“Medicinal Lichens”, by Robert Rogers

LICHENS
LUNGWORT
(*Lobaria pulmonaria*)
(*Sticta pulmonaria*)
(*Pulmonaria officinalis*)
ICELAND MOSS
(*Cetraria islandica*)
USNEA
(*Usnea* spp.)
REINDEER LICHEN
(*Cladina* spp.)
STUDDED LEATHER LICHEN, FAIRY PELT/LEMON LICHEN
(*Peltigera aphthosa*)
GROUND LIVERWORT, DOG LICHEN
(*P. canina*)
WITCH'S HAIR
(*Alectoria sarmentosa*)
BLACK TREE LICHEN
(*Bryoria fremontii*)
(A. jubata)
SPECKLED HORSEHAIR
(*B. fuscescens*)
SIMPLE HORSEHAIR
(*B. simplicior*)
ALPINE CORAL
(*Stereocaulon alpinum*)
WILD OWL CLOVER
(*Evernia vulpina*)
NORTHERN PERFUME LICHEN
(*E. mesomorpha*)
PUNCTURED GRISTLE
(*Ramalina dilacerata*)
PLATED ROCK TRIPE
(*Actinogyra muhlenbergii*)
(*Gyrophora muhlenbergii*)
(*Umbilicaria muhlenbergii*)
FROSTED ROCKTRIPE
(*Umbilicaria vellea*)
(*U. americana*)
WAXPAPER LICHEN, POWDERED SHIELD
(*Parmelia sulcata*)
SALTED SHIELD, ROCK SHIELD
(*P. saxatilis*)
POWDERED SUNSHINE
(*Vulpicida pinastri*)
(*Cetraria pinastri*)
(*Tuckermannopsis pinastri*)
ROCK ORANGE LICHEN, JEWEL LICHEN
(*Xanthoria elegans*)
FRAGILE SPHAEROPHORUS
(*Sphaerophorus fragilis*)
ALPINE SPHAEROPHORUS
(*S. globosus*)
HOODED TUBE LICHEN, HOODED BONE, MONK’S HOOD LICHEN, PUFFED LICHEN
(*Hypogymnia physodes*)
SMOKY RIM LICHEN
(*Lecanora cenisia*)
GREEN LIGHT, ARCTIC KIDNEY LICHEN
(*Nephroma arcticum*)
Dermatocarpon moulinsii
Solorinia crocea
Siphula ceratites
Ramalina tumidula
Platismatia glauca
Thamnolia subuliformis
Haematomma lapponicum
Lepraria latebrarum et al.
PARTS USED- lichen thallus

“Late in life I have come on fern.
Now lichens are due to have their turn.”
ROBERT FROST

“Or to swamps where the usnea lichen hangs in festoons from the white-spruce trees.”
THOREAU

Did you hear the one about the fungus and the alga…They took a lichen to each other.

Lichen is from the Greek ***LEIKO*** - to lick or lick up; a habit of the plant to lap its tongues all over the host. Lichen may also come from the Greek for "leprous, wart or eruption", as Dioscorides thought they resembled the skin of afflicted people, and used the Doctrine of Signatures as an attempted cure. The French scientist Tournefort named them back in 1700 AD.
Usnea is from the Arabic ***USHNA*** for moss. *Bryoria* is derived from *Bryopogon* and *Alectoria*; two genera to which it was formerly assigned.

Lichens are a slow growing symbiotic combination of fungi and algae. As such, they do not completely resemble either group, but have their own beautiful and distinctive look. One lichenologist called lichens "fungi that have discovered agriculture", in reference to their symbiotic relationship.
For a long time, it was believed that the relationship was symbiotic. Many scientists now believe, following laboratory study, that the fungus is really a parasite. When lichens were experimentally separated in labs and grown apart, the algae grew more quickly and the fungus more slowly; however, when the two join forces, they can survive where neither would make it one its own. In fact, scientists could get them to rejoin only when conditions would not support them separately. Strange bedfellows indeed!

When this idea of two organisms living together was first proposed, it was considered quite radical.
Mordecai Cooke denounced this dualism as “unqualified romance which a future generation will contemplate as fairy tales”.
The German Simon Schwendener wrote in 1869, “This fungus…slaves are green algae, which it has sought out or indeed caught hold of, and compelled into its service. It surrounds them, as a spider its prey, with a fibrous net of narrow meshes, which is gradually converted into an impenetrable covering, but while the spider sucks its prey and leaves it dead, the fungus incites the algae found in its net to more rapid activity, even to more vigorous increase.”
The term helotism, suggesting a master-slave relationship, may best describe lichens.
They have the ability to grow in the coldest, snow-free alpine and boreal forest, often growing less than a millimeter a year. It is estimated that 13,000-30,000 lichen species inhabit the planet. Over 20 species are added to the list in British Columbia each year. Lichenographs, or printed illustrations, were first published in 1480. Linnaeus was not keen on lichens, and called them “Rustici pauperrimi”, or the poor trash of vegetation.
Lichens have been used for natural dyes, including the tartans of Scotland. A few crofters still produce Harris Tweed using the lichen *Parmelia omphalodes*. An added advantage over synthetic dyes was that bitter lichen acids repel moths. The related *P. chlorochroa*, which grows on calcareous rocks on the prairie grassland, was used

by the Navaho to produce nice warm brown dyes to their wools and blankets. Brilliant blues, pinks and purples are possible, something highly unusual in the plant kingdom, by using the ammonia in urine and fermenting for several weeks. It is said that smell of urine disappears in time and finally exudes a violet like scent. If not fixed by mordants, the colours quickly dull to a pale brown in sunlight.

Ochrolechia oregonensis, which grows with little pink discs on the rough bark of conifers, gives a violet, purple dye, and is somewhat plentiful.

The Cree used *Dicranum* lichen for lampwicks, and various *Umbilicaria* species for food. Other lichens, such as the Snow Bed Iceland, were simply used in northern Alberta and the North West Territories as a hot burning tinder. Throughout the years, they have been used for medicine, food and beer making.

A thriving brandy-making industry in Sweden and Russia went bankrupt in the 19th century when the lichen supply was exhausted. One kilogram of lichen was needed to produce one-half litre of alcohol. In France, today, lichens are used in the production of chocolates, using the lichen as a filler and substitute for starch.

After all, lichen fibre is composed mainly of mannose, galactose and glucose, with each species having different make-ups. *Cetraria* and *Alectoria* spp., for example, contain significantly more glucose than *Cladina* and *Stereocaulon* spp; which in turn contain much more mannose and galactose.

This higher glucose level is reflected in higher lichenan content, making these species more than 50% soluble in water, while *Cladina* fibre is less than 5% soluble.

Aspicilia esculenta, which is closely related to *A. cinerea* and *A. caesiocinerea*, is believed by some scholars to be the manna mentioned in Exodus 16:31 of the Bible. The lichen forms small round pebble growths that are easily disturbed and blow around by the wind. They swell in morning dew and are edible.

Iwatake (*Umbilicaria esculenta* or *Gyrophora esculenta*) or "stone mushroom" is collected in the mountains of Japan and exported to China as a luxury item. Properly prepared, it resembles tripe. As food, the bitter constituents were neutralized by soda ash from fires to lessen stomach irritation. The blacker the lichen, the lesser the content of usnic acid, part of the irritation. Moo Sung Kim *et al*. (J. Ethnopharm. 105: 3) found the lichen possesses anti-thrombotic properties due to anti-platelet activity. The same author has identified the ability to reduce melanin in human melanoma cells and inhibit tyrosinase glycosylation (J. Microbiol. 45: 6).

The lichens were often assigned medicinal properties based on the doctrine of signatures.

A lichen resembling lungs was used for respiratory complaints, for example.

An unidentified black lichen known to the Paiute as **KAWA SIIN**, or Packrat Urine, was scraped off rocks and boiled as a liquor for treating venereal disease.

Highly prized in medieval Europe were lichens that grew on bare skulls, for epilepsy. The demand was so heavy and profitable for this "heady" medicine (mucus cranii humani) that collectors

devised methods to paste the skull and cultivate lichens.

Natives of northern Canada incorporated both Alectoria and Bryoria into clothing. It was interwoven with cedar or silverberry bark to make vests, leggings and moccasins. Although not very durable in wet weather, it was used by those who could not obtain furs, or as part of ceremonies.

Tanning, perfumery, and even powdered wigs relied on lichens.

Architects and model railroad buffs use glycerin soaked lichens for model trees.

Lichens are used for "sizing" in book-binding for applying gold leaf and colour; and fabric industries for filling pores in the surface of paper and fibre.

Lichens are used in funeral decorations, as they will last for several weeks at the grave.

The great mystery in the chemistry of lichens is their "secondary compounds", which are not by-products of normal plant metabolism. Because of the energy required to produce them, scientists speculate they must have important value.

During World War II, both the Germans and Americans investigated lichens for their antibiotic potential, and found over 50% of species tested showing activity. Over 700 secondary lichen substances have been identified, with new compounds being described all the time.

Aromatic compounds, such as depsides, depsidones and carotenoids, are unique to the lichens.

Studies out of India have shown species of *Lepraria* to exhibit hypotensive, analgesic, anti-inflammatory, anti-spasmodic and neuro-muscular-junction-blocking activity. Further studies could be carried out on *Lepraria* spp. in our region of the world.

With two notable exceptions, the lichens of our area are not poisonous. You must be wary of the big, bad Wolf Lichen (*Letharia vulpina*), a bright yellow lichen, and Powdered Sunshine (*Vulpicida penastri*) a lemon-yellow lichen. They contain pinastric and vulpinic acids, both extremely poisonous; and previously mixed with ground glass, nails and nux vomica to kill wolves. There is no record in North America of using these lichens for this purpose; however, the Achomawai of northern California soaked their arrowheads in the wet lichen for an entire year, sometimes combined with rattlesnake venom, to make the tips poisonous to game.

Both have been used for the brilliant yellow dyes they produce; the coastal Tlingit and Haida Gwaii trading fish oils for the lichen to colour their spruce root baskets and dancing blankets. Emmons, in the Chilkat Blanket of 1907, said that the moss was boiled in the fresh urine of children.

Interior people boiled the lichen in water and then soaked their buckskins, horsehair, porcupine quills or mountain goat's wool. The Huna of northern California used it to dye Bear Grass (*Xerophyllum tenax*).

The Okanagan Colville boiled it on occasions with Oregon Grape bark as a yellow dye. Both they and neighbouring Blackfoot used it externally to treat skin problems; the latter for warts and eczema after blackened in fire.

Be careful when collecting *L. vulpina* as it can cause severe respiratory irritation and nosebleeds in closed environments.

The Yuki of California used it as part of

bedding, and the Apache carried some with them and put a cross of the colour on their feet to let them pass enemies unseen.

The related Brown Eyed Sunshine Lichen (*V. canadensis*) is also used to dye mountain goat wool (hair?).

Natives of the southwest used *Physcia* mixed with pine resin for a yellow paint.

The Paiute of western Nevada recognized the yellow and orange lichens for their anti-bacterial and anti-fungal properties. They called them Lizard Semen, derived from the little pushups that western fence lizards do on rocks.

Lichens, especially *Usnea* spp., are an indicator of pure air. They are more susceptible to damage from sulphur dioxide that other plants, and good monitors of air quality. Researchers from Italy, in a 1997 article in Nature, suggest a strong correlation between lichen biodiversity and lung cancer.

The lichen *Hypogymnia physodes* is the most tolerant macrolichen to sulphur dioxide pollution, and will incorporate it into cellular tissue, as a measure of toxicity in the area.

Lichens are resistant to radiation, and in one experiment they survived 1000 rads a day for nearly two years from a distance of 8 m and continued to grow. A single exposure of 400 rads will kill a human, to put things in context. The potential use of lichens as bio-indicators of radionuclides is very high.

Two of the very few organic chlorine containing substances occurring in nature, gangaleoidin and diploiein, have been isolated from lichens.

One, as yet unidentified lichen growing like thick yellow-green paint on boulders of the Rockies, is used by Natives as a narcotic. Wild Bighorn sheep, especially young ewes, also enjoy a nibble, grinding their teeth to the gums to scrape it off the rocks. It is slow growing, taking over a century to spread over one square inch of rock. It is a pioneer plant, growing where other plants offer no competition. I suspect it is a *Lecanora* sp. Sheep in the deserts of Libya chew the lichen *L. esculenta* to the point of tooth loss from abrasion.

The Pima and Maricopa of the southwestern United States used a gray-coloured lichen on rocks and dead wood with a strong violet odour. They call it Earth Flower, and mixed it with tobacco as a hallucinogen, and attract women, luck and such. It is also sprinkled on cuts and sores, such as rattlesnake bites, that will not heal.

The Waorani of Ecuador use a species of *Dictyonema* as a hallucinogen (Davis and Yost, Botanical Leaflet 29: 3, Harvard U.).

Natives throughout Canada produced rock pictures of real and grotesque animals by scraping the lichen off large vertical rock faces. These have lasted centuries due to the slow growth of lichens.

The novel “Trouble with Lichen” by John Wyndham is a sci-fi novel about their long life span, as it relates to humans.

One species, *Acarospora chlorophana*, a bright yellow crustose lichen found in western Alberta, grows so slowly on rocks, it is almost un-measurable.

