The new herbal bitters: New uses for the most ancient of tastes

AANP CONFERENCE
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Is there a bitter deficiency syndrome?

- Loss of bitter foods in modern diet
- Aversion to bitter with increasing obesity
- Increase in metabolic syndrome
- Increase in alcoholism
- Increase in type 2 diabetes
- Increase in food consumption
- Increase in thyroid dysfunction
- How do bitters effect health?
- Is there a wider role for bitters in supporting health?
Top 25 Prescription Drugs Filled 2016

<table>
<thead>
<tr>
<th>No.</th>
<th>Brand Name</th>
<th>Generic Name</th>
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<tbody>
<tr>
<td>1.</td>
<td>Atorvastatin Calcium</td>
<td>(generic of Lipitor)</td>
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<td>2.</td>
<td>Levothyroxine</td>
<td>(generic of Synthroid)</td>
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<td>3.</td>
<td>Lisinopril</td>
<td>(generic of Prinivil)</td>
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<td>4.</td>
<td>Omeprazole</td>
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<td>(generic for Glucophage)</td>
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<td>6.</td>
<td>Amlodipine</td>
<td>(generic for Norvasc)</td>
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<td>7.</td>
<td>Simvastatin</td>
<td>(generic for Zocor)</td>
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<td>8.</td>
<td>Hydrocodone/Acetaminophen</td>
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<td>11.</td>
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<td>Amoxicillin</td>
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<td>Prednisone</td>
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<td>Sertraline</td>
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<td>Tamsulosin</td>
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<td>Pravastatin</td>
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<td>24.</td>
<td>Tramadol</td>
<td>(generic for Ultram)</td>
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<tr>
<td>25.</td>
<td>Montelukast</td>
<td>(generic for Singulair)</td>
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Source: www.lowestmed.com
The Five Basic Tastes

- Sweet (Sugar, Chocolate, etc.)
- Salty (Salt, etc.)
- Umami (Soup Stock of Konbu and Bonito etc.)
- Sour (Vinegar, Lemon, etc.)
- Bitter (Coffee, Bitter Gourd, etc.)
How bitter works
How bitter works?

- The bitter taste starts when a bitter compound enters the oral cavity, where the ligand binds to a T2R G protein–coupled receptor (TAS2R) expressed in the apical membrane of receptor cells found in taste buds, triggering a cascade of signaling events, leading to the release of neurotransmitter that activates an afferent nerve fiber that transmits the signal via the cranial nerve to the brain.

- Taste buds are distributed in distinct fields in the oral, pharyngeal, and laryngeal epithelia, with each field innervated by a different cranial nerve branch.

  - Taste receptors have also been identified in a variety of non-gustatory tissues, such as the gut, where they have been proposed to play a role in nutrient and toxin sensing.

  - The taste signals course through the brain and provide input to circuits that subserve various functions, such as motor and physiological reflexes, discriminative perception, and affective processing.
The bitter reflex and its Gastrointestinal implications

- When a bitter substance is recognized by bitter receptors on the tongue, a chain of neural and endocrine events begins, labeled as the “bitter reflex.” Mediated by the release of the gastric hormone gastrin, this reflex results in an overall stimulation of digestive function, which over time strengthens the structure and function of all digestive organs (liver, stomach, gallbladder, pancreas, etc.)

- Starting in your mouth, you’ll notice that your salivary glands have increased their output of enzyme-rich saliva, helping to break down complex starches into smaller and more easily digested oligosaccharides.

- In the stomach, the hormone gastrin has stimulated the secretion of hydrochloric acid.

