Dental Health: Natural Approaches
By David Crow, L.Ac.

Introduction
Botanical medicine offers many effective treatments for common dental problems and is probably the best modality, along with diet, for maintaining good oral hygiene and preventing problems without using questionable ingredients. Because of the strong link between chronic infection in the mouth and other health conditions, and the known and unknown dangers of xenobiotic substances used in dental treatments, simple natural remedies should be viewed as having not just local benefits but an important role in maintaining wellbeing and reducing the need for dental procedures that can have long term adverse immunological consequences. Additionally, if we compare the astronomical costs of clinical dental care with the extremely low cost of most of the botanical ingredients used for oral hygiene, we can conclude that not only are these remedies some of the most important for overall health but some of the most cost effective as well.

The Major Dental Diseases
There are three primary dental diseases: tooth decay, gingivitis and periodontitis. There are diverse causes and multiple types of these conditions, but the most widespread and common forms have a similar etiology and therefore similar approaches using herbal treatment. While there are limitations to what natural remedies can do once teeth and their root structures are damaged, botanical preparations can be remarkably effective at treating the inflammation and infection underlying most symptoms, and are probably the best approach for general prevention and maintaining good dental hygiene.

Tooth Decay
Tooth decay is as old as hominids; the incidence was low in aboriginal hunting and gathering societies, increased with the advent of agriculture and appearance of grains in the diet, and is now the world's most prevalent disease, followed by periodontitis; about 2.4 billion people worldwide have caries, or about 36 percent of the population.

The etiology of caries is the same as the major forms of gingivitis and periodontitis: bacterial infection with acidification from carbohydrate fermentation. In the case of tooth decay the acidification causes demineralization of the surface structures of the teeth.

Herbal preparations in conjunction with nutrition are probably the most important approach for preventing tooth decay. Minor lesions can remineralize and there is an

abundance of botanical remedies for symptomatic treatment of toothaches, but after cavities are established they must be treated by conventional dentistry; because of the prevalence of toxic materials in dentistry, it is important to work with holistic practitioners who are trained in minimizing the impacts of these toxins.

Gingivitis

Gingivitis is inflammation of the gums. There are several types and causes; the most widespread is termed "plaque-induced," as it is caused by the bacterial biofilm of plaque and the immune system's response against it. Plaque induced gingivitis is subdivided into various types depending on the influence of other factors as systemic health, medications and nutrition. Other types of gingivitis can be caused by factors other than plaque, including other types of infection, trauma, and reactions to foreign substances such as dental materials.

The primary signs and symptoms of gingivitis are halitosis, swollen gums that can be red or purple, gum tenderness and pain, and bleeding gums.

The etiology of plaque-induced gingivitis is the same as caries: accumulation of the bacterial biofilm that produce acid toxins and enzymes; in this case it provokes inflammatory responses in the gum tissue.

The primary treatment for most cases of gingivitis is plaque removal. Because plaque is a bacterial biofilm, numerous botanical approaches in conjunction with mechanical cleansing are viable and effective.

Gingivitis is not destructive and does not necessarily progress to periodontitis, but periodontitis and the deeper tissue damage it causes is always preceded by gingivitis.

Periodontitis

Periodontitis is a group of inflammatory diseases that affect the four tissues of the periodontium: gums, cementum (outer layer of roots of teeth), alveolar bone, and periodontal ligaments that connect teeth to the alveolar bone. Like gingivitis, it is caused by the bacterial biofilm on the surface of the teeth and the immune system's response to it.

Periodontitis affects about 750 million people in the world, about ten percent of the population; in the U.S. its prevalence is up to fifty percent. The disease is classified into various categories according to severity and etiology, which includes gingivitis; several of these forms are considered destructive and irreversible.

Symptoms of periodontitis include gingivitis, bleeding gums, halitosis, metallic taste in mouth, receding gums, pockets between teeth and gums, and in the later stages loose teeth. Periodontitis can progress without pain or symptoms, and the condition can become advanced before it is discovered. Periodontitis increases inflammation in the body and has been linked to stroke, heart attack and atherosclerosis.