LUNGWORT/LUNGMOSS, HAZELCROTTLE, HAZELRAW
(*Lobaria pulmonaria*)
(*Sticta pulmonaria*)

Note how *Lobaria pulmonaria* is a rhyming couplet, a taxonomic rarity. Another two are *Chrysanthemum leucanthemum*, the Ox-eye Daisy; and *Humulus lupulus*, or Hops.

Sticta is from the Greek **STIKTOS**, meaning spotted.

Lungwort grows in the old growth boreal forests, where its nitrogen fixing is very important. It can be distinguished by large thalli than cover branches and trunks of spruce, poplar and fallen logs. It looks like flaccid lungs and was used for this purpose by native tribes. As lichens grow, it is fairly luxuriant, with an average annual increase of 4.8 millimeters.

Lungwort was boiled traditionally in milk to make a "cough tea" or "lichen chocolate".

It was also used before hops for beer making in European and Siberian monasteries during the 17th and 18th century, as well as in India and Sikkim, where it was also used as a cleansing hair powder, and to tan hides.

Lungwort was also used in France for perfume, but it was not plentiful and rarer than other lichens.

The closely related *Lobaria oregana* is most commonly found in the mountains on the top of one hundred year old Douglas Fir. Here, the lichen captures nitrogen, fall to the ground and decompose, releasing the nutrient to nitrogen deficient soils.

Textured Lungwort (L*. scrobiculata*) is found west of the continental divide as well as from northern Saskatchewan to Great Slave and Great Bear Lake. It is edible and can be eaten right from the tree. The Yup'ik of Alaska know it as **QELQUAQ**. In Scotland, it was used to dye wool a brown colour.

The Haida refer to it as tree blanket, forest cloud, or cloud leaves/medicine, alluding to health properties.

MEDICINAL CONSTITUENTS - mucilage (including 30-40% lichenin), lichen acids including stictic, norstictic, sticinic, constictic, peristictic, cryptostictic, methyl stictic, thelophoric, and gyrophoric acid; fumaric and oxalic acids, fatty acids such as palmitic, oleic and linolenic, trace minerals, ergosterol, fucosterol, protein, and tannins.

Lungwort is very useful for all sorts of upper respiratory complaints, including lymphatic tuberculosis.

It is useful in formulas for hay fever, head colds, and flus as well as intermittent fevers or night sweats.

Its nourishing and blood-building nutrients are useful for those suffering chronic internal dryness. It also restores moisture to the tissue that produces breast milk.

It combines well with borage or herbal lungwort for gastric ulcers and should be given consideration in treating ulcerative colitis and allergies associated with the gastrointestinal tract. Tannins, quercetin, mucilage, and other constituents help repair and regenerate mucosal membranes, and calm mast cell reactivity. The traditional use in Ireland for treating hemorrhoids probably has basis in fact.

It acts on the base of the brain and the vagus nerve, relieving fevers and irritative coughs, both acute and chronic.

The lungwort cough is wheezing, rasping dry and persistent, often worse in the dry dusty months of summer.
Lungwort also possesses anti-rheumatic and analgesic activity, useful in pain occurring between the scapula, shoulders and occiput of the head. Sometimes the pain extends into the chest and shoulders. Myalgia and arthralgia of the small joints may also benefit.
Studies conducted by Liu at the Institute of Radiation Medicine in Tianjin have shown lungwort to be protective of bone marrow stromal and hematopoietic stem cells when exposed to radiation. This may be due, in part, to the anti-oxidant properties reported by Odabasoglu *et al.* (Phyto. Res. 18: 11).
The related Peppered Moon Lichen (*S. fuliginosa*) contains trimethylamine.
Cabbage Lungwort (*L. linita*) contains tenuiorin.
Polyporic acid, derived from *Sticta coronate*, was shown to double the life expectancy of mice infected with acute leukemia, as well as other cancers.
Melanic acid compounds in Lungwort are induced by UVB radiation.

ESSENTIAL OIL - An essential oil is steam distilled from this lichen and used in perfumery. Commonly called Lungwort, it is known in Europe as Hazelcrottle, hazelraw and rage.

HOMEOPATHY - Lungwort is for a general feeling of dullness and malaise, when a cold is coming on. The patient may feel as if floating in air and have a great desire to talk. This is accompanied by dull pressure in the forehead and root of the nose, with an unsuccessful constant desire to blow. There may be a dry, hacking cough during the night that is worse on inhalation. The extremities may be red and inflamed. Changes of weather affect the symptoms.
DOSE - Tincture to sixth potency. The mother tincture is prepared from the fresh thallus of the lichen.

ICELAND MOSS
(*Cetraria islandica*)
Although called a moss, this brown lichen attaches to rocks in open sub-alpine forests. It is best collected when green and fully-grown between May and September. An average yield of 700 kg per acre of air-dried Iceland moss could be expected if solidly covered, the exception rather than the rule.
The lichen is symbolic of health, and associated with the birth date January 16th. Other lichen, such as *Ramalina* and *Cladonia* spp., symbolize dejection, and January 14th.
It is associated with the second Rune, UR.
In Iceland, it is called ***FJALLAGROS***, and as far back at 1280 AD, the first written laws of that country banned people picking it one another's land.
The Chipewyan used **TSANJU** as a source of both food and medicine.
Iceland moss is used as a source of glycerol in the soap industry, and because of its lack of odour, in cold cream manufacture. In Russia, during World War II, Iceland Moss, *Alectoria ochroleuca* and various *Cladina* spp. were used to make a type of molasses,

with the glucose yield from Iceland Moss at 78% of dry weight.
Bread Moss, or **BRODMOSE**, is a Scandinavian name for Iceland Moss due to its use in extending wheat flour or potatoes in times of famine.
In Europe, it was traditionally soaked in birch ash (2%) to decrease the lichen acids before ingestion.
Work by Airaksinen *et al*. (Arch. Toxicol. 9, Suppl.) suggests this is a good thing. When untreated lichen was fed to mice as 50% of diet, they died in 4-5 days. When ash-soaked and boiled, survival times increased to 20-22 days, and when only 25% of diet, it was well tolerated for six weeks.
A patent issued in 1951 suggested the use of Iceland Moss as a preservative for luncheon meats, or cream filled pastries. It is both antibiotic and heat stable and safe for human consumption.
Europe's best selling natural tooth whitener, *BlanX*, contains silica and Arctic moss.
Water extracts of the lichen have been found to inhibit development of the tobacco mosaic virus. Even at 1:500, it reduced the number of brown lesions on leaves by 80% due to an enzyme called ribonuclease.
The lichenin, a hot water soluble polysaccharide, causes the formation of a gel when cooled down.
The closely related Iceland Lichen (*C. ericetorum*) is also common to parts of the prairies, and although similar, does not contain fumarprotocetraric acid. It was used to flavour and thicken soups by the Inuit of Alaska.
Striped Iceland Lichen (*C. laevigata*) in the extreme northern parts of the three provinces contains fumarprotocetraric, protolichesterinic and lichesterinic acids.
Crinkled Snow Lichen (formerly *C. nivalis*, now *Flavocetraria nivalis*) is found near the tree line or tundra. It is brewed into a tea in parts of the high Andes as a tonic for heart conditions and to relieve altitude sickness.
Early work by Burkholder *et al.* (Bull. Torrey Bot. Club 72: 2) found activity against *Bacillus subtilis*, *B. mycoides*, and *Sarcina lutea*.
Curled Snow Lichen (formerly *C. cucullata*, now *F. cucullata*) is found at higher elevations of coniferous woods and on tundra. Natives of Alaska use it to flavour their fish or duck soups.
Burkholder *et al*. (mentioned above) found activity against all above as well as *Streptococcus* spp. and *Staphylococcus albus* (hemolytic).

MEDICINAL CONSTITUENTS - lobaric acid, glucans lichenin (polysaccharides 30-40%) isolichenin (10%), lichenan (17%), galactomannan (7.6%), various usnic(?), salicylic, cetraric, physodalic and fumaric acids, estrosterol peroxide, protolichesterinic acid (0.1-0.5%), lichester-inic, protocetraric acid (0.2-0.3%) and fumarprotocetraric acids (2-11%), aromatic lichen acids (2-3%), aliphatic lichen acids (1-1.5%), cetrarin, picrolichenin, oxalic acid, furan derivatives, iodine, Vit. A, trace minerals including iron, iodide and calcium salts, fatty acid lactones, terpenes, mucilage, fibre, and gums.

Historically, Iceland Mmoss has been used to manufacture antibiotic to inhibit tuberculosis, 1 kg of antibiotics from 40 kg of plant material. In Finland, an anti-fungal cream called *USNO* is made for

treating athlete's foot and ringworm. The lichen entered the Finnish Pharmacopoeia in 1915.

In Switzerland, Iceland Moss is used for sore throat pastilles and as an additive to luncheon meats and pastries to retard spoilage.

Iceland Moss is a nutritious and soothing tonic, with slight laxative effect. It helps improve the appetite and digestion of the elderly and those recovering from a debilitating illness. The bitter principles benefit the stomach in both tincture and infusion form, stimulating a poor appetite, through stimulating the production of saliva and gastric juices.

It therefore can be used like Queen of the Meadow, for both hyper- and hypo-acidic stomach conditions.

Decoctions are used for chronic diarrhea and respiratory problems. Like lungwort, it increases the flow of breast milk but not with inflamed or sore breasts. Both low thyroid and anemia conditions are helped by trace levels of iodine and iron and other nutritive properties as well.

Lichenin is soluble in hot water and upon cooling forms a gel; while isolichenin, present in smaller amounts, is soluble in cold water.

Lichenan is a polysaccharide similar to beta glucan, found in oats and barley. Stubler *et al*. (J. Phytopathol. 144) found lichenan exhibited strong anti-viral activity.

It soothes nausea from gastritis and vomiting and combines well with borage and chickweed for peptic ulcers, hiatal hernia, and esophageal reflux. In fact, for those individuals with a Yin or fluid deficiency, it would work better than a straight astringent herb.

In an open clinical trial, 100 patients with pharyngitis, laryngitis or bronchial ailments were given lozenges containing 160 mg of an aqueous extract of the lichen. There was an 86% positive response with good gastric tolerance and lack of side effects.

Perhaps it should be considered in cases of diverticulitis and even cystic fibrosis in children.

Mild infusions of Iceland Moss can be used as a vaginal douche for its soothing, demulcent properties.

Tincture form is best for whooping cough, asthma, TB, and kidney/bladder complaints; especially those related to a dry, irritating condition. Here, the sweet, moist and astringent nature of Iceland Moss helps address the underlying concern.

It may be used for night sweats or fevers, but is taken during the day to prevent recurrence. Do not use Iceland Moss when a fever is present.

Protolichesterinic acid has been found to exhibit anti-tumour activity in mice. More recent studies have shown protolichesterinic acid to be a potent inhibitor of HIV, the virus associated with AIDS; as well as 5-lipoxygenase (Pengsuparp *et al*., J. Nat. Prod. 58). Other components, such as polysaccharides, have been found to stimulate the immune system (Infolfsdottir *et al*., Planta Medica, 1997). Earlier, the authors found a polysaccharides comparable to the fungal polysaccharide lentinan (Shiitake) used for clinical cancer therapy in Japan. The authors also found extracts of Iceland Moss to suppress the growth of *Heliobacter pylori*, which contributes to gastric and duodenal ulcers (Antimicrob. Agents Chemotherapy 41).

Lobaric acid, another constituent, has been found (Ogmundsdottir *et al*., 1998) to be significantly anti-carcinogenic with regards to two breast carcinoma and erythro-leukemia cell lines as well as anti-inflammatory properties. The ED_{50} for lobaric acid is 14-44 µg/ml for these three cancer cell lines.
Work by Haraldsdottir *et al.* (Planta Med. 70) found lobaric acid very effective against a number of human cancer cell lines *in vitro*.
Work by Gulcin *et al.* (J. Ethnopharm. 79: 3) determined Iceland Moss contains significant potential as a natural antioxidant. Just 50 µg of water extract showed higher anti-oxidant activity than 500 µg of alpha tocopherol.
Eight secondary compounds in *C. islandica* decreased by 52% when screened of natural UVA and UVB radiation (Bachereau *et al*., Symbiosi 23).
The closely related Snow Bed Iceland lichen (*C. delisei*) shows significant inhibitory activity on estrogen through inhibition of aromatase. Extracts at a concentration of 40 µg/ml showed 82% inhibition. It can be found in northwestern Alberta and throughout the Territories and Yukon.

Ragbag, or Varied Rag Lichen (*Platismatia glauca*), was formerly classified as *Cetraria glauca*. It is found in southwestern Alberta and northeastern Manitoba. It has been used in the past for yielding a chamois coloured dye for wool.
The new genus contains caperatic acid and atranorin.
The related *C. halei* contains alectoronic acid.

The common Spiny Heath Lichen (*C. aculeata*), also known as *Coelocaulon aculeatum*, has significant effect on various bacterial systems, but not mammalian cells (Zeytinoglu *et al*., Phytother. Res. 22: 1).
The lichen extract and its active constituent, protolichesterinic acid, shows activity against *Aeromonas hydrophilia*, *Proteus vulgaris*, *Streptococcus faecalis*, *Bacillus cereus*, *B. subtilis*, *Pseudomonas aeruginosa*, and *Listeria monocytogenes* (Turk *et al*., Zeit. Naturforschung 58: 11-12).