- The acidity helps break down protein, enhances the bioavailability of many minerals (especially calcium) and destroys any harmful microbes present in your food.
Many types of Mammalian Taste Receptors

<table>
<thead>
<tr>
<th>Mammalian taste receptors and cells</th>
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<tr>
<td>Umami</td>
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<tr>
<td>T1R1+T1R3 L-glutamate</td>
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<tr>
<td>L-aminos acids glycine L-AP4</td>
</tr>
<tr>
<td>Nucleotide enhancers IMP, GMP, AMP</td>
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<td>Glycine</td>
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From Willow

Botanical Toxins
Many type of bitter receptors

- Type 2, bitter receptors were first characterized in 2000: TAS2R1 – TAS2R50, and TAS2R60. There are 50+ type of bitter receptors as opposed to 2-3 types of sweet receptors.

- The TAS2R proteins function as bitter taste receptors. There are 43 human TAS2R genes.

- Gustducin is the most common taste G protein subunit, having a major role in TAS2R bitter taste reception.

- Gustducin and Transducin are G proteins and have been shown to be structurally and functionally similar, leading researchers to believe that the sense of taste evolved in a similar fashion to the sense of sight.
Bitter receptors

- Agonist for human bitter taste receptors are structurally diverse
- Individual bitter agents stimulate specific bitter receptors.

Cellular and Molecular Life Sciences 63: 1501-1509, 2006
Bitter receptors are found all over the body

- Old thought was that bitter receptors were on the back of the tongue only
- Now we know bitter receptors are found all over the digestive tract and beyond
- Recent research has found them in the lungs, bronchi and in the placenta and thyroid gland
- Bitters receptors seem to be important to humans!
Polymorphisms in bitter taste receptor genes

- An important question for human bitter taste research is how individualized the perception of different bitter compounds is. It appears that humans vary greatly with regard to bitterness perception of some bitter compounds.
- As more and more TAS2Rs are being deorphanized and therefore become accessible for functional analyses of receptor variants, the number of known functional polymorphisms will increase considerably in the future.
- It will then be very interesting to see how personal bitter taste perception might influence dietary habits and, ultimately, health.

Cellular and Molecular Life Sciences 63: 1501-1509, 2006
Conclusion: We could show for the first time that the taste receptor TAS2R38 is expressed and functionally active in placental tissues, namely in the syncytiotrophoblast and in the amnion both of which protect the embryo. Therefore, apart from the prevention of toxic food intake, TAS2Rs might play a general role in the communication with environmental factors and the protection of the body against the environment.
Taken together, the findings suggest that the taste transduction cascade is not restricted to taste per se or even to systems regulating food intake. The receptors mediating taste transduction evolved early in the vertebrate lineage, and were adopted widely as a chemodetection system in a variety of organ systems. Questions still remain as to what the natural ligands are for many of the nongustatory functions of the “taste” transduction system.
Bitter taste perception in Neanderthals through the analysis of the TAS2R38 gene

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The bitter taste perception (associated with the ability or inability to taste phenylthiocarbamide) is mediated by the TAS2R38 gene. Most of the variation in this gene is explained by three common amino-acid polymorphisms at positions 49 (encoding proline or alanine), 262 (alanine or valine) and 296 (valine or isoleucine) that determine two common isoforms proline–alanine–valine (PAV) and alanine–valine–isoleucine (AVI). PAV is the major taster haplotype (heterozygote and homozygote) and AVI is the major non-taster.

The most extensively studied taste variation in humans is sensitivity to a bitter substance called phenylthiocarbamide (PTC). Although approximately 75 per cent of the world population perceives this substance as intensely bitter, it is virtually tasteless for the remaining 25 per cent of the population (Kim & Drayna 2004). This is owing to a dominant ‘taster’ allele that shows a similar frequency to the recessive ‘non-taster’ allele. PTC itself is not found in any vegetable, but chemically similar substances that produce an identical response to PTC are present in many plant foods (including Brussels sprouts, cabbage, broccoli and others). It was discovered (Kim et al. 2003) that most of the variation in PTC sensitivity is related to polymorphisms at the TAS2R38 gene, a single 1002 bp coding exon that encodes a 333-amino-acid, G-protein-coupled receptor. The TAS2R38 gene has three amino-acid changes in high frequencies that determine only five main haplotypes. These polymorphisms are found at position 49 (encoding proline or alanine), 262 (alanine or valine) and 296 (valine or isoleucine) of the gene. The two most common haplotypes are proline–alanine–valine (PAV) and alanine–valine–isoleucine (AVI). PAV is the major taster haplotype (carrying one or two copies), and AVI is the major non-taster haplotype (carrying two copies). AVI/PAV heterozygotes have slightly less sensitivity to PTC (Drayna 2005). Of the three common variants, the nucleotide substitution at the amino-acid residue 49 (A49P) shows the strongest association with taster status; a proline in that position always implies PTC taste perception (Drayna 2005). Other additional haplotypes, AAV, PVL, and AAI,
Bitter taste perception pre Neanderthal Study Summary:

