, antiseptic, antispasmodic, carminative, cholagogue, febrifuge, stimulate appetite, indigestion, gastric pain, labor pain, alleviate menstrual cramps, abortifacient, diminishes milk flow, skin irritations, sprains, bruises, arthritic or neuritic pain (Meyer, 1981). Sprain or strained muscles, vermifuge (Moerman, 1986).

***A. arbuscula* Nutt. ssp. *arbuscula* - Dark or Dwarf Sagebrush, Little or Low Sagebrush, Scabland**

Hemostatic remedy (Curtin, 1965 under *A. tridentata* - the low-growing variety). See also *A. tridentata.*

***A. bigelovii* Gray - Bigelow's Sage-bush, Bigelow Sagebrush, Flat Sagebrush.**

Stop postpartum hemorrhage, postpartum pain, wounds, boils and abcesses, chant lotion ingredient to relieve headache, fever, lameness, general body aches and pains, coughs, colds, and chills (Wyland and Harris, 1941). Grippes, flatulence, indigestion, relieve stomach pains, rheumatism, croup, pains in the chest and limbs due to cold, flu, colds accompanied by high fevers, hemostatic, stop wounds from bleeding (Curtin, 1965). See also *A. tridentata.*

***A. californica* Less. - Coast Sagebrush, Old Man.**

Wounds, swellings (Hagenbuck, 1897). Reduce the pain of toothache, colds, coughs, asthma, rheumatism, wounds, vaginal troubles (Moerman 1986).

A. *campestris* L. ssp. *caudata* (Michx.) H. et C. - Tall Wormwood, Western Sagebrush.

syn. *A. canadensis* common names - Canada Wormwood, Sea Wormwood, Wild Wormwood.

Tonic (Pitcher, 1860 under *A. canadensis*). Tonic (Andros, 1883 under *A. canadensis*). Headache (Hough, 1898 under *A. canadensis*). Prevent falling hair, stop postpartum hemorrhage, postpartum pain, wounds, boils and abcesses, chant lotion ingredient to relieve headache, fever, lameness, general body aches and pains, coughs, colds, and chills (Wyland and Harris, 1941). Stomach trouble, coughs, eczema, rheumatic parts, sore eyes, hair tonic especially with children which cleansed as well as treated scalp infection (Hellson, 1974 under *A. campestris*). One who cannot urinate or whose bowels do not move, difficulty giving birth (Rogers, 1980 under *A. campestris*). Remedy for constipation, inability to urinate, difficulty in childbirth (Munson, 1981 under *A. campestris*). Coughs, colds, tuberculosis, bruises, sores, medicine for everything (Moerman, 1986 under *A. campestris*). Bad burns, restore menstrual flow, diarrhea, after childbirth, hasten postpartum recovery, unspecified medicine (Moerman, 1986 under *A. canadensis*). "Chills", when one is "sick at the stomach" (Moerman, 1986 under *A. caudata*). Diarrhea, hasten mother's recovery after childbirth, unspecified medicine (Turner, 1990).

A. *cana* Pursh - Hoary Sagebrush, Hoary Silver Sagebrush, Silver Sagebrush, White Sagebrush.

Astringent, eczema, body deodorant, foot bath for perspiration (Toineeta, 1970). Unspecified medicine (Rogers, 1980). General tonic, various complaints, allay thirst, hair restorer (Moerman, 1986). Same as A. tridentata.

A. *carruthii* Wood ex. Carruth - Kansas Mugwort.

Stop postpartum hemorrhage, postpartum pain, wounds, boils and abcesses, chant lotion ingredient to relieve headache, fever, lameness, general body aches and pains, coughs, colds, and chills (Wyland and Harris, 1941). Fever, influenza, cough, body pain from severe cold, "life medicine", sweatbath medicine (Moerman, 1986).