HOMEOPATHY - Iceland Moss (*Cetraria Islandica*) is used for acute and chronic bronchitis; asthma and pains in the chest while coughing.
DOSE - 10-20 drops of tincture as needed. The mother tincture is prepared from the dried lichen.

ESSENTIAL OIL - Iceland Moss is steam distilled and yields brownish oil (0.051%). It has a saponification value of 98 and an acid value of 72.
The bulk of aliphatic acids are saturated (66.8%), composed mainly of palmitic, stearic, and behenic acid. Unsaturated acids composed the rest, with oleic and linoleic acids most common.

SPIRITUAL PROPERTIES - Iceland Moss and its spiritual properties are related to the signature of this lichen. Individuals struggling with their personal evolving of spiritual issues, or those in difficult environments, physically and emotionally, will benefit from this lichen.
When an individual comes close to achieving deeper awareness of God, there is often great fear and

unwillingness to continue. This is often related to the incorrect belief that nothing will remain to be done on earth. Those working towards spiritual goals based in Eastern philosophies will also be helped. In the martial arts, one seeks to let go of the mind, and yet be ready for full physical response. Iceland Moss will help develop this trust as well as help an individual discover and feel comfortable with their own level of spiritual purpose.

GURUDAS

PERSONALITY TRAITS - The moistened *Cetraria* gives off an aroma that suggests still other mammals or things mammalian, a blended whiff of suede worn by an equestrian, and of the horse, sweating.
It is a good-bad-intriguing scent, probably with pheromonal powers, and of the sort that is used as ballast in the making of a perfume. I would not be at all surprised if an essence of this plant is eventually stirred into some concoction with a name like The Devil's Dew, to be dabbed on by would by Dionysians.

SCHENK

USNEA
SHAGGY OLD MAN'S BEARD, SUGARY BEARD
(*Usnea hirta*)
POWDERY BEARD
(*U. lapponica*)
PITTED BEARD
(*U. cavernosa*)
SCRUFFY BEARD, STRAW BEARD
(*U. scabrata*)
FISHBONE BEARD LICHEN
(*U. filipendula*)
(*U. dasypoga*)
METHUSALA'S BEARD LICHEN
(*U. longissima*)

Usnea, or Old Man's Beard, hangs in grey-green strands from larch and spruce of the boreal forest. Look for the central white thread inside *Usnea* for correct identification.
Usnea was recommended in the Formulary of Al-Kindi around 850 AD. It was suggested for a swollen spleen, a part of the immune system. Earlier in ancient Greece, both Hippocrates and Dioscorides recommended *Usnea* for uterine problems.
The Chinese have used various *Usnea* spp. (Sung-Luo) for thousands of years. It is prized for its broad-spectrum antibacterial and immune stimulating properties in various respiratory and urinary infections.
It is also very effective in trichomoniasis, giardia, and candida infections; and particularly effective in cervical erosion, as a douche.
The Malaysians use *Usnea* spp. as a general tonic and tea for colds; and the neighbouring Indonesians used *U. thallus*, or **KAYU ANGIN**, meaning "windy wood", as an astringent and anti-spasmodic for intestinal problems. It was also burned in homes to combat evil spirits and wind borne diseases.
Usnea spp. are used in Peru for a dark blue dye.
In the Sudan, the closely related *U. molliuscula* is known as **SHEIBA** and used in perfumery and as an aphrodisiac. In local medicine, it is used as a bitter stomachic, for coughs, and to relieve menstrual pain.
Usnea has been fed to cows in the alpine regions of Europe to help them get through cold winters and fight mastitis. Sodium usnate is used as a

spray for fighting mildew and other plant diseases.
The Blackfoot call it **E-SIMATCH-SIS**, and the Cree by **MITHAPAKWAN**. Both used *Usnea* spp. for stopping nosebleeds and bleeding wounds. A decoction was also used to wash sore or infected eyes.
The Dakota call it **CHAN WIZIYE**, translating as either "on the north side of the tree", or "Spirit of the North Wind". The northern Chipewyan know it as **K'I TSAJU**, while the Dena'ina call it Spruce Hair, or **CH'VALA ANDAZI.**
Usnea spp. are used as catalysts, for making fermented corn beverages, by the Tarahumara of northern Mexico.
It was an emergency food that required more boiling to remove the usnic acid; the more yellow the lichen, the more medicinal, but less edible.
Pitted Beard Lichen (*U. cavernosa*) was used by the Wylackie of California to tan leather. Animal brains were wrapped in the lichen to hold together, and then rubbed vigorously into the hide.
Fishbone Beard Lichen (*U. filipendula*) has been used on Sakhalin Island, now belonging to Russia, as a powder to treat wounds. Modern research indicates it has anti-bacterial activity.
Sodium usnate has been found effective against the tomato canker (*Corynebacterium michiganensis*); and usnic acid shows a moderate degree of inhibition of the blue staining wood fungus *Trichosporium*, and tobacco mosaic virus.
It is used in a spray at 100-500 ppm for bean rusts, and mildews, as well as brown rot on some stone fruits.
Recent work has found usnic acid strongly inhibits the mould *Neurospora crassa*.
The related *U. subfloridana* is a boreal forest lichen that was mixed with tobacco and butter, and then boiled and cooled as a lotion for skin in Europe.
Recent work suggests that lichens may produce more usnic acid when levels of UV-B are high. This suggests a biomonitor for increased radiation levels and potential for development of more effective sunscreens.
The lichen *U. longissima* is found on the West Coast as well as Eastern Canada. It has long been used in Ayurvedic and Unani medicine for arthritis, edema, eczema, cardiac tonics and massage oils for rheumatism, gout, and sciatica. Ayurvedic scholars equate its used with *Parmelia perlata*.
Tree fellers in western Canada are susceptible to skin rashes and usnic acid has been identified as a potential photosensitizer, and respiratory irritant.
Kahlee Keane, or Root Woman, in her enjoyable new book "The Standing People" mentions *Usnea* as a heart worm medicine for wolves. Interesting!

MEDICINAL CONSTITUENTS - *U. hirta* - (+)usnic acid (3%), alectoric, hirtic, thamnolic, defractic (rare), hertillic and usnaric acids, anthraquinones, hirtusneanoside, and various fatty acids. Usnic acid is also known as 2,6-diacetyl-7,9-dihydroxy-8,9b-dimethyl-1,3(2H,9bH)-dibenzo-furandione.
U. filipendula - salazinic acid. usnaric aicd, barbatic acid, d-usinic acid, as well as emulsin.
U. cavernosa - salazinic acid and/or usnic acid.
U. lapponica - usnic and/or salazinic acid; sometimes barbatic acid.
U. scabrata - inland only usnic acid.

C. longissima - various B-orcinol depsides, including evernic, barbatic and diffractaic acids; glutinol, longissimione A and B.

The outer, green grey cortex contains the antibiotic substance, while the white inner core contains immune stimulating polysaccharides.
Recently, the polysaccharides have been found to possess anti-tumour activity, confirming their traditional use for cancer.
For example, in the case of sarcoma-180 in mice, daily injections for 10 days after implantation led to complete regression of tumours compared to controls.
Although not certain of the mechanism, it is thought that an outpouring of lymphoid and plasma cells, as well as macrophages to the area of the grafted tumour is responsible. Similar active constituents are also found in *Umbilicaria*, *Lobaria*, and *Sticta* spp.
Other constituents have been found to be non-steroidal and anti-inflammatory.
In a 1993 Romanian study of *Usnea hirta*, it was demonstrated that the anti-inflammatory activity was comparable, or superior to phenylbutazone and hydrocortisone; the analgesic activity close to noraminophenazone, and the antipyretic activity equal or superior to aminophenazone.
Work by Vijayakumar *et al*. (Fitotherapia 71: 5) found usnic acid significantly reduced inflammation in both acute and chronic conditions.
Hirtusneanoside, isolated from *U. hirta*, shows activity against gram-positive bacteria (Renzaka and Sigler, J. Nat. Prod. 70: 9).
Similar studies in Japan in 1995, reported in Planta Medica, showed *Usnea diffracta* with similar analgesic and anti-pyretic effect. There, the plant is known as ***SARUOGASE*** and attributed with many of the same properties.
In Northern Europe, the medicinal values of Usnea and other lichens have been long recognized.
Studies show effectiveness against gram positive bacteria, such as *Streptococcus* (strep throat), *Staphylococcus* (impetigo), and *Mycobacterium tuberculosis*.
Usnic acid is more effective against some bacterial strains than penicillin, and it is able to completely inhibit the growth of different strains of human tuberculosis in dilutions of 1:20,000.
Other studies cite its effectiveness at 1 part per million, similar to streptomycin.
Microbes like the tubercle bacterium form heavily waxed coats and stiff cell walls that allow them to persist and even divide inside macrophages. They are able to prevent the host's lyosomes from taking in the hydrogen ions needed to create an acidic environment, and thus neutralizing their effect.
Usnea also has a different mode of action. Synthetic antibiotics resemble the cell wall of bacteria and are incorporated in the cell. This results in a weak cell structure as the bacteria swell and burst.
Scientists believe usnic acid disrupts cellular metabolism either by preventing ATP formation or by un-coupling of oxidative phosphorization. Thus, the cells run out of energy and die.
Drug resistant TB is presently undergoing a worldwide resurgence that one WHO health official described as "the most frightening situation I have ever encountered".

Work by Weckesser *et al.* (Phytomed. 14: 7-8) found *Usnea* spp. active against *Propionibacterium* acnes, *Coryne*-bacterium species, and most importantly, against MRSA, or methacillin-resistant *Staphylococcus aureus*.

Usnea may also be superior to Flagyl (metronidazole) against *Trichomonas*, a parasite that causes serious uterine and cervical infection and tissue destruction. It also has good effect in candidiasis, and giardiasis, or beaver fever as it is known on the prairies, as well as bowel inflammation in general. *Usnea* is also a relaxant of the smooth muscles of the body, including the colon and lungs.

In Russia, a sodium salt of usnic acid called Binan is used for 2nd and 3rd degree burns to prevent infection; and for varicose ulcers, furuncolosis, impetigo, *Trichomonas*, and *Lupus erythematosus*. Binan is a vigorous antibiotic, effective against microbes and protozoa in concentrations of 1:300,000 to 1:1,000,000 when applied externally.

In Germany, a product called Evosin, a mixture of usnic and evernic acids, is used for impetigo, furunculosis and Lupus vulgaris, as well as mastitis in cows. Usniplant, containing 0.2% usnic acid, is likewise used for skin conditions. Likewise, sodium usnate is used in China for pulmonary tuberculosis. In 30 cases treated, 24 were cured and 6 were improved after 71 days.

Mastitis in cows, athlete's foot, ringworm, and acute bacterial infections can be treated internally and externally. Usnic acid has been formulated into toothpaste, mouthwash, deodorants and sunscreens, as well as creams and ointments.

Usnic acid shows activity against *Streptococcus mutans*, which creates dental plaque and caries, without disrupting normal oral flora.

Usnic acid is not only anti-fungal and anti-bacterial, but also effective against viruses, and protozoa.

In Argentina, *Usnea* is used for washing warts. It is a constituent of the Chinese drug ***SHI-KOA*** and the Japanese medicinal drug ***SEKI-KA***. The Maori of New Zealand use *Usnea* to increase resistance to infection and stimulate the appetite.

This led to the unfortunate marketing of a weight loss product, LipoKinetix, which contained sodium usniate. Said to help the body burn fat, it was found to result in one death, two liver transplants, and seven cases of non-fatal liver failure.

Usnic acid was tested in one study in Saudi Arabia for the possibility of use for cancer and leprosy. It was found to have no adverse effect on testicular nucleic acids or epididymal spermatozoa in laboratory mice, unlike most anti-cancer drugs.

Usnic acid has been found to inhibit Ehrlich ascitic cells in laboratory studies. It has a vaso-dilating effect, and helps relax the muscles of the uterus, bronchi and intestine.

Other studies indicate usnic acid has anti-proliferative, anti-inflammatory, anal-gesic, anti-growth, anti-herbivore and anti-insect properties.

Both (+)-usnic acid and (-)-usnic acid, especially the former, show high cytotoxic activity against cancerous cells (Koparal *et al*., Nat. Prod. Chem. 20: 14). Nine usnic acid amine conjugates were tested for cancer on L1210 cell lines. Work by Bazin *et al*. (Bioorg. Med.