• Neanderthals were a hominine species living in Europe and Western Asia from approximately half a million years ago to approximately 28,000 years ago.

• The amplified and sequenced the TAS2R38 amino acid 49 in the virtually uncontaminated Neanderthal sample of El Sidro´n 1253 and have determined that it was heterozygous.

• Thus, this Neanderthal was a taster individual, although probably slightly less than a PAV homozygote. This indicates that variation in bitter taste perception pre-dates the divergence of the lineages leading to Neanderthals and modern humans.

• Neanderthal A49P heterozygote is that this polymorphism pre-dates the split of Neanderthal and modern human lineages, known to have been at least half a million years ago.

Herbal bitters: Historical

- The earliest origins of bitters can be traced back as far as the ancient Egyptians, who may have infused medicinal herbs in jars of wine.

- This practice was further developed during the Middle Ages, where the availability of distilled alcohol coincided with a renaissance in pharmacognosy.

- Many of the various brands and styles of digestive bitters made today reflect herbal stomachic and tonic preparations whose roots are claimed to be traceable back to Renaissance era pharmacopeia and traditions.

- By the 19th century, the British practice of adding herbal bitters (used as preventive medicines) to Canary wine had become immensely popular in the former American colonies.

- By 1806, American publications referenced the popularity of a new preparation termed *cocktail*, which was described as a combination of “a stimulating liquor, composed of spirits of any kind, sugar, water, and bitters.”
Herbal bitters: A long history of Use

- Has a long historical use as medicine and drinks
- Any plant that tastes bitter is bitter
- Many herbal drinks are bitter
- Many bitters are also classified as a tonic.
- You know when it is bitter!
- Rediscovered recently in food and medicine.
- Many new studies on the action of bitters and effects on physiology.
Aperitif , digestif and bitters

- **Apéritifs** and **digestifs** are drinks, typically alcoholic, that are normally served before (apéritif) or after (digestif) a meal.

- Apéritif may also refer to a snack that precedes a meal. This includes, chocolate, crackers, cheese, pâté or olives.

- "Apéritif" is a French word derived from the Latin verb *aperire*, which means "to open." The French slang word for aperitif is "apro."

- Bitters are botanical drinks that are bitter and are often used as Aperitifs or Digestifs to support digestion.
Historical Sayings about bitters

- Sweet to the taste buds, bitter to the stomach
- Bitter to the tongue, then sweet to the stomach
- The bitters are a tonic for all digestion and especially promote acid secretion
Traditional indications for bitters

- Loss of appetite, low HCL
- Indigestion, bloating, gas
- Nausea, diarrhea, constipation
- Abdominal distention
- Malnutrition, malabsorption
- Weakness, pale skin with edema
- Yellow or white tongue coating
- Atonic digestion and elimination
- Depression and or mood disorders
- Digestive issues that come with aging.
Traditional contra-indications of bitters

CONTRA-INDICATIONS

- Avoid in cases of acute GI inflammation, irritation
- Avoid in pregnancy
- Avoid in children under 5
Types of Herbal bitters

