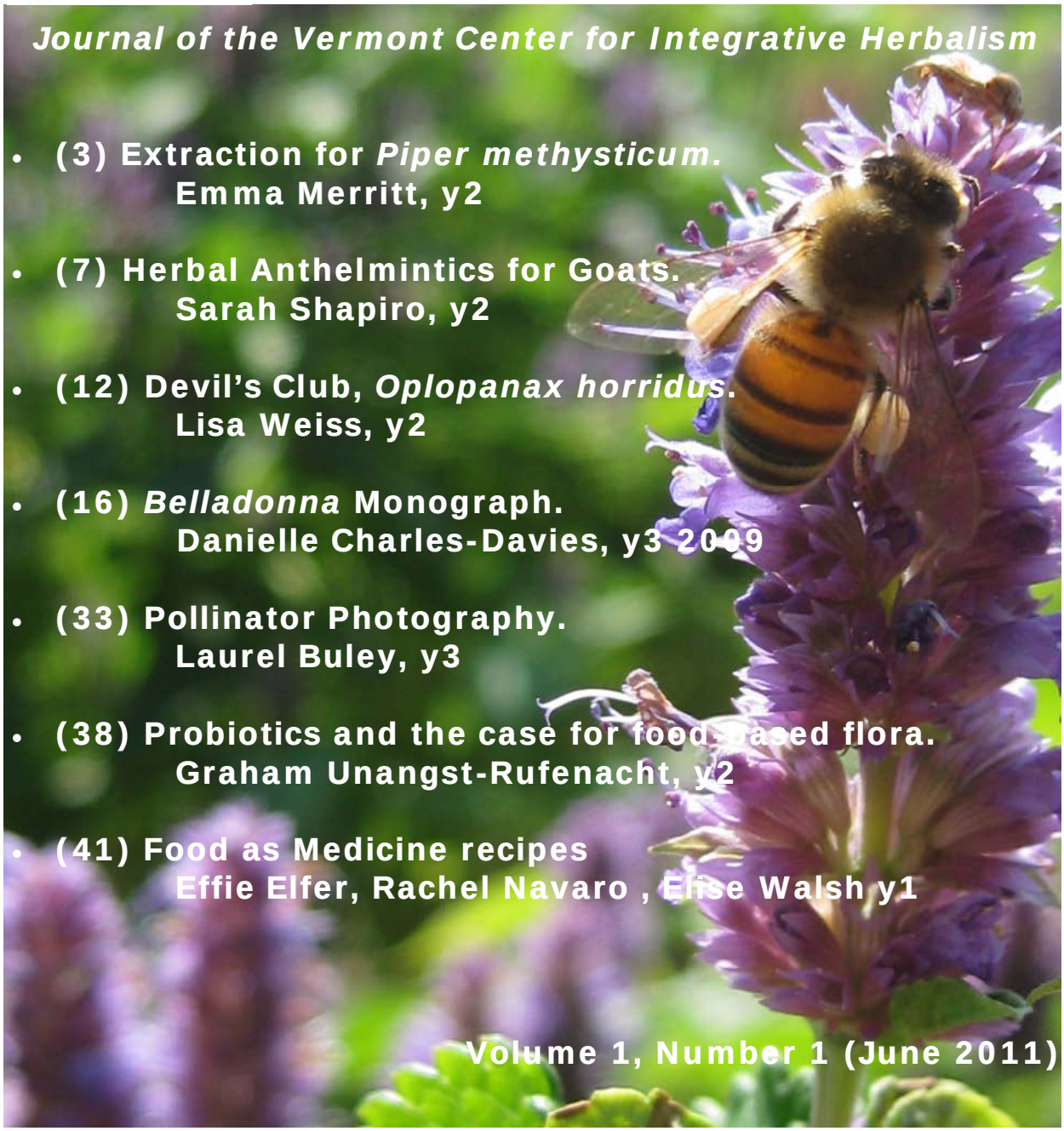
Integrative Herbalism

Summer 2011
Montpelier, VT



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Welcome.

Integrative Herbalism is a publication that focuses on the research reviews, creative work, and clinical experience of the student body at the Vermont Center for Integrative Herbalism in Montpelier, VT.

Twice annually a collection of the most recent work will focus on areas of general interest (Summer edition) and on topics in human pathophysiology and herbal therapeutics (Winter edition). Both editions will feature photographs, artwork, and special projects students have completed in the course of their studies.

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- educate and empower individuals to use traditional remedies as viable options in caring for themselves and their families;
- emphasize partnership with a clinical herbalist or other practitioner as an important adjunct to self-care;
- provide high-quality education for aspiring family and clinical herbalists;
- offer financially accessible health consultations to the community, creating an opportunity for collaborative practice among experienced herbalists, as well as a forum for education of clinical students;
- integrate and collaborate with other modalities and advance the role of the herbalist as an integral part of an effective healthcare model;
- renew deep connection with nature, encouraging a culture of ecological awareness, respect and interrelationship.

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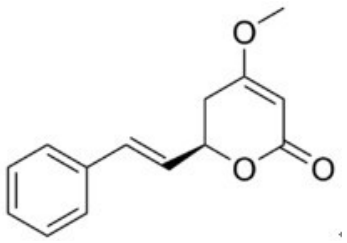
Betzy Bancroft, Larken Bunce, Guido Masé

Extraction Methods for *Piper methysticum*

Emma Merritt

Piper methysticum, commonly known as Kava, has a long-standing history of traditional use in the South Pacific (Duke). Over the past century, Kava has been adopted into the Materia Medica of Western Herbalism, and has been the subject of pharmacological and clinical studies since that time. As a result of this plant's rich history of use both in Polynesian society and western herbalism, there are several varying extraction methods for the plant, ranging from traditional ceremonial preparation (Singh, 2002) to scientific extraction.

Kava is used traditionally and in modern herbal medicine as a potent anxiolytic, sedative, and anodyne (Duke). The chemicals primarily responsible for these actions are kavalactones (Kubatova, 2001). Kavalactones are "a group of approximately 18 compounds collectively referred to as kavalactones or kava pyrones. Kawain, dihydrokawain, methysticin, dihydromethysticin, yangonin, and desmethoxyyangonin are the six major kavalactones" (Whittaker, 2008). In pharmacological studies, kava and kavalactones have been found to"enhance ligand binding to GABA type A receptors, diminish excitatory neurotransmitter release due to calcium ion channel blockade, reduce neuronal reuptake of norepinephrine, and suppress the synthesis of eicosanoid thromboxane A(2), which antagonizes GABA-A receptor function" (Singh, 2002). The result of kavalactone interaction with neurotransmitters and receptor sites is an overall anxiolytic and sedative effect(Nowakowska, 1998). Since kavalactones are primarily responsible for these actions, it is important that any preparation method employed effectively extract these chemical constituents.



Kavain

Kava has been used by pacific islanders for thousands of years, well before its use was documented by the western world. In fact, archeological research has found evidence of kava lactones in archeological sites dating back hundreds of years (Hocart, 1993). Due

to its long-standing use in its native habitat, traditional preparations of the plant should be considered. In Polynesia, a beverage is made from the fresh root (Felter, 1912). According to Hedrick, “the root of this plant is used to form an intoxication drink...The root is chewed, thrown in a bowl and water is poured on. It is then strained through coconut husks, when it is ready for use” (Hedrick, 1919). In other words, Kava is traditionally prepared as an infusion from the fresh root and employed to medicinal and mind-altering effect. While Polynesians were unaware of the chemical makeup of this beverage, they experienced its effects, which means that the kavalactones must be present in this traditional preparation. Not only is a fresh infusion of the root effective, it is also safe. Indeed, “no serious health effects have been documented for the traditional beverage” (Cote). While the fresh root is not widely available outside of the pacific, decoctions of the dried root have been found to be equally as effective, and provide the closest equivalent to the traditional preparation for western herbalists. A study conducted in 2001 conclusively showed that the dried root decocted for two hours yielded many of the active constituents (Kubatova, 2001). It can therefore be concluded that, short of fresh roots, a decoction of dried roots for at least two hours effectively and safely extracts the active chemicals in Kava.

