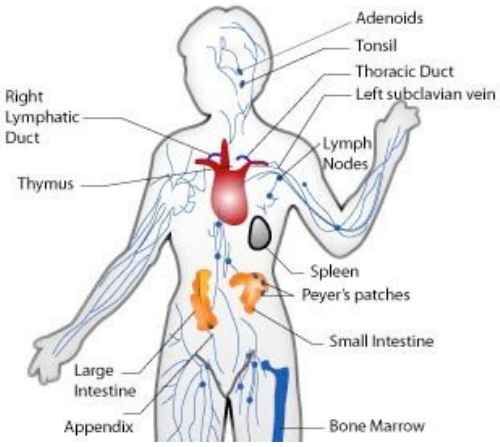
Lesson 2

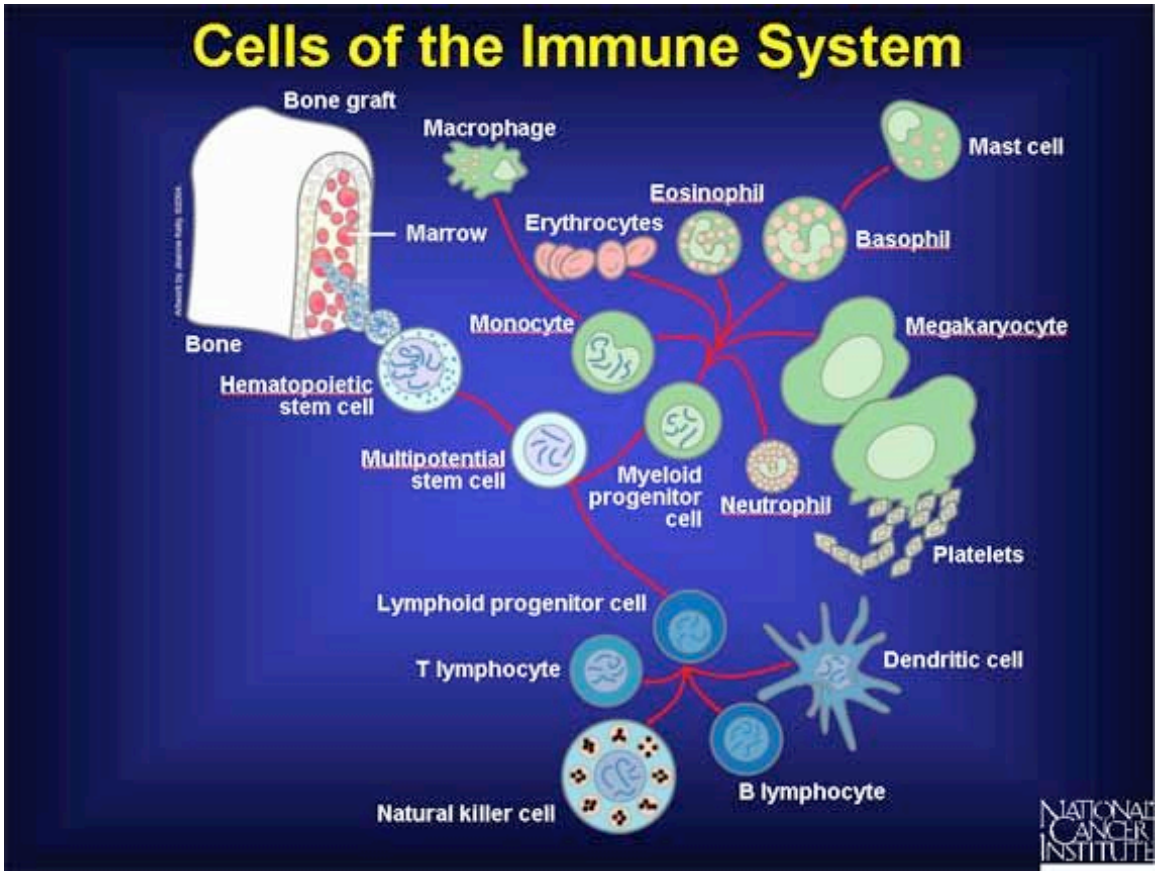
The Immune System



The immune system consists of cells, tissues and the specialized activities of certain organs designed to resist infiltration by foreign invaders, and to delete damaged or mutated body cells. The body accomplishes this through two processes: (1) **non-specific resistance**, which is a *general* response to invasion by a wide range of pathogens; and (2) specific resistance or **immunity**, involving the production and activation of **B cells**, immunoglobulins and **T cells** against a *specific* pathogen, foreign substance or damaged cell. The result of the formation of **immunoglobulins** and specialized T cells results in a **cellular memory**, and if the body is again exposed to the same pathogen, the body's response to that pathogen is strengthened considerably.

The mechanisms of non-specific resistance are our first line of defense against pathogens. They include the **skin** and **mucous membranes**, as well as certain **chemicals secreted** by various tissues and organs of the body, such as sebum (skin), lysozymes (saliva), hyaluronic acid (connective tissue), hydrochloric acid (stomach), transferrins (blood), and interferons (blood). Some of these antimicrobial substances are actually facilitated by certain **microorganisms**, such as **bacteria** that ferment secretions in the vaginal mucosa to make the internal vaginal environment acidic. Additionally, there are specialized proteins in the blood called **complement** that function in a non-specific manner in inflammation and infection, as well as **granulocytes** (i.e., neutrophils, basophils and eosinophils), **monocytes** and **natural killer cells**. Whereas these mechanisms provide a generalized response to microbial invasion, specialized immune cells called **lymphocytes** display *specificity* for a particular **antigen**, a substance that is capable of initiating an immune response. Certain lymphocytes, once activated, have the ability to *memorize* previously encountered antigens, such that another encounter with that specific antigen prompts an even more energetic response. Collectively, the immune

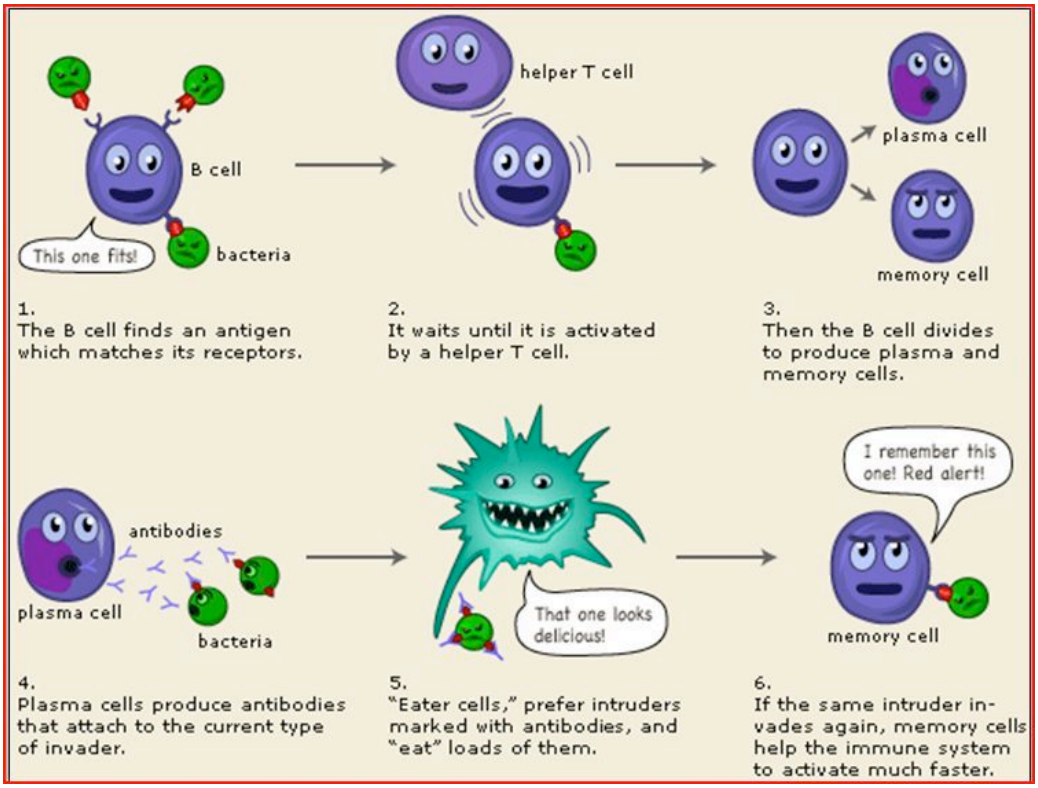
response is comprised of T and B cells, which often function simultaneously to form the cell-mediated and humoral response, respectively.



As blood is pumped through the arteries by the heart and travels to the capillaries, the strong charge of the endothelial cells that line the vessel walls repel the formed elements (e.g., the blood cells) and proteins to the center of the lumen. This allows the serous portion of the blood, as well as dissolved nutrients and oxygen, to pass through the vessel wall into the interstitial fluid. Most of this fluid is then reabsorbed back into the blood, but components of the interstitial fluid that contain cellular debris and waste materials enter into lymphatic capillaries. Now called **lymph**, this fluid is directed through a series of **nodes** that contain B and T cells that sort through the waste, checking for foreign antigens. If the lymph contains recognizable antigens an immune response is quickly initiated and the antigens neutralized. If on the other hand the antigen is unknown, it is processed over a period of days by the lymphocytes to develop a specific immunoglobulin or T

cell that can recognize and bind to the antigen and cause its destruction.