Chem. 16: 15) found significant toxicity and induction of apoptosis.
Dr. William Mitchell, Jr., considers *Usnea* a valuable diuretic that combines well with parsley. He recommends up to 90 drops of tincture 3x daily.
It combines well with Oregon grape root, dandelion root, and uva ursi for damp heat strangury and with Scullcap and Elecampane root for phlegm heat in the lungs.
For giardia infection, or amoebic dysentery, combine with Oregon grape root and elecampane root.
The active parts of *Usnea* are poorly water soluble, slightly better in alcohol and most soluble in oil. Usnic acid is also influenced by the solvent used, pH value, and with what powders or ointments it is mixed.
Usnic acid absorbs UV light and may be used in sunscreen products with good results.
Usnea hirta has an LD_{50} of 21.02 g vegetal material/kg of body weight; according to studies conducted by Dobrescu *et al*. in Romania in 1993.
Energetically, usnea clears heat and resolves toxins due to its bitter and cold nature.
This makes it very valuable in TCM theory for damp heat in the lower burner, as well as lung conditions when Qi is disrupted due to dampness, phlegm or heat.
Usnea longissima has been used in China and India as an expectorant, while First Nations used it for feminine hygiene products and bedding. The coastal species has been studied by Lee and Kim (Phytotherapy 19: 12) for its anti-platelet and anti-thrombotic activity.
Diffractaic acid in this species has been found to enhance the antioxidant defense system as well as reduce effects on neutrophil infiltration (Bayr *et al*., J. Phytomed. 13: 8).
Choudhary *et al.* (Phytochem. 66: 19) identified anti-inflammatory compounds.
Methanol extracts show *in vitro* melanogenesis inhibition. Tyrosinase glycosylation is believed to be involved. Kim et al. (J. Microbiol. 45: 6).
Work by Odabasoglu *et al.* (J. Ethnopharm. 103: 1) found usnic acid from this species both anti-oxidant and protective of indomethacin-induced gastric ulcers. More study is needed.
Other lichens are richer in usnic acid. One *Haematomma* sp. (*H. coccineum*) has nearly 20% content. The closely related Blood Spot Lichen (*H. lapponicum*) has not been studied.
A fungal strain, *Corynespora* sp., has been found on *Usnea cavernosa*. Work by Paranagama *et al*. (J. Nat. Prod. 70: 11) found extracts of this strain cytotoxic to breast and prostate cancer cell lines.

DOSE – Tincture - 20-30 drops as needed. For serious infection like trichomonas and tuberculosis, it is taken long-term up to 6x daily. When collecting and making tinctures use only living lichens.

HOMEOPATHY - *Usnea barbata* is the remedy to remember for all forms of congestive headaches; especially sunstroke. The head can feel ready to burst at the temples, or the eyes feel like bursting from their sockets. The face is reddish.

DOSE - Tincture in drop doses. The 1x dilution is used for the elimination of heavy metals.

ESSENTIAL OIL - *Usnea barbata* and others are extracted with ethanol to produce a Treemoss concrete and absolute.
The semi-solid mass is greenish-brown and contains methyl beta-orcinol carboxylate and olivetonide. It is used largely in soap perfumery, although it does supply the requisite "mossy" notes in Fougere and related perfumes.
It should be restricted to 3% of any fragrance compound for best effect.

LICHEN OIL - Stuff a glass jar tightly full of Usnea and cover with canola or olive oil. Cover with cheesecloth and set in warm, sunny window for several months.
This may be used internally, by filling gelatin capsules, or used externally as a healing salve with beeswax for infected boils, carbuncles, impetigo and even vaginal boluses for trichomonas.

LICHEN ESSENCE - *Usnea* lichen essence is for individuals in the helping or healing professions. At times, due to the desperate situations and energies of patients, there is danger of empathizing too strongly, and beginning to take on their "illness".
Usnea essence helps retain boundaries, so that effective work can be carried out without endangering their own health. This can be subtle, but once observed, which the essence helps reveal, it will be recognized and dealt with.

PRAIRIE DEVA

SPIRITUAL PROPERTIES - *Usnea* represents the north, the place of gray hairs. It maintains the lung system of the planet. When *Usnea* came to me, personified as a young man, and spoke to me of its uses, it told me that its healing qualities are specific for the lung system of the planet - the trees.
Its use for people was secondary to its primary function. This was the first time I realized that the plants provided medicinal actions with the ecosystem, that they evolved and developed to help the Earth ecosystem, Gaia, maintain a healthy balance within itself. I realized at that time that it was only because we are a part of the ecosystem that the plants also work for us as healing agents.
There is an ancient compact between *Usnea* and the trees, and coming into contact with the deeper spiritual aspects of *Usnea*, one makes contact with ancient powers that existed long before humans.

BUHNER

GRAY REINDEER LICHEN, TRUE REINDEER LICHEN
(*Cladina rangiferina*)
GREEN REINDEER LICHEN
(*C. mitis*)
TREE REINDEER LICHEN
(*C. arbuscula*)
REINDEER LICHEN, STAR TIPPED
REINDEER LICHEN, NORTHERN
REINDEER LICHEN, CAULIFLOWER
LICHEN, CARIBOU LICHEN
(*C. alpestris*)
(*C. stellaris*)
(*C. aberrans*)
BLACK FOOTED REINDEER LICHEN
(*C. stygia*)

Rangifer is the scientific grouping for both reindeer and cariboo.

True Reindeer lichen is very common across northern Canada, where it is used as a food source by caribou. It is very fragile and slow growing; averaging 3.4 mm per year. After grazing by caribou, it takes up to 15 years to recover. Although *C. rangifera* is the true reindeer lichen, the star tipped lichen is a more important food, and preferred by caribou. Both are slow growing, averaging 3.4-4.1 mm per year. Caribou and reindeer produce lichenase in their stomach, which along with bacteria and protozoa in the rumen, help them survive extreme conditions. The enzyme, lichenase, is also found in snail livers.

The Woods Cree of Saskatchewan call it ***WAPISKASTASKAMIH*** or sometimes ***ATIKOMICIWIN***. Decoctions or the dried powder were taken to rid the body of intestinal worms.

Inuit ate the undigested stomach contents of caribou as a source of Vitamin C. They also fashioned wicks from reindeer moss, for blubber oil lamps.

The Aleuts of Alaska used infusions of this lichen for chest pains, while the Tanaina boiled and ate it for diarrhea.

Cladina spp. separated from grass in caribou stomachs was stirred with oil, and stirred while the word **TENIYASH**, meaning increase was sung so the mixture would rise and become light.

The Ojibwas decocted *C. rangiferina* to bath newborns, and give them strength.

The Chipewyan call it **TSANJU**. The use of partially digested reindeer lichen from caribou digestive tracts has long been a traditional part of their diet. The contents of the rumen, **EBURTI**, were boiled by placing heated rocks into the cut out rumen or large intestine, with added meat, fat and blood. This is known to the Chipewyan as **EBIE HECHELH**, or bowel soup. The winter feast was preferred due to the fine white *Cladina* being present almost exclusively, whereas in summer you might get blueberries, leaves, grass, mushrooms, etc. It makes a stimulating tea.

According to Vogel, the Ojibwa bathed newborns in water in which Reindeer Lichen had been boiled.

The Gwich'in of the Mackenzie delta, call it White Moss, or **UHDEEZHU**. When boiled, the tea is good for stomach and chest pain. It can also be boiled for an hour, and then fried, for a crispy treat.

When taken from the caribou rumen, it is known as **IT'RIK**. It is eaten in soup, or placed on other meat to tenderize and enhance flavour. It is sometimes hung for up to a week to age, and then mixed with fat, marrow, and berries, for a real treat.

In Europe, true Reindeer Lichen has been used to produce an iron red dye for wool.
Star tipped Reindeer Lichen is harvested commercially for flower arrangements, architects and model railway hobbyists for miniature trees and shrubs. In Finland and Sweden, this is a million dollar export business, with some 3,000 tonnes harvested per year for Christmas and graveyard wreaths and models above.
Traditionally, the lichen was used in Russia in the form of powder on treating wounds. The Wood Cree decocted it to expel intestinal worms.
Black footed Reindeer Lichen has a pinkish jelly; as opposed to the clear, colour-less jelly from the true reindeer lichen.

MEDICINAL CONSTITUENTS - *C. stellaris* - usnic acid, fumarprotocetraric acid, atronorin, perlatolic acid; various polysaccharides including nigeran, galactomannan, arabinitol and mannitol; and small amounts of rangiformic acid, pseudonor-rangiformic acid, ventoric acid, proteins and sterols.
C. rangiferina - fumaroprotocetraric acid, atranorin, trace of Vit. D, some ergosterol, arabitol, mannitol, volemitol, alpha trehalose, sucrose, umbilicin; 54-63% lichenin acid
C. arbuscula - fumarprotocetraric and usnic acid
C. mitis - usnic, rangiformic acid
C. squamosa - squamatic acid
Usnic acid is significantly higher in young lichen tissue, with the first few mm containing up to 12x the older growth just 4-8 mm back.
Cladonia spp. are 94% carbohydrate, 2.7% protein, 2% fat, and 1.3% minerals.
Medicinally, the lichen is dried and powdered and decocted for intestinal parasites.
In Finland, the lichen was traditionally boiled in water as a laxative, or boiled in milk for respiratory affections.
In Denmark, a popular whisky made from the caribou or reindeer moss, so endangered the plant that production was shut down by the government. A similar brandy venture in Sweden also closed down in 1883. In Russia, *C. mitis* syrup was too bitter for human consumption and used to produce alcohol, or medium for food yeast, with a glucose yield of 75% dry wt.
Studies conducted by Wu *et al.* (Chinese J. of Parasitology and Parasitic Disease 13: 2) showed *C. alpestris* water extracts to have strong effect against *Trichomonas vaginalis in vitro*. This would be welcomed by the large number of women affected by this irritation; in the form of a warm water douche. The authors found no significant difference between the effect of usnic acid and metronidazole at concentrations of 0.4-0.6 mg/ml.
Reindeer Lichen (*C. rangiferina*) has been shown more effective in chronic inflammation rather than acute conditions. In a study by Surleyman *et al.* (Bio. Pharm. Bull. 25: 1) compared to indomethacin, the lichen extract showed 43% inhibition, as compared to the drug at 72%.
Atranorin appears to be stimulated by UV-A in sunlight.
Recent work identified new compounds, hangokenols A and B. These and other previously identified compounds were tested for activity against MRSA (methicillin resistant *Staphylococcus aureus*) and vancomycin resistant

Enterococci spp. (Yoshikawa *et al*., Chem. Pharm. Bulletin. (Tokyo) 56: 1).
Many tonnes of *C. stellaris* are used by the pharmaceutical industry for its usnic acid (see *Usnea*).
Reindeer Lichen (*C. stellaris*) is known to the Inuit of Baffin Island as **NIRAIT**. A broth is prepared for sickness and a cooled wash for eye infections.
Both *C. mitis* and *C. stellaris* show activity against *Staphylococcus aureus* and *Bacillus subtilis* in studies conducted by Harmala *et al*. (Fitotherapia 63: 3).
Early work by Burkholder *et al*. (Bull. Torrey Bot. Club 72: 2) indicated *C. mitis* showed activity against *S. albus*, *Diplococcus pneumoniae*, *Streptococcus hemolyticus*, *S. viridans*, *Bacillus mycoides*, and *Sarcina lutea*.
Cladina alpestris shows activity against *Bacillus subtilis*.
The latter, known as Caribou Lichen, or **NIRNAIT** to the Inuit, was used to cure eye infections, or boiled until the tea turned black and drunk cold by the sick. In Alaska, the lichen is added for flavouring to duck or fish soup.

HOMEOPATHY - Reindeer Lichen (*C. rangifera*) has been recently proved at the 30th potency by Misha Norland in 2002.
Mental symptoms include jealousy, suspicion and delusion. Dreams of crime, evil, guns, murder, war, fights and robbery are prevalent.
Physically, there is vertigo, throat huskiness or loss of voice, head and eye pain. Nasal congestion, burning tongue, stomach nausea, and abdominal flatulence are present. A dry cough, thick expectoration and stitching pain in chest, cold extremities and itching skin is also common.

CLADONIA - Numerous texts have mixed up *Cladina* and *Cladonia*, but unlike the former, it has a squamulose primary thallose that makes for accurate identification. *Cladonia* now refers to Pixie Cup Lichens and their relatives, but previously represented all reindeer lichens.
Cladonia spp. contain usnic and isusnic acids, especially in the cortex, as well as beta-orcinol depsides and depsidones such as barbatic acid, and squamatic acid; atranorin, fumarprotocetraric and proto-cetraric acids, as well as norstitic, psoromic, rhodocladonic and thamnolic acids. They also contain ursolic acid, found in apples and various medicinal herb species.
Usnic acid from *Cladonia* spp. has shown high cytotoxic activity against cancer cells.
Various *Cladonia* spp. have been found effective in the treatment of tuberculosis (Vartia, 1973). This confirms the traditional use in Finland of hot water lichen infusions for this dreadful disease. Didymic acid, found in many *Cladonia* spp., inhibits the mycobacterium at 25 mcg/ml. Strepsilin is in several *Cladonia* spp. and shows antibiotic activity.
Species inhibiting *Bacillus subtilis* include *C. gracilis*, *C. deformis*, *C. amaurocraea*, *C. bacillaris*, *C. coniocrae*, *C. fimbriata*, *C. pleurota*, and *C. uncialis*.
Species inhibiting *Staphylococcus aureus* include *C. gonechu*, also known as *C. sulphurina*.
Activity against both bacteria was exhibited by *C. pyrixata* (Burkholder *et al.*, Bull. Torrey Bot. Club 72: 2).

BLACK FOOT CLADONIA, SMOOTH CLADONIA
(*Cladonia gracilis*)
Gracilis means slender, referring to the slender cup shape. It may be the most common lichen in dry lodgepole forests, growing in huge mats in places.
The lichen has been used to produce an ash green dye for wool.
This lichen shows significant inhibitory effect on estrogen formation from the estrogen precursor, sulfatase. Extracts at a concentration of 40 µg/ml showed an 83% inhibition.
It also contains fumarprotocetraric acid.

LESSER SULPHUR CUP
(*Cladonia deformis*)
C. deformis has been investigated for an unusual iron substance. Work by Alagna *et al.* in Italy indicated that the iron is present as high-spin Fe(III), and coordinates in an oxygen containing environment arising graciliformin ligands. It also contains zeorin.