A. *douglasiana* Bess. - California Wormwood, Douglas's Mugwort.

Poison oak, check hemorrhages, heal wounds (Johnson, 1907 under syn. *A. heterophylla*). Unspecified medicine (Kroeber, 1925 under syn. *A. heterophylla*). Used like *A. vulgaris* - rheumatism, clear the head, headache (Barrett and Gifford, 1933 under *A. vulgaris* L. var. *heterophylla*). Reduce baby's fever, kidney and bladder trouble, rheumatism (Murphy, 1959 under syn. *A. heterophylla*). Childbirth, excessive menstruation, baby's umbilicus after navel cord severed (Gifford, 1967 under syn. *A. vulgaris* L. var. *heterophylla*). Babies navel after umbilical severed, excessive menstruation, ease menstrual cramps, stomachache, cramps associated with diarrhea, itching sores (Goodrich, 1980). Sores, welts, rheumatism, aches and pains, diarrhea, after childbirth, newborn's navel (Peri, 1982). Wounds, hunting accident spot, cuts, bruises, sores, poison oak antidote, urinary problems, prevent hair loss, stomachache, colic, fever, grippe (2), diarrhea, dysentery, internal troubles, colds, bronchitis, asthma, earaches, headache (5), sore eyes, pains, back pain, arthritic pain, rheumatism pain (2), rheumatism (3), prevent premature aging of girl, after childbirth, childbirth difficulties, promote blood circulation after childbirth (Moerman, 1986). Itches, sores (Hunn, 1990).

***A. dracunculus* L. - Dragon Sage, Dragonwort, False Tarragon, Linear-leaved Wormwood, Silky Wormwood, Sweet Sagebrush, Wild Tarragon, Yerbanis, Yerba niso.**

Bruises, contusions, fractures to prevent swelling (Hrdlicka, 1908 under syn. *A. dracunculoides*). Contusions (Yager, 1911). Unspecified medicine (Kroeber, 1925 under syn. *A. dracunculoides*). Stop postpartum hemorrhage, postpartum pain, wounds, boils and abcesses, chant lotion ingredient to relieve headache, fever, lameness, general body aches and pains, coughs, colds, and chills (Wyland and Harris, 1941). Stomachache (Owen, 1963). Reduce swelling in feet and legs, open sores (Stubbs, 1966). Relieve colic pains (Pennington, 1969 under an estafiate, *A. dracunculoides*). Eyewash, snowblindness (Toineeta, 1970). Swollen feet and legs (Hart, 1974). Heal diaper rash and rawness of skin, headache, relieve the pain of rheumatism and arthritis, stomachache, colds, general tonic (Turner, 1980). Urinary problems, dysentery, infant's colic, rheumatism, colds, women at childbirth, relieve tiredness, keep away sickness and germs, unspecified medicine (Moerman, 1986). "Excessive flowing" and "stoppage of periods", difficult labor, women after childbirth (2), tonic after childbirth, irregular menstruation, chronic dysentery, heart palpitations, "steaming old people to make them stronger", strengthening bath for children, cuts, wounds, rheumatism (4), stiff joints (2), other aches, sprains (2), swellings, aching bones or muscles (2), relieve nettle stings, relieve eye trouble, headaches (2), colds, sore throat or neck glands, venereal disease, relieve fevers, physic, unspecified (4) (Moerman, 1986 under *A. glauca*). Stomachaches, liver obstruction, tuberculosis, menstrual pains and regulation, colics and stomach ailments, colds and coughs, nervousness and sleeplessness, colic of babies and stomach aches, aid digestion, relieve gastrointestinal disorders, intestinal blockage, gastrointestinal pain caused by cold, dangerous inflammatory fevers (Linares and Bye, 1987). Alleviate the swelling and discoloration of bruises (3), arthritis, colds, babies colds, stop itching of chickenpox, headache, women after childbirth, rheumatism, stiffness of the joints and muscles, aching bones or muscles, sprains (Turner, 1990).

***A. filifolia* Torrey - Romerillo, Sand Sagebrush, Sand Wormwood, Silver Sage, Silvery Wormwood.**
Swellings and bruises (Palmer, 1878). After childbirth, purification, widely used unspecified medicine (Carlson and Jones, 1939). Stop postpartum hemorrhage, postpartum pain, wounds, boils and abcesses, chant lotion ingredient to relieve headache, fever, lameness, general body aches and pains, coughs, colds, and chills (Wyland and Harris, 1941). Rheumatism, sciatica (Campa, 1950 under romarillo = *A. filifolia*?). Asthma, indigestion, flatulency, biliousness, drive away stomach pains, rheumatism, astringent, "good for everything" (Curtin, 1965 under Romerillo = *A. filifolia*). Headaches (Ford, 1975 under silver sage = romerillo). "Woman's gray herb" (Rogers, 1980). After childbirth, boils, indigestion (2), flatulence, biliousness, snake bites (Moerman, 1986).