While traditional methods of preparing kava may be safe and effective, they can also be time consuming and laborious for the average consumer or herbal practitioner. Since the adoption of kava into the Materia Medica of Eclectic Physicians, more modern forms of extraction have been employed for making medicine from kava. For example, *King’s American Dispensatory* from 1898 recommends infusing the powdered root in a menstruum of 60% alcohol at a ratio of 1:1 (Felter, 1898). This high alcohol percentage would lead one to believe that kava lactones are more readily soluble in alcohol than water. Indeed, tinctures with 25% alcohol extract less lactones than higher percentages (Denhan, 2002). Moreover, according to some research, water extractions of the root yield only 5-10% the lactones of an alcohol extraction (Cheng). In this research, it is unclear whether the water extraction was an infusion or decoction and whether fresh or dried root was used. Based on this evidence and the recommendations of Eclectic physicians, kava tinctures made from dried root should use between 40 and 60% alcohol for optimum benefit.

Considering traditional use and available evidence from pharmacological research, there are several acceptable extraction methods for kava which all render the active constituents. Fresh roots, ground and mixed with water and allowed to steep can be prepared as a beverage. Water extractions of the dried root may also be utilized, using powdered or finely shredded root and boiling water, decocted for at least two hours. For tinctures, fresh or dry root may be used, with an alcohol percentage no less than 25% with higher percentages extracting more of the kavalactones. In each of these preparation methods , kavalactones will be extracted and the desired anxiolytic effect will be achieved, while the dose may change depending on the extraction method.

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Herbal Anthelmintics for Goats

Sarah Shapiro

Goats have been domesticated for around 10,000 years (Zeder et al. 2000). They live on all continents except Antarctica, and are the most numerous herd animal in the world (Zeder et al. 2000). Like all mammals, goats live in balance with numerous micro-organisms that help support the host animal. In traditional methods of goat herding, they were mobile, free range and able to eat and browse what they desired. As our world becomes increasingly crowded and busy, farmers have turned to pasture raising their animals for convenience of space and time. A problem of pasturing (without rotating or co-grazing pastures) is the increased burden of parasites in the pasture, which increases the animals likelihood of consistently re-infecting themselves through grazing close to the ground, thereby increasing their internal numbers of gastrointestinal parasites (Hale 2006). The most problematic goat parasite is the gastrointestinal roundworm *Haemonchus contortus,* also known as the barber pole worm and a variety of other names. *Haemonchus contortus* can sap its host of up to 1/10th of its blood supply daily, which can cause severe anemia, protein loss and death, and thus is one of the most important to control. Because of its life-cycle and ability to become dormant for long periods, *Haemonchus* is also one of the hardest worms to eradicate (Neaton 2006). Other common parasites that affect sheep and goats are *Haemonchus contortus*, *Ostertagia circumcincta*, *Ostertagia trifurcata*, *Trichostrongylus axei* (Merck Veterinary Manual). Increasingly, goat farmers are experiencing resistance to pharmaceutical anthelmintics, a problem which has become widely recognized and acknowledged, especially in warmer climates where there are no cold periods when parasites become dormant (Geerts 2000). A variety of different approaches have been utilized to improve efficacy of pharmaceutical anthelmintics, including smart-drenching (only dosing the most infected animals), rotating pastures, rotating or combining classes of anthelmintic pharmaceuticals, and a combination of these approaches (Neaton 2006). Plant-based treatments deserve more attention for many reasons, including affordability,

accessibility and the possibility for non-reliance on petroleum. This paper will address traditional use of plant based anthelmintics in ruminants and current research into the efficacy of specific forage and plant constituents.

Traditional anthelmintics include two categories: plants fed in quantity, and plants fed in smaller doses for a desired curative outcome. Plants fed as browse traditionally used to prevent and treat parasites include Mimosaceae member from India *Acacia catechu* (Anthra 2008). In 2003, Min et al showed that condensed tannin-rich extracts from *Acacia* species were effective in reducing egg viability of goat parasites, confirming other research on the topic (Paolini 2002). Garlic has been used traditionally as an anthelmintic (de Baircli Levy 1952). Garlic has also been shown to be efficacious in lowering counts of coccidia protazoa in goats (Worku 2009). In British Columbia, Canada, current ethnoveterinary practices show use of *Juniperus communis* and *Pinus ponderosa* (Lans 2007). Much modern research has been based in the research of feeding plants containing condensed tannins, including: sulla, *Hedysarum coronarium, s*ainfoin*, Onobrychis viciifolia, Sericea lespedeza, Lotus corniculatus, Lotus pedunculatus, Chicorium intybus, c*assava*, Manihot esculenta* and *Leucaena leucocephala* (Hoste 2008). Though the author has not discovered the history of the research into tannins, it is suspected that the traditional use of these plants as animal forage and medicine is the reason they were selected as research targets.

Acacia catechu

Plants used in smaller doses include the seeds of Fabaceae family member *Abrus precatorius,* from India (Anthra 2008). From Zimbabwe, *Venonia amygdalina* leaves are crushed with water and given as a dose to treat worms, as are the roots of the banana tree, *Musa paradisiacal* and the whole crushed leaves of *Aloe* species (Matekaire 2004). *Artemisia* species have a long history of use as anthelmintics (Grieve 1931), both in humans and animals, though current research in small ruminants shows mixed efficacy (Ferreira 2010). In 2001 Waller et al conducted exhaustive research into Nordic ethnoveterinary use of plants as deworming agents, though it was qualified that research had not been done to verify the traditional uses.

Modern research has focused on condensed tannins as a plant source of anthelmintic activity. In a study from 2005, Hoste et al conducted a study on two groups of lactating goats (60 in each group) fed either a sainfoin hay or lucerne hay diet. The sainfoin hay

contained 2.6% condensed tannins, while the lucerne contained 0.6%. In other regards, the protein and nutritional quality of the hay were similar. Overall, egg output, as a measure of infection, was significantly lowest in the sainfoin group, but the composition of nematodes present was similar among the two groups. The animals on the sainfoin diet ate more hay than the control group, and the authors suggest that the resultant lack of grazing could also be partially responsible for the results observed, as well as the tannin content of the sainfoin. Research into the mechanism of action of the tannins suggests that because tannins bind proteins and other molecules tightly at the near-neutral pH of the rumen, this prevents endogenous microbes and pathogenic ones from digesting and using the bound proteins and molecules (Hoste 2005). With dissociation of the molecules in the acidic pH of the abomasum, they are freed for digestion by the goat, with more proteins and macronutrients passing into the small intestine for absorption into the bloodstream. This could be responsible for the observable signs of better health and productivity in the group of goats eating tannin-rich hay (Hoste 2005).

Sainfoin (Onobrychis viciifolia)

Other research has also demonstrated the increased nutritive effect of higher amounts of amino acids and other molecules passing to the duodenum, where there is greater absorption, and may be improving the animals natural immunity and resistance to parasites (Min 2003). Other research demonstrates that some effects occur through direct interactions between condensed tannins and parasites, resulting in reduced egg viability and thus lower parasite burdens in pasture, although the exact mechanism of action is not known (Minja 2004). Since many parasites, including *Haemonchus,* live in the abomasum, perhaps the tannin molecules being freed from from their bound state as they enter it contribute to their effects on the viability of the worm eggs.

Plant based approaches for reducing the burden of parasites in goats should be researched in more depth. Many species of browse in the forest contain tannins (Duke) and it seems logical to the author that the goats natural or wild diet contained many more tannins and other plant secondary metabolites than the diets of hay and grain that they are

typically fed in pastured farms. This leads to the conclusion that feeding supplemental browse to goats, especially woody and leguminous species rich in condensed tannins should improve their overall picture of health by helping reduce parasite burdens.

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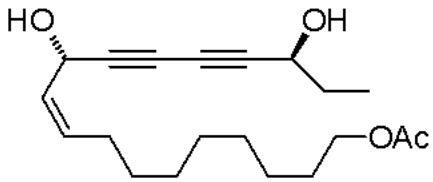
Devil's Club, *Oplopanax horridus*

Lisa Weiss

Oplopanax horridus is a member of the Araliaceae, or Ginseng family. Though some of its medicinal properties are similar, *O. horridus* is not as ubiquitous in apothecaries as other, more well-known plants in the Araliaceae. This may be due to the limited geographic range of *O. horridus*, the difficulty in cultivating it, or the lack of clinical trials on the plant in the literature.