Periodontitis should be considered in the realm of conventional dental diagnosis and treatment, with botanical remedies offering many complementary and alternative approaches. Herbal medicine can play an important role in prevention of periodontitis through daily hygiene. There are many reports of successful botanical treatment of chronic and advanced cases using more intensive methods such as herbal packs for the gums, and treating loose teeth (one of the symptoms of advanced periodontitis) was a routine part of early American herbal practice.

Toxic Dental Products and Materials

While tooth decay, gingivitis and periodontitis are the three most important and widespread dental diseases, dental materials are increasingly implicated as causative factors in a number of immunological problems. In my clinical practice I have always considered the patient's dental history, and have found many suspected links between dental work and systemic problems, including deterioration of mercury fillings and thyroid function, root canals and onset of chronic sinus infections, use of plastics and resins and later onset of autoimmune disorders, and so on. Many of these are well established in the medical literature, such as the neurological problems caused by mercury exposure in the dental profession, immune reactions to resins and implants, and chronic infections around root canals; others are relatively new and have yet to receive attention.

In comparison to the numerous simple, nontoxic and effective botanical ingredients, the vast array of dental and oral care products available over the counter look suspiciously like ingenious ways of recycling toxic waste and finding new uses of chemical compounds. This long list includes various forms of fluoride; artificial colorings, flavorings and sweeteners; triclosan, an antibacterial and antifungal compound used in soaps that degrades into dioxins, poisons ecosystems and is a known endocrine disrupter; questionable substances that are Generally Recognized as Safe by the FDA such as propylene glycol; and numerous industrial cleansing agents such as trisodium phosphate, once used in toilet cleaners but now discontinued because it damages metal.

The list of materials used in dental procedures is more extensive: alloys of various metals, bone substitutes, resins, ceramics, cements, sealants, plastics, nylons, silicones, adhesives and more. The most famous of these is probably the mercury-based so-called "silver amalgams," which, in spite of their obvious and known toxicity to both humans and the environment are still in wide spread use. This arsenal of compounds is potentially more dangerous from the immunological standpoint than those found in toothpastes and mouthwashes, as the materials are implanted in the mouth and undoubtedly degrade and interact with other materials over time.

The impact of dental materials on overall health and the immune system is not the primary topic of this paper, but it illustrates the most important reason for becoming knowledgeable about botanical alternatives: when it comes to self care and preventive healthcare routines, there is probably nothing more basic and important that we can do than to avoid, unless absolutely necessary, the use of implanted dental materials. While

much is known about the long-term effects of these substances, what is more important is what is not known.

One striking example that has emerged in recent years is Morgellons, sometimes referred to as "springtails." This bizarre condition is characterized by the emergence of thread-like exudates from persistent skin lesions, accompanied by intense sensations of insects crawling, biting and stinging. It has been proposed that this syndrome comes from new nanoparticles or GMO crops, while the medical community generally regards it as "delusional parasitosis."

While these hypotheses may be plausible, the explanation that I have found most convincing comes from Dr. Omar Amin, an expert parasitologist. He has renamed the disorder "Neuro-Cutaneous Syndrome," and attributes its cause to inflammation of peripheral nerves in response to dental xenobiotics. To sum up one of his many medical papers on the subject: "Components in the calcium hydroxide dental sealants Dycal, Life and Sealapex have been identified as the sources of the observed symptoms." (1)

Microbial Ecology

Maintaining oral health and treating common dental problems is fundamentally a process of regulating a complex microbial environment. This regulatory process is based partly on a diet that provides high quality nutrients and avoids frequent intake of carbohydrates and sugars, partly on routine cleansing, both mechanical and biological, and partly on maintaining and promoting healthy salivary flow; the primary objective is controlling bacterial overgrowth of pathogenic bacteria that are the cause of conditions such as caries, gingivitis, and periodontitis.

There are a wide variety of botanical species used in various forms for achieving these purposes, including chewing sticks, toothpowders containing herbal and mineral ingredients, and herbal and essential oil mouthwashes. Many of these are long-standing remedies in various cultures that are now being shown to be as effective or more than synthetic products. The effectiveness of these botanicals is generally based on the combination of their mechanical cleansing abilities combined with the presence of antimicrobial and anti-inflammatory compounds.