The movement of lymphatic fluid is largely dependent upon skeletal muscle contraction, unlike the arterial blood, which has the advantage of the heart as a pumping mechanism. Eventually the lymph is directed to the thoracic duct, where it is returned back to the venous blood and enters into systemic circulation.



Immune deficiency

Immune deficiency symptoms are associated with an increased susceptibility to infectious disease, poor recuperation, and slow healing of injuries. According to classical physiomedical thinking, immunodeficiency is an atonic condition. The range of immunodeficiency symptoms is broad, from what appear to be constitutional weaknesses to full-blown immunodeficiency diseases. The underlying cause of immunodeficiency, apart from constitutional and genetic factors, can range from a diet low in protein to lingering bacterial or viral infections (e.g.

Epstein-Barr virus). The most common cause of immunodeficiency is the use of immunosuppressive agents such as chemotherapy, radiation and other immunosuppressive agents such as corticosteroids. The most commonly discussed form of immunodeficiency in the media at least is acquired immunodeficiency syndrome (AIDS), thought to be caused by the human immunodeficiency virus (HIV). Cancer as well can be thought of as an immunodeficient state, in which there is a loss of immune vigilance, which allows mutant cells to proliferate into tumors. In many cases of immunodeficiency there is often a component of psychological or limbic stress, feelings of depression, worthlessness and alienation. The immune system maintains an important link with the nervous and endocrinal systems, and a deficiency in one system will often affect the other through the broad range of interactions they share.

HERBS TO STIMULATE

Therapeutic approaches that are used in immunodeficiency states have a variety of goals, including enhancing the efficiency of lymphatic drainage, promoting leukocyte proliferation, and enhancing the hepatic synthesis of proteins that end up forming the complement system and immunoglobulins. As stated, there is very often an accompanying dysfunction of the nervous and endocrinal systems, and they are usually treated simultaneously. In many cases there are sub-clinical deficiencies of many key nutrients including protein, vitamins A, C and E, as well minerals such as zinc, magnesium and selenium.

Immunostimulants: e.g. *Echinacea, Commiphora, Thuja*
Antibacterials: e.g. *Echinacea, Hydrastis, Baptisia*
Antifungals: e.g. *Artemisia, Tabebiua, Berberis*
Antivirals: e.g. *Hypericum, Lomatium, Ligusticum*
Lymphagogues: e.g. *Phytolacca, Ceonathus, Gallium*
Hepatic tonics: e.g. *Gentiana, Berberis, Menyanthes*

Immune excess

True symptoms of a constitutional immune excess are difficult to come by and probably unimportant, but theoretically speaking, relate to a hyper-vigilance of the immune response. This would include all hypersensitivity

reactions ranging up to full blown autoimmune conditions. It may be better instead to think of these conditions as a kind of immunodeficiency, in which the immune response is uncoordinated and disjointed – powerful – but lacking in direction and self-control. Compared to a military operation, immune excess would be akin to having a well-trained fighting force, with all the latest in lethal military technology, but lacking in leadership and intelligence. In a military sense, this could cause a coup. Autoimmune conditions are like immune system coups in the body. The result often ends up as immunodeficiency, as components of the immune response take increasing hits from so-called "friendly fire." Conversely, immune deficiency is akin to a poor trained and lethargic fighting force.

HERBS TO RELAX

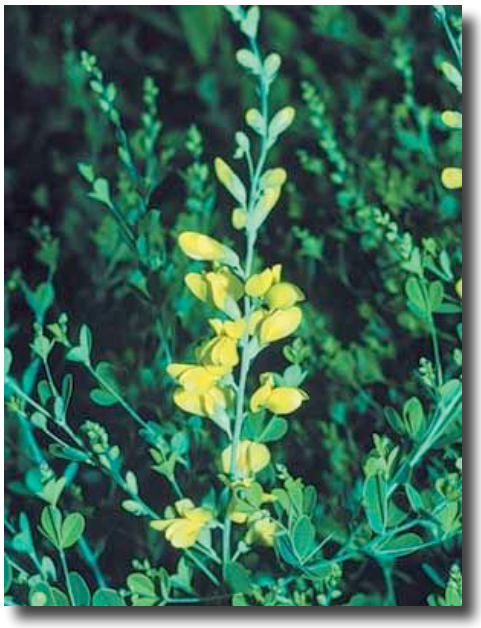
Overall, the approach in treating immune excess is to modulate the effects of immune function, decrease inflammation, restore cellular antioxidant mechanisms, and remove components from the blood that provoke immune responses. In most cases there will be a deficiency of omega 3 fatty acids, which helps to reverse the inflammatory cascade cleaved from arachidonic acid. Additional measures include following a diet low in refined cereals and grains, as well as the avoidance of drugs such as acetylsalicylic acid and acetaminophen, to prevent gastrointestinal irritation, hepatic injury and antigenic stimulation. Care must be taken in states of immune excess to not promote the immune response by the use of immune stimulants.

Immunomodulants (adaptogens): e.g. *Eleuthrococcus, Ganoderma, Panax quinquefolium*
Anti-inflammatories: *Glycyrrhiza*, *Harpagophytum*, *Menyanthes*, *Tanacetum parthenium, Chrysanthemum*
Antioxidants: *Crataegus, Rosmarinus, Allium spp.*
Alteratives: e.g. *Urtica, Trifolium, Berberis, Apium*

Immune trophorestoration

Immuno-trophorestoration is essentially the same as the treatment for immunodeficiency, with similar attention paid to the nervous and endocrinal systems.

Botanical Name: *Baptisia tinctoria*, Fabaceae



Common names: Wild Indigo, Indigo Weed, Horsefly Weed, Yellow Broom, Clover broom, Rattle bush, Yellow Indigo.

Plant description: Wild Indigo is a shrubby perennial plant reaching a height of 60-90 cm, with a glabrous, branching, yellow-green stem studded with small black dots. The bluish-green trifoliate leaves are small, alternate and sessile, with tiny stipules and bracts, becoming black upon drying. The flowers are yellow, 2-3 cm long, borne in small, loose, terminal racemes. The flowers bloom from July into September, maturing as pods about the size of a pea, with one to several seeds.

Habitat, ecology and distribution: Wild indigo is indigenous to the eastern half of North America, found in woods and on hillsides in dry, poor soils, and also in flower gardens as an ornamental.

Part used: Fresh or dried root, leaves.

History: In some parts of North America the green shoots of Wild Indigo are eaten like asparagus, although this practice is not recommended. The genus name *Baptisia* is derived from the Greek word *bapto* or *baptizo* (to dye, to color), owing to the plant's former usage as a dying agent.

Constituents: The constituent information for the root of *Baptisia tinctoria* is minimal due to what appears to be a general lack of modern interest in its medicinal use. Felter and Lloyd report an acrid, poisonous alkaloid called baptisine (baptitoxine or cytisine), and two glucosides, the baptisin and baptin. Duke lists biochanin-a as an additional constituent in the root.[1,2]

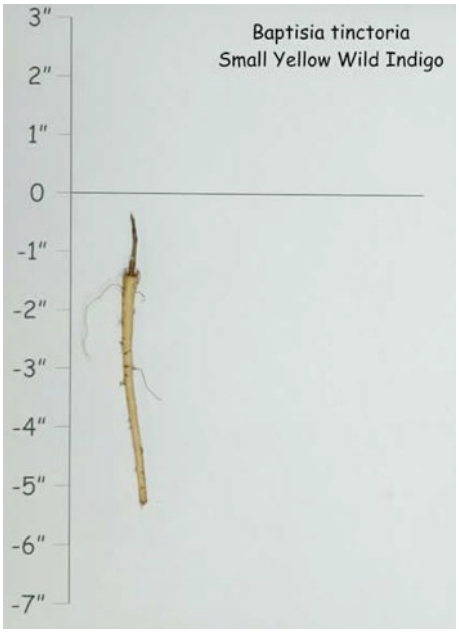
Medical Research: There has been little research on Wild Indigo, with a few German studies dating back to the mid 1980's to the early 1990's that indicate an *in vivo* and *in vitro* immunostimulant (lymphocyte) activity by the glyco proteins.[3,4]

***Gastrointestinal**:* Quinolizidine alkaloids create gastrointestinal action with high doses.[5]

Toxicity: *Baptisia* is reported to be toxic in many unreferenced sources, inferred no doubt from its cytisine content, although there is no data to indicate the amounts of this constituent in this plant. William Cooks states that although *Baptisia* "…has been pronounced poisonous… there seems to be no proof whatever that such is the case. I have used the leaves with much freedom outwardly, and at times inwardly".[6] Felter and

Lloyd observe that large doses can be dangerous, the herb having a profound "emeto-cathartic" activity, "…sometimes so violent as to produce gastro-enteritis".[7]

Herbal action: alterative, hepatic, cholagogue, antimicrobial



Indications: infectious conditions, with atony

Contraindications and cautions: Felter states that *Baptisia* is contraindicated in inflammatory states.[8] Brinker states that high doses are contraindicated if there is an underlying inflammatory gastrointestinal conditions, particularly with accompanying capillary congestion[9]