Oplopanax horridus grows in moist woodlands of Washington, Oregon, Idaho, Montana, and Alaska in the United States, and the Yukon, British Columbia, and Alberta in Canada. It has also been reported in Ontario and Michigan (USDA, NRCS 2011). *O. horridus* is a deciduous shrub that stands up to eight feet tall, with large palmate leaves. The hermaphroditic green flowers turn into bright red berries, and the stalks and undersides of the leaves are covered in inch long thorns (Tilford 1997). Though in it's native range it often grows quite aggressively, it can be difficult to cultivate: *O. horridus* is not frost hardy and requires shade, moisture, and acidic soil (Plants for a Future 2011). Apart from the wild or one's successful garden, it can be purchased as dried root bark or tincture.

Oplopanax horridus is popular as a medicine amongst native people of the Western United States and Canada. It is the most commonly used plant of The Gitskan of northern British Columbia (Johnson 2006). Johnson reports that Gitksan medicines are often used over long periods of time and that tonics are used commonly as a promotion of health. She found that the most common use of *O. horridus* by the Gitskan is as a tonic. The Gitskan also use decoctions of the bark of *O. horridus* for treatment of respiratory ailments, gastrointestinal complaints, headaches, flus, ulcers, wounds, cancer, tuberculosis, arthritis, and as a purgative. Johnson writes, "For the Gitksan, the underlying cause of much illness is seen to be spiritual, or a result of imbalance. The concepts of purification and cleansing are significant in both healing and gaining power." *Oplopanax horridus* is used both for healing through cleansing (it is taken medicinally for purification) and for gaining power (it is used in smudge sticks for the enhancement of luck). It has also been used by Northwest Native Americans as a poultice for wounds, snakebites, and other skin conditions (Frances 2001).



Oplopandiol acetate, representative polyyne

There has been a fair amount of pharmacological research on *Oplopanax horridus*, some of which verifies the traditional uses of the plant. McCutcheon et al. (1995) tested inner bark extract of *O. horridus* in vitro on several strains of virus, and found that it partially inhibited respiratory syncytial virus. Five polyynes were isolated from *O. horridus* by Kobaisy et al. (1997). Each polyyne exhibited anti-candida, antibacterial, and antimycobacterial activity. While Kobaisy et al. attributed the use of *O. horridus* in the treatment of tuberculosis to the polyynes present in the plant, Inui et al. (2007) suggest that synergy within inner stem bark extract is responsible for the antimycobacterial effect on *Mycobacteria tuburculosis*. Tai et al. (2006) found that an extract from *O. horridus* has anti-proliferative action on several cancer cell lines as well as strong antioxidant activity. Several other researchers have reported the in vitro anti-cancer effect of *O. horridus* on breast cancer cells (Sun et al. 2010), colorectal cancer cells (Xiao-Li et al. 2010), and ovarian cancer cells (Tai et al. 2010).

Sharol Tilgner, a naturopathic doctor and long-time herbalist writes in her book *Herbal Medicine from the Heart of the Earth* that the specific indication for *Oplopanax horridus* is "...adrenal burnout with mental, nervous, emotional, and physical exhaustion. Often dry mucous membranes are part of they symptoms." She recommends a dose of 10-60 drops, BID to QID of 1:4 dried root bark tincture (Tilgner). Deborah Frances, another

herbalist and naturopathic doctor states “Oplopanax is well indicated for those too nice, perhaps even somewhat timid, souls who are easily overwhelmed in the face of adversity or for those folks who express a desire to claim their power but can't quite seem to follow through, either from fear or the toxic overlay of family and cultural taboo.” Frances uses *O. horridus* tincture energetically (only a few drops) in adaptogen formulas for people who are overly apologetic and unconfident, both because she considers it an endangered plant, and because, “Devil's Club is powerful medicine” (personal communication, November 2008).

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Belladonna monograph

Danielle Charles—Davies

Belladonna

Botanical Nomenclature: *Atropa belladonna* L. [Fam.: Solanaceae]

Common Names[1,2]: Deadly nightshade, black cherry, dwale, devil's cherries, dwayberry, naughty man's cherries

Part Used: Leaves, roots

Identification[1,3,4]: Perennial herbaceous plant growing up to 1-2 m in height. Stems are erect, purplish and dichotomously branched with a soft downy covering on young stems and leaves, but otherwise glabrous. Soft, dull-green leaves are born alternately from the stem on short petioles; the lower leaves solitary and the upper most leaves born in unequally sized pairs alternately on opposite sides of the stem. The leaves are ovate to elliptical in shape, with entire margins, ranging from 8-16 cm long by 4-8 cm in width and vary tremendously in size. Flowers appear in June and July and continue blooming through September. They are pediciled and solitary on upper leaf axils, generally drooping and dull or dingy purple in color. The calyx is 1-1.5 cm, herbaceous and deeply 5-cleft with ovate to lanceolate segments that are acuminate. The corolla is 2.5-3 cm in length, campanulate, shallowly 5-lobed, and distinctly longer than wide. The flower has 5 stamens with filaments nearly as long as the corolla tube and short cordate and 4-lobed anthers. The stigma is capitate and 2-lobed. Flowers give way to a many seeded, 2-celled berry about the size of a cherry. The berry is of a glossy black-purple color, with inky black juice and an intensely sweet taste. Seeds are reniform. The root is thick, fleshy and whitish, about 6 inches long, and heavily branched. The entire plant ex-

udes a fetid odor when bruised.

Commercial Sources and Handling: Due to the relative toxicity of this plant, extracts and bulk herb are not commonly available. Majority of European and Asian cultivation is sold to the pharmaceutical industry for isolation of atropine.[5]

Growing and Harvesting Information: Belladonna's native habitat spans from Southern and Central Europe to Central Asia and Northern Africa, where it is often found growing in disturbed areas and mountainous woodlands.[1,5] It is now cultivated worldwide.[5] It grows best in mild-temperate climates but will tolerate temperatures down to -10°F, or zone 6 and is a hardy perennial in most places.[6]

Belladonna prefers well-drained, rich and alkaline soils that are kept relatively weed-free and constantly moist.[4,5] It poorly tolerates clay or water-logged soils.[7] It can be grown in part shade to full sun, but does best when shaded.[4] It is most successfully propagated from seed, which take 4-6 weeks to germinate, and are best sown in flats in early spring.[4] Seeds are often dormant and require various pre-treatments before planting. The most successful of these treatments include stratification (storing them for 6 hours at 30°C then 18 hours at 15°C) and pretreatment with 1.00mg/L of giberrellic acid.[8] Once the seedlings have reached 1 inch in height, they can be set out in well composted, moist soil at 18 inch spacing and are best covered with shade cloth for several days until acclimated.[4] The soil should be kept weed free and moist – though periods of hot, dry weather tend to significantly increase alkaloidal content while the plant is in flower.[4] Belladonna can also be cultivated from cuttings of the green branch tips or root cuttings. Cutting back the plant in autumn to soil level will encourage branching, increase leaf yield, and remove woody growth.[7]

The leaves are harvested while the plant is in flower, particularly when flowering has just begun as alkaloid content is highest.[7] Harvesting after a period of hot and dry weather will also yield an increased concentration of alkaloids.[7] The first year harvest is typically has the highest alkaloid concentration.[7] The leaves are carefully separated from the stem, and processed immediately to prevent the absorption of moisture, which will damage the alkaloid content.[7] Any leaves that are withered or discolored should be discarded. Roots are harvested in the autumn of the second or third year. Plants older than 3 years tend to yield roots that are overly woody and of poor quality.[4] The root should be split into small segments to hasten drying. [4]

Taste/ Odor: Taste of both leaf and root is sweet at first, then bitter and acrid.[9] The odor of the leaf is described as “narcotic”, while the root is described as, “heavy and licorice-like.”[1]

Energetics: dry, cold; stimulating in small doses, depressing in large[1]

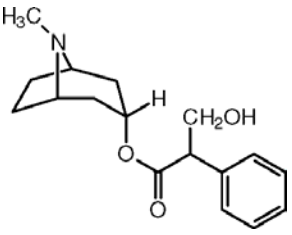
Physiological Actions:

- parasympatholytic/ anticholinergic[10,11,13]

