PH-09 Australia, the Pacific, and the Arctic and boreal north

HEALING after the FALL, research library, PH-09

Researched 10 October 2026 by Claude Opus agent for THRIVING after the FALL, Book Four. Library document, unverified.

How to read this report

This report covers three regions the European herbals leave out, and each part is written to stand alone for a reader who lives there. Temperate Europe remains the home pharmacopoeia (THRIVING library, PH-01). Where a boreal plant also grows in Europe (juniper, birch, willow, angelica), this report gives only what differs in the north.

Each region opens with its knowledge on its own terms: whose it is, how its holders understand illness and remedy, and what the record marks as restricted. The evidence follows, separating what the tradition says, what the record shows and what modern science infers. Grades follow the series scale (A trials or systematic reviews, B consistent clinical or observational series, C convergent tradition with plausible pharmacology, D single tradition or anecdote, X ineffective or harmful). A grade belongs to the preparation tested, not to the plant (THRIVING library, PH-01).

Three warnings. The community-authored books the brief names (Lassak and McCarthy 2001, the Northern Territory Traditional Bush Medicines of 1988, Whistler 1992, Cox and Banack 1991, Brooker, Cambie and Cooper 1987, Riley 1994, Fortuine 1989, Ootoova and others 2001) were not available online and were not read. Several of these plants are sold in the wellness trade (noni, kava, chaga, Kakadu plum, Rhodiola), and much said about them is marketing. And in two of the three regions the most useful finding is not a plant: in the Arctic it is a way of eating, in the Pacific it is honey.

1. Australia

The knowledge and who holds it

Aboriginal and Torres Strait Islander medicine is not one system. It is held by hundreds of language groups, each on its own Country, and the plants, their uses and the right to use them differ from one Country to the next. Healing joins plant, place, healer, kin obligation and, in many communities, ceremony, and some knowledge is restricted by gender, age, initiation or clan. The library's lessons are Foster v Mountford (1976), in which a court stopped a book that disclosed Pitjantjatjara sacred material, and the smokebush (*Conospermum*) licence of 1993, worth more than five million dollars, whose traditional basis was disputed (THRIVING library, SY-04). This report names restricted areas where the record shows them and does not describe them. A reader in Australia should treat the published bush medicine books as a starting point and the elders and community health workers of their own Country as the authority (THRIVING library, SY-04, Protocols A to E).

Ranked table, Australia

Rank	Plant, part	Preparation	Use and grade	Dose	Harms	Lookalikes
1	Tea tree, *Melaleuca alternifolia*, leaf oil	Diluted, skin only	Acne A. Tinea pedis B. Dandruff B. Nail fungus C	5 per cent acne and scalp. 25 to 50 per cent tinea	Swallowed, under 10 ml can cause coma in a child. Allergy to aged oil	Other *Melaleuca* oils differ. Eucalyptus oil bottles
2	Kakadu plum, *Terminalia ferdinandiana*, fruit, inner bark	Fruit raw or dried. Bark wash	Vitamin C B. Skin D	2 to 3 g fresh fruit a day [VERIFY, own arithmetic]	High oxalate	Other northern *Terminalia*
3	Eucalyptus, *E. globulus* and others, leaf oil. Kino of *E. camaldulensis* and others	Leaf steam. Cineole capsule. Kino drink or wash	COPD (capsule) B. Kino for diarrhoea, sores D. Oil by mouth X	Capsule 200 mg three times daily. Old oral oil dose 0.05 to 0.2 ml	5 ml can kill a child	Oil mistaken for cough syrup
4	Old man weed, *Centipeda cunninghamii*, whole plant	Leaf binding, tea	Inflammation, aches D	None established	Tradition warns of toxicity in large amounts	Other small *Centipeda*
5	Emu bush, *Eremophila longifolia*, leaf	Smoke. Leaf in fat	Smoke antimicrobial C (laboratory). Fat D	None	Ceremonial context	Over 200 *Eremophila* species
6	Pituri, *Duboisia hopwoodii*, leaf. Corkwood, *D. myoporoides*, *D. leichhardtii*	History only	X as home remedy	None	Nicotine and anticholinergic poisoning	Native *Nicotiana* also called pituri

Tea tree oil

The tradition. The Bundjalung people of northern New South Wales crushed the leaves for coughs, colds and wounds, inhaling the oil or making an infusion (Carson, Hammer and Riley 2006). The commercial oil industry began in the 1920s. I found no community source and nothing on whether any of this knowledge is restricted.

The record. The oil is defined by ISO 4730: terpinen-4-ol at least 30 per cent and 1,8-cineole at most 15 per cent (Carson, Hammer and Riley 2006). After the Fall that matters, because oil from a mixed stand may be a different chemical.

- **Acne.** Bassett and colleagues (1990) compared 5 per cent gel with 5 per cent benzoyl peroxide in 124 patients over 3 months. Both reduced lesions, benzoyl peroxide faster and better (P less than 0.05), but adverse effects were 44 per cent on tea tree against 79 per cent (Carson, Hammer and Riley 2006). Enshaieh and colleagues (2007) gave 5 per cent gel or placebo to 60 patients for 45 days, and tea tree was 3.55 times more effective on lesion count and 5.75 times on severity (abstract only). Grade A, with the caveat that both trials are small.
- **Athlete's foot.** At 10 per cent the oil failed against placebo. Satchell and colleagues (2002) treated 137 patients twice daily for 4 weeks: effective cure 48 per cent at 25 per cent strength, 50 per cent at 50 per cent, 13 per cent on placebo, with dermatitis in 2.8 and 7.9 per cent. Grade B.
- **Nail fungus.** Neat oil against 1 per cent clotrimazole over 6 months in 117 patients gave 60 against 61 per cent cure or improvement, without a placebo arm (Buck 1994). Grade C.
- **MRSA carriage.** In 224 evaluated patients tea tree cleared 41 per cent and standard care 49 per cent. **Dandruff:** in 126 patients, 41.2 against 11.2 per cent improvement on placebo (all through Carson, Hammer and Riley 2006).

The inference. Terpinen-4-ol damages microbial membranes. Tea tree is a real topical antimicrobial of modest strength. I found no trial on open traumatic wounds, where honey (THRIVING library, WO-02) and spruce resin (below) have better records.

Harm. The rat oral LD50 is 1.9 to 2.6 ml per kg, and the review records no human deaths, but children are poisoned by swallowing it (Carson, Hammer and Riley 2006). Less than 10 ml has caused ataxia and coma in children, and a child under two who swallowed about a teaspoon needed intubation (Vanderbilt Poison Center 2015). Allergy comes mainly from oxidation products in old oil exposed to air and light (Carson, Hammer and Riley 2006).