Medicinal uses: *Baptisia* is indicated in conditions characterized by atony and purulence, with weakness of vitality and "…suppressed or vitiated secretions".[10] The complexion of the body generally or of the part affected will appear swollen, with a bluish or purplish hue imparting the impression that the tissue is hypothermic. The tissues may be ulcerated, purulent and even gangrenous. In diarrheal afflictions the bowel movements may appear dark and tarry, like prune-juice, and the tongue will appear smooth and enlarged, with thick pasty coating. On a more general level, *Baptisia* is indicated in any form of persistent diarrhea, accompanied by fever, or when there is evidence of intestinal ulceration with muco-pus or blood with pus. *Baptisia's* hepatic properties appear to make it ideally suited to some forms of chronic bowel disease, to restore liver function and check alterations in the bowel ecology. For septic conditions of the ears, nose and throat *Baptisia* is considered to be an exceptionally useful remedy, especially when there is clear indication of purulence and tissue necrosis, with foul smelling yellowish-green or greenish-colored mucosal discharges. In purulent otitis media, an infusion of *Baptisia* can be injected into the ears. Felter and Loyd state that *Baptisia* is indicated in "…septicemia following retained fragments of placenta after abortion…" as well as for purulent vaginal discharges and ulceration of the cervix. In the treatment of tumors and swellings of the breast, Felter and Lloyd state that the leaves can be applied as a fomentation.[11] Eli Jones includes *Baptisia* in combination with *Phytolacca* root and *Thuja* leaf in his famous 'Cancer Drops,' used as a general remedy in the treatment of cancer. In the case histories reported in his text *Cancer: Its Causes, Symptoms and Treatment*, Jones appeared to rely upon *Baptisia* in formulation, often with *Hydrastis* and *Thuja* in the treatment of breast cancer. Of *Baptisia* specifically, Jones writes "…this is a useful remedy in cancer when the disease is in the last stage with great prostration, exhalations and discharges fetid… tongue a dirty yellow color, dry and cracked. In such conditions you should prescribe tincture *Baptisia* five drops once in two hours."

Although Felter and Lloyd suggest that *Baptisia* "…loses much of its activity when dried or boiled", Cook states that the powdered herb is useful when applied topically,

and has a decidedly stimulant effect upon the liver and bowels. Further, Cook states that *Baptisia* should always be dried before use. Modern herbalists use both the fresh and dried forms in practice, although most herbalists would probably prefer the fresh plant extract.

Pharmacy and dosage:

- *Fresh Plant Tincture*: fresh root, 1:2, 95% alcohol, 3-10 gtt
- *Dry Plant Tincture:* recently dried root, 1:5, 25%, 3-20 gtt
- *Infusion:* finely chopped root, 1:20, 15-30 ml
- *Powder:* recently dried root, 100-200 mg

Licensing: As of Nov 15, 2010, 25 licenses have been issued for *Baptisia* by the Canadian NHP.

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Botanical Name: *Ceanothus americanus,* Rhamnaceae

Similar species: *C. velutinus, C. sanguineus, C. cuneatus, C. integerrimus*

Common names: Red Root, Buckbrush, Tobacco Brush, Deerbrush, Mahala May, Lilac Bush, Oregon Tea Tree, Sweet Birch

Plant description: Red Root is a spreading shrub or bush that attains a height of between 30 and 120 cm. It has numerous smooth reddish branches, the younger ones hairy, and a large and thick root. The root is red to brown, the cortex dark red. The leaves are ovate to oblong-ovate, tip acute, margins serrate, with three veins, smooth above and somewhat pubescent below. The fragrant flowers are quite small, white and numerous, contained in clusters that arise from the leaf axils. The petals number five and have long spreading claws, stamens 5, ovary 3-celled. The fruit is dry and 3-celled, with papery valves.

Habitat, ecology and distribution: The various species of Red Root can be found across temperate North America: *C. americanus* found primarily in the eastern regions, and species such as *C. velutinus* found in the west. It occurs in dry to moist sites usually in sunny locations, and is an important pioneer species after fire and clear cuts.

Part used: Fresh or dried root; leaves.

History: Wood mentions that *Ceanothus* was used early in the 19th century by surgeons as an anti-hemorrhagic, and that its widespread usage in homeopathy is attributed to Dr. Compton Burnett, who reviewed it in a booklet published in 1898 called *Diseases of the Spleen*.[1] Prior to European usage, *Ceanothus* was widely used by First Nation peoples for a variety of complaints. Willard mentions that *Ceanothus* was in smoking mixtures and as a substitute for black tea.[2]

Constituents: There is little constituent information for *Ceanothus.* Duke mentions betulin and betulinic-acid in the root bark.[3] Moore lists a group of alkaloids called ceanothin, ceanothamine, integerressine, integerrenine, integerrine, and americine, as

well as ceanothic acid, ceanothenic acid, methyl salicylate, tannins, resins and various plant acids.[4] Li et al. mention the existence of three triterpenes (ceanothic acid, 27-hydroxy ceanothic acid and ceanothetric acid) and two flavonoids (maesopsin and maesopsin-6-O-glucoside).[5]

Medical Research:

•***Anti-inflammatory:*** A methanol extract of *Ceanothus americanus* demonstrated antimicrobial activity against selected oral pathogens. Through bioassay-guided fractionation and purification, three triterpenes (ceanothic acid, 27-hydroxy ceanothic acid and ceanothetric acid) and two flavonoids (maesopsin and maesopsin-6-O-glucoside) were identified, both ceanothic acid and ceanothetric acid demonstrating inhibitory effects against *Streptococcus mutans, Actinomyces viscosus, Porphyromonas gingivalis,* and *Prevotella intermedia*.[6]

Blood clotting time: An aqueous-ethanol extract reduces the blood-clotting time by 25% in blood taken from young rats.[7]

Toxicity: There is no toxicity data for the various *Ceanothus* species, but they are generally regarded by herbalists as safe remedies in small to moderate doses.

Herbal action: astringent, expectorant, sedative, antispasmodic, and anti-syphilitic

Indications: gonorrhea, dysentery, asthma, chronic bronchitis, whooping-cough

Contraindications and cautions: Very large doses may overexcite the spleen and lymphatic structures.

Medicinal uses: From a survey of the ethno-botanical literature, *Ceanothus* has a long and important use in First Nations medicine as a remedy for the blood. This appears to provide a practical basis for its more modern usage as a remedy for the spleen and lymphatic system. It is a use, however, that appears to have escaped the early physiomedicalists. William Cook thought Red Root to be at best a mild stimulating astringent with nervine and expectorant properties. Cook mentions it internally in chronic diarrhea, and as an injection given in chronic gonorrhea and leucorrhea, and as a wash for ulcers and venereal sores. Cook also makes mention of a Dr. J. Overholt that used *Ceonathus* leaves as a "…tonic expectorant, with some demulcent properties," indicated in respiratory dryness, bronchitis, cough with debility, and pneumonia.[8] It appears that it was only after the publication of Edwin Hale's *New Remedies,* a treatise on some commonly used botanicals in First Nations medicine, shortly after the publication of Cook's *Physiomedical Dispensatory,* that *Ceanothus* was considered a remedy for the spleen.[9] In 1893 Felter and Lloyd wrote that *Ceanothus* is a useful gastric and hepatic stimulant, with a specific activity directed to the spleen, indicated by "…splenic enlargement, with sallow, doughy skin, and [an] expressionless face". Felter and Lloyd liken the activity of *Ceonathus* to *Silybum marianum* in its ability to

overcome hepatic and splenic congestion, although they made clear that this is not for acute cases, but for sub-acute and chronic states used over the long term.[10] More recently, herbalists such as Michael Moore have begun to think of *Ceonathus* as a sub-clinical remedy for lymphatic congestion, when symptoms have not fully matured or are becoming chronic. Moore's live blood experiments with the tincture have suggested to him that *Ceonathus* increases the repelling charge of capillary endothelial cells, improving the movement of blood in and out of tissues, as well as the movement of lymph. He suggests that its usage as a spleen remedy really extends to all lymphatic tissues, when there is sub-acute to chronic inflammation, useful in lingering forms of mononucleosis and hepatitis .[11] Wood goes a step further, calling *Ceonathus* the "archetypal spleen medicine," not drawing upon a physiological principles but rather the Chinese notion of Spleen, whose function is partly digestive and partly to transport substances through the blood. Wood suggests that *Ceonathus* is indicated by a swollen tongue with a white coating, a frail pulse, abdominal pains watery stools, symptoms that are more or less synonymous with the Chinese conception of Spleen yang deficiency.[12] Moore mentions Red Root in symptoms of portal congestion, with aching hemorrhoids, varicose veins and prostatic congestion, and Wood includes gynecological disorders such as uterine pain, menorrhagia, frequency and leucorrhea. On an energetic level, Wood believes *Ceonathus* could be useful in "melancholia," or depressive states where the person feels gloomy and ineffectual, lacking purpose or motivation, especially indicated in "…people who seem to be unable to think their way out of a problem".

Pharmacy and dosage:

•*Fresh Plant Tincture*: fresh root, 1:2, 95% alcohol, 3-20 gtt, 1-3 ml
•*Dry Plant Tincture:* recently dried root, 1:5, 50%, 3-20 gtt, 1-3 ml
•*Infusion:* finely chopped root, 1:20, 60-120 ml
•*Powder:* recently dried root, 500-1500 mg

Licensing: As of Nov 15, 2010, 8 licenses have been issued for this botanical by the Canadian NHP.