- antispasmodic (smooth muscle)[10,11]
- bronchial dilator[13]
- antisecretory[10,11,13]
- mydriatic[11]
- anodyne / anesthetic [5]
- negative chronotrope (low dose)[12,13]
- positive chronotrope (higher dosage)[12,13]

Key Constituents: (Skindari, Duke)

- Tropane alkaloids: 0.2 -6% [11] (0.3% in the leaf, and 0.5 % in the roots)[14]
  - *atropine ((+)-hyoscyamine), (-)- hyoscyamine, belladonine, scopalamine, apoatropine, hellaradine* [15]
  - *(-)-hyoscyamine is the most active alkaloid, and comprises 99% of the alkaloidal content of the fresh plant. When dried, it readily forms a racemic mixture known as atropine, or (+)-hyoscyamine, which exerts a much weaker pharmacological action [11]*



Atropine

- Flavanol glycosides (leaf only) [10]
  - *kaempferol, quercitin*
- Steroidal saponins [16]
  - *atroposides A-F*
- Coumarins [15]
  - *aesculetin*
- Tannins [10,15]
- Organic acids [10,15]
  - *succinic acid, leukatropinic acid*

Pharmacology:

The main physiological effects of belladonna can be attributed to the tropane alkaloids, particularly atropine, which block the activity of the neurotransmitter acetylcholine by antagonistically binding muscarinic receptors throughout the body.[13] This blockade is believed to occur through the binding of positively charged tertiary amine group to the same anionic site on the muscarinic receptor that acetylcholine occupies.[13] However, because atropine cannot fit into the narrow cleft where Ach binds, the receptor cannot be activated and is effectively blocked.[13] As Acetylcholine is the predominant neurotransmitter used by the parasympathetic nervous system, atropine effectively reduces parasympathetic stimulation of muscles and glands regulated by the autonomic nervous system, including salivary, sweat and mucus glands, cardiac muscle, gastrointestinal smooth muscle, and genitourinary smooth muscle. While isolated atropine alkaloid has been favored by the pharmaceutical world, galenic or whole plant preparations of belladonna have been found to possess greater activity than that suggested purely by the alkaloid content of the plant.[17] One study found that atropine in whole plant extracts was absorbed into the intestinal wall at a faster rate than isolated atropine due to the presence of active flavonol glycosides arising from degradation of A and B flavonol triglycosides with a betaglycosidase.[18] This may provide one possible mechanism for the greater activity demonstrated by whole belladonna.

Cardiac effects:[13]

As a pharmaceutical, atropine is mainly used to increase the rate of myocardial contraction and conduction velocity in conditions of sinus bradycardia and AV nodal block. It achieves this effect by directly blocking vagal mediated parasympathetic stimulation to the sinoatrial node and conduction to the atrio-ventricular node. Increases in vagal activity to the SA node reduces the firing rate of the pacemaker cells by altering potassium, calcium and sodium currents leading to hyperpolarization, thus increasing the amount of depolorization required to activate the cell to fire. In the AV-node, vagal stimulation manifests similar electrophysiological effects which result in a reduction of impulse conduction velocity. By blocking the effects of Ach, atropine blocks vagal nerve activity on the heart and therefore increases heart rate and conduction velocity. Paradoxically, at very low doses atropine can cause slight bradycardia. This effect is hypothesized to occur through blocking presynaptic muscarinic receptors that normally provide feedback inhibition of the release of ACh, leading to an initial increase in ACh release that overrides the amount of post-synaptic muscarinic receptor blockade that occurs with low doses. As the dosage of atropine increases, the amount of post-synaptic muscarinic antagonism then overrides this effect, and parasympathetic activity is effectively blocked. These effects have also been observed in whole plant preparations, which show vagotonic effects in small doses (1-2 ml ethanolic extract) and vagolytic effects in larger doses (2-5 ml).[12]

Gastrointestinal effects:[13]

Belladonna exerts numerous effects on the gastrointestinal tract through the anticholinergic effects of the alkaloids, especially atropine. Digestive secretions mediated by parasympathetic vagal stimulation are all reduced, including salivary, gastric, pancreatic and biliary secretions. Atropine also inhibits vagal mediated smooth muscle stimulation, and therefore inhibits gastrointestinal motility. A 2004 study out of Beijing tested 4 Belladonna alkaloids (scopolamine, atropine, anisodine and anisodamine) for gastrointestinal motility inhibition, and found that susceptibility was greatest in the small intestine.[19] Atropine showed the greatest inhibitory activity (40.69% on gastric emptying and 58.46% on small intestine movement), followed by scopolamine (29.78% and 51.98% respectively).[19] The study also found that the concentration required by all alkaloids for gastrointestinal inhibition was less than that required to impact avoidance-response memory, avoidance-response learning and open-field memory, suggesting that the plant can be used effectively for GI spasm without causing CNS related side effects.[19]

Genitourinary effects:

Atropine and whole Belladonna extract cause urinary retention by blocking the excitatory effect of Ach on the detrusor muscle of the bladder.[13,20] The detrusor muscle is a smooth muscle lining the bladder which contracts via stretch reflex activated parasympathetic stimulation to void urine out of the bladder and into the urethra.[13] Atropine also causes relaxation of the ureters.[13]

Central nervous system effects:[13]

Smaller doses of atropine have minimal central effects (0.2 – 2mg), while intermediate

doses (2-10 mg) cause memory and concentration impairment and drowsiness. At dosages of more than 10 mg of atropine, a collective constellation of symptoms known as *central anticholinergic syndrome* arises, including confusion, excitement, hallucinations, asynergia and coma. Atropine has been shown to decrease alpha EEG waves, and increase low-voltage slow waves associated with drowsy states. Scopalamine causes central effects even in very low doses, leading to sedation, amnesia and drowsiness.

Ocular effects:[13]
Belladonna causes dilation of the pupil (mydriasis) and paralysis of the accommodation reflex (cycloplegia). Mydriasis is caused by inhibition of ACh stimulated contraction of the pupillary sphincter muscle, allowing the radial pupillary dilator muscle to contract and dilate the pupil. Cycloplegia is caused by paralysis of the cilliary muscles. Atropine also increases aqueous outflow resistance. These effects typically take 7-14 days to wear off.

Respiratory effects:[13]
By antagonizing muscarinic receptors in the respiratory tract and blocking parasympathetic stimulation, belladonna inhibits secretions and relaxes smooth muscle contraction. This effect is most pronounced in the larger airways, where parasympathetic innervation is greatest.

Skin effects:
Atropine inhibits sweating which can cause hyperpyrexia and subsequent flushing.[13] Belladonna whole plant aqueous extract applied topically to skin wounds was found to shorten the inflammatory process, accelerate collagen formation and increase wound stiffness.[21] These effects may be attributed to stimulation of cytokeratin 19 in keratinocytes.[21] Belladonna was also found to stimulate human umbilical vein endothelial cell proliferation as well as increase fibroblast growth, but only at very low concentrations.[21] Another study investigated the wound healing properties of belladonna in rats. It was found that the wound tensile strength in rats treated for either 2 days after surgery or 5 days after surgery was significantly higher than the control group, though there was no statistical difference between the 2 day and 5 day treatment groups.[22]

Specific Indications:

- Parkinson's[5,23, 24]
- Spasm of involuntary muscles with excessive secretion [1,14,23]
- Eclectic Indications:[1,25]
    - **Impairment of the capillary circulation in any part of the body with congestion or tendency towards blood stasis,** especially cerebral or spinal congestion, characterized by dullness of intellect and drowsiness, often with a dull, heavy headache such that the person would sleep if not for the pain. Pulse is soft, full, oppressed and compressible. Circulation is sluggish, with cold extremities. Skin will be either bluish and pallid or of a dusky redness, such that a fin-

ger drawn across it will leave a permanent white line until the blood slowly returns. Passage of urine is copious, often paired with a deep aching of the loins or back with a sense of fullness. Face is dull and expressionless, pupils often dilated or immobile. Breath is slow, labored and imperfect.