***A. frigida* Willd. - Colorado Sage, Estafiata, Fringed Sagebrush, Mountain Ball Sage, Mountain Wormwood, Prairie Sagewort, Pasture Sage, Pasture Sagebrush, Rocky Mountain Sage, Sierra Salvia, Wild Sage, Wormwood Sage.**
Local pains and nervous shooting (Morice, 1892). Badly frightened person (Hrdlicka, 1908). Stomach medicine (Jones, 1931). Stop postpartum hemorrhage, postpartum pain, wounds, boils and abcesses, chant lotion ingredient to relieve headache, fever, lameness, general body aches and pains, coughs, colds, and chills (Wyland and Harris, 1941). Coughs (Murphy, 1959). Stop hemorrhages (Nickerson, 1966). Mountain fever, heartburn, colds and coughs (Johnston, 1970; 1982). Astringent, eczema, body deodorant, foot bath for perspiration (Toineeta, 1970). Menstrual pad which reduced skin irritation, lessen the swelling of wounds, bleeding nostril (Hellson, 1974). Stomachache (Ford, 1975 under Rocky Mountain Sage). Make one sweat to get rid of a cold or flu (2), medicine good for anything (Turner, 1980). Diuretic, laxative (Meyer, 1981). Loss of appetite (Munson, 1981). Used by women during the period of their menses and for baby diapers (Johnston, 1982). Mountain fever, convulsions,

cure for "fits", flatulence, biliousness (2), indigestion, heartburn, nosebleed, stop bleeding from wounds, irregular menstruation (4), disinfect room of contagious patient, lung troubles, consumption, cough, colds, toothache, "life medicine", revive comatose patient, stimulant, tonic, unspecified medicine (Moerman, 1986). Some kind of medicine, possibly for venereal disease (Turner, 1990).

***A. lindleyana* Bess. in Hook. - Columbia (River) Mugwort, Columbia Sagebrush.**

Colds (3), influenza, overeating, indigestion, diarrhea, arthritis, bonesetter, "clean you, heal your insides" (Turner, 1990). See also *A. ludoviciana.*

***A. longifolia* Nutt. - Long-leaved Mugwort.**

See also *A. ludoviciana* and *A. vulgaris.*

***A. ludoviciana* Nutt. - Cud-weed Mugwort, Dark-leaved Mugwort, Estafiate, Gray Sage, Lobed Cudweed, Louisiana Sage, Prairie or Western Mugwort, Prairie or Western Sage, Small Sagebrush, Teposano, White sage.**

Assist childbirth, nose hemorrhage (Palmer, 1878). Disinfectant, women's medicine ("drunk by women at certain periods" - menses ?) (Dunbar, 1890). Menstruation (Gilmore, 1930). Relief for soreness or stiffness, prevent feet from sweating, sweat bath ingredient (Swank, 1932 under *A. gnaphalodes*). Sore and inflammed eyes (Steward, 1938 under *A. gnaphalodes*). Unspecified (Carlson and Jones, 1939). Headache, earache, stomachache, sore eyes, sore throat, cold, cough, boils (Foster, 1944). Keep disease away (Merriam, 1962). Menstruation (Pennington, 1963a). Colds, Rocky Mountain fever (Stubbs, 1966). Sore eyes (2), itching skin, sores (Merriam, 1967). Relieve itching and swelling of insect and spider bites (Jones, 1968; 1972). Stomach and bowel disorders, feet and legs soak (Smith, 1972). Bruises, itchiness, colds, wash for areas affected with poison ivy (Hart, 1974). Respiratory disorders, relieve chest and throat constrictions, blisters, bust boils, foot deodorant (Hellson, 1974). Bad colds with coughing and bronchitis (Hinton, 1975). Hasten healing of sores, snuff for head cold or headache, clear man's wind and enable him to walk long distances (Turner, 1980). Earache, gastrointestinal pain, vomiting, swellings, infections, inflammation, embedded thorn, whiny or crying child