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Botanical Name: *Echinacea angustifolia,* Asteraceae

Common name: Echinacea, Purple Cone Flower, Narrow-leaved Coneflower, American Cone Flower, Black Sampson, Black Susans, *Brauneria Angustifolia*, Brauneria Pallida, Comb Flower, Coneflower, Echinaceawurzel, Hedgehog, Igelkopfwurzel, Indian Head, Kansas Snakeroot, Narrow-leaved Purple Cone Flower, Pale Coneflower, Purple Cone Flower, Purpursonnenhutkraut, Purpursonnenhutwurzel, Racine d'echininacea, Red Sunflower, Rock-Up-Hat, Roter Sonnenhut, Schmallblaettrige Kegelblumenwurzel, Schmallblaettriger Sonnenhut, Scurvy Root, Snakeroot, Sonnenhutwurzel

Similar species: *E. purpurea, E. pallida*

Plant description: Echinacea is a herbaceous perennial, with a slender stem bristling with hairs, 50-180 cm in height, arising from thick, black roots. The leaves are 3-veined and vary in shape from lanceolate to linear, slender at the base, the lowermost leaves with short petioles. The flower head consists of white, pink or purple ray florets that fringe a conical disk of tubular florets that give way to a four sided achenes. All taxa within the genus *Echinacea* hybridize, and thus hybrids within this genus are common.

Habitat, ecology and distribution: The range for *Echinacea* extends from western Minnesota to eastern Saskatchewan and southwards, east of the Rocky Mountains to Texas, and occurring in greatest concentration on the Great Plains. It prefers open dry forest and grasslands, its presence is an indicator of good range for livestock. Recent drought conditions, overgrazing and over-harvesting has had a serious impact on wild populations, and *E. angustifolia* is currently on the United Plant Savers "at risk" list (www.plantsavers.org). In some states, unauthorized harvesting is a punishable offense. At this time, the amount of *E. angustifolia* under cultivation does not appear to meet the market demand, and thus it can be a little more difficult to obtain in very large quantities.

Part used: Roots, seeds, leaf. Commercial sources may be adulterated with other members of the Asteraceae, especially *Parthenium integrifolium*.[1]

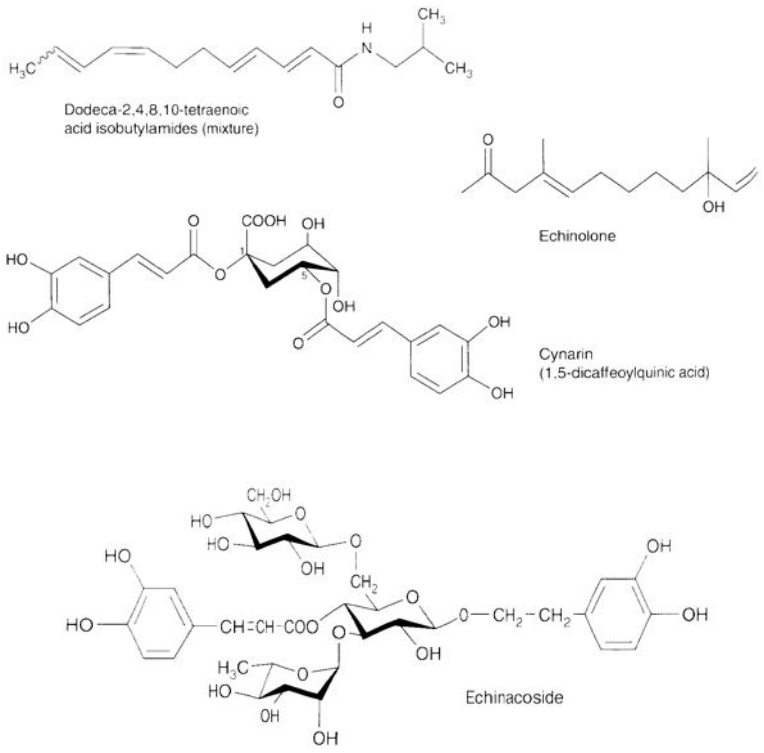
History: This herb is quite misunderstood in modern times**.** Although *Echinacea* has become one of the most popular herbs of commerce, it is interesting to note that its therapeutic indications over the years

have changed considerably. The earliest usage of *Echinacea* is found in the First Nations healing tradition, which reportedly used it in the treatment of venomous bites and stings, as a mouth rinse for sore throat and tonsillitis, in the treatment of infected ulcers and sores, and in the treatment of gastrointestinal illness.[2] Felter and Lloyd state that a Dr. H. F. C. Meyer, of Pawnee City, Nebraska, who marketed it under the name "Meyer's Blood Purifier", introduced *Echinacea* into modern clinical practice. We can literally say that it was the original **'snake oil'** as that is the way the Meyer promoted it. Following what appears to be a reflection of historical usage, Meyer claimed that it was an antidote for insect stings and in particular the bite of the rattlesnake. Among its other uses indicated by Meyer were malaria, cholera, internal abscesses, typhoid fever, ulcers, herpetic lesions, boils, sore throat, respiratory congestion, hemorrhoids, eczema, acne, headache and ophthalmic disorders. Although the Eclectics had a somewhat more cautious approach, they found that many of Meyer's claims could be substantiated, and John King especially was impressed by it, and included it in his *Dispensatory.* [3]

For quite some time, confusion has surrounded the different species of *Echinacea*, and whether or not they contain the same properties. This confusion begins with the German homeopaths who imported what they thought was *Echinacea angustifolia* during the late 1800s. In fact, they were working with a plant classified as another species (*Rudbeckia purpure) which now* now *E. purpurea.* In further scientific studies with *Echinacea*, some German researchers obtained what they thought was *E. angustifolia* but was in fact *E. pallida.* With this latter confusion, much of the German research on *E. angustifolia* before 1987 may be in fact be supporting data for *E. pallida,* and should be viewed with caution.[4] Some of the early studies were performed on a completely different plant, *Parthenium integrifolium.*

From a historical perspective, *Echinacea* was rarely used for acute conditions. It was used for deeper chronic situations, generally call 'bad blood'. Even in the period 1970 – 80, we used it as an alterative, not for acute immune issues.

Constituents: Although some of the data on the various *Echinacea* species may be confused, it appears that many constituents are shared across all three major species (e.g. *angust., purp., pall.)*.[5] The most characteristic constituents of *Echinacea* are the akylamides. These are mostly comprised of isobutylamides that provide for the characteristic tingling sensation felt in the mouth upon ingestion, a constituent said to be highest in *E. pallida.* Other constituents found in the root include caffeic acid esters, primarily echinacoside, as well as chicoric acid (*E. purpurea* only) and cynarin *(E. angustifolia* only). The root has also been shown to contain an essential oil, polyacetylenes, polysaccharides, phytosterols and non-toxic pyrrolizidine alkaloids. Both the seeds and the leaf contain a similar range of constituents as the root, but also contain flavonoids.[6,7]



Medical Research: *Echinacea* has undergone a significant amount of experimental investigation since the 1950's, much of which has led to the current view of it as an antimicrobial and antiviral agent, with immunostimulatory, immune-modulator and anti-inflammatory properties. Unfortunately most of this research is based upon *in vitro* models, or *in vivo* models that use isolated constituent extracts, often injected into the bloodstream of experimental animals. The botany of the raw material used was not always consistent. The primary observations made in these studies, many of them involving the activity of the purified polysaccharides (which are precipitated in tincture and inert), include an increase in non-specific and immune-specific activities, e.g. inhibition of hyaluronidase, cytokine activation (e.g. IL-1), leukocyte migration, phagocytic enhancement, an increase in T-lymphocytes activity (with a shift of the T4/T8-cell ratio in favor of T4 cells), and viral inhibition. As useful as this information is, it does not provide any real understanding of how an oral dose of *Echinacea* exerts its effect in the human body. Mills and Bone mention that the only effect that has been noted in experimental oral doses is a non-specific enhancement of immunity.[8]

One of the more common misconceptions of *Echinacea* is that its immunostimulant properties wear off after a period of weeks if taken on a regular basis. Thus one recommendation suggests that *Echinacea* doses should be pulsed, taken for 10 days on, five days off, etc. This is based on an English mistranslation of the original German study written by Jurcic et al published in 1989.[9] In the original article, the study shows that the *Echinacea*-induced elevation of phagocytosis begins to decline after day five and levels off from day eight to ten. However, the dose of *Echinacea* used in the study was discontinued after day five, a fact that was missing from the English translation. Thus instead of showing a diminished response to *Echinacea* over ten days, the study

appears to indicate that there is an elevation of phagocytosis for five days after the *Echinacea* was discontinued.[10] There have been a few clinical studies with *Echinacea*, mostly very preliminary, looking at its measured effect in clinical trials of cold and flu symptoms. The majority of these studies show a benefit for *Echinacea*, especially if taken at the very early stages of a cold or flu. There are almost as many studies however that show no statistical benefit in taking *Echinacea* when compared with placebo. The problem may lie in poor quality control in the market place, and thus it is difficult to come to any sort of conclusion from the many studies. The following are a few examples of the clinical studies that have been conducted so far:

- ***Cold and flu symptoms*:** various *Echinacea* preparations have shown to reduce the symptoms, duration and severity of common cold by 10 – 30%.[11,12,13,14,15,16,17,18,19,20,21] Echinacea is best if started before the symptoms and carried on for the first 7 – 10 days. It has it best effect in the first five days depending on the dosage form. Not all studies have been favorable, with discrepancies most likely due to different material and extraction techniques used.[22,23,24,25] A randomized, double-blind, placebo-controlled community-based trial examined the efficacy of an encapsulated mixture of unrefined *Echinacea purpurea* herb (25%) and root (25%) and *E. angustifolia* root (50%), taken in 1-g doses six times on the first day of illness and three times on each subsequent day of illness for a maximum of 10 days. The results indicated no statistically significant difference between the *Echinacea* and placebo groups for any of the measured outcomes.[26] A randomized, double-blind, placebo-controlled clinical trial of 80 men and women examined the efficacy *Echinacea purpurea* herb (Echinacin, EC31J0) in reversing cold symptoms. In the *Echinacea* group the median time of illness was 6.0 days compared to 9.0 days in the placebo group. EC31J0 was well tolerated and clinically effective in alleviating symptoms more rapidly than placebo in patients with a common cold.[27] A random double-blind placebo-controlled study examined the efficacy of an *Echinacea* compound herbal tea preparation (Echinacea Plus) given at early onset of cold or flu symptoms in 95 subjects. Researchers noted a significant difference between the experimental group and control group, suggesting that *Echinacea* at early onset of cold or flu symptoms was more effective than a placebo.[28] Patients attending one of 15 study practitioners as a result of acute symptoms of the common cold were enrolled in a randomized double-blind placebo-controlled study of a preparation of *Echinacea* root, *Baptisia* root and *Thuja occidentalis*, 3 tabs t.i.d. for 7 to 9 days. In all, 259 patients were evaluated, the results indicating the superiority of the herbal remedy over placebo. In the subgroup of patients that started the therapy at an early phase in their cold symptoms, the efficacy of the herbal remedy was most prominent. The therapeutic benefit of the herbal remedy was found to occur by day 2 and attained its greatest significance on day 4, continuing until the end of the treatment.[29]
- ***Immune System:*** increases in phagocytosis and increases lymphocyte activity, possibly by promoting the release of tumor necrosis factor (TNF), interleukin-1 (IL-1), and interferon have been found.[30,31,32] Although many constituents of echinacea seem to be involved in creating non-specific immune response; high-molecular weight

polysaccharides, such as heteroxylan and arabinogalactan; and lower molecular weight compounds, including alkylamides and caffeoyl conjugates such as chicoric acid and echinacosides seem to be the most significant. Heteroxylan seems activate phagocytosis, and arabinogalactan most likely induces macrophages to produce the cytokines TNF, IL-1, and interferon beta-2.[33] Arabinogalactan have been found to activate macrophages, creating a cytotoxic effect against tumor cells and micro-organisms[34] Chicoric acid and echinacosides constituents play a role in enhancing phagocytosis.[35] Polysaccharides in echinacea have moderate effects on B-lymphocytes, but not the same apparent activity on T-lymphocytes.[36]

Anti-inflammatory: *in vitro* research suggests constituents of echinacea have an anti-infamatory activity, inhibiting cyclooxygenase and 5-lipogenase.[37,38] Clinical research also shows anti-inflammatory effect as seen from serum ferritin, which is an indicator of inflammatory cytokines, is lowered in people treated with echinacea.[39]

Antineoplastic: Mills and Bone report two clinical studies that looked at the efficacy of *Echinacea (E. angustifolia* and *E. pallida)* in combination with *Baptisia* and *Thuja* in the treatment of breast cancer, in conjunction with chemo-radiation therapy. Overall, this combination showed some benefit, promoting the recuperation of the hematopoietic system and reducing the incidence of infection, when compared with controls.[40]

Vaginal candidiasis. Taken orally in combination with a topical antifungal cream, *Echinacea* has been shown to be effective for preventing recurrent vaginal yeast infection. Herb juice of *Echinacea purpurea* in combination with topical econazole (Spectazole) lowers recurrence rate to 16.7% compared to 60.5% with econazole alone.[41] Polyacetylenic compounds in echinacea, (ketoalkenes and ketoalkynes) have antifungal activity, including activity against Candida yeast.[42]

Leukopenia. An isolated polysaccharide fraction of *Echinacea purpurea*, given intravenously has reduced leukopenia caused by chemotherapy.[43]

Wound Healing: echinacoside constituent of echinacea help protect type III collagen from free radical damage, having activity against bacterial hyaluronidase. Animal research shows that the extracts can speed would healing, enhance epithelialization, and reduce inflammation.[44]

UV Skin protection: caffeoyl found in echinacea helps prevent UV radiation skin damage by protecting collagen from free radical damage.[45]

Cytochrome p450: Echinacea modestly inhibit cytochrome P450 1A2 (CYP1A2) *in vivo*. Clinical research using caffeine as a probe for CYP1A2 activity has demonstrated that echinacea can inhibit caffeine clearance by 27%.[46] But it also induce hepatic cytochrome P450 3A4 (CYP3A4), but it inhibits intestinal CYP3A4. [47,48] These opposing effects seem to cancel each other out or more specifically give a **moderating effect on the body** as herbalists have been stating for years.

Toxicity: Echinacea has displayed no demonstrable toxic effects.[49]

Herbal action: alterative, immunostimulant, antimicrobial, antiviral, immunomodulant, anti-inflammatory, lymphatic, vulnerary

Indications: acute fever; chronic catarrhal conditions, including sinus congestion, lymphatic congestion, pharyngitis, and bronchitis; septic conditions (topically and

internally); abdominal pain made worse by eating, with bad breath; acne, boils, eczema; pain, in cancer; acute injuries, venomous bites and sting; immunodeficiency

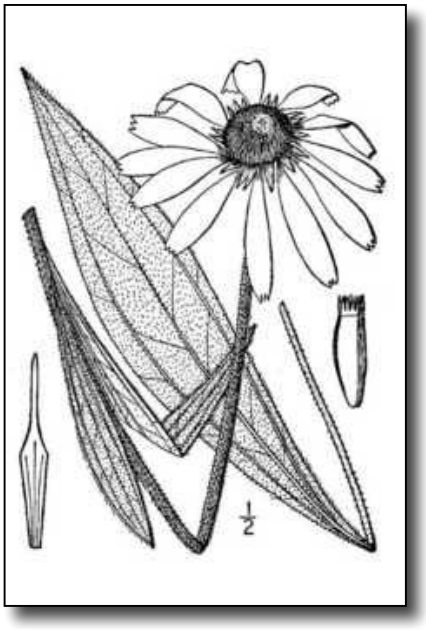
Specific Indications[50]

- Dull eyes; full feeling of mind and body; shattered in mind or body
- Fatigue, exhaustion; from overwork, poor work habits; often accompanied by production of boils, dirty, gray visage of the face
- Ulcerative pharyngitis, tonsillitis and stomatitis (canker sores)
- Tongue coated dirty brown or black
- Gastric and duodenal ulcers
- Enteritis
- Swollen lymphatics
- Swollen, blue veins
- Septicemia, prostrating fever, chills
- Septic infection; veins leading from wound are swollen, purple; promotes discharge of pus (suppuration)
- Boils, abscesses, carbuncles, semi-active, low-grade character, with exhaustion and atrophy; chronic, constitutional tendency
- Eczema from toxins in the blood
- Bee stings, snake bites, venom; histaminic irritation; applied directly it has a cooling and detoxing effect
- Deepened, bluish or purplish coloration of the skin or mucosa, with a low form of inflammation
- Putrescent odor from excess of broken-down material being eliminated from the system; as in scarlet fever, diphtheria, spinal meningitis and typhoid fever (with *Baptisia*)
- Old sores, wounds, necrosis, gangrene
- Chilly

Contraindications and cautions: Mills and Bone describe an immunomodulant property for *Echinacea*, suggesting that it 'modulates' rather than stimulates the immune system. In particular, Mills and Bone argue that the contraindication for autoimmune disease described in the German Commission E monographs is not supported by any clinical studies.[51] Even still, anecdotal evidence suggests that *Echinacea* can promote adverse effects in some patients with autoimmune disease, although this effect may not be noted in all. Thus, *Echinacea* should be used with caution in autoimmune disease. The contraindication of *Echinacea* for acquired immunodeficiency cases however, established in the Commission E monographs, does not match the experience of many herbalists who continue to use it to treat any opportunistic infection.[52]

Medicinal uses: It is important to note that *Echinacea* was used differently traditionally than it is today. It was used mostly for deep chronic bad fluids, not for acute immune issues. The most acute issues were snake bites, stings and poisoning of various types. *Echinacea* is one of the few herbs that has a cooling, stimulating effect.

King's American Dispensatory contains a rather large and enthusiastic entry on *Echinacea*. John King singled it out as the primary corrector of "depraved fluids," what in an earlier period was referred to as 'bad blood,' evidenced by a tendency to sepsis, malignant ulcers, and foul smelling discharges. Felter and Lloyd write about "…its extraordinary powers—combining essentially that formerly included under the terms antiseptic, anti-fermentative, and antizymotic—are well shown in its power over changes produced in the fluids of the body, whether from internal causes or from external introductions. The changes may be manifested in a disturbed balance of the fluids resulting in such tissue alterations as are exhibited in boils, carbuncles, abscesses, or cellular glandular inflammations. They may be from the introduction of serpent or insect venom, or they may be due to such fearful poisons as give rise to malignant diphtheria, cerebrospinal meningitis, or puerperal and other forms of septicemia. Such changes, whether they are septic or of devitalized morbid accumulations, or alterations in the fluids themselves, appear to have met their antagonist in echinacea. "Bad blood," so called, asthenia, and adynamia, and particularly a tendency to malignancy in acute and sub-acute disorders, seem to be special indicators for the use of echinacea". Echinacea was especially indicated if these symptoms were accompanied weakness and emaciation, perhaps with a bluish or purplish coloration to the skin and mucous membranes. The tongue might be covered in a dirty-brown coating, and the pulse will be thin and weak.[53] From a more modern perspective, we can say that it is best suited for deeper conditions where white blood cell production is required in high concentration. This of course can be a situation where there is a putrefactive circumstance or compromised health from a long-term septic drain on the system as our ancestors use it. It is also very suitable to people that have vital exhaustion due to long-term stress. In this way I often use the botanical as an immune prophylactic for the busy person, especially if they travel a lot. In these cases the tincture is not effective, we need to do the ground herb (usually root). This also helps for long hours in the clinic, working with sick people.