- Onset of inflammatory conditions[25]
- Spasm of the involuntary muscles

Traditional Uses:

Gastrointestinal:

- antispasmodic for spastic conditions of the stomach, intestines and bile ducts [5,23]
  - acute or chronic enterocolitis[23]
  - irritable bowel syndrome[10,35]
  - spastic constipation[10]
  - spasmodic constriction of the bowels[1,26]
  - spasmodic colic[1]
  - passage of biliary calculi [25,27]
  - cholecystitis[27]
  - biliary dyskinesia[23]
- hyperacidity conditions[23]
- gastric and duodenal ulcers [5,23]
- gastritis[23]
- excessive salivation (ptyalism) [1,28]

Nervous system:

- Parasympatholytic for the relief of Parkinson's symptomatology, (especially post-influenzal Parkinson's) including abnormal motor function, resting tremors, rigidity, speech difficulties, excessive salivation, postural and mobility dysfunction [5,23,24]
- Spinal and cerebral hyperaemia:[28]
  - congestive headache with dull, throbbing pain and drowsiness[26]
  - encephalitis[26]
  - meningitis[26]
  - myelitis[26]
- neuralgia, especially trigeminal, but also intercostal, facial, sciatic and visceral [1,26]
- epilepsy[1]

- chorea[1]

Genitourinary:

- irritation of the urinary tract[1]
  - irritable bladder from excessive parasympathetic tone on bladder [29]
  - cystitis[1]
- urinary incontinence[27]
  - especially diurnal dribbling of urine in children due to poor pelvic circulation and irritability of the bladder[26]
- nocturia[1]
- relaxing the ureter spasm during the passage of urinary stones[10]
- urethral or ureter spasm[1]
- Nephritis[1]
  - early stages of nephritis (k) w/ a sense of fullness, weight and dragging in the loins and albuminuria[25]
  - chronic
- tubular nephritis[1,26]
- renal capillary engorgement[1,26]
  - following any disease, especially scarlet fever
- diabetes insipidus[1]

Respiratory:

- spastic bronchitis[10]
- airway obstruction[30]
- pertussis [1,5]
- croup[25]
- spasmodic asthma[1,5]
- nervous cough from laryngeal irritation or muscular irritability [1]
- hay fever with excessive nasal catarrh [1,5,28]
- sore throat with redness, swelling, dysphagia, intense soreness and dryness [26,27,28]
  - tonsillitis, pharyngitis

Cardiovascular:

- Sinus bradychardia[5,31]
- AV nodal block[31]
- ventricular asystole (sudden cardiac arrest)[28,31]
- pulmonary congestion with pallor of the skin or cyanosis in extreme cases[25]
- phlebitis (externally)[25]

Immunological:

- exhaustive sweating of tuberculosis and other debilitating diseases[1,25,26,27,28]
- diphtheria, given early on to sustain respiratory function and circulation[1,25,26,27]
- exanthemata[1.25,26,27,28]
  - measles
  - smallpox
  - scarlet fever
- febrile states tending to congestion[1]
  - Malarial fever
  - Typhoid fever

Ocular:

- iritis[1]
- ulceration of the cornea[1]

Reproductive:

- spasmodic dysmenorrhea,[1] especially with coldness: clammy skin, icy cold hands and feet and subnormal temperature[25]
- congestive dysmenorrhea[25]
- uterine neuralgia, inserted vaginally as a suppository[1]
- hotflashes[2]
- relaxing a rigid os (applied externally)[25]
- spermatorrhea with enfeebled genital circulation[1,26]
- chordee, applied externally[26]

- excessive mammary secretions, applied externally[1,26,27]

Skin:

- urticaria and erythema with sluggish cutaneal circulation[25]
- eczema[28]
- prurigo[28]
- erysipelas[1,27]
- excessive sweating (hyperhidrosis) [2]

External:

- topical anesthetic/ anodyne[1]
  - neuralgia
  - myalgia
  - lumbago
  - painful and swollen joints
  - cancerous tumors
- radiation burns[2]
- superficial inflammations
  - abscesses[1,27]
  - boils[1,27]
  - carbuncles [28]
- hemorrhoids and fissures [28]
- to allay itching in urticaria, pruritis and eczema [27]
- acute mastitis [1]
- inflammatory glandular swelling[1]

Antidote:[31]

- belladonna or isolated atropine sulphate have been used as antidotes in the poisoning of the following:
  - anticholinesterase drugs
  - muscarinic toxicosis
    - certain mushroom species (inocybe and clytocye species)

- organophosphates (insecticides and nerve gases)

Clinical Trials:

Note: This section includes studies on whole plant belladonna preparations, and excludes those on isolated constituents or studies conducted on homeopathic preparations.

Belladonna's dose dependent effects on autonomic cardiac control were examined in a single-blind placebo controlled study. A single oral administration of belladonna tincture (0.1 mg alkaloid/ ml) was given to eight healthy young subjects. Over a period of 4 days, subjects received 4 different doses of *Atropa belladonna* tincture (day1: 2ml, day 2: placebo, day 3: 5ml, day 4: 1ml). Each day, mean RR interval (RR), high frequency spectral power of heart rate variability (HF) and noninvasive baroreflex sensitivity (BRS) were calculated during metronome breathing in supine position in order to calculate the amount of vagal activity occurring. At a dose of 5 ml belladonna tincture, a vagolytic response was observed in six of eight subjects (marked by decreased RR, HF and BRS. After 1 and 2 ml dosages and placebo, RR and HF increased markedly, although the increase after *Atropa belladonna* tincture was significantly higher than that elicited by placebo. The authors concluded that vagal cardiac activity was augmented by the 1 and 2 ml dosages. From this study, the authors concluded that low doses of orally administered *Atropa belladonna* tincture can be used to stimulate parasympathetic activity, but the mode of vagal activation changes from vagotonic to vagolytic between 2 and 5 ml dosages. [12]

A Russian study investigated the effects of belladonna in 27 patients with hyperhidrosis using colorimetric determination of the number of functioning sudoriferous glands and the Minor's, or starch-iodine test. The confines and intensity of sweat secretion were measured before treatment, during treatment, and after clinical recovery. Staged use of belladonna and the antihistaminic preparation “hydroxyzine” were found to significantly ameliorate symptoms with minimal side effects. [32]

A double-blind study out of Belgium in 1991 investigated the ability of belladonna to prevent airway obstruction during sleep in infants with breath-holding spells. 20 infants with a history of breath holding spells from 4-46 wks of age were studied. At baseline, the infants had a median of 6 airway obstructions per 10 hr recording with a median duration of 8 seconds. Each infant was given either oral administration of belladonna tincture (0.01 mg/kg atropine) or placebo syrup, administered at bedtime for 7 days, following a 7 day wash out period, and concluded with a final 7 day administration of treatment. A nighttime polygraphic recording was used to assess the number and extent of airway obstruction. In 10 of the infants, belladonna was found to completely eliminate airway obstruction and placebo had no impact. 5 of the infants showed no effect to either belladonna or placebo administration, and 4 subjects responded equally well to both belladonna and placebo. The author's concluded that for some breath-holding infants, belladonna can effectively reduce airway obstruction episodes and the autonomic nervous system may have an important role in the control of the upper airways during sleep. [30]

A 1978 double-blind, cross-over trial published in the Journal of Clinical Pharmacology in-

vestigated the effect of 5 anticholinergic drug combinations (including whole belladonna plant extract) and placebo on 16 patients with long standing irritable bowel syndrome of moderate severity. The subjective response was assessed with 4 subjective methods, including the 10 prominent symptoms evaluation, factor analysis method, drug preference choice and 5 prominent symptom evaluation. It was found that all patients preferred 30 mg phenobarbital + 8 mg of belladonna to placebo.[33]

Safety Issues:

Belladonna is a low dose plant. It is contraindicated in pregnancy and lactation, tachycardia, arrhythmia, bowel obstruction, hypertension, intestinal atony in the elderly or debilitated, retention of urine due to prostatic hyperplasia, narrow-angle glaucoma, acute edema of the lungs and myasthenia gravis. [2,10,14,31]Belladonna is also contraindicated in patients taking tricyclic antidepressants or the medications amantadine or quinidine, due to potential potentiation of the drug's effects.[14] It should be avoided in people who have significant reactions to anticholinergic drugs, or who are allergic to members of the Solanaceae family, such as tomatoes, peppers, eggplant etc.[2]