(Alcorn, 1984). Sinus attacks, nosebleeds, nasal hemorrhage, headaches (4), drive away bad or ominous dreams, antidote for bad medicine, stomach trouble, stomachache (2), diarrhea (2), fevers (3), steam out infection of influenza, influenza, severe infections, heavy colds (2), head colds, cut phlegm, for the lungs, tonsilitis, sore throat, aching feet, rheumatism or other aches, swellings, skin eruptions (2), boils, old sores, scrofulous sores, sores, rashes (2), itches (2), eyewash (2), babies fevers (2), tonic after childbirth, regulator of menstrual disorders, venereal disease, physic, "life medicine", lustration (Moerman, 1986). Colds (3), influenza, overeating, indigestion, diarrhea, arthritis, bonesetter, "clean you, heal your insides" (Turner, 1990).

A. ludoviciana* ssp. *ludoviciana

Stomach pains, stomachache, rheumatism, expectant mothers, expel the afterbirth (Curtin, 1965 under syn. *A. rhizomata*).

***A. ludoviciana* ssp. *mexicana* (Willd.) Keck - Iztauhyatl, Estifiate, Mexican Mugwort.**

Antihelminthic (Braubach, 1925 under syn. *A. mexicana*). Pleurisy, coughs, asthma, diarrhea, colic, chills, swollen testicles, cure white spots on the skin, vertigo (Roys, 1931). Antispasmodic (Cerna, 1932 under syn. *A. mexicana*). Colic, substitute for true ajenjo (*A. absinthium*) - stomachic, antihelminthic, light aperative (Zingg, 1932 under syn. *A. mexicana*). Burns, wounds, spots in the face, felons (Campa, 1950 under *A. mexicana*). Ease discomfort caused by colds (Pennington, 1963a; 1969). Women drink during menstruation (Pennington, 1963b under *A. ludoviciana* var. *mexicana*). Diarrhea, dysentery, intestinal obstructions, relief from stomachache or pain in the side, stimulant, antihelminthic, emmenagogue, purge for babies suffering from diarrhea and vomiting, children's cough and phlegm, rheumatism (Curtin, 1965 under syn. *A. mexicana*). Drive soreness away from aching parts of the body, headache, whenever (one) did not feel well, moxa for headache or other pains, used in sweat house to treat rheumatism, body aches, arthritis, depression or not feeling well (Jordan, 1965). Relieve weakness, against colic, reduce fever, against coughs (Montellano, 1975). Rheumatism, tonic for "aire frio", stomach, diarrhea, coughs, colic, flatulence, bile problems, pleurisy, asthma, dysentery, intestinal obstructions, stimulant, antihelminthic, emmenagogue, antiseptic, antispasmodic, carminative, cholagogue, febrifuge, stimulate appetite, indigestion, gastric pain, labor pain, alleviate menstrual cramps, abortifacient, diminishes milk flow, skin irritations, sprains, bruises, arthritic or neuritic pain (Meyer, 1981). Antihelminthic, muscle weakness and spasm, deafness, dropsy, emetic, alleviate tenesmus and liver obstructions, digestive, antipyretic, increase appetite, "interacts" with the uterus (Loyoza, 1982). Sores, sore throats, purifying agent in the sweat house (Moerman, 1986 under *A. mexicana*).

***A. ludoviciana* ssp. *redolens* - Anisote.**

Colic and other stomach troubles (Curtin, 1965 under *A. redolens*). Aromatic bitter (tonic), diaphoretic (Meyer, 1981).

***A. michauxiana* Bess. ex. Hook. - Michaux's Mugwort.**

Enuresis (Turney-High, 1941 under syn. *A. discolor*). Astringent, eczema, body deodorant, foot bath for perspiration (Toineeta, 1970). Headache, sprains, swellings, unspecified medicine (Moerman, 1986; under syn *A. discolor*). Unspecified medicine (Turner, 1990; specific identification uncertain, referred to as friend of *A. canadensis*).