Verdict. Grade A for acne and B for athlete's foot and dandruff at stated strengths, on skin. Not a wound cure-all, and a poison when swallowed.

Eucalyptus oil and kino

The tradition. Eucalypt leaves are crushed and inhaled for colds across Aboriginal Australia and used in smoking ceremonies, which are not described here. The red kino that bleeds from the bark of the river red gum (*E. camaldulensis*) and other species was used for diarrhoea, sores and burns (Victoria's Forestry Heritage, n.d., secondary).

The record. Kino is rich in tannins, which bind proteins and tighten tissue. I found no clinical series and no dose. Grade D. For the oil, medicinal grade holds at least 70 per cent 1,8-cineole, and the old adult oral dose was 0.05 to 0.2 ml (INCHEM PIM 031, citing Reynolds 1982). The only trial-grade evidence is for purified cineole capsules: 200 mg three times daily for 6 months alongside usual therapy reduced exacerbations of chronic obstructive pulmonary disease (Worth, Schacher and Dethlefsen 2009, abstract only). I could not confirm the sample size. Grade B for that capsule, not for a kitchen oil.

Harm. This is the most important Australian finding. The NSW Poisons Information Centre recorded 4,412 essential-oil exposures from July 2014 to June 2018, 63 per cent in children under 15. Eucalyptus caused 2,049 (46.4 per cent) and tea tree 749 (17.0 per cent). Thirteen per cent were therapeutic errors, often oil given for cough liquid. As little as 5 ml can be life-threatening, and child-resistant closures were required only above 15 ml (Cairns and others 2020). The Royal Children's Hospital Melbourne guideline: 2 to 3 ml causes mild depression of the nervous system, 5 ml or more can cause coma, usually within 30 minutes and up to 4 hours. Observe at least 4 hours. No charcoal, no antidote (RCH, eucalyptus). Its general guideline gives 2 to 3 ml as toxic in a child and 5 to 15 ml in an adult (RCH, essential oils). The historical record has deaths after about 15 ml in a ten-year-old (Neale 1893) and 25 ml in an adult (Myott 1906), but also children who survived 14 and 24 ml, and a probable lethal dose of 0.05 to

0.5 ml per kg (INCHEM PIM 031). The sources agree a teaspoon is dangerous for a child and differ on what kills, because people vary.

Duboisia: pituri and hyoscine

History. Pituri, the leaf of *Duboisia hopwoodii*, was prepared mainly in south-western Queensland and traded over more than half a million square kilometres (Tobacco in Australia, section 8.2). Silcock, Tischler and Smith (2012) estimate 2,500 to 3,000 kg was traded a year, from about 36,000 mature plants west of the Mulligan River yielding 0.15 to 6.68 kg of dry matter each (abstract). It was chewed for endurance on journeys, against hunger and pain, and used to stupefy game at waterholes.

Restricted knowledge. The knowledge of preparing pituri carried sacred and ritual significance, was held by specific clans, and use was probably restricted to older men (Tobacco in Australia, citing Watson, Luanratana and Griffin 1983). It exists, it is restricted, and this book does not describe it.

Evidence, dose and toxicity. The leaf holds up to 8 per cent nicotine and also nornicotine, and livestock deaths were reported in 1882 (Tobacco in Australia). Corkwood (*D. myoporoides* and *D. leichhardtii*) is the world's main source of hyoscine (scopolamine), grown in Queensland plantations since the Second World War. All parts are poisonous and the sap was used to stupefy fish (Wikipedia, *Duboisia myoporoides*). Poisoning gives the anticholinergic syndrome: dry mouth, wide pupils, hot dry skin, fast pulse, delirium (THRIVING library, PH-10).

Feasibility. A whole leaf of variable alkaloid content cannot be dosed safely, and hyoscine is made by industrial extraction. After the Fall, *Duboisia* is a plant to recognise and keep children from. Grade X as a home remedy.

Eremophila, Centipeda and Kakadu plum

Eremophila. Emu bush (*Eremophila longifolia*) leaves are burned to make a smoke in which mothers and newborns are held after birth, or boys after circumcision, and the leaves are also worked into fat (Sadgrove, Jones and Greatrex 2014, abstract). Both smokings are ceremonial and are not described, and outsiders should not copy them. Sadgrove found that the antimicrobial (-)-genifuranal forms only when the leaf is heated, appears only in some regional chemotypes and is absent from fat preparations. The insistence on smoke has a chemical logic. No human trials. Grade C for the laboratory finding, D clinically. Use is reviving in remote communities.

Old man weed (*Centipeda cunninghamii*) is bound on the body or drunk as tea, and the tradition warns it is toxic in large amounts (Wikipedia). Extracts inhibit COX-1 and COX-2 in the laboratory, the targets of aspirin and ibuprofen (Western Sydney University, abstract). No human trial and no dose. Grade D.

Kakadu plum (*Terminalia ferdinandiana*) is gubinge in Bardi, anmarlak in Kundjeyhmi, manmorlak in Kunwinjku and murunga in eastern Arnhem Land (Wikipedia). The fruit is eaten fresh and the inner bark used for skin complaints. Brand and colleagues (1982) measured 2,300 to 3,150 mg of vitamin C per 100 g of fresh fruit, up to 5,300 (cited by Wikipedia). Zhou and colleagues (2023) report about 14,038 mg per 100 g dry weight and high oxalate. The two agree once water is allowed for [VERIFY]. The scurvy floor is 10 mg a day and the target about 45 mg (THRIVING library, HY-08), so 2 to 3 g of fresh fruit, about one plum, covers a day [VERIFY, own arithmetic]. The oxalate argues for small amounts, not a staple.

2. The Pacific

Rongoā Māori and Pacific medicine on their own terms

In Aotearoa New Zealand, rongoā Māori joins rongoā rākau (plant medicine), mirimiri (bodywork) and karakia (prayer) into one practice, carried locally in each rohe and whānau under tikanga (Ministry of Health 2014, in THRIVING library, SY-04). Illness is a loss of balance between the person, their whakapapa, their whenua and

the spiritual world, and a plant is never only a chemical. The Tohunga Suppression Act of 1907 to 1962 drove much of this knowledge underground (THRIVING library, SY-04). Karakia are sacred and are not reproduced.

In Hawai'i, illness is a loss of mana or pono, and the kahuna lā'au lapa'au joins plant, prayer and the mending of relationship (Wikipedia, lā'au lapa'au, secondary). Samoan healers treat with plant preparations and massage and recognise illnesses of spirit alongside the body (Sci.News 2021) [VERIFY vocabulary]. Kava ceremonies in Fiji, Tonga, Samoa and Vanuatu are restricted to their context and are not described (THRIVING library, TR-15).