Supporting the First Nations usage of *Echinacea*, the Eclectics reported that *Echinacea* met with success in the treatment of acute injuries complicated by infection, and appeared to successfully treat venomous insect bites. *Echinacea* however is also mentioned in a variety of other complaints, such as tonsillitis (with or without ulceration) as well catarrhal affections of the nose, sinuses, and naospharynx. Similarly, *Echinacea* is said to be of benefit in chronic bronchitis, and was even used by the Eclectics to "…avert a gangrenous termination in pulmonic affections". *Echinacea* is also thought to be helpful "fermentative dyspepsia," characterized a foul to fruity smelling breath as well as abdominal pain that is aggravated upon eating, especially foods such as flour products and commercial dairy. In fever, *Echinacea* is an important tool for parents, effectively helping resolve eruptive diseases such as measles, chicken-

pox, and scarlet fever, also mentioned in typhoid and especially in malarial fever to control symptoms, but not periodicity. Felter and Lloyd state that influenza is partially ameliorated by *Echinacea*, used primarily to ensure "…good convalescence". Echinacea is also mentioned in the Eclectic literature as a remedy for pain, in the treatment of erysipelas, and especially in cancer for which its virtues are extolled by Eli Jones in his text *Cancer: It's Causes, Symptoms and Treatment.* Jones states that *Echinacea* is indicated for the pain of cancer, but does not actually treat it. *King's* states that this effect is best noted when the cancer involves the mucous membranes. Echinacea is also used by herbalists as a remedy for the skin, and in particular the treatment of eczema, especially in chronic conditions with a wet, sticky exudate, and which the patients are thin and weak. [54]

Flower Essence

Self-Integration/Immune Interface

Positive qualities: Core integrity, contacting and maintaining an integrated sense of Self, especially when severely challenged. Developing immune interface between environment and Self.

Patterns of imbalance: Feeling shattered by severe trauma or abuse which has destroyed one's sense of Self; threatened by physical or emotional disintegration reflected in immune issues. A feeling of being only partially there, and not fully being present.

Every time we make a big shift in our life, either from trauma, abuse, or personal growth, we leave the old 'us' behind. The image of self is beginning to change, but you are not quite the 'new you' yet. Since the immune system is the interface between us and environment, it also needs to adjust. During this adjustment period the immune system is not as active or integrated. If you don't release the old image of yourself, your energies become stagnant, weakening the immune system. Echinacea flower essence helps you let go of the old image and protects you as you grow into the new image of Self. Echinacea flower essence will help during these transition phases. Just as taking the whole herb is beneficial for the physical body, Echinacea flower essence is important for the emotional shift associated with the immune system

Pharmacy and dosage:

•*Fresh Plant Tincture*: fresh root/seed 1:2, 95% alcohol, 20-60 gtt
•*Dry Plant Tincture*: recently dried root/seed, 1:5, 50% alcohol, 20-60 gtt, 1-10 ml
•*Hot Infusion*: recently dried leaf and flower, 1:20, 60-120 ml
•*Decoction*: recently dried root, 1:20, 60-120 ml
•*Powder*: recently dried root, 500-5000 mg

NHP Monograph[55]

- Traditionally used in Herbal Medicine to help relieve the symptoms of upper

respiratory tract infections
- Traditionally used in Herbal Medicine to help relieve sore throats

Dosage:

Children 2 - 4 years:
- **Preparation:** Dry, Powder, Decoction & Infusion + All Non-Standardised Extracts
  Dose(s): 0.17-0.5 Grams per day, dried root and rhizome

Children and adolescents 5 - 9 years:
- **Preparation:** Dry, Powder, Decoction & Infusion + All Non-Standardised Extracts
  Dose(s): 0.25-0.8 Grams per day, dried root and rhizome

Adolescents 10 - 13 years:
- **Preparation:** Dry, Powder, Decoction & Infusion + All Non-Standardised Extracts
  Dose(s): 0.5-1.5 Grams per day, dried root and rhizome

Adults and adolescents 14 and over:
- **Preparation:** Dry, Powder, Decoction & Infusion + All Non-Standardised Extracts
  Dose(s): 1-3 Grams per day, dried root and rhizome

Licensing: As of Nov 15, 2010, 378 licenses have been issued by the Canadian NHP for products containing *Echinacea*.

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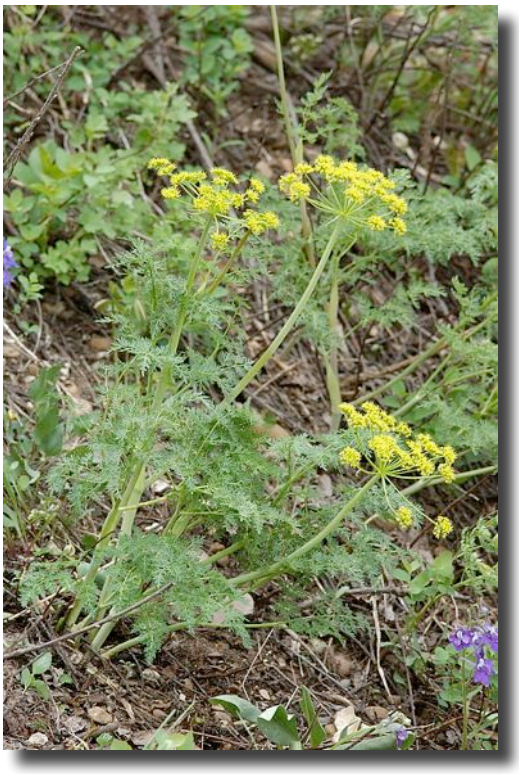
Botanical Name: *Lomatium dissectum*, Apiaceae



Botanical synonyms: *Leptotaenia dissecta*

Common names: Lomatium, Fern-leaved Desert Parsley, Biscuit root.

Similar species: The *Lomatium* genus contains over 80 species, many of which are used more or less interchangeably, including *L. triternatum* (Narrow-leaved Desert Parsley), *L. nudicaule* (Indian Consumption Plant), and *L. montanum* (Biscuitroot).

Plant description: Lomatium is a robust perennial herb with a distinctly spicy fragrance. Several hollow stems, between 50-150 cm, rise from taproots, and the bases of the stem having a purplish hue. The thick root is irregularly shaped with many knobs and protuberances, epidermis grey, cortex white and fleshy. The leaves are mostly basal and finely dissected, almost fernlike. The tiny flowers are borne on long stalks in umbels 8-10 cm across, yellow to deep purple in color. The fruits are oblong to elliptic seeds, with flattened backs and broad wings.

Habitat, ecology and distribution: *L. dissectum* can be found scattered in dense colonies at low to mid elevations in temperate to arid regions of western North America, from southern BC and Alberta to Colorado, preferring arid basins and dry plateaus. Other similar species such as *L. montanum* can be found further to the east, in Wyoming and Montana.

Part used: Root.

History: Lomatium is an exceptionally important and highly regarded plant in First Nations medicine, but appears to have escaped the notice of the Physiomedicalists and Eclectics. It is difficult to imagine how this occurred, considering that other equally important and useful First Nations plants such as Echinacea and Goldenseal were identified fairly early on. The relatively recent popularity of Lomatium is due in part to academic research conducted by ethnobotanists over the last century, by herbalists that apprenticed with First Nations healers, and from clinical experimentation in naturopathic circles in the Pacific Northwest. Lomatium first attracted the attention of the medical community when it was shown to be effective in treatment an influenza epidemic in the Great Basin area during the 1920's.[1] Although it is considered to be an important medicinal plant by many First Nations groups, Lomatium has important food

and ritual uses as well. Many groups, such as the Nlaka'pmx and Okanagan dug the roots in early spring and cooked them in a pit until soft.[2,3] When peeled, split and dried the roots can be pounded into flour to make biscuits, hence its common name 'Biscuitroot.' The young shoots and leaves are also said to be edible, cooked as a pot herb and used by some as a relish with meat.[4,5] Although older, more mature plant parts were considered inedible by both humans and livestock, the seeds are described as being used as a food.[6] First Nations groups in Nevada pulverized the root and smoked it for pleasure,[7] and used it to treat horses for distemper. Lomatium was also used as a ceremonial agent and was highly regarded for its spiritual potency, burned by the Blackfoot as incense, and taken internally by Navaho dancers for the 'mountain top dance'. [8]

Constituents: Moore lists a variety of plant chemicals, none of which have been studied all that well, including an essential oil, gums, resins, and resinoids. Van Wagenen et al. have reported the presence of three coumarin glycosides, one which contains apiose, a sugar that is uncommon in the coumarins. Moore also mentions the presence of an "antibiotic tetronic acid," as well as luteolin, luvangetin and a furanocoumarins. The plant is also reputed to contain appreciable amounts of ascorbic acid.[9,10]

Medical Research:

•***Antiviral:*** A *Lomatium dissectum* root extract was found to completely inhibit the cytopathic effects of rotavirus, *in vitro*.[11] Suksdorfin isolated from the fruit of *Lomatium suksdorfii* was found to be able to inhibit HIV-1 replication in the T cell line, *in vitro*.[12]

Toxicity: Turner et al. report that the Okanagan-Colville First Nations considered the purple shoots, mature roots and tops, as well as strong aqueous preparations of Lomatium to be toxic.[13] This is mentioned, however, nowhere else in the ethnobotanical record.