***A. nova* A. Nels. - Black Sagebrush, Little Black Sagebrush.**

Physic (Murphy, 1959). Coughs and colds (Moerman, 1986).

***A. pycnocephala* (Less.) DC. - Beach Sagewort, Beach Sagebrush.**

Headache, grippe, stomachache, swellings, etc. (Moerman, 1986). See also *A. camprestris*.

***A. rothrockii* Gray - Rothrock Sagebrush, Timberline Sagebrush.**

See *A. tridentata*

***A. spiciformis* Osterh. - Sub-alpine Sagebrush.**

see *A. tridentata*

***A. spinescens* D.C. Eaton - Bud Sage, Bud Sagebrush, Spring Sagebrush.**

Medicine for bladder (Murphy, 1959). Chronic stomach troubles and cramps, influenza, indigestion, swellings, rheumatism, colds, coughs, chest congestion, prevent bedsores, sores, bruises, "draw out boils", stoppage of the bladder, skin irritations and rashes, itch, stop nosebleed, stop tubercular hemorrhage (Moerman, 1986).

***A. suksdorfii* Piper. - Coastal or Suksdorf Mugwort.**

No references to the medicinal use of this species found in the literature.

***A. tilesii* Ldb. - Aleutian Mugwort, Cariboo Leaves or Weed, Moose Brush, Raychlook.**

Colds, injuries, swellings (Anderson, 1939). Chest pain, cough, sore eyes (Honigmann, 1949 under "moose brush"). Cuts, break up colds (Osgood, 1966). Body deodorant, tobacco substitute (Young and Hall, 1972). Wash for skin rash, cuts (2), blood poisoning, sore eyes and any kind of infection; swelling, arthritis, other body aches, toothache, earache, snowblindness, athlete's foot, itching, childbirth, bad burn, boils, chest ailments, colds (3) (Kari, 1977; 1987). Chest colds, severely infected wound, impetigo of the face and scalp, relieve arthritic joint pain (Overfield, 1980). Colds, sore throat, excessive bleeding from a cut, for the kidney, when stomach gets too hard you can drink it like a laxative, infected minor cut, wounds, lacerations, broken limbs, internal bleeding, postnatal hemorrhaging (Ball, 1983). Antitumor agent, diseases from rheumatism to tuberculosis, skin infections, stomachache, heal a sprained or sore limb, painful joint, sweat bath (Moerman, 1986). "Switch" for rheumatism, sore muscles and minor cuts, tonic especially good for dying person (Moerman, 1986 under *A. unalaskensis*). Cancer, smoked like marijuana - it makes you giggle, makes you dizzy (Carulick, 1989). Cancer, stomach ailments, arthritis, headaches, heal and prevent infection in cuts and wounds (Butterworth, 1989). Breast cancer, preventative medicine (Carlick, 1989). Stomach ulcers, cancer, wounds, sore throat, inflammation, infected wounds (Williams, 1989).