Ranked table, the Pacific

Rank	Plant, part	Preparation	Use and grade	Dose	Harms	Lookalikes
1	Mānuka, *Leptospermum scoparium*, honey	Honey dressing	Burns A, infected wounds B (honey in general, WO-02)	Thick layer, changed every 12 to 24 hours	No honey by mouth under 12 months	Kānuka (*Kunzea*)
2	Koromiko, *Veronica* (*Hebe*) *stricta*, *V. salicifolia*, young tips, buds	Decoction. Buds chewed	Diarrhoea, dysentery, vomiting B (record 1883 to 1945)	6 buds child under 6, up to 12 adult (O'Carroll 1884)	Untested in infants. Rehydrate first	Other *Veronica*
3	Kawakawa, *Piper excelsum*, leaf	Balm, tea, chewed, binding	Toothache C. Eczema, boils, stomach D	Not standardised	Pregnancy safety unknown [VERIFY]	Few. Heart-shaped peppery leaves
4	Tamanu, *Calophyllum inophyllum*, seed oil	Oil on skin	Wounds, skin infection C (laboratory)	Thin layer. No human dose study	One case of contact allergy	Both it and *T. catappa* called kamani in Hawai'i
5	Matalafi, *Psychotria insularum*, leaf	Leaf homogenate	Inflammation, fever, wounds D	None	Unknown	Other *Psychotria*
6	Kava, *Piper methysticum*, peeled root	Water drink	Anxiety (extracts) B, contested. Solvent extracts X	See TR-15	Liver injury (extracts). Heavy use, skin and weight loss	Stems and peelings are not root
7	Kūmarahou, *Pomaderris kumeraho*, leaf, flower	Tea	Coughs, colds, asthma D	None	Unknown	Other *Pomaderris*

Rank	Plant, part	Preparation	Use and grade	Dose	Harms	Lookalikes
8	Noni, *Morinda citrifolia*, leaf, fruit	Heated leaf poultice. Juice	Boils D. Marketing claims X	None	Potassium. Rare liver injury	Few
9	Tropical almond, *Terminalia catappa*, leaf, bark	Decoction	Diarrhoea, wounds D	None	Unknown	Tamanu

Mānuka and honey

The Pacific's best-tested wound remedy is honey. Jull and colleagues (2015, Cochrane) pooled 26 trials in 3,011 people: honey healed partial-thickness burns about 4.68 days faster than conventional dressings, grade A for burns and B for infected wounds (THRIVING library, WO-02). Neither WO-02 nor anything I read shows that mānuka beats other honeys on clinical outcomes. Any clean honey works by low water activity. Beekeeping gives a Pacific village a grade A burn dressing it can make itself.

Koromiko

Koromiko has the best historical record in the Pacific. Ngā Tipu Whakaoranga, the Māori plant-use database at Landcare Research, collects the accounts as recorded by settler physicians. A decoction of young leaves was given for diarrhoea and dysentery (Brett 1883, Neil 1889, Kirk 1889). O'Carroll (1884) gives 6 buds for a child under six and up to 12 for an adult, chewed for vomiting. Baber found an infusion of dried leaves ineffective but a decoction effective. Koromiko entered the Extra Pharmacopoeia in 1895 and was later withdrawn. Dried leaves were sent to Māori troops in Egypt in 1914 to 1918 (letter of H. H. Allan, 13 October 1941), and it was used again in the Second World War (Wall and Cranwell 1943, Adams 1945). The New Zealand Army considered a trial but never ran one. Bell (1890) records a use in bleeding after childbirth (all through Ngā Tipu Whakaoranga). Grade B for diarrhoea from a consistent record over 60 years without a trial. The practical lesson is to boil it.

Kawakawa

In rongoā, kawakawa leaf is made into a balm for eczema, boils, bites, stings and grazes, chewed for toothache, drunk as a tea for stomach and urinary complaints, and bound over wounds. Practitioners prefer leaves with insect holes (University of Auckland 2023). Pook and colleagues (2022), working with Wakatū Incorporation, found more than 60 compounds. Pellitorine, which numbs, was most abundant, with yangambin and dopamine (abstract and university summary). The numbing compound fits the toothache use. Earlier laboratory work found no antibacterial activity, and myristicin, sometimes claimed, was not confirmed. Grade C for toothache, D for the rest. I found no standard tea strength.

Kava

The dangerous-remedies register covers kava harm (THRIVING library, TR-15). The Pacific water drink of peeled root differs from the European acetone and ethanol extracts linked to liver injury in 2001 to 2002, and Teschke (2008) kept only 3 of 26 cases as probable or highly probable. What this report adds is the efficacy record. Pittler and Ernst (Cochrane 2003) pooled seven trials in 380 people and found a 3.9-point advantage on the Hamilton anxiety scale (95 per cent confidence interval 0.1 to 7.7) for extracts over placebo, with mild adverse events. Sarris and colleagues

(2013) found remission in 26 against 6 per cent over 8 weeks with an aqueous extract (abstract). Then the largest trial, 171 people with generalised anxiety disorder over 16 weeks, was null: remission 17.4 per cent on kava against 23.8 on placebo, with more abnormal liver tests, memory problems and tremor on kava (Sarris and others 2020). In Arnhem Land, where kava arrived in the 1980s [VERIFY], very heavy users drinking about 440 g of powder a week were 20 per cent underweight with scaly skin and raised liver enzymes (Mathews and others 1988, summary), and Clough and colleagues (2003) found GGT abnormal in 61 per cent and ALP in 50 per cent of users (abstract).

Verdict. A modest grade B effect that did not survive the best recent trial. The traditional drink in moderation has a long social record. Heavy use harms. It is not a treatment for a person in crisis.

Noni and tamanu

Noni. Whistler (1992) called noni the most widely used medicinal plant of Polynesia before Europeans (quoted by Hinduism Today, original not read). The National Tropical Botanical Garden records heated leaves as a poultice for boils across Polynesia, and the fruit used in Samoa and Tonga for mouth, gums, sore throat and toothache, as well as illnesses of spirit. These are local, topical uses. The juice sold worldwide since the 1990s has no trial supporting a disease claim. A man with chronic kidney failure became hyperkalaemic on juice holding 56.3 mEq of potassium per litre, like orange juice (Mueller and others 2000, summary). Several hepatitis cases are reported, one needing a transplant (Stadlbauer and others 2008, the sixth case). EFSA (2006) judged liver effects unlikely, and LiverTox calls noni a rare idiosyncratic cause with onset at 2 to 8 weeks. Grade D for the poultice, X for the marketing. Never in kidney failure.