At dosages up to 1.5 mg per day, belladonna is generally well tolerated.[2] Frequent side effects include dry mouth, dry eyes, flushing of the skin, allergic rash, constipation, tachycardia, confusion, nervousness, hyperactivity and dizziness.[2,14] It may cause nausea and vomiting.[2] Some may experience an extreme reaction to external applications known as Stevens-Johnson syndrome, characterized by red, blistered eruptions on the skin.[2]

Toxicity is caused by disruption of the parasympathetic nervous system's ability to regulate breathing, sweating and heart rate, known as anticholinergic poisoning. A mnemonic used to describe the symptoms brought on by tropane alkaloid poisoning is “hot as a hare, blind as a bat, dry as a bone, red as a beet, and mad as a hatter.” Symptoms of overdose include dilated, unreactive pupils; blurred vision; hot, dry flushed skin; dryness of mucous membranes; dysphagia; diminished or absent bowel sounds; urinary retention; tachycardia; hyperthermia; hypertension; hallucinations passing into delirium; prostration and increased respiratory rate. In fatal poisoning, coma will be followed by death from respiratory and cardiac failure[1,2,31]. The anticholinesterase inhibitor physostigmine is given as an antidote.[31]

For children, the toxic dosage is said to be 0.2 mg atropine per kg of the child's weight.[2] Since one berry contains 2 mg of atropine, the consumption of 2 fruits is often deadly for a child.[2]

Preparation and Dosages:

Preparations are made from the leaf or root of the plant. The leaf is often preferred as it contains flavanoids and other constituents not present in the root,[10] and is typically considered to be slightly weaker in action,[14] which is preferred in this case. Preparations made from fresh plant tend to be stronger in action than dried, as the most pharmacologically active alkaloid, (-)-hyoscyamine, is readily converted to a racemic mixture (atropine or (+)-hyoscyamine)with a far weaker pharmacological action upon drying.[11] For this reason, the more pharmacologically active root is often used dried, while the less potent leaf is used

fresh. Often, a product with known concentration of tropane alkaloids is preferred for accurate dosing.

The tincture is typically made at a dilution of 1:10, using dried root or fresh leaf, at 70% alcohol.[34]

The eclectics prepared a tincture of dried leaves at 1:6.67 and 41% alcohol.[1] A description of the preparation is as follows:

> "*Belladonna leaves, in No. 60 powder, one hundred and fifty grammes (150 Gm.) [5 ozs. av., 127 grs.]; diluted alcohol, a sufficient quantity to make one thousand cubic centimeters (1000 Cc.) [33 fl℥, 391 ℥]. Moisten the powder with two hundred cubic centimeters (200 Cc.) [6 fl℥, 366 ℥] of diluted alcohol, and macerate for 24 hours; then pack it firmly in a cylindrical percolator, and gradually pour diluted alcohol upon it, until one thousand cubic centimeters (1000 Cc.) [33 fl℥, 391 ℥] of tincture are obtained*"[1]

Dosing for gastrointestinal spasm is as followed by the German Commission E:[14]

- Belladonna leaf powder is dosed between 50-100 mg, with a maximum single dose of 200 mg (or 0.6 mg of hyoscyamine), and a maximum daily dose of 600 mg. (German Commission E)
- Belladonna root powder is dosed at 50 mg, with maximum single dose of 100mg (0.5 mg hyoscyamine) and a maximum daily dose of 300 mg. (NS)
- Whole belladonna plant extract is dosed at 10 mg per dose, with a maximum single dosage of 100 mg (0.5 mg hyoscyamine) and a maximum daily dose of 150 mg.

The German Physician Rudolph Weiss recommends the following dosages:[23]

- For spastic gastrointestinal conditions:
  - “The dose should be such that there is just a slight dryness in the mouth, and perhaps also mild disturbances of vision. The patient is carefully questioned to these effects, on the third and fourth day of treatment. As soon as the patient notices that his mouth feels dry, the dose of Belladonna is slightly reduced, and this dose is adhered to for some time.”
  - For men, begin with 10 drops 3 times daily taken in water or chamomile tea, for one to days until dry mouth ensues, then reduce dosage to 8 drops 3 times daily.
  - For women, begin with 8 drops 3 times daily taken in water or chamomile tea, and reduce to 6 drops 3 times daily when dry mouth ensues.
- For persistent constipation, mucous colitis and spastic conditions of fermentative dyspepsia:
  - 5 drops three times daily
- For gastric or duodenal ulcers:
  - 5-8 drops three times daily in water

Herbalist Guido Mase recommends the following dosages:

- For muscular symptoms of Parkinson's, 10 drops 1:10 tincture BID – TID, never higher than a total daily dosage of 30 drops[24]
- For irritable bladder, 10-15 drops 1:10 tincture daily[29]

In an article on Irritable Bowel Syndrome in JAMA, Dr. Howard R. Mertz recommends:[35]

- 0.3 – 1.2 mg belladonna extract given 4 times daily

For children's complaints, belladonna should be dosed between 0.01 and 0.03 mg/kg of body weight. The maximum daily dosage should not exceed 3.5 ml of tincture (27-33 mg alkaloids per 100 ml).[2]

Eclectic dosing was given in an almost homeopathic fashion, being described by Felter as thus, "Belladonna is employed in Eclectic Therapeutics in doses which produce exactly the opposite effects from the gross or physiologic and toxic action. Large doses paralyze; small doses stimulate."[26]

- Felter: 1/20 – 1 drop, or 5-10 drops in 4 oz water, 1 tsp taken every 1-3 hours[26]
- Ellingwood: tincture of belladonna leaves one to 30 minims (0.6 – 1.8 ml) per dose[25]
- King: tincture of belladonna leaves 5-10 drops per dose[1]

Belladonna is also applied externally in the form of ointments, lotions, liniments and plasters. Topical preparations often are standardized to contain 0.25% belladonna alkaloids, such as the plaster produced by Cuxson Gerrard in England.[2]

Eclectic physicians used Belladonna topically in the following manner:[26]

- A lotion containing 5-10% belladonna extract was used to reduce itching in pruritis, eczema and urticaria, and to reduce excessive sweating
- An ointment or liniment of belladonna was used in the treatment of local inflammations and swellings, including painful and swollen joints, abscesses, boils, hemorrhoids and fissures, pleurodynia, neuralgia, lumbago, myalgia, and inflamed glands.
- The ointment was used for relaxing a rigid os during labor
- A suppository of belladonna was used to relieve spasmodic dysmenorrhea
- A liniment, ointment or plaster was applied as an antigalactagogue for acute mastitis or weaning the child

Combinations/ Similar Herbs:

Other tropane alkaloid containing herbs have similar anticholinergic properties to Belladonna, including datura (*Datura stramonium)*, henbane (*Hyoscyamus niger),* mandrake (*Mandrogora officinalis),* scopalia (*Scopalia carniolica)* and Japanese belladonna (*Scopalia*

japonica). [1,24]

Eclectics often combined belladonna with aconite for treatment of sore throats and fevers. [25,26]

To reduce the drying effects of belladonna, it should be combined with a moistening, slightly aperient herb such as licorice or marshmallow.

For gastrointestinal spasm, belladonna can be combined with a gentle bitter and slightly demulcent remedy such as chamomile.[23]

For Parkinson's, belladonna can be given with the herb *Macuna pruriens*, a concentrated plant source of L-dopa.[24]

Miscellaneous Facts:

Atropa belladonna is named after Atropos, the Greek fate with the power to cut the thread of life.[4,5] Belladonna refers to a name it was given in 16th century Italy (*herba bella donna*), meaning “plant of the fair lady,” due to the common practice of using drops of belladonna in the eye to dilate the pupil and impart in the eye a dark brilliance considered fashionable at that time.[5] The common name dwale is believed to derive from the Scandinavian *dool,* meaning delay or sleep, or the French *deuil,* meaning grief.[4]

The plant enjoys a colorful history of use. It was a plant often linked to witches and sorcerers, believed to be an ingredient in the flying ointments that produced hallucinatory dreaming and gave one the sensation of flight (leading to the common day association of the witch flying on her broomstick).[36] The Romans were said to have used the plant to contaminate the food stock of their enemies.[5] Another legend states that the Scottish army defeated the Danes by putting an extract of the herb into their enemies liquor supply, then taking advantage of their drug induced slumber to murder and defeat them.[5]

Because of Belladonna's narcotic and toxic properties, it was often demonized and considered a plant of the devil, as evidenced by its common names of “devil's berry” and “devil's cherry.”[36] Hildegard of Bingen described the plant as thus:[36]

> “Belladonna has coldness in it, but this coldness also holds evil and barrenness, and in the earth and at the place where it grows, a diabolic influence has some share and participation in its craft. It is dangerous for a person to eat or drink, since it will disorder his spirit, as if he were dead.”