***A. tridentata* Nutt.** - Big Sagebrush, Chamiso Cimmarron, Rama ceniza, Seniso.

Headache, colds, stimulant, worms (Palmer, 1878). Check diarrhea, eyewash, liniment (Coville, 1897). Person whose ailment is supposed to be in the ilium (Hough, 1897; 1898). Unspecified medicine (Chamberlain, 1909). Fever (Yager, 1911). Pains in arms and legs, fevers resulting from grippe or colds, abdominal pains and disorders, ease pain of toothache (Steward, 1938). Stop postpartum hemorrhage, postpartum pain, wounds, boils and abcesses, chant lotion ingredient to relieve headache, fever, lameness, general body aches and pains, coughs, colds, and chills (Wyland and Harris, 1941). Burns, wounds, spots in the face, felons (Campa, 1950). Indigestion (Murphy, 1959). Grippes, flatulence, indigestion, rheumatism, croup, pains in the chest and limbs due to cold, flu, colds accompanied by high fevers, relieve stomach pains, hemostatic, stop wounds from bleeding (Curtin, 1965). Universal therapeutic, sores (Moriarty, 1965). Colds, pneumonia (Stubbs, 1966). Colds, lung congestion, stop external bleeding (Smith, 1972). Colds (Melgrave, 1973; under "sagebrush"). Colds and pneumonia (Hart, 1974). Bad cold with coughing and bronchitis (Hinton, 1975). Athlete's foot infections, fissures between toes, foot deodorant, colds, body aches, stomachaches (Camazine, 1980). Unspecified medicine (Rogers, 1980). Colds, coughs, sore throats, tonsilitis, nasal and throat decongestant, diaphoretic for colds (2) and grippe, indigestion, biliousness, tuberculosis, smallpox, kills germs (Turner, 1980). Intermittant fever, relieve fever, coughs, colds, gout, croup, bronchitis, neuralgia due to colds and flu, rheumatism (Meyer, 1981). Stomach complaints, children's stomachache, stomachache (2), stomach cramps, stomach disorders, indigestion (3), constipation, laxative, emetic, carminative, digestive disorders, ailing ilium, diarrhea (2), malarial fever, diaphoretic (2), fevers (2), headaches (4), febrile conditions, "la grippe", influenza, pneumonia (3), colds (7), coughs (2), cough remedy (2), head colds (2), chest colds (2), bad colds, big cough, expectorant, sore throat, muscular cramps (2), sore feet, lumbago (2), rheumatism (2), swellings, aches and pains, liniment (2), wounds (2), cuts (3), sores (2), heal bullet wounds, antiseptic wash, water snake bites, red ant bites, poultice, inflamed eyes, eyewash (2), toothache, aid for deliverance of women, postpartum pain, talcum powder for babies, baby powder, antiseptic for newborns, tonic, panacea, poison antidote, revive a patient, fumigant for sickroom or utensils (Moerman, 1986). Colds, fever, headache, prevent gray hair (Hunn, 1990). Laryngitis, colds (4), consumption, emaciation, revive unconscious patient, arthritis, muscle relaxant, muscle ailments, contraceptive, protect against sickness (Turner, 1990).

A. tripartita **Rydb. ssp.** ***tripartita*** **- Cutleaf Sagebrush, Three-tip Sagebrush, Tall Three-tip Sagebrush.**

Used medicinally in the same way as the big sagebrush, *A. tridentata* - Colds, coughs, sore throats, tonsillitis, nasal and throat decongestant, diaphoretic for colds (2) and grippe, indigestion, biliousness, tuberculosis, smallpox, kills germs (Turner, 1980). Headaches, wounds caused by removed corns (Moerman, 1986).

A. vulgaris **L. - Common Mugwort, Zizim, Zitzim.**

Rheumatism, clear the head, headache (Barrett and Gifford, 1933). Antihelminthic, aromatic bitter (tonic), diaphoretic (Meyer, 1981). Relieve the pains of afterbirth, newborn babies navel, female backache and kneeache, headache, colds (3), pleurisy, "worm" medicine, gonorrheal sores, hasten healing of sores, purifying agent, any kind of sickness (Moerman, 1986).

Artemisia - vermifuge (Fenton, 1946 - Cherokee).

***Artemisia* sp. (Sagebrush)** - All stomach troubles (Cook, 1930). Snakebite (Toineeta, 1970).

***Artemisia* sp.** - relief from constipation (Jones, 1931 - New Mexico Isleta).

***Artemisia* sp. (Estifiate)** - Menstrual cramping, diarrhea, stomachache (3), stomach upset (Ford, 1975).

***Artemisia* sp. (Romerillo)** - Stomach ailments, suppositories (Ford, 1975).

***Artemisia* sp. (Sage, Shikatyuni, Big snake medicine)** - Rheumatism, salve, liniment, fever, headaches (Swank, 1932 Acoma and Daguna in New Mexico).

***Artemisia* sp. (Tsiutse - back medicine)** - Permanent cure for kidney trouble (Swank, 1932 Acoma and Daguna in New Mexico).

***Artemisia* sp. (Wormwood)** - Unspecified (Yager, 1911). Colds, hair rinse for dandruff (Stubbs, 1966).

Estafiate; Ajenjo (*Artemisia* sp.) - Stomachache, menstrual cramping, diarrhea (Ford, 1975).