MANY FORKED CLADONIA
(*Cladonia furcata*)
(*C. subrangiformis*)
C. furcata has been shown to inhibit the *Staphylococcus aureus* bacterium, and contains fumarprotocetraric acid.
Work by Liu *et al.* (Acta Pharmacol. Sin. 22: 8) identified a polysaccharide in the lichen that induced apoptosis in human leukemia K562 cells.

TRUMPET LICHEN
(*C. fimbriata*)
(*C. major*)
Trumpet Lichen (*C. fimbriata*) contains only 12.9 µg/g of carotenoids, while some *Caloplaca* ssp. contain up to 151 µg/g of varous carotenoids.
Work by Czeczuga *et al*. (Feddes Repertorium 110: 7-8) from Poland priduced a list of carotenoids from 34 lichen species in
The lichen also contains atranoric acid, fimbriatic acid, and fumaroprotocetraric acid.
It has been used in the past as a red dye for wool.

BROWN PIXIE CUP, CUP MOSS, CHIN CUPS
(*Cladonia pyxidata*)
CONSTITUENTS - Abundant atranorin and fumaroprotocetraric acid, barbatic acid and psoromic acid; mucilage; as well as parellic acid, and an enzyme emulsin.

Pyxidata is from the Latin **PYXIS**, meaning a box. A pyx is now a term applied at the government mint for a box containing sample coins. Chin Cup comes from its former use in whooping cough or chin cough as it was known.
This lichen is fairly widespread throughout the area and exhibits demulcent, anti-tussive and expectorant properties. The lichen has been shown effective against bronchitis and coughs, including whooping cough, once combined well with coltsfoot and sundew. It grows mainly on high mineral soil, contributing needed trace minerals to formulas.
They can be identified by their cup-like shape.
As well as medicinally, it was used traditionally in Europe to dye wool either red/purple or ash green.

HOMEOPATHY - Symptoms include hurried feeling, but less anxious and nervous; bloated abdomen,

disorientation, uncertainty, dryness of tongue, lips, throat, skin and rectum. Tired and yet sleeplessness, desire for open air; difficulty breathing in hot room.

DOSE - Six to 30th potency. Proving by Izzie Azgad and Rosalind Floyd on 9 provers.

BRITISH SOLDIERS
(*Cladonia cristatella*)
This lichen is so named due to its green body and red head; reminiscent of the early British red coats.
The lichen contains usnic, didymic, barbatic and rhodocladonic acid.
Early work by Burkholder *et al.* (Bull. Torrey Bot. Club 72: 2) found activity against *Staphylococcus albus*, *Diplo-coccus pneumoniae*, *Bacillus subtilis*, *B. mycoides*, and *Sarcina lutea*.
The same authors found both *C. pleurota* and *C. uncialis* active against the above bacteria as well as several *Streptococcus* spp.
Mealy Pixie Cup (*C. chlorophaea*) was boiled by the Okanagan-Colville and used to wash sores slow to heal. It contains fumar-protocetraric acids. This lichen is an old whooping cough remedy mentioned in early European herbals. It is boiled in milk and used today in Wales under the name **CWPANAU PAS.**
Research in Michigan found four different chemical populations of this species with each race occupying a different habitat, leading to significant difference in constituents, from grayanic acid to cryptochlorophaeic acid to merochlorophaeic acid, to the more common fumar-procetraric acid strain.
The red-tipped *C. bellidiflora* is common. The Haida Gwaii dipped the red tip into human breast milk and applied it to sore eyes.
Other *Cladonia* spp. worth mentioning are Gritty British Soldiers (*C. floerkeana*) containing cocellic acid; and *C. macilenta* with thamnolic acid. Both are eastern species.
Dragon Cladonia, or Dragon Funnel (*C. squamosa*) contains atranorin.
C. bacillaris contains barbatic acid, which possesses anti-tuberculinum activity. It also produces hemolysis.
Arctic Alpine Lichen (*C. coccifera*) has red apothecia, and contains zeorin.
The European *C. convoluta* contains usnic acid, fumarprotocetraric acid and 9'-(O-methyl) protocetraric acid, the latter of which has been shown to induce apoptosis of murine leukemia cells (Bezivin *et al*., Planta Med. 70).

LICHEN ESSENCES - Smooth *Cladonia* lichen essence is the mirror- for helping open new doors into consciousness. It is like a spotlight focusing deep within, reflecting up into awareness, an unacknowledged part of oneself.
It helps to discover and understand the patterns developed and enacted today. It allows one to reclaim power through awareness.

CANADIAN FOREST

Arctic Alpine *Cladonia* lichen releases deep-seated patterns and worn-out old issues by transmuting negative karma, which is ripe for resolution. Destructive emotions are then purified, self punishment, anger and low self-esteem relinquished.

FINDHORN

STUDDED LEATHER LICHEN, FAIRY PELT/LEMON LICHEN, FRECKLE PELT, SEA GREEN LICHEN
(*Peltigera aphthosa*)
CONSTITUENTS - various phenolics, including aphtosin and tenuiorin; methyl gyrophorate, gyrophoric acid, and triterpenoids Phlebic acid A and B.

Peltigera is from the Greek and Latin, meaning "shield bearing". *Aphthosa* is from the Latin meaning thrush, referring to the disease of the throat, for which it was once a specific. Or perhaps, originally, it is from the Greek **APHTHAI**, meaning pustule or eruption.
When moist, this lichen turns a brilliant green, later dulling to a grey green. It is commonly found growing over true mosses in coniferous forest.
All *Peltigera* spp. are used for boiling water dyes, usually brown in nature.
It is a strong purgative and anthelmintic, the combines well with other plants for cleansing worms and other parasites.
The Swedes boil the lichen in milk for treating thrush in their children. Back in the 1800s, it was believed that white spots on the cheeks of feverish children was caused by elves, and used Fairy Pelt to help the cure. This is another example of plant signature, where the cephaloida was thought to be similar to thrush eruptions in children's mouths. Given the prevalence of chronic thrush and yeast infections today, it is a plant worthy of further attention.
When cooked, the lichen becomes thick and glue like. This is a great remedy for diaper rash, applied and left to dry. Repeat as needed.
The Nitinaht of Vancouver Island chewed both *P. aphthosa* and closely related *P. britannica* for tuberculosis. The Tlingit sprinkled the dry, powdered lichen on scalds and burns, and the Nitinaht used the fresh poultice on leg sores.
Fairy Pelt or Lemon Lichen contains a mixture of methyl and ethyl orsellinates that have been shown to be superior to commonly used preservative agents like methyl and proply p-hydroxybenzoates. The anti-microbial active compounds were found to be effective against fungi and both gram positive and negative bacteria.
It contains several laccases, which may have application in biological reactions.
The closely related Ruffled Freckle Pelt (*P. leucophlebia*) was at one time considered the same species, but now distinct. Both are extremely widespread and common.
Studies by Ingolfsdottir *et al.* (Pharm. Biol. 38: 4) showed the lichen possessing moderate inhibition of HL-60, human leukemia cells.
The phycobiont of this lichen, *Coccomyxa* sp., excretes 16x more biotin in a culture medium than free-living *Chlorella*.
The related Frog Pelt, or Many Fruited Pelt (*P. polydactylon*) is used medicinally in Sikkim as a paste to stop bleeding and as an antiseptic. It is common to the mountains, and montane of Alberta, and contains 2-3% peltigerin, a derivative of orcinol, as well as tenuiorin, methyl gyrophorate, gyrophoric acid, and triterpenes.
Studies in Wales indicate that the lichen inhibits the germination of grass seeds, as well as root production and elongation in grass seeds. This suggests the use of this and other lichens in organic farming and weed control.
Water extracts of Dog Pelt, mentioned

below, inhibit various bent, meadow, and rye grasses as well as fescue.

Membranacous Dog Lichen (*P. membranacea*) was used by the Kwakiutl of British Columbia as a love charm in an unspecified manner, as well as by Nitinaht men who could not easily urinate.

Peltigera rufescens shows remarkably high anti-oxidant activity despite low levels of phenolics (Odabasoglu et al., Fitotherapia 76: 2).

GROUND LIVERWORT, DOG PELT (*Peltigera canina*)
CONSTITUENTS - ergosterol, emulsin, mannitol like substances, methionine

Its Latin name, *P. canina*, was for its former value in protection from dog bites; based on the plant signature of the fruiting bodies resembling dog teeth or ears. Today, it is known as a safe, reliable laxative, if used in moderate amounts; and a mild effective liver tonic.
Early German settlers to North America used the lichen for strengthening a weak liver, or cooling one that was inflamed. When ground into a powder and put in white wine, it was given to little boys suffering hernia. In parts of 19th century Wales, it was powdered and mixed with black pepper for dog bites.
The Nitanaht of Vancouver Island used *P. canina* (or *P. aphthosa* above) as an infusion for those suffering anuria, or inability to urinate.
Boiled in water, and gargled, the lichen soothes the swelling of tonsils and the uvula.
The distilled water is excellent for an inflamed liver or for treating jaundice, a few tablespoons taken several times daily. The high concentration of methionine may be responsible, in part, for its high curative rate.
The lichen has the symbolic meaning of confidence. It was a dye source in Europe as an iron red colour for wool.

Concentric Pelt (*P. elisabethae*), Ruffled Freckle Pelt (*P. leucophlebia*), Veinless Pelt (*P. malacea*), Black Saddle Lichen (*P. neckeri*), Carpet Pelt (*P. neopolydactyla*), and Flat Fruited Pelt (*P. horizontalis*) contain tenuiorin, methyl gyrophorate, gyrophoric acid, peltigerin, and various triterpenes.
Many of the others in our region contain no lichen substances, so you cannot just speculate.
Fan Lichen (*P. venosa*), for example, contains zeorin and tenuiorin.
Tenuiorin has been tested against human breast, pancreas and colon cancer cell lines, and showed moderate activity (Ingolfsdottir *et al*., Phytomed. 9: 7).

HOMEOPATHY - Ground liverwort is used whenever there is lots of throat congestion, with profuse expectoration and hoarseness. The throat is tickling and irritating, with a scraping and rough sensation.
Liverwort induces free and easy expectoration; relieving that continual feeling of something caught in the epiglottis.

DOSE - Second potency

PERSONALITY TRAITS
The noble liverwort does not appear,

Without a speck, like the unclouded air,
A plant of noble use and endless fame,
The liver's great preserver, hence its name.

ABRAHAM COWLEY

WITCH'S HAIR
(*Alectoria sarmentosa*)

This lichen looks at first glance like *Usnea*, but it lacks the central cord. It is found in the same boreal forests, hanging from conifers that are at least a century old. The Bella Coola of B.C. used the long hair for their dance masks.

In Scandinavia, different coloured *Alectoria* and *Usnea* spp. are used to make trolls, to warn children to be good and kind to other people. Legends told of deformed children driven into the woods, and dwarves carrying off naughty children.

In Western Canada, it was mainly used as a fibre for mattresses, baby diapers, and sanitary napkins. It was woven with *Bryoria fremontii* (below) for poor quality clothing, when skins were unavailable. It was often interwoven with wolf willow bark to make it more durable.

The Haida Gwaii call it Crow's Mountain Goat Wool or Crow's Blanket.

It was also used to make false whiskers and hair for decorative dance masks.

Recent studies indicate that a new anti-microbial dibenzo-furanoid lactol called alectosarmentin has been isolated from this lichen. The compound exhibits activity against *Staphylococcus aureus*, and *Mycobacterium smegmatis*. Usnic and physocid acids in this lichen were found effective against these two bacteria as well as *Candida albicans*.

Studies by Gollapudi *et al.* (J. Nat. Prod. 57: 7) at the U. of Kansas showed four anti-microbial compounds, including usnic acid, physodic acid, 8'-0-ethyl-beta-alectoronic acid, and alectosarmentin, the newly discovered dibenzofuranoid lactol.

It contains a yellow dye, and at one time was used by distillers to make alcohol. Previous studies have indicated the presence of mannitol and arabitol, active anti-tumour polysaccharides.

The closely related Gray Witch's Hair (*A. nigricans*), found in the foothills and montane of western Alberta, also has medicinal properties. Although it lacks usnic acid, it does have alectorialic acid. An extract was found to exhibit notable inhibition of ODC activity induced by 12-0-tetradecanoylphorbol-13-acetate in cultured mouse epidermal 308 cells. The IC_{50} value was only 2.6 µg/ml. Work by Ingolfsdottir *et al*. (Pharm. Biol. 38: 4) found this lichen active against leukemia cell lines and to exhibit quinone reductase activity.

Green Witch's Hair (*A. ochroleuca*) was used during the 1930s in Russia to make a type of molasses. It yielded 82% of its dry weight to glucose and produced a light yellow syrup. It also contains diffractaic acid (Llano, Econ. Bot. 10: 4).

The Inuit call it Greenbeard or Caribou Moss, or **TINQAUJAIT**, meaning "what looks like pubic hair". It is a handy fire starter.

BLACK TREE LICHEN
(*Bryoria fremontii*)
EDIBLE HORSEHAIR
(*Bryoria* spp.)

Black Tree Lichen was mixed by the Interior Salish with mud to chink log cabins. Others made a fibre that could be made into clothing such as vests, ponchos, shoes and leggings. It was twisted together with strands of Wolf Willow bark or other fibres to give it strength.