Streptococcus mutans

Historically, the prevalent model of tooth decay and conditions such as gingivitis has been based on a bacterial theory, with Streptococcus mutans being identified as the primary culprit. Microbes such as S. mutans in the biofilm of plaque cause caries and other infectious conditions though three mechanisms: their adhesive properties, their ability to create an acidic environment and their tolerance to that acidity. (2)

The role of a healthy bacterial ecology in the mouth and on the teeth is the same as that which colonizes the mucus membranes in general, which is to provide immunological protection against overgrowth of pathogenic species and acidification of the terrain this causes. It is known that when the teeth are colonized by healthy bacteria they are less

likely to become colonized with pathogens such as S. mutans and the development of caries is less likely. Prevention and treatment of all the common oral and dental problems therefore entail the same strategies that are used in other conditions of the mucus membranes when they are inflamed and infected, which is controlling pathogens with antimicrobial and anti-inflammatory remedies while supporting the healthy microbial terrain, generally with mucilaginous herbs. (3)

While S. mutans is still considered to be the most important pathogen of the mouth, a more holistic model has emerged which views the processes of inflammation and infection at the root of these problems as an ecological problem caused by imbalances in the dynamic relationships among plaque causing microbes, dietary carbohydrates and sugars, saliva and pH levels in the mouth. Fermentable carbohydrates in the mouth cause an increase of pH by acidogenic microbes of the plaque biofilm; this acidification of the terrain increases when the antimicrobial and mechanical cleansing properties of saliva are diminished by reduced flow. (4)

Saliva

Saliva plays a crucial role in dental and oral health. Mechanically, its flow regulates exposure of tooth surfaces to carbohydrate fermentation and the microbial composition of plaque, thereby regulating overall pH of the mouth. (5)

Saliva contains compounds that inhibit bacterial fermentation and acidity that cause oral inflammation and infection. Enzymes such as amylase and salivary lipase start the digestion of starches and fats and reduce bacterial buildup on the teeth, supported by antibacterial agents as secretory IgA, and other compounds such as proline-rich proteins, which support formation of enamel.

Salivary flow is directly related to the pH of the mouth and surface of the teeth. There is a continual interplay between the flow of saliva and demineralization and remineralization on the surface of the teeth: when the flow of saliva decreases, the acidity levels of the mouth in general and on the teeth specifically increase.

Considering the importance of saliva for maintaining a healthy bacterial ecology of the mouth, it is not difficult to understand that there is a relationship between the quantity and quality of salivary flow and pH levels created by the acidic carbohydrate fermentation of the biofilm of plaque, and therefore the rate of caries formation, gingivitis, and periodontitis.

Research confirms this important role of salivary health, thereby adding another dimension to both the diagnosis of overall oral ecology and its treatment. One study found that in children free of caries, 90 percent had normal levels of hydration and salivary flow rate and 100 percent had healthy salivary pH, whereas in the group with caries the rates for these three parameters were all around 30 percent, a significant statistical difference. (6) Similar results have been found in related studies examining other parameters of salivary health, such as levels of calcium and antimicrobial peptides. (7)(8)

It is interesting to note that the sympathetic and parasympathetic nervous systems stimulate production of two different types of saliva. That produced by sympathetic stimulation is thicker and primarily for supporting respiratory functions, while that produced by parasympathetic stimulation is more watery and facilitates digestion. Furthermore, parasympathetic stimulation also increases blood flow to the salivary glands, which in turn stimulates more flow of saliva.

The implication of this is that stress affecting the sympathetic nervous system not only affects digestive health but also weakens and disrupts the ecology of the mouth, leading to an increased propensity for inflammation and infection or a worsening of preexisting conditions. Additionally, many other factors such as diet and smoking cause reduced salivary flow; dryness of the mouth is a common side effect of many prescription drugs.

Gathering the Jade Juice

Knowing that abundant flow of parasympathetic-stimulated saliva is beneficial for oral and dental health, we can understand the value of the qigong exercise called "Gathering the Jade Juice." This exercise is done by circling the tongue around the mouth and over the teeth to stimulate the flow of saliva, which is allowed to accumulate. Once the mouth is full of saliva it is swished around, cleaning the teeth and gums and releasing more saliva. As this continues the taste of the saliva becomes sweeter and the consistency more watery, indicating its parasympathetic origin. The practitioner then visualizes that the saliva is infused with pure silver moonlight that transforms it into a nectar of healing, and then it is swallowed.