Tamanu. The seed oil of *Calophyllum inophyllum* is used across Polynesia and Melanesia on wounds, sores and skin. Léguillier and colleagues (2015) tested five Pacific oils. They were not toxic to skin cells at the strengths tested, sped closure in a scratch test by a factor of 1.3 to 2.1 at 0.1 per cent, and inhibited Gram-positive bacteria including MRSA and the acne organism, while acting against Gram-negatives only indirectly through the body's defensins. No human trial, and one case of contact allergy (Drugs.com). Grade C. Its Gram-positive range matches spruce resin's, which suggests both help staphylococcal and streptococcal skin infection and neither helps the Gram-negative infection of deep or soiled wounds [VERIFY, own inference].

Kūmarahou, matalafi, Hawaiian staples and Terminalia catappa

Kūmarahou (*Pomaderris kumeraho*) is gumdigger's soap, because its flowers lather from saponins. Its leaf tea is given for coughs, colds, bronchitis, asthma and, historically, tuberculosis (Wikipedia). The science I found is one laboratory study against Gram-positive bacteria (Ministry of Health summary, read in search results). Grade D.

Matalafi (*Psychotria insularum*) is a Samoan leaf remedy for inflammation, fever, wounds, skin infection and illnesses of spirit. Molimau-Samasoni and colleagues (2021), working with traditional healers, found anti-inflammatory activity similar to ibuprofen in the laboratory, by iron binding through rutin and nicotiflorin, shown in yeast (Sci.News 2021). The partnership with healers is the model SY-04 asks for. Grade D clinically.

Hawaiian staples. ʻAwa (kava) for tiredness, chills, headache, anxiety and insomnia, kukui (*Aleurites moluccanus*) for constipation, sores and ulcers, ʻōlena (*Curcuma longa*) root juice, noni and ʻuhaloa (*Waltheria indica*) (Wikipedia, lāʻau lapaʻau). The Native Hawaiian Center of Excellence guide was unreadable. Raw kukui nut is a strong purgative [VERIFY].

Tropical almond (*Terminalia catappa*, kamani haole in Hawaiʻi, talie in Samoa) has general reviews of laboratory antidiarrhoeal and wound activity (Terminalia catappa review 2025), and I found no specific Pacific source. Grade D.

3. The Arctic and boreal north

Sámi and Inuit knowledge on its own terms

The Sámi of northern Fennoscandia and Kola, the Inuit of Greenland, Canada and Alaska, the Iñupiat, Yupiit and Alutiiq of Alaska, the Dene and Athabaskan peoples and the Cree and other boreal First Nations each hold their own knowledge. Rautio, Axelsson Linkowski and Östlund (2016) show that the Sámi did not just gather angelica but managed it, dispersing seed and harvesting so stands would last: a land practice, not a herbal. Inuit health knowledge is recorded in the oral-tradition volumes of Nunavut Arctic College. Volume 5, *Perspectives on Traditional Health* (Ootoova and others 2001, edited by Therrien and Laugrand), covers fractures, diagnosis and care of the sick as remembered by North and South Baffin elders (publisher listing). I confirmed it exists but could not read it. Sámi noaidi practice and joik have sacred dimensions that are not described.

Two things stand out. Food and medicine are not separate: the Nunatsiavut Inuit name for roseroot, tulligunak, covers both (Mardones, Cuerrier and Hermanutz 2021). And the region's greatest medical problem in the record, scurvy, was solved by Inuit eating, not by a plant.

Ranked table, the Arctic and boreal north

Rank	Food or plant, part	Preparation	Use and grade	Dose	Harms	Lookalikes
1	Ringed seal liver, muktuk, caribou liver	Raw, frozen, or boiled with broth drunk	Scurvy prevention B	About 130 g raw seal liver gives 45 mg [VERIFY, own arithmetic]	Polar bear, bearded seal, fox liver: vitamin A poisoning	Never those three livers
2	Spruce resin, *Picea abies*	Salve 10 per cent in fat and wax	Pressure ulcers, surgical wounds B	Change every 1 to 3 days	Allergy 1 to 3 per cent	Yew (*Taxus*), deadly
3	Cloudberry, *Rubus chamae-morus*, fruit. Mountain sorrel, *Oxyria digyna*, leaf. Willow, *Salix*, young leaf	Raw, frozen, in oil	Vitamin C B	30 g cloudberry gives about 45 mg [VERIFY]	Sorrel oxalate	Unknown greens
4	Sphagnum moss, *Sphagnum*	Dried, in muslin	Absorbent dressing B	As a pad	Sporotrichosis in handlers	Other mosses
5	Willow, *Salix*, bark	Decoction	Back pain B (PH-01)	4 g per 200 ml (PH-01)	Never under 18	Poplar
6	Rhodiola, *Rhodiola rosea*, root	Extract or tea	Fatigue C (EMA traditional). Depression X	144 to 400 mg extract daily	Not under 18 or in pregnancy	Other *Rhodiola*, *Sedum*

Rank	Food or plant, part	Preparation	Use and grade	Dose	Harms	Lookalikes
7	Angelica, *Angelica archangelica*, stalk	Boiled, in milk	Food, digestion D	See PH-01	Sun burns on skin	Water hemlock (*Cicuta*), deadly
8	Labrador tea, *Rhododendron groenlandicum*, leaf	Weak short infusion	Colds, drink D	No published dose	Ledol, grayanotoxins, convulsions	Bog rosemary, bog laurel, toxic
9	Juniper berry, birch leaf	As PH-01	Flushing D	As PH-01	Juniper: not in kidney disease, pregnancy, under 18	Yew, savin
10	Scurvy grass, *Cochlearia officinalis*, *C. groenlandica*, leaf	Raw	Scurvy C	No figure found	Gut irritation	Small white crucifers
11	Chaga, *Inonotus obliquus*	Tea, powder	X as daily powder (TR-15)	Not recommended	Oxalate kidney failure	Dark birch growths

How the Inuit and Sámi prevented scurvy

The record. Scurvy struck the white men of the Arctic, not its peoples, while those peoples ate their own food. Geraci and Smith (1979) studied a seal camp at Holman, Northwest Territories, from July to September 1975. Intake ranged from 11 to 118 mg a day, mean at least 30 mg. In mg per 100 g they measured ringed seal liver 35 raw and 13.6 after 10 minutes' boiling, muktuk epidermis 38, mountain sorrel 36 raw and 5.3 boiled, the root of alpine sweetvetch (*Hedysarum alpinum*) 21 raw and 4.5 boiled, whole raw arctic char 5.8, and caribou flesh only 1.4. About 35 per cent of the vitamin C went into the broth, which was always drunk. Fediuk and colleagues (2002) give mattak 36.0 (beluga) and 31.5 (narwhal), caribou and ringed seal liver 23.8 each, and raw eggs 49.6 (abstract). The two sets agree within the spread of samples.