- **True bitters: Only bitter**
  - Centaurium umbellatum
  - Gentiana lutea
  - Hydrastis canadensis
  - Mahonia aquifolium
  - Aloe spp. Bitter Aloe
  - Eupatorium perfoliatum
  - Menyanthes trifoliata
  - Cinchona bark
  - Quassia bark

- **Aromatic bitters: bitter with flavor**
  - Artemisia absinthium
  - Achillea millefolium
  - Humulus lupulus

- **Nutritional bitters with Prebiotics**
  - Taraxacum
  - Articum
  - Inula
  - Angelica
  - Cynara
Current summary of how bitters improve digestion

- Cephalic Vagal Response
- Local reflex, increase secretions
- Hyperemia, increase abdominal blood flow
- Alcohol (with bitters) improves digestion

Better Digestion
New bitter concepts

- The bitter receptors TR2 a family of G protein coupled receptors
- Can sense over 100 types of bitters based on testing
- Can have effects without tasting the bitterness
- Chronic inflammation can over express TR2 receptors leading to adverse response to bitters
- The bitters stimulate natural incretins and hence stimulate insulin and lower glucose
- The bitters may act directly as endocrine triggers, by passing the CNS
- Stimulate Hyperemia increasing GI blood flow
- The bitter may lead to less obesity and improve metabolic syndrome via increase fullness, and hormone stimulation
- Lack of bitter sensitivity may contribute to alcoholism
The bitter truth: It is good for us!

The effect of bitters also extends to the pancreas. With bitters, digestive enzyme secretions are increased, helping to promote the complete breakdown of nutrients into their absorbable units, preventing gas formation when large molecules are acted upon by bacteria further down the small intestine.

The complete breakdown of proteins is particularly important, as the cross reactivity of immune cells between undigested protein molecules and intestinal cells plays an important role in the etiology of conditions such as celiac disease and allergies.

Thus, the taste of bitter can be used to strengthen the most fundamental aspect of our health—the ability to extract the nutrients from our foods and nourish our bodies. Over time, they will lessen symptoms of poor digestive function such as gas and bloating, constipation, loose stools and food allergies; enhance vitamin and mineral absorption; promote balanced blood sugar levels; protect the liver and strengthen eliminatory function; moderate inflammatory damage to the gut wall; and reduce the incidence of allergic.
New actions for bitters

- Blood Sugar Support
  - Incretin effect
  - Probiotics from bitter herbs

- Cardiovascular effects
  - Lipid Moderating
  - Metabolic syndrome

- Supports decrease craving for alcohol

- Thyroid Balance
  - The bitter receptors found in thyrocytes
  - Can block or enhance TSH production

- Vascular effect: Increase gut circulation, increase BP

- Neuronal effects
  - Stimulate endocrine hormones via gut
  - Improved digestion, absorption
  - Appetite stimulant, but increase satiety and weight loss

- Chronic Inflammation
  - Pro inflammatory compounds serve to over express T2Rs, leading to adverse bitter response
  - The bitters can down regulate Tumor Necrosis factor receptors
Bitters can influence all phases of digestion

- Cephalic, Taste
- Gastric
- Intestinal

Source: Bitters time for a new paradigm://dx.doi.org/10.1155/2015/670504
The results indicated that high BMI (Body mass index) participants reacted to bitter stimuli showing more profound changes from baseline in neutral and disgust facial expressions compared with low BMI. No differences between groups were detected from the subjective pleasantness and familiarity.

**Keywords:** Affective facial reaction; Bitter food; Body mass index; Overweight; Taste responsiveness
This phenomenon has been dubbed the 'incretin effect' and is estimated to account for approximately 50-70% of the total insulin secreted following oral glucose administration.

Thus, incretins are hormones that are secreted from the gastrointestinal tract into the circulation in response to nutrient ingestion that enhance glucose-stimulated insulin secretion.

The term 'incretin' was subsequently used to denote these glucose-lowering, intestinal-derived factors.