I have personally found this exercise not only beneficial for restoring hydration and a sense of wellbeing to the mouth after waking, when fatigued from travel, or dietary excesses, but also very helpful for eliminating simple digestive disturbances.

Oil Rinsing

Ayurveda describes the use of sesame oil as a traditional method for oral hygiene with numerous benefits. Recently, the technique known as "oil pulling" seems to have become somewhat of a craze in the natural health world, with everything from curing receding gums to growing lustrous hair being attributed to it.

The technique is to take about a tablespoon of oil in the mouth, rinse the mouth with it for ten to fifteen minutes, "pulling" it through the teeth and gums, and then spitting it out.

There is no doubt that this method can be beneficial for the mouth, gums and teeth. Sesame oil has known antibacterial properties, and when combined with the increased salivary flow that is created, it becomes more beneficial.

The range of potential benefits beyond the mouth can be understood from the perspective of Ayurvedic "nasya" therapy, which treats problems of the brain, neck, sinuses, mouth and upper back using medicated oils in the nostrils. There is a clear empirical and functional

link between chronic infections in the mouth and those in the sinuses and vice versa, so to treat one system will positively affect the other.

There are a number of other oils besides sesame that can be considered for this purpose. Coconut oil is also antimicrobial, and neem oil even more so. While neem oil has a rather disagreeable taste, I see no contraindications for its periodic use in this way, especially when a more powerful antimicrobial effect is needed, as long as it is not being ingested. Other oils that could be considered would be argan, caulophylum, and just about any other species that is widely used in ethnobotanical traditions for topical applications and especially for culinary purposes.

Herbal Ingredients

The major oral and dental conditions such as caries, gingivitis and periodontitis are primarily infectious processes regulated by pH of the bacterial ecology in the mouth; therefore, it is relatively easy to propose a large pharmacopeia of botanical remedies in various forms that would offer great benefits both preventively and curatively. These species can be organized into wide therapeutic categories, the most important being antimicrobials, anti-inflammatories, circulatory stimulants and demulcents; they can then be classified according to the various forms that they can be administered in, as well as following the Ayurvedic system of the three doshas.

Medicinal plants can be used for dental treatments and hygiene as powders for brushing, as decoctions and tinctures for holding in the mouth, rinsing and ingestion, and made into paste for applying as poultices to the gums. Some species can be chewed and used as tooth sticks.

Tooth Sticks

Tooth sticks are small branches, twigs or roots of medicinal trees or shrubs that are used for dental hygiene. A tooth stick is prepared by chewing one end until it is soft and frayed and then using it as a toothbrush and toothpick for cleaning the teeth and gums.

Tooth sticks have several advantages over regular toothbrushes. Where locally available they are either free or cost less, they do not require toothpaste, and are able to freshen the mouth without mouthwashes; additionally, many species play important roles ecologically and economically. Most importantly, these species contain strong medicinal compounds such as essential oils and alkaloids that give them astringent, antiseptic, and antimicrobial powers. The drawback of using tooth sticks is that they must be used knowledgably, as simply vigorously rubbing the teeth with them can cause gum damage.

There are numerous botanical species that are used in different parts of the world. The two most famous are neem (Azadirachta indica) and arak (Salvadora persica), also known as peelu; others that are well known are licorice, cinnamon, tea tree, and sassafras. However, in every culture where ethnobotanical medicine is still practiced there are many species utilized for this purpose; in southern India, for example, species of Acacia, Achyranthes, Ficus and Smilax are used.

Arak
Also known as miswak, this is a tooth stick made from twigs and branches of Salvadora persica. The use of this plant for that purpose has an ancient history, predating Islam. It is mentioned many times in Islamic scriptures, such as the instruction from the Prophet Mohammed to "Make a regular practice of miswak for verily it is the purification for the mouth and a means of the pleasure of the Lord."

Arak has been recommended for dental hygiene by the W.H.O.. The branches of this species are high in natural fluoride and silica, as well as having antiseptic and astringent properties. It has been found that arak has an immediate antibacterial effect on Streptococcus mutans. (9)

Resins
A number of resins have been used traditionally for treatment of dental problems and preservation of the teeth; the three most often mentioned are frankincense, myrrh and mastic. Resins can be chewed, used in brushing powders, made into mouthwashes from tincture, and used as essential oils.