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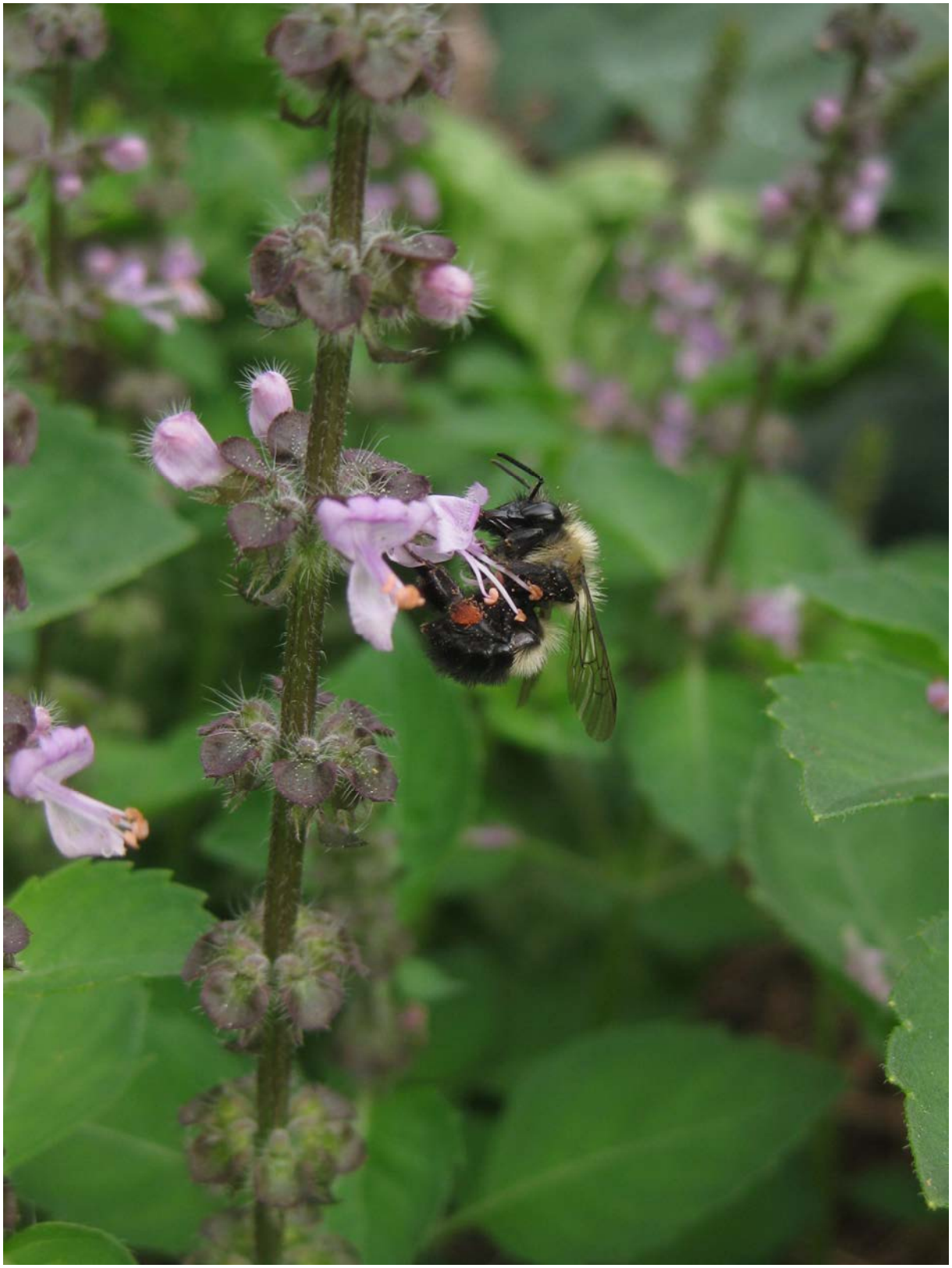
Pollinator photography

Laurel Buley

Purple Coneflower (Echinacea purpurea)

Teasel (Dipsacus sylvestris)



Holy Basil, Tulsi (Ocimum sanctum)

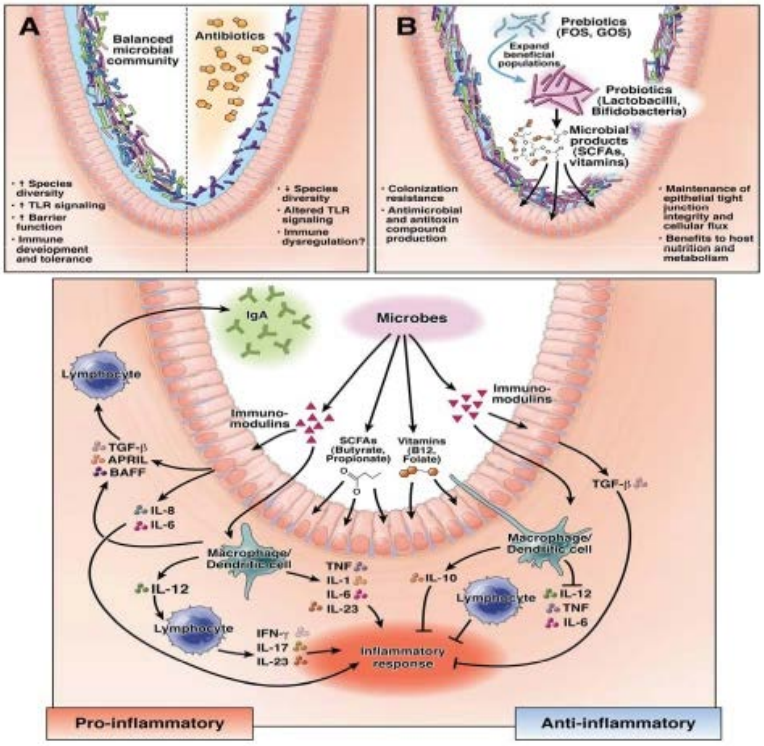
Comfrey (Symphytum officinale)

Probiotics and the case for food-based flora

Graham Unangst-Rufenacht

Probiotics are defined as “live microorganisms which when administered in adequate amount confer a health benefit on the host”(1). This project investigates the effects of probiotics in the form of lactic acid producing bacteria - with a specific interest in those found in traditionally fermented foods as opposed to those promoted as supplements - at the mucous membrane interface of the organism. The focus on the interface of the skin and mucous membrane layers is important as it plays a key role in immune function being perhaps the first line of defense - whether that be in the gastro-intestinal tract, the respiratory tract, or the dermal layer - against pathogenic microorganisms infecting the body.

In some cases these layers’ effectiveness is attributed specifically to their function as “physical barriers” (2). However, this is an incomplete examination of the



http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3023613/figure/F1/

importance of these aspects of our bodies and belies a focus on structure as opposed to ecosystem function: “A growing body of evidence suggests that host-microbial interactions may result in dysregulated mucosal immune responses, causing chronic inflammation such as Crohn’s disease or ulcerative colitis. A modest stimulation of the immune system by commensal bacteria may prevent infections. Immunomodulation is interpreted more broadly and includes antibodies, complement and cytokines, effects on gut barrier function and induction of antimicrobial compounds by the host. Microbes in the gastrointestinal tract (GIT) can exert numerous effects on different cells of the mucosal immune system and, in turn, induce the production of cytokines, which prime additional immune cells. Depending on the immune stimulus, Toll-like receptors (TLRs) on the surfaces of immune cells are differentially stimulated and allow the immune system to discriminate between pathogens and the gut microbiota. (5) The soluble cytoplasmic NOD-like receptors, NLRs, also mediate communication between the GIT and gut microbiota. The NLRs and TLRs act synergistically, resulting in the induction of immune cascades such as the NFκB pathway, which ultimately leads to the induction of chemokines and cytokines” (8). (9) For these reasons the region of specificity is here referred to as the “interface” of the skin and mucous membrane layers as it is within this interface that crucial components which influence structural integrity as well as general health of the gastrointestinal tract and its myriad of flora and fauna are determined.