When the diet broke down, scurvy came. Levine (1940) found subacute scurvy in 28 of 30 children at Point Barrow, Heller (1949) found poor plasma levels in 96 of 117 people, and Stefansson and Nansen noted scurvy among explorers eating southern food (all cited by Geraci and Smith 1979). The library covers the Nares expedition of 1875 to 1876, which failed on lime juice (THRIVING library, HY-08).

Willow mattered too. The Alutiiq ate leaves, buds and inner bark raw, with seal oil, or stored in oil (Alutiiq Museum). Alaska Native food data give young willow leaves about 190 mg per 100 g (nutritionvalue.org, from USDA data) [VERIFY]. Cloudberry has 158 mg per 100 g (University of Alaska Fairbanks). The Sámi boiled angelica stalks into reindeer milk to preserve it (SLU summary), and I found no vitamin figure for that.

The inference. Vitamin C is destroyed by heat and lost into water. Eating organs and skin raw or frozen and drinking the broth is exactly what keeps it. Scurvy shows after 8 to 12 weeks under 10 mg a day (THRIVING library, HY-08),

so a southern diet of cooked muscle meat and stored flour will bring it by late winter.

The liver rule. Rodahl's assays, reviewed in *Arctic* in 1951, found vitamin A at 18,000 to 26,700 IU per gram in polar bear liver, 15,000 in bearded seal and 12,000 in arctic fox, against 1,200 in walrus and arctic hare and 3,000 to 3,400 in hooded and harp seal, from over 10,000 livers assayed. The Inuit eat walrus and hare liver and refuse polar bear, bearded seal and fox liver (Rodahl review 1951). A 30 g portion of polar bear liver would hold 500,000 to 800,000 IU [VERIFY, own arithmetic]. The traditional rule matched the chemistry exactly. Grade B.

Spruce resin

The tradition. Across Fennoscandia, the resin that weeps from wounds in Norway spruce (*Picea abies*) has been put on wounds and boils for centuries. Jokinen and Sipponen (2016) trace it to a Finnish medical text of 1578 by Benedictus Olai and a recipe in Lönnrot's *Flora Fennica* of 1866. The salve is resin with fat and sometimes wax. I found no traditional proportions.

The record. Sipponen and colleagues (2008) randomised 37 patients with grade II to IV pressure ulcers in 11 Finnish hospitals to 10 per cent resin salve or hydrocolloid. Of completers, 12 of 13 (92 per cent) healed on resin against 4 of 9 (44 per cent). But 8 of 21 and 7 of 16 dropped out, and some patients also took oral antibiotics. A non-randomised pilot of 23 surgical wounds on 10 per cent salve healed all, in a mean of 43 days (standard deviation 24) (Sipponen 2012). The resin acts against Gram-positive bacteria including MRSA and VRE and against dermatophytes, not against Gram-negatives or most *Candida*. Allergy affects 1 to 3 per cent. In Finland 24 of 2,646 occupational allergic reactions in 1990 to 1996 were to resin, and in Denmark 0.4 per cent of men and 1.0 per cent of women were allergic (all through Jokinen and Sipponen 2016).

The inference and verdict. A large effect in one small trial with heavy dropout, run by authors who hold shares in the manufacturer (Jokinen and Sipponen 2016, disclosure), fitting a long folk record and a plausible mechanism. Grade B, not A. It is the north's own wound remedy and fits a household. The tested strength is 10 per cent. Finnish and Austrian commercial salves use 20 to 30 per cent (product listings), untested [VERIFY].

Labrador tea and chaga

Labrador tea. Dene, Inuit and Athabaskan peoples drink *Rhododendron groenlandicum* as a beverage and for colds, while the Iñupiat considered the related *R. tomentosum* poisonous (Wikipedia, citing Dampc and Łuczkiewicz 2015). Harvesters teach that longer steeping makes it stronger (Juneau Empire). All species contain ledol, lowest in *R. groenlandicum*, and grayanotoxins. Excess causes diuresis, vomiting, dizziness and drowsiness, and large doses cramps, convulsions, paralysis and rarely death. Livestock deaths are recorded (Wikipedia). I found no published human dose. Grade D.

The lookalikes are the danger. Labrador tea has alternate, leathery leaves with rolled edges, dense rusty woolly hairs beneath (white on young leaves) and clusters of small white flowers. Bog rosemary (*Andromeda polifolia*), highly poisonous, has a pale, powdery, hairless underside and pink bell flowers. Bog laurel (*Kalmia*) has opposite leaves (UBC Coastal Plants, Wild Adirondacks, Juneau Empire).

Chaga. The register covers it (THRIVING library, TR-15): a 69-year-old Korean man who took 10 to 15 g of powder a day with vitamin C for three months went into kidney failure needing dialysis, and chaga holds about 14.2 g of oxalate per 100 g. Grade X as a daily powder.

Rhodiola rosea

Roseroot is food and medicine to the Nunatsiavut Inuit (Mardones, Cuerrier and Hermanutz 2021) and used medicinally in Nunavik, and it is a known Russian and Scandinavian remedy for fatigue and cold. I found no Sámi source. Mardones and colleagues warn of overharvest as markets grow.

The European Medicines Agency grants only traditional use, for temporary relief of stress symptoms such as fatigue, for a dry extract (drug-to-extract ratio 1.5 to 5 to 1, 67 to 70 per cent ethanol) at 144 to 200 mg a dose and 144 to 400 mg a day. Not under 18, not recommended in pregnancy or breastfeeding, and see a doctor after two weeks (EMA 2012). Ishaque and colleagues (2012) found all 11 studies at high risk of bias or poorly reported, inconclusive. Hung, Perry and Ernst (2011) found in 11 trials that it might help, with no independent replication. Mao and colleagues (2015) randomised 57 people with depression over 12 weeks: scores fell 5.1 on rhodiola, 8.2 on sertraline and 4.6 on placebo, none significantly different, with adverse events in 30, 63.2 and 16.7 per cent.

Verdict. A gentle, plausible remedy for fatigue on weak evidence, grade C. Not a treatment for depression. A root tea has no tested dose.

Angelica, juniper, birch, willow and sphagnum

Angelica (*Angelica archangelica*) was the Sámi plant most used, as food, as a milk preservative and for the fadno reed flute (Rautio and others 2016, SLU summary). Its sap burns skin in sunlight. Its lookalike, water hemlock (*Cicuta*), kills an adult with a 2 to 3 cm piece of root (THRIVING library, PH-10). **Willow** is the north's analgesic (bark, PH-01) and a vitamin C source (leaves). **Juniper** and **birch** carry PH-01's doses and cautions, grade D.