Frankincense
Frankincense gum has been chewed for millennia for its health promoting effects, especially in the mouth. The resin tears typically contain about one percent essential oil content, which is released gradually at biocompatible levels into the mouth and digestive tract.

There are many species of frankincense, and not all of the resins are suitable for chewing. Some, like Boswellia neglecta or B. rivae, have an unpleasant powdery consistency and are often incense and not medicinal grade. The species that are best to use, in descending order, are B. sacra from Oman, B. carterii from Somalia, and B. serrata from India. These come in higher grades of pure and clean resin tears that can be enjoyably chewed for a long time. Besides being beneficial for oral and dental problems, the gradual release of low levels of essential oil can have positive effects on the digestive system, respiratory system and immunity.

Various species of frankincense have been studied extensively for their antimicrobial, anti-inflammatory and anti tumor properties, among others. In a study of the use of B. serrata it was found that "Frankincense application (either extract or powder) can lead to remarkable decrease in inflammatory indices" in plaque-induced gingivitis. (10)

Essential oils of frankincense can be used safely and effectively in mouthwash preparations.

Myrrh
Myrrh is another famous resin that has a long history of use for dental problems. It is significantly more bitter, astringent and antiseptic than frankincense and not agreeable for

chewing. Myrrh powder is sometimes found in brushing formulas, and more often in mouthwashes as a tincture. It is often combined with goldenseal when a strong antimicrobial and anti-inflammatory agent is needed, as in acute gingivitis. The essential oil of myrrh should not be used in the mouth.

Mastic
Mastic is the gum resin from a species of pistachio tree. It has been highly regarded since ancient times as an effective cleanser of the mouth, gums and teeth, as well as an important medicine for the stomach and digestive system. It has recently been recognized as having antimicrobial powers, specifically against Helicobacter pylori. It is somewhat difficult to procure as it comes from only one Greek island, but is an enjoyable chewing resin and an even more enjoyable incense.

A Few Important Dental Herbs
The list of herbs from around the world that research is confirming have potential for dental purposes is extensive. These are only a few of the species that are commonly found in easily available natural dental products, and a few from the Ayurvedic pharmacopeia.

Prickly Ash
Prickly ash bark is commonly found in brushing powders. This species was originally widely used by Native American as a toothache remedy and was adopted by the settlers. It was used traditionally for cleaning and drying wounds.

Echinacea
Application of Echinacea root was a Native American remedy for toothache. It has significant anti-inflammatory and antimicrobial powers.

Goldenseal
Goldenseal is a major herb for treating infection in the gums. It is most effectively used as a mouthwash that is held in the mouth. A close relative that is interchangeable is coptis, goldthread.

Lamiaceae species
A large number of herbs in the Lamiaceae family are utilized for oral and dental conditions, including rosemary, mints, lavender, and sages. These are aromatic species rich in antimicrobial essential oils, which are often utilized in dry form in brushing powders, and as tinctures and essential oils in mouthwashes.

Licorice
Licorice roots are used in Ayurvedic medicine as tooth sticks. The powder, paste and decoction for mouthwash are one of the best for soothing inflamed gums and treating canker sores. It has anti-plaque action, is antibacterial, and has anti-carious effects.

Turmeric
Turmeric is an important anti-inflammatory and antimicrobial herb that has an important

place in dental care. Curcumin modulates inflammatory responses. A mouthwash of 0.1% turmeric dilution was found to be equally effective as a 0.2% dilution of chlorhexidine (see below) for anti-plaque, anti-inflammatory and antimicrobial powers. (11)

Amla
Emblica officinalis is regarded highly in Ayurveda as a rejuvenative herb. It can be used as juice, decoction or the powder mixed with water as a mouthwash that is held in the mouth. It is also taken internally for a gradual tonification and strengthening purposes.

Neem
Neem is a well-known tree of tropical and arid regions that provides a number of medicinal preparations from its leaves, bark and seeds. Its twigs and small branches are used as tooth sticks, and its leaves and bark are used in numerous tooth powders and mouthwashes.