Eskimo - colds (2), injuries or swellings, unspecified medicine (2) (Moerman, 1986).

Little sagebrush - wash out eyes (Murphy, 1959 - Paiute at Fort MacDermitt, Murphy identifies small sagebrush as *A. ludoviciana*).

Mugwort - purification of women after menstruation (Moerman, 1986 - Dakota).

Rameria - sagebrush (*Artemisia*) Cuts, wounds, general tonic (Carter, 1949 - California).

Ramero - bruises and contusions (King, 1902).

Sage - Colds, headache (Opler, 1965).

Sages - All New Mexico sages used at Santa Clara in the treatment of indigestion". (Robbin, et al cited in Jones, 1931).

Sagebrush - Emetic to cleanse the body of noxious fluids (Lowie, 1909a). Colds and minor distempers (Lowie, 1909b - Shoshone). Fever, venereal disease (Whitebread, 1924, Arapaho, Shoshone). Placed in nostrils for colds, used in sweat house (Murphy, 1927 - Lilloet).

Sagebrush = siklo'klũs (Klamath), black sage - Moxa for pain, rheumatism (Spier, 1930).

Sagebrush = Qémqem (Nez Perce, collected around the Salmon River) - Tuberculosis (Harbinger, 1964).

Small sage (*Artemisia* sp.) - Physic (Murphy, 1959).

Wild sage - Stomach troubles (5), rheumatism, many other ailments (5), purification (5) (Moerman, 1986 Dakota, Omaha, Pawnee, Ponca, Winnebago).

Wormwood - Amenorrhea (Pitcher, 1860). Earache, stomachache, sore throat, cough, cold, headache, boils, wounds (Foster, 1944 - Yuki, California). Healing poultice for sores, cuts, etc., disinfectanct, deodorant (Ring, 1930).

Wormwood = cuñten (Western Kuksu) - Gas on the stomach, colds, boils, infected cut (Loeb, 1934).

Wormwood = mûfũ'l SE (Pomo) - Wash for burns to relieve soreness and cause new skin to form rapidly, newborn's navel (Barrett, 1952).

Wormwood = mesini (Yokut) - Rheumatism (Gayton, 1950b).

References - see Appendix 9

6.9 Appendix 9 - Bibliography of ethnobotanical references

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7.0 Glossary

Abortifacient - substance which is used to cause abortion.

Adjuvant - substance which is combined with others to enhance or improve their action; seasoner.

Alterative - substance which produces a change in the whole system or alters appearance of local disease.

Ammenorrhea - abnormal suppression of the menses.

Analgesic - substance for the relief of pain without losing consciousness.

Anodyne - substance which soothes the nerves and allays pain, similar to sedatives and nervines.

Anthelminthic - substance for destroying or expelling worms from the body.

Antiemetic - substance which prevents or suppresses vomiting.

Antipyretic - substance that relieves or reduces fever.

Antirheumatic - substance that relieves rheumatic symptoms.

Antiscorbutic - substance for the prevention or cure of scurvy.

Antiseptic - substance for the inhibition or prevention of infection by microorganisms.

Antispasmodic - substance for the prevention or relief of spasms.

Antitussive - substance which decreases or suppresses coughing.

Astringent - substance that contracts or shrinks body tissue and blood vessels, thereby lessening secretions.

Beal - pimple, pustule or small inflammatory tumor.

Bright's disease - kidney disease characterized by the presence of albumin in the urine; nephritis.

Carminative - substance which is a local stimulant for the stomach and intestines, causing the expulsion of gas.

Catarrh - inflammation of upper respiratory passages with mucous discharge.

Cathartic - substance that stimulates evacuation of the bowels; purgative or laxative for cleansing the bowel.

Cephalic - of the head.

Chancre - venereal ulcer or sore.

Cholagogue - substance which promotes or increases bile secretion.

Cholera morbus - non-infectious, rarely fatal cholera with diarrhea and cramps; usually caused by contaminated foods.

Chorea - nervous disease with spasmodic, irregular movements which are uncontrollable.

Decongestant - substance for relieving congestion of airways.

Demulcent - emollient; mucilaginous substance which sheathes and soothes inflamed mucous membranes and raw surfaces.