Herbal action: antiviral, antimicrobial, immunostimulant, adaptogen

Indications: colds, flu, sore throat, pharyngitis, tracheitis, tonsillitis, strep throat, bronchitis, asthma, tuberculosis, immunodeficiency, viral hepatitis, convalescence

Contraindications and cautions: May cause a hive-like rash in apparently sensitive individuals. The mechanism of the response is not known but does not appear to be allergic. Michael Moore postulates that the effect may be from excess immunostimulation or represent a viral die-off response. Thus, Moore states that Lomatium is best used along with diaphoretic herbs to prevent this response, but I have seen one case where the rash erupted regardless. The rash, which is otherwise benign and painless, in most people dissipates after a few days to a few weeks, but in some individuals can last up to six months or more. John Bastyr notes that the appearance of the rash is a sign to lower the dose of the herb rather than to discontinue it.[14,15]

Medicinal uses: As a medicine, Lomatium was considered to be a powerful healing agent by First Nations healers, and was used for a wide variety of complaints. As a springtime remedy, the Okanagan-Collville used Lomatium as an alterative to prepare for the heat of summer.[16] Lomatium was used as a treatment for sore throat by the Paiute of Nevada, and a decoction of the roots was used as an inhalation and for internal usage in the treatment of colds and flu by the Great Basin peoples.[17,18] Lomatium was considered an important remedy in the treatment of tuberculosis and lung diseases such as asthma by several First Nations groups, including the Nez Perce of Montana, the Okanagan-Colville, the Great Basin, the Paiute, Shoshone, and Washoe peoples.[19,20,21] In the treatment of venereal disease Lomatium root was taken both internally and applied externally by the Paiute.[22] As an adaptogen, Lomatium was used by the Blackfoot to assist in weight gain and to assist in healing during convalescence.[23] In the treatment of digestive disorders the Cheyenne drank an infusion of the pulverized roots.[24] In the treatment of compound fractures, including those that had become infected, the Gosiute applied a poultice of the roots to the affected area.[25] In more recent times, Lomatium has come to be used as an important remedy in the treatment of upper respiratory tract infections, both viral and bacterial in origin. It can be used as a preventative during epidemics and outbreaks, and as a first line treatment to halt the progression of a cold, in the treatment of asthma and bronchitis, and in severe states of immunodeficiency. For this reason, and with support from preliminary experimental evidence that shows Lomatium may have an anti-HIV activity, Lomatium can be used as an adjunct in the treatment of AIDS and ARC. As a topical remedy, Lomatium is an excellent antimicrobial agent, used in periodontal disease as a mouth rinse, as a fomentation or bath for skin infections, and as a douche for *Candida* and *Gardnerella* infections.[26] Some practitioners have also found that Lomatium may be helpful in the various forms of viral hepatitis, as an antiviral and perhaps more importantly an adaptogenic alternative to the deadly combination therapies of interferon and ribavirin.

Pharmacy and dosage:

•*Fresh Plant Tincture*: fresh plant, 1:2, 95% alcohol, 10-30 gtt
•*Dry Plant Tincture*: recently dried root, 1:5, 70% alcohol, 10-30 gtt
•*Hot Infusion, Decoction*: recently dried root, 1:20, 30-90 ml

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Botanical Name: *Thymus vulgaris*, Lamiaceae

Common names: Thyme, Common Thyme, Garden Thyme

Plant description: Thyme is a small shrub 10-30 cm in height, with numerous brittle branches and a woody fibrous root. The stem is square. Leaves are opposite, quite small, numerous, ovate-lanceolate, and the margins are entire. Flowers very small, carried in leafy and terminal whorls, bluish to purple in color. The entire plant is highly aromatic.

Habitat, ecology and distribution: The Wild Thyme *(T. serpyllum)* is said to be native to southern Europe and northern Africa, preferring dry habits and light soils. Grieve reports that the richer the soil the less aromatic the plant.[1] Common or Garden Thyme is thought to be a cultivated species of Wild Thyme.

Part used: Aerial parts.

History: The genus name *Thymus* is of Greek origin, thought either to be derived from a word that means 'to fumigate,' or from the word *thumus*, meaning courage or strength. This gives us a good metaphor for this botanical as it is a strong, deeply dredging remedy that can open up the system so heat and toxins can be removed.

Thyme is mentioned in Virgil's *Georgics* and by Pliny as a fumigating agent. In the Capitularies of Charlemagne, a text that lists the various ordinances of the emperor's rule, it is said that thyme should be grown in abundant volumes in monastery gardens and made available to the general populace because of its health-giving properties. In medieval Europe, thyme was considered to be an emblem of bravery and courage, and it was the custom for ladies to embroider a bee hovering over a sprig of thyme on the scarves they presented to their knights. Grieve mentions that thyme is a favorite of honeybees, and is the source of the nectar that bees use to make the famous Hymettus honey near Athens, Greece. Thyme is also commonly used as a flavoring agent in cheese and liqueurs, and is an important culinary herb in French cuisine.[2,3]

Constituents: The key constituent in thyme is the essential oil, which comprises upwards of 1-2.5% of the plant, including the monterpenes thymol (30-70%), carvacrol (70%) and thymol methyl ester (1.5-2.5%), as well as *p*-cymene, linalool, alpha-terpineol and thujan-4-alcohol. Other important constituents include flavonoids, including methylated flavones, phenolic glycosides and aliphatic alcohols, as well as biphenyl compounds, phenolic acids such as rosmaric acid, resins and tannins.[4,5]

Medical Research: There have been a few clinical trials with thyme and thymol. In one double-blind placebo-controlled trial of 60 patients with productive cough the effectiveness of a thyme syrup or bromohexine was compared. The results indicated that thyme syrup is just as effective as the drug to improve symptoms. Two cases of vulval lichen sclerosis were successfully treated with the topical application of a cream containing thyme extract.[6] In the treatment of Kaposi's sarcoma a daily dose of 1-4 g of thymol, dosed in two cycles of 64 and 169 days, was found to be successful. In one of case of dermatomycosis and another of progressive scleroderma, the administration of thymol was shown to resolve the progression of the disease.[7]

The following is an overview of the experimental data on thyme:

- ***Antispasmodic:*** Concentrated thyme extracts have demonstrated an antispasmodic *in vitro*, enhancing the relaxation effect of bradykinin. The essential oil of thyme, the purified flavonoids and concentrated extracts of the crude herb have been shown to inhibit tracheal smooth muscle cell contraction, phasic contractions in ileal muscle, and the contraction of the vas deferens*, in vivo*. The antispasmodic activity appears to be greatest on tracheal muscle, perhaps by inhibiting calcium ion flux.[8]
- ***Antimicrobial:*** Concentrated extracts of thyme, as well as the essential oil and its purified components the monoterpenes thymol and carvacrol, have all demonstrated antimicrobial properties *in vivo* against gram positive and gram negative bacteria, including pathogenic oral bacteria *Porphyromonas gingivalis, Selenomonas artemidis* and *Streptococcus sobrinus,* as well as other bacteria including *Salmonella typhimurium, Sarcina* and *Staphylococcus spp.* Both aqueous and ethanolic extracts of *Thymus* were found to significantly inhibit *Helicobacter pylori*. It has also been shown to be effective against influenza A.[9,10,11,12]
- ***Fungicidal****:* Thymol and carvacrol, as well as the essential oil of thyme, have been shown to exhibit an *in vitro* antimicrobial property against several species of fungi, including *Cryptococcus neoformans, Aspergillus spp., Rhizoctonia solani, Pythium ultimum, Fusarium solani* and *Colletotrichium lindemuthianum.*[13] The oil is also effective against several *Candida* species, including *C. albicans*. It has been shown to potentiate the antifungal activity of amphotericin B.[14,15] Thymol is active against fungal microorganisms that cause finger and toe nail fungus (onychomycosis) including: *Trichophyton rubrum, Trichophyton mentagrophytes, Microsporum canis, Epidermophyton floccosum*, and *Epidermophyton stockdale*.[16]
- ***Antioxidant:*** Thymol has been shown to cause a dose-dependent inhibition of endothelial cell mediated oxidation of low density lipoproteins, and both thymol and carvacrol have demonstrated the ability to inhibit peroxidation of phospholipids and to scavenge peroxyl radicals, *in vitro*. Rosmarinic acid has demonstrated the ability to inhibit lipid peroxidation, decrease the production of the super oxide radical, and inhibit

the oxidative effects of polymorphonuclear leukocytes, *in vitro*. The biphenyl compound 3,4,3',4'-tetrahydroxy-5,5'-diisopropyl-2,2'-dimethyl-biphenyl, as well as the flavonoid eriodictyol, were found to inhibit super oxide anion production and lipid peroxidation, the biphenyl compound in particular protecting red blood cells against oxidative hemolysis.[17] Thyme and its constituents thymol and carvacrol have antioxidant effects and DNA protective effects.[18,19,20] The antioxidant effect of thyme increases the production of nitric oxide and improve atherosclerosis and endothelial dysfunction.[21]