Neem based mouthwashes have been found to be "Equally efficacious with fewer side effects as compared to chlorhexidine (see below)…in treating plaque induced gingivitis." (12)

Salts and Minerals

Salt
Salt is an important ingredient in many brushing powders. It has antibacterial properties, and an alkalizing effect. Rinsing frequently with saltwater solutions can be beneficial in treating gingivitis.

Sodium Bicarbonate
Baking soda is also commonly found in brushing powders. It inhibits plaque formation and reduces its acidity, supports remineralization of the enamel, and alkalizes the environment of the mouth.

Pearl Powder
A moderately expensive addition to dental hygiene, brushing with pure pearl powder is a contribution from Chinese medicine. It is regarded as having superb cleansing, polishing and mineralizing effects for the teeth.

Essential Oil Mouthwashes
There are many studies confirming the benefits of herbal and essential oil preparations used for mouthwashes. The major purpose of these is antibacterial, and therefore effective for several common dental and oral problems.

When reviewing research studies related to dental health, two products are frequently mentioned. The first is Listerine, which is frequently the standard used for so-called "essential oil mouthwashes." While it is true that Listerine is an example of an essential oil based mouthwash, it is a better example of how marketing and advertising create problems that are then solved, in this case "chronic halitosis," which drove sales and profits of what

was previously sold in the 1800's as a floor cleaner and surgical antiseptic by convincing people that bad breath was the cause of their romantic problems.

The recipe for Listerine is useful from the standpoint of understanding how concentrated and powerful essential oils are: 0.042% menthol, 0.064% thymol, 0.06% methyl salicylate, and 0.092% eucalyptol. The remainder of the recipe is water, various preservatives and flavoring agents, and 20 – 30% ethanol, which has been questioned for its possible contributing role in oral cancers. We can see that the combined total amount of essential oil derived compounds comes to a dilution of 0.25%, which can give us a guideline for making our own recipes using complete oils.

The second product is chlorhexidine, a chemical antiseptic antibacterial. It is toxic in high concentrations but widely used in mouthwashes, skin cleansers, contact lens formulas and as a preservative, even though it is linked to anaphylactic reactions at low doses. It is considered valuable for gingivitis and periodontitis because it tends to last longer in the mouth than other compounds.

Essential oils play an important role in oral and dental care and treatments. Because they are produced by plants primarily for immunological and protective purposes essential oils are by nature highly antimicrobial. There are a large number of studies confirming the antibacterial powers of essential oils against a wide range of pathogens, including MRSA; these results are also found in studies about the use of essential oils for S. mutans and its associated infections. A sampling of conclusions from these studies will suffice to show that these highly concentrated botanical extracts have great potential in preventing and treating oral and dental problems; many of these studies have also found that essential oils work faster and more effectively at lower concentrations than chlorhexidine.

"Cinnamon oil, lemongrass oil, cedarwood oil, clove oil and eucalyptus oil exhibit antibacterial property against S. mutans. The use of these essential oils against S. mutans can be a viable alternative to other antibacterial agents as these are an effective module used in the control of both bacteria and yeasts responsible for oral infections." (13)

"The essential oils from Eucalyptus camaldulensis and Mentha spicata significantly retard biofilm formation and can contribute to the development of novel anticaries treatments." (14)

"In vitro biofilm inhibitory properties were in the order Mentha piperita > Rosemary officinalis > chlorhexidine. In vivo experiments on the antibiofilm properties revealed that all concentrations of the oils were significantly more effective than chlorhexidine. In conclusion, essential oils may be considered as safe agents in the development of novel antibiofilm agents." (15)

"Cinnamon oil produced maximum inhibition zone against Streptococcus mutans as

compared to clove oil. This is contrary to the popular belief that clove oil is effective in tooth decay and dental plaque. This study shows the potential of cinnamon oil over clove oil in the treatment of dental caries." (16)

Applications
Essential oils are a valuable addition to mouthwash formulas. The simplest way to use them is simply to put one drop on about a quarter cup of water, rinse and spit out. The longer the dilution is kept in the mouth the more effective it will be. Even the strongest of the essential oils such as oregano and cinnamon can be used this way relatively safely, as long as they are not ingested. Common sense dictates that if an oil feels too strong and potentially irritating to discontinue use or switch to another milder species.