Northern flying squirrels build their cozy nests from it.

This lichen was commonly used by native tribes for food. Some aboriginals say it tastes like candy, if properly prepared; while others maintain it is strictly a survival food. In the Okanagan, young natives would bring back lichen from various areas to their grandmother to taste. If sweet, the family would claim the area where it was growing.

It can be collected at any time of year, and the flavour is definitely influenced by the tree it grows on.

The Northern Okanagan preferred that growing on Ponderosa or Lodgepole Pine; whereas the Southern Okanagan preferred the Douglas Fir or Western Larch. Probably whatever was in your area, I imagine.

Long poles were utilized to pull the lichen from branches or youngsters would climb into the trees to throw it down. In a good site, five or six trees would yield sufficient harvest for one family for the year!

The fresh lichen is light and bulky and was soaked in water; then cooked in a steam pit, created by putting hot rocks at the bottom and covering with green leaves and masses of lichens. It was left for the night, removed after cooling in the morning, and cut into jelly like loaves. It can be eaten then or stored for several years, and soaked before eating.

It compacts with cooking, as a 20-cm thick layer reduces to 4 cm after steaming. It is rather bland, so it was often cooked with layers of nodding onions, mixed with Saskatoon berries, or dipped in berry juice after cooking.

The Okanagan would also cook it the False Solomon Seal rhizomes, while others would sweeten it with Douglas Fir sugar.

The Carrier mixed it with flour and baked it like fruitcake and before flour with grease.

The Okanagan also used another method for cooking Black Tree Lichen. They would roast it until dry and crumbly, then boil it until molasses-like. The Nlaka'pamux still prepare it today in modern ovens, and serve it as a form of taffy, called **WE'IA**, with the texture and flavour of licorice.

The lichen is incredibly rich in iron, containing 8.3 mg per 100 grams.

The dried cakes were used for long journeys. Pregnant women did not eat this, as they believed it would make their babies dark. The Okanagan Colville mixed the dry lichen with grease and rubbed it on the navel of newborns to prevent infection. They also gave a mixture of Saskatoon berry juice and syrup of *B. fremontii* to babies after weaning.

Natives of the northern Boreal forest heat the various horsehair lichens into a powder for burns. Further south, the Nez Perce used it for treating diarrhea and ingestion.

Some black spruce forests of northern Saskatchewan produce over 500 kg of horsehair lichen per hectare.
Horsehair Lichen (*B. trichodes*) is found isolated in central Saskatchewan, but is common in eastern Canada. The related subspecies *americana* is found in B.C. and in parts of southern Alaska. It was gathered and piled on a sick person in steam baths to help hold in heat, and used to staunch bleeding wounds. The lichen was also gathered and burned into a black powder for wood paint, as was Shiny Horsehair Lichen (*B. glabra*).
Horsehair Lichen contains fumar-protocetraric acid and atranorin.
One related lichen, Inedible Horsehair (*B. tortuosa*), which looks somewhat like Black Tree, contains high concentrations of the poisonous vulpinic acid and is a potential toxin. This is mainly a coastal species and not present east of the Rockies.
One species, *B. capillaries*, found on spruce and fir trees of the Rocky Mountain foothills, was traditionally burned into a black powder for paint as above. The related *B. fremontii* was eaten as food, spun into fibre for clothing, and dye colour. Natives of Oregon called it **WA KAMWA**. They dried, powdered and added it to soups. It is said to taste like acorns.

SPIRITUAL PROPERTIES - The coyote is the trickster and transformer of all things in their present state. The Black Tree Lichen was originally derived from Coyote's Hair braid which became tangled on a tree branch he was climbing.
He cut himself loose and fell to the ground, without his braid. Looking up he said "You shall not be wasted, my valuable hair. After this, you shall be gathered by the people. The old women will make you into food".
It was changed into lichen and has been used as food ever since.

MOURNING DOVE

ALPINE CORAL
(*Stereocaulon alpinum*)
EASTER LICHEN
(*S. paschale*)
Stereocaulon is from the Greek **STEREOS**, meaning hard or firm; and **KAULOS**, meaning stem; referring to the firm brittle texture when dry.
Stereocaulon alpinum is a rose-white greyish lichen common to Northern Alberta in sub-alpine forest floors. It is often confused with the closely related *S. tomentosum*, which is silvery grey.
Several studies indicate that the active ingredient of *S. alpinum* (methyl beta-orsellinate) is a superior preserving agent to commonly used methyl and propyl p-hydroxybenzoates. It is anti-fungal and shows signs of gram positive and negative bactericidal activity.
Lobaric acid isolated from this lichen has shown *in vitro* inhibitory effects on arachidonate 5-lipoxygenase, similar to the flavone baicalein, found in Scullcap (Bucar *et al*., Phytomed. 11: 7-8).
Studies conducted in Iceland, a mecca of polar lichens, by Ogmundsdottir *et al.* of the Icelandic Cancer Society Laboratory in 1998 show some exciting results in the Jan. 1998 Journal of Pharmacology.
On cultured, human cells, three malignant cell lines from breast carcinomas and erythro-leukemia (K-562) were tested. At concentrations of

20 µg/mL, significant cancer cell death was detected.
In contrast, the proliferation and survival of normal skin fibroblasts and DNA synthesis was not affected.
These results open up the opportunity for future studies of protolichesterinic acid with regards to anti-tumour and anti-inflammatory properties.
Atranorin and lobaric acids, isolated from the lichen also showed activity against *Mycobacterium aurum*, a non-pathogenic organism with sensitivity similar to the Tuberculinum bacterium.
Work by Ingolfsdottir *et al*. (Phytomedicine 4: 4) showed the presence of an alkamide, called 9-cis-octadecenamide. This compound showed moderate inhibitory activity against cyclooxygenase from sheep seminal vesicle microsomes with an IC_{50} of 64.3 µM, indicating anti-inflammatory properties.
The related Rock Foam Lichen (*S. saxatile*), Grand Foam (*S. grande*), and Easter Lichen (*S. paschale*) contain lobaric acid, while Woolly Foam Lichen (*S. tomentosum*) contains stictic acid.

Easter Lichen is used in Traditional Chinese Medicine. In Alaska and Western Canada, it was used to stuff caribou skins for rafts.
Early work by Burkholder *et al*. (Bull. Torrey Bot. Club 72: 2) showed activity against *Staphylococcus aureus*, *Bacillus subtilis*, *B. mycoides*, and *Sarcina lutea*.
Snow Foam Lichen (*S. rivulorum*) usually contains lobaric acid, with some areas containing perlatolic and anzaic acid, and others only atranorin.
The related Variegated Foam Lichen (*S. vesuvianum*) is found on newly exposed rock in the Rocky Mountains as well as throughout the northern territories. It contains stictic and norstictic acids.

LICHEN ESSENCE - Variegated Foam
Lichen essence is like the lichen, the first plant to grow on cooled lava. It gives us the power to begin over again. It strengthens our resolve to move forward even in small steps.

KORTE PHI

ROCK SHIELD, SALTED SHIELD, CROTTLE (*Parmelia saxatilis*)
SMOKY CROTTLE (*P. omphalodes*)
Saxatilis is from the Latin **SAXUM**, meaning a rock.
Parmelia saxatilis is a lichen found abundantly on acidic rocks and outcroppings in boreal forests of the prairies. It increases in size by an average of 3.4 mm/year.
It contains both altranoric acid (0.5%) and salazinic acid (3.1%), a compound with myobacterial activity. In studies conducted by Ingolfsdottir *et al*. in Iceland, the compound showed MIC values of 125 µg/mL.
This may be of significance in the treated of tuberculosis from a natural source. Various *Parmelia* spp. have been used traditionally in both India and China for medicinal purpose. In TCM, *P. saxatilis* is known as **SHIH HUA**.
This lichen accumulates the rare mineral Beryllium.
In Sweden, country people call this Dye Lichen, or Stone Moss. It is collected from rocks easily after a rain with a table knife. It yields various shades of brown, depended on the quantity used.
In Scotland, it is used to dye wool for Harris Tweed, and does not require a

mordant. The scent of Harris Tweed is that of the lichen itself, even more pronounced when wet. In 1850, a factory in Glasgow covered 17 acres and processed 254 tonnes of lichen annually. Human urine was used for ammonia, and required collection of over 13,000 L daily.
The dried lichen was sprinkled in stockings in parts of the Highlands to prevent foot inflammation and pain from long journeys. In parts of Ireland it was applied to bad sores under the chin, as well as burns and cuts.
Smoky Crottle (*P. omphalodes*) more often found in the northern territories, was also used traditionally for dying the deep red browns and rusty oranges prized by weavers. The brown shades produced are known as Crottle, and the red shades, Corkir. Studies have shown that the dye is produced by a reaction between the free amino groups of the wool with aldehyde groups on the lichen acids. There is no correlation between the colour of the lichen and the colour obtained on boiling with wool. Lichen substances, such as gyrophoric, evernic and lecanoric acids, as well as erythrin convert to a purple compound in the presence of oxygen and ammonia.
It also contains salazinic acid, sometimes accompanied by lobaric acid.
Concentric Ring Lichen (*Arctoparmelia centrifuga*), has been used traditionally in the north as a red brown dye for wool.

WAXPAPER LICHEN, HAMMERED SHIELD LICHEN
(*Parmelia sulcata*)
Sulcata is from the Latin **SULCUS**, meaning a furrow or groove.
Also known as Powdered Shield Lichen, this is a common branch lichen on dead spruce branches throughout the north.
The Rufous hummingbirds used it to decorate and hide their nests.
The lichen was rubbed on the gums of teething babies to help make them less restless and sleep.
The lichen acids, including salazinic and lobaric, are antiseptic.
In Italy, various species of *Parmelia* are used as a cholagogue.
Because it contains salizinic acid, it can also be used for dyeing wool.
The lichen shows activity against *Aeromonas hydrophila*, *Bacillus cereus*, *B. subtilis*, *Listeria monocytogenes*, *Proteus vulgaris*, *Yersinia enterocolitica*, *Staphylococcus aureus*, *Streptococcus faecalis*, *Candida albicans*, *C. glabrata*, *Aspergillus fumigatus*, *A. niger* and *Penicillium notatum* (Candan *et al*., Zeitschrift für Naturforschung 62: 7-8; Rankovic *et al*., Mikrobiologya 76: 6).
Parmelia entotheiochria contains secalonic acid A, related to the ergochromes from ergot.
The related *P. andina*, which contains lecanoric acid, is used in pipe mixtures for smoking in the southern Sahara.
Alpine Camouflage Lichen, previously known as *Parmelia stygia*, but now moved to the *Melanelia* genus, is found in the western mountains and throughout the former North West Territories.
Spotted Camouflage Lichen (*M. olivacea*) ranges throughout eastern Saskatchewan and Manitoba. Both have been used previously to produce a brown dye in Great Britain.
The genus contains lecanoric, fumarprotocetraric, stictic and perlatolic

acids, as well as echinocarpic and galbinic acids.
Parmelia spp. exhibit astringent, resolvent, aperient and diuretic properties.

PLATED ROCK TRIPE
(*Actinogyra muhlenbergii*)
(*Gyrophora muhlenbergii*)
(Umbilicaria muhlenbergii)
FROSTED ROCKTRIPE
(*U. vellea*)
(*G. vellea*)
(*U. americana*)
Rock Tripe is a flat, brown, circular lichen that attaches itself to rocks with a cord.
The Woods Cree of Saskatchewan call it **ASINIWAKON** and used it for food by cleaning and breaking small pieces into fish broth to thicken it. Very hot water was poured over the pieces and after cooking for 5-10 minutes, the pieces softened and the broth thickened as it cooled. It was considered good nourishment for those who were sick, because it does not upset the stomach.
The Chipewyan also used this "rock dirt", or **TTHE TSI**, as a food source. The flakes were cleaned off and boiled in soup, giving a sour, mushroom flavour. The soup also helps to fatten up sled dogs.
The Chipewyan also burned it to ash, and then boiled it to make a syrup for tapeworms.
Usually the lichen is added to boiling water that is discarded first to remove some of the more irritating and bitter acids. Ashes are sometimes added to the water to neutralize the acidity; even baking soda will make rock tripe more digestible.
The lichen contains gyrophoric acid.
One species, *Umbilicaria esculenta*, or "rock tripe", is considered a delicacy in Japan. It is sold as a delicacy, under the name Iwatake and taken as part of a special tea ceremony or natural food in mountain inns. There is some confusion as to the exact identity of the lichen, with *Dermatocarpon miniatum* sometimes identified as the same lichen. It is either boiled until tender, and then seasoned with rice vinegar or sesame paste; eaten as a vegetable in soybean soup; or deep fried as a tempura.
The lichen *U. esculenta* contains an acylated B-1-6 glucan that shows anti-tumour activity against bone cancer (sarcoma 180).
Leather Lichen or Stippleback Lichen (*D. miniatum*) is found on limestone rock in southern Alberta and Saskatchewan. It is used as a source of ash green dye for wool in some parts of Europe.
In Japan, a sulfate isolate from rock tripe showed an inhibitory effect on the replication of HIV-1 *in vitro*. The compound (GE-3-S) appears to work in a manner similar to dextran sulphate and heparin, preventing attachment of HIV to the surface of T4 cells. This partially acetylated pustulan sulphate is only one of four polysaccharide that show weak animal toxicity, with GE-3-S showing no acute toxicity in mice at very high doses (Chem. Pharm. Bull. 37: 9).
The lichen is active against gram-positive bacteria. A substance similar to pustulan, an acylated B-1-6 glucan, has shown anti-tumour activity against sarcoma 180.
In Scotland, rock tripe was used to make **CORKIR**, a brilliant red dye to colour

tartans. When treated with urine, it yielded purple.
Decoctions can be used as a gargle for soothing canker sores and bleeding gums.
Both *U. vellea* and *U. americana* have been recently separated into two distinct species. The later lichen is found in a sweeping arc from Lake Winnipeg to Great Slave Lake in the territories. Work by Swanson and Fahselt in 1997 found that UV-A increased and UV-B decreased the content of secondary compounds.
The Inuit know Rock Tripe as **QUAJAUTIT**, a word associated with slippery underfoot. They absorb blood for cleaning a wound and ripe boils. A spoonful of the boiled lichen is considered good for any illness, but the lichen is not eaten. The tripe was used to absorb oil from the dried skins of baby seals on Baffin Island.