Sphagnum. In the First World War, after cotton was diverted to explosives, Lieutenant Colonel Cathcart of Edinburgh persuaded the War Office to use moss dressings, which the German army already used. The Edinburgh War Dressings Supply rose from 30,000 to 69,000 dressings a month by January 1917, sent to England, France, Salonika, Mesopotamia and India, with a depot at Oban run by Madeline MacLeod, and by the war's end about a million dressings a month were made (Holliday, Tiree). The Science Museum records the first large-scale military use by Japan in 1904 to 1905. Wartime claims that it absorbs more than twice as much as cotton reached me only through a search summary [VERIFY]. Sphagnan inhibits some bacteria (Holliday). The harm is fungal: in 1988, 84 people in 15 American states caught sporotrichosis from Wisconsin moss packed around seedlings (Dixon and others 1991), and among New York forestry workers 13 of 76 handlers fell ill, 17 per cent (CDC 1988). Grade B as an absorbent layer, not an antiseptic.

Cloudberry, scurvy grass and seal oil. Cloudberry (*Rubus chamaemorus*) keeps frozen or in water. Scurvy grass (*Cochlearia*) was eaten by sailors and Arctic peoples against scurvy, but I found no measured vitamin C figure, and herbal sources warn that large amounts irritate the gut (RxList). Grade C. Seal oil preserved willow leaves and berries through winter (Alutiiq Museum). I found no clinical record of it as a medicine.

Evidence grades

- **A.** Tea tree oil 5 per cent gel for acne (two RCTs). Honey for burns (WO-02).
- **B.** Tea tree 25 to 50 per cent for athlete's foot and 5 per cent for dandruff. Cineole capsules for COPD exacerbations. Kakadu plum, cloudberry, willow leaf, raw seal liver and muktuk for scurvy. The Inuit liver rule. Honey for infected wounds. Spruce resin salve 10 per cent. Sphagnum as absorbent. Koromiko decoction for diarrhoea. Kava extracts for anxiety (contested, largest trial null). Willow bark for back pain (PH-01).
- **C.** Tea tree for nail fungus. Rhodiola for fatigue. Tamanu oil for wounds. Eremophila smoke. Kawakawa for toothache. Scurvy grass.
- **D.** Kino, Centipeda, kūmarahou, matalafi, *Terminalia catappa*, noni poultice, Labrador tea, angelica, juniper, birch.
- **X.** Tea tree or eucalyptus oil swallowed. Kava solvent extracts. Noni juice disease claims. Daily chaga powder. Rhodiola for depression. Pituri and corkwood. Polar bear, bearded seal and fox liver.

Means ledger

Remedy	Hands and knowledge	Hearth	Garden and still	Village (300)	District (3,000)	Hospital before the Fall
Scurvy prevention	Know the foods and the forbidden livers	Eat raw or frozen, drink broth	Store berries, willow leaf in oil, Kakadu plum	Winter ration records, spot early signs	Treat established scurvy	Ascorbic acid tablets or injection
Spruce resin salve	Find resin on living spruce	Melt with fat, strain	Beeswax and scale to 10 per cent	Patch test, record healing	Pressure ulcer ward use	Modern dressings, debridement, antibiotics
Tea tree oil	Never swallow	Dilute in fat	Distil from a known stand	Measure strength by volume	Acne, tinea, scalp	Benzoyl peroxide, antifungals
Honey dressing	Keep bees, infant rule	Spread on clean cloth	Strain, store clean	Change on schedule	Burns care	Silver and alginate dressings, grafts
Sphagnum pad	Gather with gloves	Dry, clean	Pack in muslin	Store dry, check for mould	Ward supply	Cotton and foam
Koromiko or kino	Rehydrate first	Boil young tips	Grow koromiko	Record stool output	Stool microscopy	Fluids, antibiotics for dysentery
Oil poisoning	Lock oil away	Watch	Label every bottle	Observe 4 hours, keep airway open	Airway support	Intubation, ventilation

The first rung changes outcomes most: knowing which liver not to eat, which bottle not to give and which foods prevent scurvy costs nothing. The garden rung makes resin and honey dressings consistent. The infirmary adds airway support and the eye for a failing wound.

Harm test

- **Eucalyptus and tea tree oil swallowed.** 5 ml of eucalyptus can be life-threatening to a child (Cairns and others 2020), under 10 ml of tea tree has caused coma (Vanderbilt 2015). Signs within 30 minutes to 4 hours: drowsiness, unsteadiness, vomiting, slow breathing, coma, seizures. Do not induce vomiting or give charcoal. Lay on the side, keep the airway open, watch at least 4 hours (RCH). Most recover within 24 hours. The historical harm is the therapeutic error.
- **Spruce resin.** Allergy in 1 to 3 per cent: itching, redness, blisters. Stop and wash. Gathering error: yew (*Taxus baccata*), of which about 50 g of needles can kill (THRIVING library, PH-10).
- **Labrador tea.** Strong infusion causes vomiting and dizziness, and excess convulsions. Misidentification is the greater risk. Not for children or in pregnancy [VERIFY, precautionary].
- **Chaga.** Daily powder for weeks causes oxalate kidney failure. Never in kidney disease (TR-15).
- **Kava.** Heavy use causes scaly skin, weight loss and liver enzyme rises. Never with alcohol, in liver disease or pregnancy (TR-15).
- **Noni.** Never in kidney failure. Stop at any jaundice.
- **Polar bear, bearded seal and fox liver.** Acute vitamin A poisoning. Never.

- **Sphagnum.** Sporotrichosis through cuts on the handler's hands.
- **Angelica and all wild umbellifers.** The water hemlock lookalike kills.
- **Kakadu plum and sorrel.** High oxalate, not for people with kidney stones [VERIFY].
- **Pituri and corkwood.** Nicotine and anticholinergic poisoning. No home use.

Red flags

- **A child who swallowed oil and is drowsy, breathing slowly or seizing.** Lay them on their side, clear the mouth, keep them warm and stay for at least 4 hours. Most children recover if they keep breathing.
- **Scurvy with bleeding gums, swollen joints, reopening old wounds or breathlessness.** Late scurvy can kill suddenly (THRIVING library, HY-08). Give the richest vitamin C food several times a day. Recovery begins within days.
- **A wound with red streaks, fever, or grey foul tissue.** Resin, tamanu and tea tree act on Gram-positive bacteria and do nothing for deep or gas-forming infection. Open, clean and see the library's wound and sepsis reports.
- **Bloody diarrhoea with fever, or a baby who will not drink.** Rehydration first. Koromiko does not replace it.
- **Yellow eyes after kava, noni or any herbal.** Stop everything. Liver failure has no village treatment.
- **Convulsions after a wild tea.** Suspect misidentification and keep the plant.