The disadvantage of using an essential oil with water, as above, is that it is not miscible, and can therefore be irritating to the mouth, especially with stronger and more caustic oils as oregano and cinnamon. One way to get around that is to add the drop of oil to sesame oil for rinsing, which will emulsify it. Another way is to add it first to a tincture and then dilute the tincture further in water.

My favorite mild essential oils to be used in the above manner would include frankincense, lavender, and eucalyptus; I would consider the use of stronger oils such as tea tree, cinnamon and oregano only in lower concentrations and for shorter periods of time; besides the potential for irritation of the oral mucosa, strong concentrations of essential oils may have deleterious effects on enamel.

Vata, Pitta and Kapha
The Ayurvedic system of the three humors can offer some basic guidelines to help organize botanical remedies into categories that could increase the likelihood of success and reducing the chances that it could cause an adverse reaction. These are simplistic concepts but I have found that there is merit in considering them before giving blanket prescriptions simply because a remedy has a reputation of working for a particular symptom.

Vata
The most basic presentation would be dental and oral conditions accompanied with dryness of the mouth, decreased salivary flow, and receding gums; chronic periodontitis with looseness of the teeth caused by degeneration of bone and ligaments could be placed in this category. A common sense approach would be to minimize use of ingredients that would have a further drying effect such as tinctures of strongly bitter herbs, salts, baking soda, and essential oils, and to emphasize ingredients with demulcent effects such as licorice, calendula, plantain, aloe juice and marshmallow. Although I have found no mention of it in any research, I suspect that a mucilaginous preparation of comfrey root held in the mouth would have excellent gum regenerating, periodontal tendon strengthening and bone mending powers.

Pitta
The most basic presentation would be conditions characterized by infection and

inflammation; classic examples would be gingivitis and canker sores. Treatment would emphasize the bitter cooling herbs such as neem, goldenseal and coptis in tincture, decoction or powder forms, resins as frankincense and especially myrrh, soothing demulcents as licorice, and essential oil mouthwashes with milder cooling oils such as lavender.

Kapha
The most basic presentation would be conditions characterized by a mucogenic appearance such as swollen gums, thick tongue coating and thrush. It would be reasonable to assume that hydrating emollients would be the least effective choice, while salts and mineral powders, bitter herbs in various forms, and essential oil mouthwashes with species such as oregano and cinnamon would be the treatment of choice. Ayurveda would suggest spicy stimulants as clove and cardamom, and astringent tooth sticks such as Acacia catechu.

Early American Dental Herbs
Considering the widespread poverty, poor nutrition and lack of medical care that existed in the U.S. and Europe of the 1700 and 1800's, the status of dental health in the general population was undoubtedly very low. Herbalists of the time were probably faced with frequency and severity of tooth decay, gingivitis, periodontitis and other dental diseases that could be found today in some Third World countries. It is reasonable, therefore, to consider that those herbalists had firsthand experience with what plants worked effectively for these conditions.

As a simple example of what can be found in the classical herbals that were used in the early American colonies, here are a few quotes from the English herbalist Nicholas Culpeper about some important remedies of the time for dental and oral problems. "Fastening" loose teeth appears to have been a primary concern.

"If you will keep your teeth from rotting or aching, wash your mouth continually every morning with juice of lemons, and afterwards rub your teeth either with a sage leaf or else with a little nutmeg powder."

"Myrrh fastens loose teeth."

"The juice of purslane used with oil of roses…is good for sore mouths and gums that are swollen, and to fasten loose teeth."

"Mastic…fastens the teeth and strengthens the gums, being chewed in the mouth." "Being mixed with white wine and the mouth washed with it, it cleanses the gums of corruption and fastens loose teeth."

About strawberry: "Lotions and gargles for sore mouths or ulcers therein…are made with the leaves and roots thereof, which is also good to fasten loose teeth and to heal spongy foul gums."

About decoction of goldenrod: “It also is of especial use in all lotions for sores or ulcers in the mouth…it also helps to fasten the teeth that are loose in the gums.”

About elecampane root: “The decoction of the roots in wine or the juice taken therein…gargled in the mouth or the root chewed, fasteneth loose teeth and keeps them from putrefaction.”

About celandine: “The juice of decoction of the herb gargled between the teeth that ache eases the pain, and the powder of the dried root laid upon any aching, hollow or loose tooth will cause it to fall out.”