- ***Anti-mutagenic:*** The flavonoid luteolin isolated from Thyme was found to possess anti-mutagenic properties against dietary carcinogens derived from cooking. In another study a Thyme extract demonstrated anti-mutagenic activities, modulating the effects of DNA repair in *Escherichia coli* by stimulating error-free repair (rather than suppressing of error-prone repair).[22]
- ***Anti-inflammatory:*** Rosmarinic acid has demonstrated an ability to inhibit the activation of complement protein C3, preventing immunohemolysis of erythrocytes *in vitro.* The oral administration of rosmarinic acid has also demonstrated passive cutaneous anaphylaxis in rats at doses of 1-100 mg/kg. Thymol has been shown to inhibit neutrophil chemotaxis, and thyme oil has been shown to inhibit prostagladin synthesis, *in vtro* .[23,24]

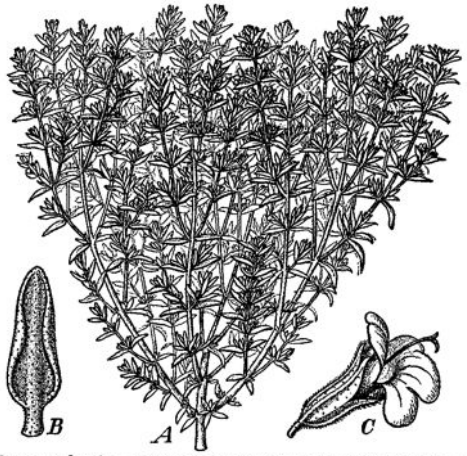
Detoxing: Thyme affects phase I and phase II xenobiotic metabolizing enzymes in the liver. In an animal model, it induces the phase I enzyme 7-ethoxycoumarin-O-deethylase (ECOD) enzyme. Thyme also induces the phase II enzymes glutathione-S-transferase (GST) and quinine reductase (QR). Thymol and carvacrol are thought to be responsible for these effects.[25]

Other: Thyme also has antiplatelet, anti-inflammatory, and antiallergic activity.[26,27,28] Additionally, thyme improves wound healing, and is an effective mosquito repellent.[29,30]

Bronchitis: Thyme, in combination with cowslip (*Bronchipret*®), relieves symptoms of bronchitis such as coughing, fever, and increased production of sputum.[31]

Dyspraxia. thyme oil, in combination with evening primrose oil, fish oils, and vitamin E, has shown to create improvements in movement disorders (dyspraxia) in children.[32]

Toxicity: The crude herb is generally recognized as safe, used as a medicine, food and condiment. Mills and Bone report that the LD_{50} of the essential oil is 2.84 g/kg in rats (route administered not given), and that oral doses of 0.5-3 g/kg of a concentrated thyme extract decreased locomotor activity and slightly slowed the rate of respiration in m. Newall et al. report an oral LD_{50} for thyme oil in rats as 4.7 g/kg. Thyme oil is considered a dermal and mucous membrane irritant and should not be taken internally or applied to skin. Toxic symptoms for thymol include nausea, vomiting, gastralgia, headache, dizziness, convulsions, coma, and cardiac and respiratory arrest. Hyperemia and inflammation have been noted in topical and bath preparations that use the essential oil (Newall et al. 1996, 256).[33]



Thymus vulgaris: *A*, plant in bloom; *B*, leaf seen from under surface. magnified 4 diam.; *C*, flower seen from the side, magnified 5 diam.

Herbal action: antispasmodic, carminative, expectorant, antiseptic, antimicrobial, antioxidant, emmenagogue, rubifacient

Indications: dyspepsia, gastritis, asthma, bronchitis, pertussis, laryngitis, tonsillitis, dysmenorrhea; topically for fungal and bacterial infections, gingivitis

Specific Indication[34]

Mind, Sense, Nerves, Emotions, Personality

- Person with low-level anxiety from subconscious sources, difficulty sleeping
- Person with low vitality, chillness, frequent, recurrent infections and cold limbs
- Heat affecting the nervous system; nightmares, restlessness, lethargy, spasm
- People who wake with fright or startled; wake with phlegm in the throat
- Paralysis, epilepsy, fainting
- Alcoholism

Head

- Headaches, hangover

Respiration

- Laryngitis, sore throat, tonsillitis
- Constant clearing of the throat; postnasal drip
- Acute cold with shivering
- Acute and chronic bronchitis
- Highly irritable mucosa causing constant coughing; unstoppable fits of coughing; in acute or chronic respiratory disease
- Whooping cough in children
- Shortness of breath, emphysema
- Respiratory problems associated with worms
- Respiratory mucus associated with emotions (with Marruium)
- Wet coughs, spasmodic, coughs, mucus yellow, green, thick
- Pneumonia
- Respiratory mycosis

Digestion

- Poor appetite, slow digestion, food ferments, creates gas and burning in the stomach, heartburn; cold, sluggish constitutions with putrefactive tendency
- Colic, gas, cramps, diarrhea
- Parasites
- Typhoid fever

Kidney and Bladder

- Genital urinal complaints including bladder infections, yeast infections, thrush, putrid discharge
- Childhood bedwetting and diarrhea

Female

- Amenorrhea

Muscular and Skeletal

- Cold limbs
- Gout, rheumatism
- Skin of finger dry (with *Crataegus*, back of wrist dry)

Fever

- Fever with faulty perspiration, deep heat, chill, cold extremities

Skin

- Scabies, lice, crabs, athlete's feet (external and internal)
- Boils, abscess, surface infections, mastitis, bruises, shingles (external)

Other

- Leukopenia, low immunity, anemia
- Spleen, damp, boggy

Contraindications and cautions: None found.

Medicinal uses: Thyme is best suited for cold, inactive conditions where the patient tends to be chilled, shivering, putrefaction, sepsis and stagnant, and stuck mucus. It has even been used against anthrax, typhoid fever and diphtheria. The ancient Greeks said it was "hot in the third degree", while the oil is "hot to the fourth degree" meaning it can 'burn', or irritate the skin.

Grieve states that an infusion of thyme can arrest gastric fermentation and is useful in gastrointestinal spasm and colic. According to Felter and Lloyd, the cold infusion is useful in dyspepsia, with weakness and irritability of the stomach, "…and as a stimulating tonic in convalescence from exhausting diseases". As a diaphoretic, the hot infusion can assist in promoting perspiration at the commencement of a cold or fever, and is useful in dysmenorrhea, flatulence, colic, and headache. According to Culpepper, thyme is "…a noble strengthener of the lungs, as notable a one as grows, nor is there a better remedy growing for whooping cough. It purgeth the body of phlegm and is an excellent remedy for shortness of breath. It is so harmless you need not fear the use of it. An ointment made of it takes away hot swellings and warts, helps the sciatica and dullness of sight and takes away any pains and hardness of the spleen: it is excellent for those that are troubled with the gout and the herb taken anyway inwardly is of great comfort to the stomach." Gerard adds that it will "cure sciatica and pains in the head," also indicated in leprosy and the epilepsy. Weiss states that the oil when taken internally is eliminated by the alveoli of the lungs, exhibiting an antimicrobial as well as spasmolytic activity on the bronchia. To this extent thyme is sometimes referred to as 'tracheal relaxant,' used in convulsive coughing from infectious or allergic causes. Thyme is especially indicated in whooping cough, or pertussis, and represents a viable alternative

to the pertussis vaccine. For sore throat, tonsillitis and laryngitis, the diluted tincture or strong infusion is a useful remedy. For gingivitis, a dilute tincture of thyme can be used as a mouthwash. Felter and Lloyd state that the "…oil is valuable as a local application to neuralgic and rheumatic pains", but should not be applied to the skin without a carrier. Mills and Bone suggest that thyme may be helpful as an antioxidant and hypolipidemic agent, useful in cardiovascular disease, and as an adjunct in the treatment of gastric ulcer.[35,36,37,38]

Thyme stimulates the thymus gland (its namesake) and thus improves immunity, self identity and reduces adrenal stress, By relaxing the parasympathetic system, thyme acts on the gastrointestinal tract, useful for dyspepsia and sluggish digestion.

Thyme is suited for people with deep unconscious issues that might even disturb the sleep. The mind can be preoccupied with issues outside of consciousness, thyme brings up these deeper 'toxic' issues and releases them, just as it does toxins in the body. Similarly it has an effect on sleep and dreams (when the parasympathetic system is running the show). Thyme will support less disturbed and more productive sleep by helping the autonomic nerves relax.

Pharmacy and dosage:

•*Fresh Plant Tincture*: fresh herb, 1:2, 95% alcohol, 20-40 gtt, 1-5 ml
•*Dry Plant Tincture:* recently dried herb, 1:5, 25%, 1-15 ml
•*Infusion:* finely chopped herb, 1:20, 90-120 ml

Official

UK	Accepted for general sale, internal or external use
France	Accepted for specified indications
Germany	Commission E, ESCOP

NHP Monograph[39]

- Traditionally used in Herbal Medicine as an expectorant to help relieve the symptoms of bronchitis and catarrhs of the upper respiratory tract (anti-catarrh)
- Traditionally used in Herbal Medicine to help relieve coughs (spasmolytic)
- Traditionally used in Herbal Medicine to help relieve flatulent dyspepsia and colic (carminative)

Licensing: As of Nov 20, 2010, 60 products contained thymus have received licenses from the Canadian NHP.

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