FIREDOT LICHENS
(*Caloplaca* spp.)
Various *Caloplaca* spp. grow on arctic alpine soil, and others on the bark of aspen. They appear as orangey, rusty dots on the bark of poplar, or granite rocks and sidewalks.
A fungus occurring in the genus has been found to produce physcion. This is identical to the monomethyl ester of emodine.
Work by Manojlovic *et al.* (Pharm. Bio. 43: 8) on various *Caloplaca* spp. suggest both anti-microbial and anti-fungal activity.
Gray Rimmed Firedot Lichen (*C. cerina*) has been found by the same authors to possess anti-fungal activity (Manojlovic *et al.*, Fitoterapia 76: 2).

LICHEN ESSENCE - Sulphur Firedot Lichen (*C. flavescens*) leaf lichen essence acts as an energy support for the skin. It helps us change or redefine our contact with the outside world. For people who are too "thin-skinned" in their relationships.

KORTE PHI

COMMON GOLDSPECK
(*Candelariella vitellina*)
The fungus from this lichen, an egg yolk coloured species with scattered and flattened growth on acid and calcareous rocks and tree bark, contains stictaurin. They all contain calycin, a yellow pigment.

ROCK ORANGE LICHEN, ELEGANT SUNBURST LICHEN
(*Xanthoria elegans*)
These rock lichens, are easy to notice with their flat, fan shape and bright orange colour contrasting against a limestone type rock. Occasionally, they may be found on old wood or bones, but they seem to prefer the carbonic environment.
In fact, this lichen is looked for by Inuit hunters to locate the burrows of animals such as the hoary marmot. The nitrogen from bird or mammal waste encourages its growth.
Various native tribes of British Columbia used the pigment for face paint.
The Rock Orange Lichen was found growing on the graves of crew members of Franklin's last expedition. The lichens are slow growers and after more than 100 years only grew 4.4 cm in diameter, but the lichen is hardy. It has been

found on Himalayan rocks at 7,000 m altitude.
Work by Ingolfsdottir, mentioned above, found the lichen showed significant induction of quinone reductase against hepatoma cells. The concentration to double activity was determined to be only 4.8 µg/mL. This is significant, because many plant constituents with cytotoxic activity are also harmful to healthy cells. Work by Gerhauser et al. (1997) found significant induction of QR activity in an assay using cultured Hepa 1c1c7 hepatoma cells.
Xanthoric acid, besides possessing cytoxicity, is anti-convulsant, anti-bacterial and anti-mycotic.
All *Xanthoria* spp. contain various anthraquinone pigments, such as parietin, and xanthroin.
The related Wall Lichen (*X. parietina*), was thought, due to its orange colour, of use for jaundice, based on the doctrine of signatures. This is one of many cases, which does not run true. It is not found in our region and sometimes called Maritime Sunburst Lichen. It is bright yellow in sunny regions and grey in the shade, suggesting a protective mechanism from UV radiation.
The lichen is used as part of hair powder in India. It is decocted in wine in Spain to treat menstrual problems, and simply decocted for kidney disorders, toothache, and as part of a cough syrup. Throughout Spain it is known as Flor de Piedra or Rompiedra.
It contains bromoperoxidase and significant amounts of the element vanadium; as well as parietinic and atranoric acid. Parietin pigment levels are strongly influenced by UV-B radiation.
The related Hooded Sunburst Lichen (*X. fallax*), commonly found on elm and poplar of the prairies, contains fallacinal.
Shrubby Sunburst Lichen (*X. candelaria*) is found in western Alberta and elsewhere. It is called the Candle Lichen in Sweden and used to color animal fat to make candles.

LICHEN ESSENCE - Xanthoria parietina essence facilitates an awakening, bringing wisdom and understanding. It can help to relieve fears, nervousness and confusion. It is for those who walk around in circles. It helps balance the solar plexus, CNS, liver, skin, lungs, and nerves.

SILVERCORD

FRAGILE SPHAEROPHORUS, FRAGILE CORAL LICHEN
(*Sphaerophorus fragilis*)
ALPINE SPHAEROPHORUS, CORAL LICHEN
(*S. globosus*)

Fragile *Sphaerophorus* is an arctic species that grows in dense cushions and has very fragile branches. Alpine *Sphaerophorus* has two variations, one var. *gracilis* that grows on coniferous forest west of the continental divide, and var. *globosus*, a rarer type that grows on the ground or in rock crevices. They both contain hypothamnolic acid, with Coral lichen sometimes containing squamatic acid.
Both these lichens also exhibit significant inhibition against the estrogen precursor, sulfatase. When

tested at 40 µg/mL, the former showed inhibition of 95% and the latter of 90% Alpine *Sphaerophorus* also exhibited inhibition against aromatase, another estrogen precursor. While only at 74%, the combined inhibition of both precursors makes this a potentially exciting prospect for the future.

HOODED BONE, HOODED TUBE LICHEN, MONK'S HOOD LICHEN, PUFFED LICHEN (*Hypogymnia physodes*)
(*Parmelia physodes*)
POWDER HEADED TUBE LICHEN
(*H. tubulosa*)

This pale grey green lichen is commonly found on coniferous and birch trees in the boreal forest. Research shows it is more tolerant of pollution from sulphur dioxide than most macrolichens, but is still used as an indicator of pollution.
It appears to be able to bio-remediate arsenic, both by arsenite excretion and methylation of the toxic mineral (Mrak *et al*., Environ. Pollut. 2007).
It has been used for both food and medicine. The Potawatomi used it in soup and as a treatment for constipation.
In Sweden and Scotland, the lichen is used to yield a brown dye for wool.
Vainshtein *et al.* (Mikologiya-i-Fitopatologiya 26: 6) studied the effect of water extracts of the lichen. They found it to inhibit many of the common wood destroying fungi, such as *Heterobasidon annosum*, *Laxitextum bicolor*, *Schizophyllum commune*, *Stereum hirsutum*, and *S. rugosum*.
This work could lead to some innovative inoculants or anti-fungal treatments for woodlot management.

The tube lichens contain atranorin, physodic acid, and often orcinol, as well as beta- orcinol depsidones, including protocetraric and physodalic acids.
Physodic acid, at 6-12 µg/mL inhibits *Mycobacterium tuberculosus*.
Burkholder *et al.* (Bull. Torrey Bot. Club 72: 2) found the lichen active against *Staphylococcus aureus*, *S. albus*, *Bacillus subtilis*, and *Sarcina lutea*.
In 15th century Europe, it was combined with *Evernia prunastri* and *Evernia furfuracea* in creating the mixture lichen *Quercinus virides*.

Powder Headed Tube Lichen, common throughout B.C. and into southern Alberta, contains 3-hydroxyphysodic acid.
Work by Yilam *et al.* (Zeit. Naturforsch. 60: 1-2) found this compound active against *Aeromonas hydrophila*, *Bacillus cereus*, *B. subtilis*, *E. coli*, *Klebsiella pneumoniae*, *Listeria monocytogenes*, *Proteus vulgaris*, *Salmonella typhimurium*, *Staphylococcus aureus*, *Streptococcus faecalis*, and *Candida albicans*.
Varnished Tube Lichen (*H. austerodes*) contains oxyphysodic acid, physodic acid, and sometimes 3-hydroxyphysodic acid, in addition to the above.

SMOKY RIM LICHEN
(*Lecanora cenisia*)

Smoky Rim Lichen is a rock lichen found commonly through out North America, and contains atranorin and fatty acids, especially roccellic acid. It sometimes contains gangaleoidin.
The related *L. californica* contains norgangaleoidin and a fatty acid known as nephrosteranic acid.

Granite Speck Rim Lichen (*L. polytropa*), found in the Canadian Shield, contains usnic acid, zeorin and fatty acids. It is found worldwide including at the 24,000 feet level on the south side of Makalu.
White Rim Lichen (*Lecanora rupicola*) contains atranoric acid, rocellic acid, and thiophanic acid; as well as sordidone, eugenetin and eugenitol, mycobionts not found in the thallus.
The related *L. esculenta* grows on cliffs of the Middle East, and is believed to be the manna that fed the Hebrew people fleeing from Egypt, as told in the Bible. Moses told everyone to gather it up because "this is the bread which the Lord hath given you to eat"…tasting" like wafers made with honey". High desert winds sometimes scatter it, even to this day, falling on Bedouin settlements like rain. It does have a naturally sweet flavour and is edible, hence the species name. Locals call it the "fat of the Earth", and it is sometimes flavoured with anise and honey into Panakarpian, a type of bread popular in Alexandria.
Three parts lichen and one part meal are made into a bread called **SCHIRSAD**, and can today be bought in the bazaars of Tehran to encourage breast milk production.
In 1829, during the war between Persia and Russia, a Caspian town was covered with lichen, which literally fell from heaven. This was made into bread and helped stave off starvation.

GREEN LIGHT, ARCTIC KIDNEY LICHEN
(*Nephroma arcticum*)
POWDERY KIDNEY LICHEN
(*N. parile*)

Green light is found in the extreme north following the Canadian Shield, and on the extreme tops of the Rocky Mountains.
Powdery Kidney Lichen is found in the sub-alpine region and mountains into British Columbia, as well as extreme northeastern Saskatchewan.
Natives of Alaska cooked the lichen with crushed fish eggs, or alone as an infused tonic after a lengthy illness. The lichen was picked in summer and then stored until needed.
Mustard Kidney Lichen (*N. laevigatum*), found on the west coast, contains usnic acid and nephrin.
Powdery Kidney Lichen has been used in Scotland as a blue dye for wool.

STIPPLEBACK LICHEN
(*Dermatocarpon moulinsii*)
This fairly common lichen is found on gravel in both the extreme north and southern parts of Alberta. When wet, the upper part turns green, and becomes translucent. It can be soaked in water and then chewed slowly as a food source. When boiled for about 15 minutes with a little salt, it has a flavour reminiscent of mushroom. It is a good addition to help thicken and flavour rock soup.

TUMBLEWEED SHIELD
(*Xanthoparmelia chlorchroa*)
PEPPERED ROCK SHIELD
(*X. conspersa*)
Tumbleweed Shield Lichen is common to the Great Western Basin and into central Alberta and Saskatchewan. The common name is due to its detaching

from rock and tumbling around with the wind.
It is an indicator of good antelope grazing territory.
The entire plant, called Ground lichen by the Navaho, was boiled for a red, brown, or orange dye for leather, baskets and wool.
They also used it medicinally to treat impetigo, possibly due to its content of salazinic and norstitic acid. It contains 2% usnic acid, compared to 1.5% in *Usnea barbata*.

Peppered Rock Shield Lichen is present in eastern Manitoba, with limited range near the Alberta/Saskatchewan boundary north of Medicine Hat.
It has been used in England for dye, producing a red-brown colour for wool.
The lichen is used in southeastern Africa for medicine, both internally and applied as a powder to treat snakebites and venereal disease, especially syphilis.
It contains a sticitic acid complex including cryptostictic acid, and variable amounts of norstitic acid.

The related *X. taractica* is common throughout the boreal forest, on exposed rock associated with gravel and slides. The lichen is a hyper-accumulator of zinc, and may be a prospecting tool for mining companies.

The related *X. scabrosa* has been found to induce smooth muscle relaxation that promotes arterial dilation and increased blood flow. It is a main ingredient in a novel sexual stamina formula, a sort of natural Viagra approach to arousal.

Other interesting lichens include the Snow Lichens, such as Curled (*Flavocetraria cucullata*) and Crinkled (*F. nivalis*). The first, previously classified as *Cetraria cucullata*, has been used in northern Canada as a condiment for fish or duck soup.
Curled Snow Lichen has been used as a food, and was used by Russia during the Second World War to produce glucose molasses, yielding 71% by dry weight.
It produces a violet dye with addition of ammonia.
Near the Peru and Bolivia border, the lichen is known as Beard of the Rock and is infused in hot water as a cardio-pulmonary tonic for heart attack and altitude sickness.
It contains usnic and sometimes proto-lichesterinic acid.

Common Greenshield Lichen (*Flavoparmelia caperata*) is found near Lesser Slave Lake in Alberta, and northeastern Manitoba.
It has been used as an orange-brown to yellow dye on the Isle of Man, and a dry powder on burns in Mexico.
It contains usnic, protocetraric and caperatic acids as well as atranorin.
Early work by Burkholder *et al.* found activity against *Staphylococcus aureus*, *Diplococcus pneumoniae*, *Streptococcus hemolyticus*, *S. viridans*, *Bacillus subtilis*, *B. mycoides*, and *Sarcina lutea*.