Lactobacilli bacteria of various strains have been shown to be bacteria with a positive influence on gut function and integrity, signifcantly affecting the immune system. A recent study in the International Journal of Food Microbiology identified twelve different lactobacilli strains from a fermented kimchi product. Different strains displayed many different properties but most important to this general discussion, they all survived “gastrointestinal conditions simulating stomach and duodenum passage”, they showed a greater ability than Lactobacillus rhamnosus GG - a common lactobacilli supplement - to adhere to colorectal cancer HT-29 cells (4), and they presented “antimicrobial activity against a number of food -borne pathogens”. (6) This study is significant in that it shows the ability of a number of food based lactobacilli strains to have antimicrobial effects throughout the GI as opposed to being limited to just the stomach for example. As opposed to directly affecting the integrity of the mucosal lining, this study suggests that lactobacilli play an indirect role in protecting the lining from potential pathogens.

Outside of the GI tract, isolated lactobacilli strains from Kimchi were recently assessed for potential therapeutic use for allergen induced airway inflammation. Oral administration of these three strains was followed by “challenge with aerosolized ovalbumin”. General inflammation and “airway hyperresponsiveness” was suppressed using two of the strains (interleukin levels were depressed and Foxp3 expression in the intestinal lamina propia cells was noticed). (3) This suggests that even oral administration of food based lactobacilli can affect inflammation and hyperresponsiveness in areas of the body also affected by general interleukin and Foxp3 levels.

A potential detriment to the integrity of the physical barrier of the mucous lining itself is oxidative stress caused by free radicals. Lactobacilli plantarum - extracted from Kimchi - was assessed specifically in relationship to a probiotic supplement - Lactobacillus rhamnosus GG - in order to determine its relative anti-oxidant capacity. The results suggest that

the food derived lactobacilli not only has a greater anti-oxidant effect, but also has greater resistance to oxidative stress including superoxide anions. (7) In terms of maintaining mucous membrane health and preventing oxidative stress, this study shows that not only are lactobacilli from foods effective at processing free radicals but they also have the ability to survive through very intense oxidative stress themselves (more so in both categories than the supplement tested).

These studies reflect the importance of lactobacilli from food sources (specifically fermented kimchi products) to maintaining a healthy and integral mucous membrane layer, and also point to potential therapeutic uses of these bacteria, but more importantly the foods which they are isolated from. These lactobacilli have been shown to be broadly anti-microbial, anti-oxidant, anti-inflammatory and highly resistant to deterioration throughout the GI.

Notes

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Food as Medicine Recipes

Effie Elfer, Rachel Navaro, Elise Walsh

Rice & Lentil Salad – Effie Elfer

3 ½ c cooked brown rice
2 c cooked green lentils
1 med red onion finely chopped
1 c raisins

Mix the above together then top with the following dressing:

whisked together....
Olive oil
the juice of l lemon
salt to taste

let sit before serving then top with and mix in ¾ c. or more of chopped parsley and ½ – 1 cup chopped raw almonds

Food as Medicine:

*Brown rice/lentil/almond combo = ideal protein combo (whole grain, legume, nut)

*Brown rice: Yang tonic, nurtures the spleen and stomach, high in B vitamins and minerals, jasmine of basamati rice can be subbed if brown rice is hard to assimilate., reduces vatta, can irritate kapha and pitta

*Lentils: Benefit heart and circulatory system, key vegetarian protein source, contain less sulfur than other legumes

*Almonds: Support the digestive tract, great source for vit E, benefit all doshas, predominately unsaturated fat, restoring toning and nurturing

*Raisins: high in antioxidants, natural flavor enhancer due to natural tartic acid, reduce pitta and kapha
:
*Olive oil: A very stable oil, mono saturated fat, beneficial or neutral to all doshas

*Lemon: Cooling and astringent, aids digestion, supports liver function, high in Vit C, high in potassium, reduces vatta

*Parsley: Warming blood tonic, superior source of vit A, vit C, iron, good for nervousness, kidney weakness, anti carcinogen and antioxidant, reduces pitta/kapha

AVOCADO SWEET-ICE - Rachel Navaro

5 ripe avocados (mixed with 1 T. fresh lemon juice to prevent oxidation)
1 c. whole plain yogurt (local)
½ c. frozen blueberries (local)
½ c. ground walnuts
½ c. maple syrup (local)
2 T. ground flax seed
½ t. cinnamon
½ t. vanilla
almond slivers as garnish

After blending ingredients, freeze in a metal container for at least two hours, stirring once. Et voila!

For an atrophic person. Avocados are a cooling fruit that nourish the yin and support the large intestine, liver, lung, and spleen. They are a wonderful source of monounsaturated fatty acids, vitamins E and K, the B-vitamins (more than most fruits), fiber (14 grams per ounce!), lutein for eyesight, lycopene (which may help prevent heart disease and prostate cancer), protein (more than most fruits), more potassium (for nerve conduction, fluid balance, and blood pressure regulation) than bananas, the powerful antioxidant glutathione, and magnesium (which is essential for muscle relaxation—including the heart muscle—and DNA production and function).
Being a soft food, avocado is a good food for people with IBS. Adding a small amount of maple syrup (at only 65% sucrose), which accentuates the fruit's natural sweetness, makes avocado a lovely addition to a "Spring" diet. Because an avocado is nearly 300 calories—20% of which are fat—it's a super food for a malnourished or underweight person, particularly those who might have trouble assimilating other fatty foods. Up to 30% of a person's calories can be fat, which is good news because we require fat both to assimilate the fat-soluble vitamins (A, D, E, and K) and to ensure the stability and flexibility of cell membrane function.
Meanwhile, fat- and protein-rich walnuts (a warming food and the second-highest source of omega-3 fatty acids) nourish the qi and yang and support the kidney, lung, large intestine, and bowel. Antioxidant-, anthocyanidin-, and flavanoid-rich blueberries prevent cell deterioration and strengthen blood vessels (while reducing their inflammation, which is an important means of preventing cardiovascular disease). And for the reproductively challenged, the milk fat in the (unpasteurized and therefore fermented) yogurt will supply vitamin A and magnesium, and the ground flax seeds and walnuts will supply additional vitamin E (and jing for the "next generation").
Like walnuts, cinnamon is also a warming qi- and yang-tonic and may help increase an atrophic person's vitality while calming their nerves. Vanilla helps digest rich foods, which are abundant in this recipe. And almonds restore, tone, and nurture while supporting both the digestive tract and nervous system. (Cinnamon—a relative of avocado—and vanilla and almonds are all tridoshic.)

Sources

- Food as Medicine, 2011; Betzy Bancroft; Vermont Center for Integrative Herbalism
- The New Whole Foods Encyclopedia, Rebecca Wood
- http://www.wholeliving.com/article/powerfoods-avocado

Green Rice - Elise Walsh

4 cups Cooked Brown Rice
olive oil
1 head garlic
1 bunch Cilantro
1 bunch Mint
1 bunch Arugula
1 bunch Parsley
½ lemon squeezed
salt

Finely chop greens (or put in food processor).
Sautee minced garlic on low heat in olive oil.
Combine rice, garlic and greens.
Top with lemon juice and salt.

Medicinal Qualities of this dish
This combination of rice and green vegetables may be used to support and stimulate the digestive system. This dish is ideal for the lightening and detoxification process that we undergo in the spring season.
The parsley, mint, cilantro and arugala stimulate digestion, remove toxins and support many of the meridians connecting to the digestive system (spleen, liver, bladder, kidney, stomach). These greens also provide minerals and anti-oxidants. Garlic stimulates the metabolism and has an anti-microbial effect on the digestive system. Rice provides soluble fiber and B vitamins, nurturing the spleen and stomach and also calming the nervous system. The sour property of the Lemon Juice will enhance fat digestion.
This combination of rice with a high volume of greens and pungent herbs can be a good way for youngsters to eat lots of green vegetables.