Diaphoretic - substance which induces or increases perspiration.

Diuretic - substance which increases urinary discharge.

Dropsy - edema, abnormal accumulation of watery fluid in any body cavity or tissue; often a symptom of kidney malfunction or congestive heart failure.

Dysuria - difficulty or pain discharging urine.

Emetic - substance which induces vomiting.

Emmenogogue - substance which assists or promotes menstrual discharge.

Emollient - substance which softens or soothes surface tissues.

Erysipelas - acute infectious disease of skin or mucous membranes, characterized by fever and skin inflammation; usually caused by streptococcal infections.

Expectorant - substance which causes or increases the expulsion of mucous or phlegm.

Febrifuge - substance which reduces, drives away or removes fever.

Felon - painful, pus-producing infection at the end of a finger or toe, usually near nail.

Flux - diarrhea, looseness of stools.

Galactogogue - substance which promotes or increases the secretion of milk.

Hemostat - substance which arrests or stops bleeding.

Hydrophobia - rabies, "mad dog bite".

Lacteal stimulant - substance which induces or increases the secretion of milk.

Leucorrhea - whitish, mucous discharge from vagina or uterus; usually caused by yeast or bacterial infection.

Locomotor ataxia - chronic disease of the nervous system, usually caused by syphilis; characterized at onset by intense pain followed by disturbances of sensation, loss of reflexes and muscular coordination, functional disorders of the organs.

Narcotic - substance which induces lethargy, drowsiness, and profound sleep, usually for the relief of pain.

Nephritic - substance that has a local stimulant effect on the kidneys; substance for the treatment of kidney disease characterized by inflammation, degeneration, fibrosis, some types of which are called Bright's disease.

Nervine - substance that soothes or calms the nerves; nerve tonic.

Opthalmic - substance used for ailments or diseases of the eye.

Oxytocic - substance which promotes or hastens childbirth by stimulating uterine contractions.

Parturition - the act of childbirth.

Pectoral - substance useful in diseases of the breast and lungs.

Pertussis - cough.

Phthisis - consumption; tuberculosis.

Physic - substance which has a curative or healing effect; cathartics.

Ptomaine poisoning - acute digestive diorder caused by eating putrid or rancid food containing toxic bacteria; "food poisoning".

Purgative - cathartic; substance which causes bowel movements.

Rubefacient - counterirritant; substance which produces redness of skin with heat.

Rupture - hernia; especially abdominal or inguinal (near or around the groin) hernia.

Scald head - any of several scale diseases of the head.

Scrofula - tuberculosis of the lymphatic glands, especially the neck; characterized by enlargement and degeneration of the glands.

Scrofulous - scaly skin; also used generically to refer to degenerative or corrupt tissue.

Scurfy - covered with little dry scales shed by the skin as dandruff; dry matter adherring to the surface.

Sedative - substance which calms, moderates or tranquilizes; lessening pain, excitement, irritation.

Stimulant - substance which temproarily increases the activity of some vital process or organ.

Stomachic - digestive tonic; substance which stimulates the action of the stomach or strenghtens stomach.

Stranguary - difficult and painful passage of urine due to spasm of the urethra and bladder.

Styptic - astringent; blood coagulent; substance which halts bleeding by contraction of blood vessels or tissues.

Sudorfic - substance which causes or induces perfuse sweating, usually to reduce fever.

Summer complaint - cholera infantum; intestinal disease of infants and young children occurring in warm weather; characterisized by pain, vomiting, diarrhea, fever and prostration.

Suppurative - substance which induces or promotes the gathering and discharge of pus, festering; draws boil or abcess to a head and promotes discharge.

Tetters - skin diseases characterized by itching; eczema, psoriasis, etc.

Tonic - substance which gives strength to the entire system.

Vermifuge - substance which expels worms from the intestines.

Vulnerary - substance used for the cure of wounds.

Wens - small benign tumor or abnormal growth.

Whites - leucorrhea.

Whitlow - a painful, pus producing inflammation at the end of a finger or toe, near or under the nail; felon; flaw or flaking off of the skin near the quick or sensitive part of finger around the nail.