Honest comfort: warmth, presence, clean bedding, sips of water and quiet company. A familiar drink, Labrador tea in the north or kava in the Pacific, may be part of sitting with the dying if it is what they know and want.

The case against

Edzard Ernst, the most cited critic of herbal medicine, co-authored the kava meta-analysis and then counted about 70 reports of liver injury (THRIVING library, TR-15). A small effect against a rare serious harm is a poor bargain when better drugs exist. After the Fall they do not, which shifts the balance without erasing it. **Rolf Teschke** argues the other side, that the harm lay in solvent extracts and the ban punished Pacific growers (TR-15). **Jerome Sarris**, who ran the largest kava trial, published its null result himself (Sarris and others 2020).

On Rhodiola, Ishaque and colleagues (2012) and Hung, Perry and Ernst (2011) found nearly every trial at high risk of bias and none independently replicated. **On spruce resin**, the case against is the authors' own disclosure: one RCT with 22 completers, run by shareholders of the manufacturer (Jokinen and Sipponen 2016). A cautious reader would grade it C until an independent group repeats it. **On tea tree**, its best head-to-head trial lost to benzoyl peroxide (Bassett 1990), and its advantage is fewer side effects, not more effect.

On the regional pharmacopoeia as a whole: most of the evidence is laboratory work done because a plant was famous, and laboratory activity rarely becomes a clinical effect. Of about 30 plants named here, only tea tree, honey, cineole, spruce resin, sphagnum, koromiko, kava and the Arctic foods have a human outcome record [VERIFY, own count]. From the side of the knowledge holders, the science itself has taken from them: the smokebush deal (SY-04) and the Kakadu plum and kawakawa markets raise the question of who benefits. The Wakatū and Samoan healer partnerships are the better model.

10-line summary

1. Tea tree oil is grade A for acne at 5 per cent and B for athlete's foot at 25 to 50 per cent. Never swallowed.
2. Eucalyptus oil causes nearly half of Australian essential-oil poisonings, and 5 ml can kill a child.
3. Honey of any kind, mānuka included, is the Pacific's grade A burn dressing (WO-02).
4. Spruce resin salve at 10 per cent healed 92 against 44 per cent of pressure ulcers in one small, conflicted trial. Grade B.

5. The Inuit prevented scurvy with raw seal liver, muktuk, sorrel and willow, and by drinking the broth.
6. The Inuit refusal of polar bear, bearded seal and fox liver matches their vitamin A content exactly.
7. Kakadu plum holds 2,300 to 3,150 mg of vitamin C per 100 g. One fruit covers a day.
8. Koromiko decoction for diarrhoea has a 60-year clinical record. Boil it and rehydrate first.
9. Kava extracts have a small, contested effect on anxiety, and the largest trial was null.
10. Labrador tea, chaga, Duboisia and noni injure at household doses or through misidentification.

Open questions

- Does mānuka honey beat ordinary honey on clinical outcomes?
- Would an independent trial repeat the spruce resin result?
- What strength of Labrador tea is safe?
- How much vitamin C is in scurvy grass?
- Does the traditional kava drink injure the liver at Pacific doses? Heavy Arnhem Land use raised liver enzymes.
- Does tamanu oil heal human wounds?
- How much community knowledge is cleared for outsiders? That is for its holders to decide.

Sources to read in full

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At the bedside after the Fall

Australia

Household. Lock eucalyptus and tea tree oil in a high cupboard and know that a child who swallowed oil is watched for 4 hours. Use tea tree at 5 per cent for acne and 25 to 50 per cent for tinea. Keep honey or sugar for wounds (WO-02). Know where the nearest Kakadu plum or other vitamin C fruit grows. Mix oral rehydration solution for diarrhoea (THRIVING library, FO-01). First failure: a child given oil for cough mixture.

Village of 300. Plant *Melaleuca alternifolia* in wet ground and learn to distil it [VERIFY, yield not found]. Keep bees. Build a relationship with the Traditional Owners and community health workers of the Country and ask before using any bush medicine. Keep a register of poisonings and wound outcomes. First failure: plants taken without consent, closing the door to the knowledge that matters most.

District of 3,000. A healer who can manage an airway and recognise scurvy and the anticholinergic syndrome. Child-safe bottles for oil. A Kakadu plum or citrus orchard. First failure: bottles run out and oil is kept in food jars.

The Pacific

Household. Honey for burns and wounds, never by mouth for a baby. Oral rehydration for diarrhoea. Kawakawa for toothache. Tamanu for small sores. First failure: noni juice given to someone with failing kidneys.

Village of 300. Keep bees. Grow koromiko and record each dose and result. Work with the tohunga or healers of the place on their terms. First failure: heavy kava drinking by men under stress.

District of 3,000. A honey-based dressing service and a stool microscope for dysentery. First failure: a deep Gram-negative wound infection treated only with plant oils.

The Arctic and boreal north

Household. Know the vitamin C foods and eat them raw or frozen. Never eat polar bear, bearded seal or fox liver. Make spruce resin salve. Learn Labrador tea and its lookalikes. First failure: a winter of cooked meat and flour, and scurvy by March.

Village of 300. A cache of frozen berries, willow leaves in seal oil and raw organs for late winter. Dried sphagnum in sacks. A healer who knows the resin salve, the patch test and the 1 to 3 day changes. First failure: sporotrichosis in the moss gatherers.

District of 3,000. A ward using resin and sphagnum on pressure ulcers and wounds, with records. A healer who can recognise and treat scurvy. First failure: resin allergy mistaken for infection.

Protocols

Protocol 1. Spruce resin salve and dressing

- ☐ Gather only from living true spruce (*Picea*). Spruce needles are single, stiff and four-sided and roll between the fingers [VERIFY, standard field mark]. Never from yew, which has flat, soft needles in two rows and red berries (THRIVING library, PH-10).
- ☐ Take hardened resin from old bark wounds. Do not cut the tree.
- ☐ Weigh 10 g resin to 90 g of base. This is the 10 per cent strength of the trials (Jokinen and Sipponen 2016). Commercial 20 to 30 per cent salves are untested.
- ☐ Make the base of 1 part beeswax to 4 parts fat or oil by weight (THRIVING library, PH-01, Protocol 6).
- ☐ Melt resin with the fat on low heat, never smoking or boiling, away from open flame [VERIFY].
- ☐ Strain through clean cloth, add the melted wax, pour into clean dry jars, label with date and strength.
- ☐ Before first use on a patient, rub a little on the inner forearm and wait 24 hours. Redness or itching means allergy.
- ☐ Clean the wound with boiled water cooled to body heat (THRIVING library, PH-01).
- ☐ Spread salve on clean cloth about 1 to 2 mm thick [VERIFY] and lay it on the wound. Change every 1 to 3 days (Jokinen and Sipponen 2016).
- ☐ Stop at spreading redness, foul smell or fever. Expect slow healing: the pilot averaged 43 days.