The bitters stimulate natural incretins and hence stimulate insulin and lower glucose.
The bitters stimulate natural incretins
TAS1R- and TAS2R-type taste receptors are expressed in the gustatory system, where they detect sweet- and bitter-tasting stimuli, respectively. These receptors are also expressed in subsets of cells within the mammalian gastrointestinal tract, where they mediate nutrient assimilation and endocrine responses. These findings suggest that a functionally compromised TAS2R receptor negatively impacts glucose homeostasis, providing an important link between alimentary chemosensation and metabolic imbalance.
Gut microbiota fermentation of prebiotics increases satietogenic and incretin gut peptide production with consequences for appetite sensation and glucose response after a meal \(^1\text{–}^3\)

Patrice D Cani, Elodie Lecourt, Evelyne M Dewulf, Florence M Sohet, Barbara D Pachikian, Damien Naslain, Fabienne De Backer, Audrey M Neyrinck, and Nathalie M Delzenne

**ABSTRACT**

**Background:** We have previously shown that gut microbial fermentation of prebiotics promotes satiety and lowers hunger and energy intake in healthy individuals. Increased fecal output and increased plasma glucose are associated risk factors for type 2 diabetes and obesity. Prebiotics and inulin not only reduce body weight, but also increase gut microbial fermentation, thereby promoting the growth of propionate-producing bacteria and decreasing glucose homeostasis and related hormone response.

**Objective:** To provide evidence that prebiotics could be a useful tool for controlling food intake and glucose homeostasis and promising agents for maintaining or restoring both glucose and energy homeostasis.

**Design:** This randomized, controlled, double-blind, placebo-controlled cross-over study was performed in the morning to measure the following: hydrogen breath test, satiety, glucose homeostasis, and related hormone response.

**Results:** We show that the prebiotic treatment increased breath-hydrogen excretion (a marker of gut microbiota fermentation) by \(~\)3-fold and lowered hunger rates. Prebiotics increased plasma glucagon-like peptide 1 and peptide YY concentrations, whereas postprandial plasma glucose responses decreased after the standardized meal. The areas under the curve for plasma glucagon-like peptide 1 (GLP-1) and peptide YY (PYY) were decreased after the prebiotic meal compared to the maltose meal. Overall, these findings emphasize the importance of prebiotics in the modulation of glucose homeostasis and body weight, and suggest that they could provide a useful tool for controlling food intake and glucose homeostasis.
Our findings indicate that TAS2Rs couple the detection of bitter-tasting compounds to changes in thyrocyte function and T3/T4 production. Thus, TAS2Rs may mediate a protective response to over ingestion of toxic materials and could serve as new targets for therapeutic treatment of hypo- or hyperthyroidism.
In summary, taste perception is a complex trait influenced by numerous genes. Further, there are European American and African-American population differences in the frequency of these variants. We have observed modest findings with 2 genes, which contribute to bitter-taste sensitivity and influence alcohol consumption. As alcohol consumption is a necessary precursor leading to alcohol dependence, taste perception may represent one of the many pathways that contribute to the development of or protection against alcohol dependence.
This review summaries how sensing of nutrients by taste receptors along the gut plays a key role in the process of digestion and how disturbances or adaptations of these chemosensory signaling pathways may contribute to the induction or resolution of a number of pathological conditions related to diabetes, obesity or diet induced symptoms generation in irritable bowel syndrome. Targeting these receptors may represent a promising novel route for the treatment of a number of these diseases.
Summary: New herbal bitter

Blood sugar moderating via incretin effect
Cardiovascular support
Metabolic syndrome
Supports healthy inflammation response
Obesity and weight issues
Decrease cravings for alcohol
Decrease food consumption
Thyroid dysfunction support
Bitters in Formulation

- True bitters are commonly and historically mixed in combination with aromatic and carminative herbs.
- Lessens the ability of bitters to cause bowel cramping.
- Warms the formula.
- Commonly use mints, fennel, anise, calamus, Ginger or aromatic bitter herbs in combinations.
Dosing bitters

- Generally small doses, repeated frequently
- 15-30 drops of extract, or 0.5-1.0 ml
- Larger doses may improve action, but increase slowly
- Before meals or after
- Present to the taste buds as tea or extract
- Capsule and tablet of bitters have been found to be useful for GI tract bitter receptors and general systemic effects
Take the 30 day bitter Challenge!