Powder-edged Speckled Greenshield (*Flavopunctelia soredica*) is found on bark in open woods, throughout the prairies. It contains usnic and lecanoric acids.
The Navaho of New Mexico use it to produce a flesh colored dye.

Green Starburst Lichen (*Parmeliopsis ambigua*) is widespread and contains divaricatic acid.

Dusty, or Chalky, Ramalina (*Ramalina pollinaria*) is common throughout eastern Alberta. It has a long history of use in the preparation of cosmetics and perfumes.
It contains usninic, obtusatic, evernic, and sekikaic acids.

Dotted Ramalina, or The Dotted Line, (*R. farinacea*) is common throughout central Alberta. It has been used traditionally as a light brown dye for wool, and has a history of use in cosmetics and perfumes throughout Europe.
The lichen contains ramalinolic acid, sekikaic acid, arabitol, mannitol, and d-usnic acid.
Work by Tay *et al.* (Zeit. Naturforsch. 59) found (+)-usnic acid from this lichen active against *Bacillus subtilis*, *Listeria monocytogenes*, *Proteus vulgaris*, *Staphylococcus aureus*, *Streptococcus faecalis*, *Yersinia enterocolitica*, *Candida albicans* and *C. glabrata*.
Norstictic acid showed activity against all the above except *Y. enterocolitica* as well as Aeromonas hydriphila, and protocetraric acid showed activity against the yeasts.

Rock Ramalina (*R. intermedia*) which resembles the Dotted in some respect, contains sekikaic acid. This lichen is more commonly found on the Canadian Shield throughout Manitoba and northeastern Saskatchewan.
The related *R. bourgeana* is used in Europe to dissolve kidney stones.

Blue Grey Rosette Lichen, or Powderback Lichen, (*Physcia caesia*) contains atranoric acid, haematommic acid, and zeorin. Star Rosette Lichen (*P. stellaris*) contains atranorin.
As mentioned above, *Physcia* spp. were previously combined with pine resins to produce a yellow staining paint.
The distinct shiny bluish grey appearance of this genus is due to a thin layer of calcium oxalate crystals that deflect light and help lichens survive extreme conditions.

Gold Eye Lichen (*Teloschistes chrysophthalmus*), found throughout southern Manitoba, contains usnic acid that shows activity against the arena viruses Junin and Tacaribe (Fazio *et al*., Zeit. Naturforschung 62: 7-8).

Bitter Wart Lichen (*Pertusaria amara*) is found in the Rockies and extreme southeast Manitoba. It contains arabitol, mannitol, and emulsin, as well as picrolichenic acid.
It is extremely bitter, as the name suggests, is the basis for its medicinal use in treating high fever. The decocted medicine was said to be a quinine replacement. The related *P. communis* was said more useful for men than women.

Eight lichens, including *Platismatia glauca*, found on lodgepole pine and white spruce, were studied for cytotoxic activity by Bezivin *et al*. (Phytomedicine 10: 6-7). All demonstrated activity on human cancer cell lines.
Platismatia glauca contains protolichesterinic acid. The Haida refer to the lichen as Red Cedar Goat Wool or Light Clouds.

Yellow Map Lichen (*Rhizocarpon geographicum*) is found in southwestern Alberta, as well as the Shield of northeastern Saskatchewan and most of northern Manitoba.
This was a popular lichen in Scandinavia for producing a brown dye for woolens. It contains the pigment rhizocarpic acid, as well as parellic, psoromic and rhizonic acid, and tetronic acid derivatives. Rhizocarpic acid and various depsidones found in various lichens are active against methacillin resistant strains of Staphylococcus aureus. Kokubun *et al.* (Planta Med. 73: 2) found hybocarpine the most active compound.

Fine Rock Wool (*Pseudephebe pubescens*) derives its common name for its appearance of black steel wool. It is found in the mountains of Alberta and west. The Haisla of B.C. used it to make a black wood paint.

Candle Flame, or Lemon Lichen, (*Candelaria concolor*) contains callopismic acid, also known as ethylpulvic acid; stictaurin or dipulvic acid; barbatic acid, and dipulvic dilactone; as well as tetronic acid derivatives.

The Dust Lichen (*Lepraria latebranum*) contains lepraric acid, and fuciformic acid, while Fluffy Dust Lichen (*L. lobificans*), found in the montane and mountains of western Alberta, contains atranorin, stictic and constictic acids as well as zeorin.

Siphula ceratites contains siphyulin.

Orange Chocolate Chip Lichen (*Solorinia crocea*) contains solorinic and norsolorinic acid, as well methyl gyrophorate and gyrophoric acid. Solorinic acid is an anthraquinone.
As the name suggests, it is unmistakable with its bright orange medulla and red born apothecia. Common throughout the mountains and rest of B.C., it contains at least two lacasses (Lisov *et al*., FEMS Microbiol. Lett. 275: 1).

Crater Lichen (*Diploschistes scruposus*) has a zinc content up to 9.34% of its dry weight, showing unusual ability to absorb ions from the soil.

Whiteworm Lichen (*Thamnolia vermicularis* var. *subuliformis*) is frequently found on tundra and arctic alpine areas. Birds like the Golden Plover use the lichen for nesting material.
It is used in Nepal for its antiseptic properties.
It contains baeomycesic acid, a beta-orcinol depside, which shows weak inhibition of platelet type 12 (S) lipoxygenase (Ingolfsdottir *et al*., Phytomed. 4).
There are two distinct strains, one containing thamnolic acid and another with squamatic and baeomycic acid, the former found more coastal and the latter in the Rocky Mountains. Omarsdottir *et al.* (J. Phytomed. 13: 9-10) identified thamnolan as one of the immuno-modulating polysaccharides.

Blood Spot Lichen (*Haematomma lapponicum*) and other species of this genus contain porphyrillic acid, which shows antibiotic activity, as well as divaricatic and usnic acids. The related

H. coccineum contains 20% usnic acid dry weight, a phenomenal amount.

The poetic Pepper Spore Lichen, *Rinodina oreina* (previously *Dimelaena oreina*) contains gyrophoric and fumarprotocetraric acids.

Evernia prunastri, mentioned below, contains evernic acid. This compound shows activity against mycobacterium at rates similar to usnic acid. It was used traditionally to leaven bread, and as a hop substitute for beer.
Dermatocarpon miniatum is a powerful anti-oxidant and was identified by Aslan *et al.* (Pharm. Biol. 43: 8).
Flaccid Jelly Lichen (*Collema flaccidum*), found further east, has been found to possess antitumor activity (Renzanka *et al.*, Nat. Prod. Res. 20: 10).

Powdered Loop Lichen (*Hypotrachyna revolute*) found on Vancouver Island, contains beta-orcinol metabolites hypotrachynic acid, deoxystictic acid, cryptostictinolide, and 8'-methyl-constictic acid.

ESSENTIAL OILS - All lichens will give up a certain percentage of essential oils. Certain species, like the oakmoss lichen (*Evernia prunastri*), have been used in Europe for centuries by the perfume industry as fixatives and bass notes. It was shipped from Cyprus and Greece to Egypt for packing embalmed mummies. From the northern boreal muskegs, spruce moss or Boreal Oakmoss Lichen (*E. mesomorpha*) grows on the branches and bark of black spruce, larch, and birch. The Chipewyan call it **K'TSA"JU**, or birch lichen. They would use a cooled decoction of the lichen from birch trees as treating snow-blindness. Solvent extractions of spruce moss have been used since the 16th century for perfume.
West of the Rockies, *E. prunastri* is quite prominent, and a good source of perfume fixatives as well as usnic acid, and heteropolysaccharides.
About 9,000 tonnes are still today, shipped from Macedonia to France to produce Oakmoss absolute. It is often mixed with *Pseudoevernia furfuracea*, which is more aromatic but inferior as a perfume fixative.
Oakmoss is used today in aromatherapy for its grounding nature, and to create a sense of security and personal prosperity. It helps one work with nature spirits and prevents slipping of secrets.
Oakmoss Lichen has been used in Egypt as a bread additive, and by the Turks to make a type of jelly.
Over the centuries, certain lichens have been dried and powdered for the white powdered wigs of aristocrats and to repel lice. Lichen extracts are also found in soups and deodorants, due in part to their anti-bacterial activity, which in turn, helps reduce underarm odour.
Various *Ramalina* and *Parmelia* spp. are useful for the production of absolutes by alcohol and aldehyde free petroleum ethers. In the southern Boreal Forest and northern Aspen Parkland, both Punctured Gristle (*R. dilacerata*) and Dusty, or Chalky Gristle (*R. pollinaria*) are quite common.
Iceland moss has been distilled and yields 0.051% of a brownish oil from which unidentified crystals separate

upon standing. It contains cetrarine, a phenol-ketone.
Lungwort (*Lobaria pulmonaria*) also makes a fine perfume by alcohol extraction.
Diluted Lichen absolutes can be rubbed into the forehead and over sinus area for pain relief.
Some, like *Sticta fulgininosa*, have an oceanic or fishy smell, not appreciated by all.
Considering the vast expanses of raw material available, there are great possibilities for creating viable business opportunities. They all possess the ability to retain scent and are used extensively in potpourri for this purpose.

HYDROSOL - Those afflicted with bloody flux should boil tree moss (*E. prunastri*) in water or red wine and take this in drink…this will protect women from premature birth.

SAUER

PERSONALITY TRAITS - Lichens can live several hundred years on trees and in harsh habitats, such as wind ravaged mountain rocks. They even adapt happily to life on graveyard tombstones. They draw nutrients from dew and rainfall, and store the food in their bodies for very long periods, releasing nourishment gradually as needed. The lichen can thus sustain itself almost indefinitely in a tough environment. What provisions do you need to sustain you tomorrow? A certain amount of food, money, clothing and household goods are only a start. What about the sustenance that comes from family, friendships, and sound values? It's never too soon to stock your storehouse with these treasures that nourish over a lifetime.

G. MOHAMMED

I've always looked on this fabulous forest find as the elder statesman of the woods. Perhaps it's because it takes months and months of the right conditions within a thicket of timber for *Usnea* to fully develop. Or maybe it's because it resembles a ragged beard as it hangs stiffly from tree branches. Whatever the reason, I have a feeling its long period of maturation has given it a chance to soak up the wisdom, energy and secrets of all the other trees and plants that surround it.

DEWEY

In certain districts of Scotland, as Aberdeenshire, almost every farm or cotter had its tank or barrel (litpig) of putrid urine (graith) wherein the mistress of the household macerated from lichens (crotals or crottles) to prepare dyes for homespun stockings, nightcaps or other garments. The usual practice was to boil the lichen and woolen clothes together in water or in the urine treated lichen mass until the desired colour, usually brown, was obtained.
This took several hours, or less on the addition of acetic acid, producing fast dyes without the benefit of a mordant or fixing agent. The colour was intensified by adding salt or saltpeter. This method was prevalent in Iceland as well as Scotland for those homespuns best known to the trade as Harris Tweed.

G A LLANO, 1951

SPIRITUAL PROPERTIES - I have always felt lichens spoke to the essence of unconditional love. They consist of two unrelated living entities, a fungus and an algae, dependent on each other for nourishment, protection and habitat. Their biological systems become so intermingled that they act as a single living entity we call a lichen. When speaking botanically, this is pure symbiosis, in human terms could it not be unconditional love?

K. KEANE

Usnea's keyword is clairvoyance. *Usnea* gives one trust in their higher consciousness. *Usnea* supports all the extrasensory perceptions and heightens any kind of clairvoyance.

MULDERS

RECIPES

TINCTURE – 1-2 ml up to 3x daily. The mother tinctures of lungwort, Iceland Moss, *Usnea* and ground liverwort are made from the fresh thallus in alcohol. Generally, lichen tinctures can be made at 1:5 and 50%. I prefer *Usnea* tincture of 1:3 at 90%, but 'hey' that's me. Let soak for up to two months, longer if you can.

Hot alcohol tincture is best but not to be tried by the amateur. A Soxlet extractor is needed for this precise extraction. *Usnea* tincture is contraindicated during pregnancy. Iceland moss may aggravate gastric or duodenal ulcers, and is contraindicated in cases of excessive catarrh or mucous congestion. *Usnea* is a cold medicine and overuse for colds, flu and infections can damage spleen Qi.

COLD INFUSION - Take one teaspoon of the dried shredded lichen to one cup of cold water and let sit overnight. Warm slowly before drinking 1 oz. every hour as needed.

DECOCTION - In order to remove the bitter principles in lichens, a quick boil and discarding of first water can be followed by a standard decoction. When the demulcent and antiseptic properties are needed, this is a good idea. Bitter decoctions are better in cases of stomach deficiency, vomiting, and night sweats.

SODIUM USNATE - 30 mg 3x daily or 1.5 mg/kg/day. Take one week off every twelve and continue.

DYES - Various constituents of lichens decompose to produce orcin, that in the presence of ammonia and oxygen produce orecein, and a purple colour.

CAUTION - All lichens have the tendency to mold. If not handled properly, this can create bronchial or dermal irritation and allergies. Aromatic lichen acids are UV-absorbing substances and several are evidently able to photosensitive human skin. Atranorin is the most frequently involved.