Protocol 2. Tea tree oil, dilution and safe keeping

- ☐ Store tea tree and eucalyptus oil locked away above head height, labelled, with child-proof caps.
- ☐ Never give either by mouth.
- ☐ **Acne, 5 per cent:** 1 ml oil in 19 ml carrier oil or gel. Apply thinly once or twice daily. Expect improvement over 6 to 12 weeks (Bassett 1990, Enshaieh 2007).
- ☐ **Athlete's foot, 25 per cent:** 5 ml oil in 15 ml carrier, twice daily for 4 weeks on clean dry feet (Satchell 2002). 50 per cent works as well with more dermatitis (7.9 against 2.8 per cent).
- ☐ **Nail fungus:** neat oil twice daily for 6 months (Buck 1994). Expect about 60 per cent improvement.
- ☐ Keep bottles full, dark and closed, and discard oil that smells harsh or changed [VERIFY], because oxidised oil causes allergy (Carson, Hammer and Riley 2006).
- ☐ If a child swallows oil: no vomiting, no charcoal, side position, watch at least 4 hours (RCH). Drowsiness or slow breathing is a red flag.

Protocol 3. Anti-scurvy ration by region

Floor 10 mg a day, target about 45 mg (THRIVING library, HY-08). The weights are my arithmetic from the measured values [VERIFY].

- ☐ **Australia.** One Kakadu plum, 2 to 3 g fresh fruit, a day (Brand 1982, Zhou 2023). No more than a few a day because of oxalate.
- ☐ **Arctic coast.** 130 g raw or frozen ringed seal liver, or 120 g raw muktuk epidermis, a day (Geraci and Smith 1979). If boiled, drink all the broth and expect to lose about two-thirds.
- ☐ **Arctic inland and boreal.** 30 g cloudberries (University of Alaska Fairbanks), or about 25 g young willow leaves [VERIFY], or 125 g raw mountain sorrel (Geraci and Smith 1979).
- ☐ Never polar bear, bearded seal or arctic fox liver (Rodahl review 1951).
- ☐ Do not count caribou or other muscle meat, which holds almost none.
- ☐ Store berries frozen, in water or in oil, not dried.
- ☐ If scurvy has begun, give the richest food several times a day for at least 2 weeks. Where ascorbic acid tablets remain, MSF gives 250 mg three times daily from age 12 and 100 mg three times daily for children (THRIVING library, HY-08).

Protocol 4. Diarrhoea: rehydration first, then koromiko or kino

- ☐ First give oral rehydration solution: 1 litre clean water, 6 level teaspoons of sugar (about 25 g), half a level teaspoon of salt (about 2.1 g) (THRIVING library, FO-01). A cup after every loose stool.
- ☐ **Koromiko.** Pick young tips of *Veronica stricta* or *V. salicifolia*. Make a decoction, not an infusion, because Baber found the infusion failed. Simmer 3 to 4 g of leaves in 200 to 250 ml water for 15 minutes, the library's standard decoction (THRIVING library, PH-01) [VERIFY, no koromiko-specific strength found]. Up to three cups a day for an adult.
- ☐ For vomiting, chew buds: 6 for a child under 6, up to 12 for an adult (O'Carroll 1884).
- ☐ **Kino.** No dose found. If used, a pea-sized lump dissolved in a cup of boiled water, no more than twice a day, from a known eucalypt only [VERIFY, own inference].
- ☐ Discard any decoction after 12 hours (THRIVING library, PH-01).
- ☐ Red flags: blood with fever, a baby who will not drink, no urine for many hours. Rehydration stays the treatment.

Protocol 5. Labrador tea, identification and a weak infusion

- ☐ Confirm all of these: leathery evergreen leaves, alternate, edges rolled under, dense rusty woolly hairs beneath, small white flowers in clusters (UBC Coastal Plants, Wild Adirondacks).
- ☐ Reject a pale hairless underside or pink bell flowers (bog rosemary) and opposite leaves (bog laurel).
- ☐ Prefer leaves with rusty, not white, hairs [VERIFY].
- ☐ Apply the rule of three independent confirmations before first use (THRIVING library, PH-10).
- ☐ Steep 3 or 4 leaves in a cup of hot water for 5 minutes, not longer, because strength rises with steeping (Juneau Empire) [VERIFY, no published dose].
- ☐ No more than one or two cups a day. Never for children or in pregnancy [VERIFY].
- ☐ Stop at vomiting, dizziness or drowsiness. Convulsions are a red flag.

Protocol 6. Wound dressings without imports: honey, tamanu, sphagnum

- ☐ Clean the wound with boiled water cooled to body heat.
- ☐ **Honey, all regions.** Thick layer on clean cloth, changed every 12 to 24 hours (THRIVING library, WO-02). Never by mouth under 12 months.

- ☐ **Tamanu, Pacific.** Cold-pressed oil from known seed, thinly on small skin wounds once or twice daily, after a patch test [VERIFY, no clinical dose].
- ☐ **Sphagnum, north.** Gather in gloves and cover cuts on the hands (Dixon 1991). Shake out debris and dry fully until it crumbles [VERIFY]. Pack loosely in muslin bags, as in the First World War (Holliday).
- ☐ Lay the moss bag over the honey or resin dressing, not directly on the wound [VERIFY, own inference]. Change when soaked. Discard mouldy moss.

Numbers to carry

1. **5 ml** of eucalyptus oil can be life-threatening to a child. Watch **4 hours**.
2. **5 per cent** tea tree for acne, **25 to 50 per cent** for athlete's foot. Never swallowed.
3. **10 per cent** spruce resin salve, changed every **1 to 3 days**.
4. **10 mg** of vitamin C a day prevents scurvy, **45 mg** is the target.
5. Vitamin C per 100 g: raw seal liver **35 mg**, muktuk **38**, cloudberry **158**, Kakadu plum **2,300 or more**.
6. **Never** polar bear, bearded seal or arctic fox liver: up to **26,700 IU** of vitamin A per gram.
7. **6 to 12** koromiko buds for vomiting, child to adult, after rehydration.
8. **1 to 3 per cent** are allergic to resin. Patch test **24 hours**.
9. **12 months**: no honey by mouth below this age.
10. **2 to 3 cm** of water hemlock root can kill an adult.

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