- To improve your digestion and overall health, take the 30 day bitter challenge.
- Find a bitter formula, herb or combination that has one of the true bitters or Eupeptic Bitters.
- Take 10-30 drops of the bitter before meals, ideally 10 minutes, or after meals.
- Take enough to get strong bitter sensation and “bitter shudder”.
- Continue for 30 days, moving the dose up or down depending on reaction.
- Assess your health before or after.
Two Famous bitters

Wormwood

Gentian
**Gentiana lutea** (Gentian)

- **Common names:** Bitter Root, Bitterwort, Gall Weed, Gentiana, Pale Gentian, Stemless Gentian, Yellow Gentian, Wild Gentian, Qin Jiao.

- **Family:** Gentianaceae

- Listed in the USP 1820-1955, and the NF 1955-1965

- **Medicinal parts:** root and rhizome

- **Preparations:** dried root may be decocted or powdered and encapsulated. Dried or fresh root may be tinctured
**CHEMICAL CONSTITUENTS**

- **Gentiopicroside** - a bitter principle. One of the most bitter substances known. Comprises 1-2% of the fresh root.
- **Genistic Acid (Genistin)** - an organic acid
- **Tannic acid** - tiny amounts
- **Quinnic acid** - minute amounts
- **Isovitexin**
- **Vanillic acid**
- **Gentian contains very little tannin and is considered a pure peptic bitter.**
Chromatographic Evaluation and Characterization of Components of Gentian Root Extract Used as Food Additives

Yoshiaki Amakura,*a,# Morio Yoshimura,a,# Sara Morimoto,a Takashi Yoshida,a Atsuko Tada,b Yusai Ito,c Takeshi Yamazaki,d Naoki Sugimoto,b and Hiroshi Akiyama,b

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Gentian root extract is used as a bitter food additive in Japan. We investigated the constituents of this extract to acquire the chemical data needed for standardized specifications. Fourteen known compounds were isolated in addition to a mixture of gentisin and isogentisin: anofinic acid, 2-methoxyanofinic acid, furan-2-carboxylic acid, 5-hydroxyethyl-2-furfural, 2,3-dihydroxybenzoic acid, isovitexin, gentiopicroside, loganic acid, sweroside, vanillic acid, gentisin 7-O-primeveroside, isogentisin 3-O-primeveroside, 6′-O-glucosylgentiopicroside, and swertialapicose D. Moreover, a new compound, loganic acid 7-(2′-hydroxy-3′-O-β-D-glucopyranosyl)benzoate (1), was also isolated. HPLC was used to analyze gentiopicroside and amarogentin, defined as the main constituents of gentian root extract in the List of Existing Food Additives in Japan.

Key words gentian root extract, Gentiana lutea, food additive; bittering agent; iridoid
Gentian Root

ACTIONS
- Cholagogue
- Bitter tonic
- Gentian is stimulating to digestive organs, mucosal tissues, and portal circulation.

INDICATIONS
- GI atony, poor digestion, low stomach acidity.*
- Portal Congestion
- General GI debility, atony, flatulence, anorexia *

CONTRAINDICATIONS
- Avoid in cases of acute GI inflammation
- Avoid in pregnancy
Gentian Root: Specific Indications
(Felter Materia Medica 1922)

- **Action and Therapy.**—One of the best of the simple bitter tonics. However, large doses can produce nausea, vomiting, and diarrhea, and fullness of the pulse, with headache.

- Chief use is to promote appetite and improve digestion in states of chronic debility.

- For atony of the stomach and bowels, with feeble or slow digestion, it is an ideal stimulating tonic; and after prolonged fevers and infections, when the forces of life are greatly depressed and recovery depends upon increased power to assimilate foods, gentian may be used to improve gastric digestion and thus hasten the convalescence.

- Gentian is especially useful in anorexia, in the dyspepsia of malarial origin, and in subacute gastritis and intestinal catarrh.
However, a trend for a higher response of glucagon-like peptide-1 after Encapsulated bitter than after control was observed. Encapsulated bitter determined a significant 30% lower energy intake over the post-lunch period compared with control. These findings were consistent with the tailored release of bitter-tasting compounds from Encapsulated bitter along the gastrointestinal tract. This study demonstrated that microencapsulated bitter secoiridoids were effective in reducing daily energy intake in humans.
Gentian Summary

- Gentian is the quintessential bitter. It is one of the most bitter substances on the planet.
- Gentian has tonic effect on the entire constitution. It has the classic “sweet taste, followed by bitter taste” characteristic of many constitutional tonics (example: ginsengs).
- Gentians are found all over the planet. Every indigenous people has had access to a gentiana plant.
- A true bitter can taste in a 1 to 30,000 dilution.
- That is 22 gallons of gentian extract to an Olympic size pool.
- Cold and drying nature.
The Green Fairy

ARTEMISIA ABSINTHIUM (WORMWOOD)

Albert Maignan's painting of “Green Muse”
Wormwood

- Wormwood
- The Green Fairy
- la fee verte
- The Green Muse
- From Greek work “apsinthion” meaning undrinkable
Historical Uses of Wormwood

- In the Bible, grew in the Garden of Eden.
- Ebers Papyrus 1550 B.C earliest written use.
- Pliny the Elder noted its use against worms.
- John Gerald 1597 Herbal, noted gastric tonic.
- 18th century use as popular drink Absinthe.
Chemistry of Wormwood

- Volatile Oils: monoterpenes alpha and beta thujone, chamazulene.
- Sesquiterpene lactones (bitters) including, absinthin and others.
- Acetylenes: In the root.
- Flavonoids: quercetin and others
- Phenolic Acids: coumaric and vanillic
- Lignans.
Traditional Clinical Uses

- Choleretic
- Anthelmintic, antiparasitic
- Stomachic, bitter
- Stimulates appetite
- Sweet smell contrasts to bitter taste.
- Bittersweet medicines use to promote balance.
- Good for integration of physical and emotional levels.
- Useful for breaking the cycle of destructive behavior.
Wormwood: Keys

- Long history of medicinal use and abuse
- Used to shift human thoughts
- Powerful nervine herb that affects consciousness
- Used to bring emotion and spiritual balance
- A bittersweet medicine
Dandelion: Earth Nail
**Taraxacum officinale**

- **Family**: Asteraceae
- **Habitat**: Found throughout most of the world, particularly the Northern hemisphere
- **Collection**: The roots are best collected between June and August when they are at their most bitter. Split longitudinally before drying. The young leaves may be collected at any time, although those collected in the spring are less bitter.

- **Part Used**: Root and/or leaf
- **Taste**: Bitter, salty, sweet
- **Temperature**: Cold
- **Channels**: Liver, Gall Bladder, Spleen, Bladder
Actions:
- Diuretic (leaf), hepatorestorative, hepatoprotective
- Choleretic, cholagogue, anti-inflammatory
- Anti-rheumatic, gentle laxative, alterative,
- Anti-hypertensive, stomachic, tonic, bitter
Taraxacum officinale

- Root is for liver, leaves are for kidney
- Leaves are a potassium rich diuretic. Supportive in blood pressure
- Root is a choleretic and cholagogue. Useful for liver and biliary problems of all kinds.
Taraxacum officinale

- **Preparations & Dosage:**
  - Decoction: put 1-3 teaspoonful's of the root into one cup of water, decoct for 10-15 minutes.
  - If using leaves, infuse rather than decoct for 10-15 minutes. This should be drunk three times a day.
  - The leaves may also be eaten raw in salads or steamed as a spring green.
  - Juice of the pureed leaves; sig up to 20 ml/ day
  - Extract (1:5 40 % EtOH): 2.8 ml of the root and/or leaf
Cynara scolymus
(Artichoke)
Fruit and Leaf
Cynara scolymus (Artichoke)

- Common names: Artichoke, globe artichoke, Fruit eaten as a vegetable
- Member of the daisy (Asteraceae) family
- Pleasantly bitter taste in fruit
- Leaves extremely bitter
- Combines both liver and gallbladder action
- Well research to support liver and lipid levels
Cynara

- Anti-toxic
- Liver tonic, restorative, stimulates bile production, relieves gas, relieves cramping, relieves nausea
  - Promotes liver cell regeneration
  - Promotes blood flow to the liver
  - Stimulates bile production (Caffeoylquinic acids, e.g. Cynarin)
- Aids in metabolism of blood lipids
- Decreases cholinesterase and supports healthy liver composition.
- Classic remedy for indigestion
As the ancients said, hops grew "wild among willows, like a wolf among sheep," hence the name *Humulus lupulus*. 
Hops: Strobile
**Humulus lupulus**: Hops

- Family: Cannabaceae
- Same family as Cannabis
- Part Used: Female Strobiles
- The plants are unisexual (separate male and female plants).
- Both plants contain a resin that has strong physiologic properties.
- Marijuana contains THC (tetrahydrocannabinol) and Hops contains Lupulin.
Hops: Chemistry

- **Volatile oil** (humulene, myrcene, caryophyllene, farnescene);
- **15-25 % resinous bitter principles**
- **Organic Acids** known as alpha acids and beta acids
- **Estrogenic substances (Phytosterols)**,
  - 8-prenylnaringenin, 6-prenylnaringenin and isoxanthohumol
- The oil and bitter resins together are known as lupulin. Lupulin is a yellow powder. Found in the strobile
Hops: Action

- **Humulus** is stated to possess sedative, hypnotic, diuretic (like beer) and topical bactericidal properties. Phytoestrogenic.
- The German Commission E approved use for mood disturbances such as restlessness and anxiety as well as sleep disturbances. Has a high level of phytosterols. Has been used like soy and flax for hot flashes and menopausal symptoms. In men it may be a anaphrodisiac (lowers sex drive)
- Bitter agent: Stimulates digestion
Specific Indications for Hops (Fyfe 1903)

- Nervousness, irritability, insomnia, irritation of bladder, fermentative indigestion with acid eructation's. (Lloyd Dose Book)

- Impairment of the digestive organs, resulting from abuse; exhaustion and irritability of the stomach; flatulent colic; incontinence of urine; priapism and involuntary seminal emissions; deranged conditions of the brain and nervous system. (Fyfe)
Summary: How bitters improve digestion (Traditional)

Better Digestion

- Cephalic Vagal Response
- Alcohol with bitters Improves digestion
- Hyperemia, Increase abdominal blood flow
- Local reflex, Increase secretions
Summary: New herbal bitter

**The New Faces of Bitters**

- **Blood sugar moderating via incretin effect**
- **Cardiovascular support**
- **Metabolic syndrome**
- **Supports healthy Inflammation Response**
- **Obesity and weight issues**
- **Decrease Cravings for Alcohol**
- **Decrease food consumption**
- **Thyroid dysfunction**
- **Support**
Resources for bitters

Books

- *A Spirited History of a Classic Cure All: Bitters* by Brad Thomas Parsons, 2011
- *DIY Bitters: Reviving the Forgotten Flavor* by Jovial King and Guido Mase, 2016
- *Bitterman’s Field Guide to Bitters & Amari* by Mark Bitterman, 2015
Thank You!

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