“Rosemary flower wine…strengthens the gums and teeth.”

The Psychology of Dental Hygiene

Unlike many herbal treatments of common ailments, the use of botanical remedies for dental hygiene is an ongoing process that continues throughout life, not just when there are active symptoms. Therefore, a certain mindset is necessary to implement the long-term use of various products if we are to successfully preserve and protect the teeth and gums from the encroachment of aging and decay.

Some people can approach this endeavor with yogic discipline, but I am not one of them. What I have found works best for me is to be faced every morning and evening with a variety of intriguing powders and liquids to experiment with. I have found that it is more effective to brush with an herbal powder one day, rinse with oil the next, use an essential oil mouthwash the following and a tooth stick the next, than to repeat the same routine for months and lose interest. Therefore, my suggestion for maintaining good dental and oral health is to enjoy a variety of new tastes and sensations, which not only makes it more interesting for the years ahead, but probably also creates a more wide spectrum beneficial effect on the complex ecology of the mouth.

References

(1) Amin, O.M. 2003. On the diagnosis and management of Neuro-cutaneous Syndrome (NCS), a toxicity disorder from dental sealants. Explore! for the Professional 12:21-25.

(2) Minerva Stomatol. 1990 May;39(5):413-29.
[The role of Streptococcus mutans in human caries].

Mosci F, Perito S, Bassa S, Capuano A, Marconi PF.

Università degli Studi di Perugia, Istituto di Clinica Odontoiatrica.

(3) Front Biosci. 2004 May 1;9:1267-77.
Virulence properties of Streptococcus mutans.

Banas JA.
Center for Immunology and Microbial Disease, Albany Medical College,MC-151, 47 New Scotland Avenue, Albany, NY 12208, USA.

(4) Crit Rev Oral Biol Med. 2002;13(2):108-25.
A mixed-bacteria ecological approach to understanding the role of the oral bacteria in dental caries causation: an alternative to Streptococcus mutans and the specific-plaque hypothesis.

Kleinberg I.
Department of Oral Biology and Pathology, State University of New York, Stony Brook,

(5)
J Dent Res. 1994 Mar;73(3):672-81.
Role of micro-organisms in caries etiology.

van Houte J.
Forsyth Dental Center, Department of Oral Microbiology, Boston, Massachusetts 02115.

(6)
J Indian Soc Pedod Prev Dent. 2012 Jul;30(3):212-7. doi: 10.4103/0970-4388.105013.
Evaluation of non-microbial salivary caries activity parameters and salivary biochemical indicators in predicting dental caries.

Kaur A, Kwatra KS, Kamboj P.
Paediatric and Preventive Dentistry, B.R.S. Dental College and Hospital, Sultan Pur, Panchkula, Haryana, India.

(7)
Pediatr Dent. 2002 Nov-Dec;24(6):581-6.
Can salivary composition and high flow rate explain the low caries rate in children with familial dysautonomia?

Mass E, Gadoth N, Harell D, Wolff A.
Department of Pediatric Dentistry, The Maurice and Gabriela Goldschleger School of Dental Medicine Tel Aviv, Israel.

(8)
BMC Oral Health. 2006 Jun 15;6 Suppl 1:S13.
Oral antimicrobial peptides and biological control of caries.

Dale BA, Tao R, Kimball JR, Jurevic RJ.
Dept. of Oral Biology, Box 357132, University of Washington, Seattle WA 98195, USA.

(9) J Contemp Dent Pract. 2004 Feb 15;5(1):105-14.
The immediate antimicrobial effect of a toothbrush and miswak on cariogenic bacteria: a clinical study.

(10)The effect of Frankincense in the treatment of moderate plaque-induced gingivitis: a double blinded randomized clinical trial.

Khosravi Samani M, Mahmoodian H, Moghadamnia A, Poorsattar Bejeh Mir A, Chitsazan M.

Department of Periodontology & Implantology, Dental Materials Research Center, Dentistry School, Babol University of Medical Sciences.

(11) J Indian Soc Periodontol. 2012 Jul;16(3):386-91. doi: 10.4103/0972-124X.100917.

Comparative evaluation of 0.1% turmeric mouthwash with 0.2% chlorhexidine gluconate in prevention of plaque and gingivitis: A clinical and microbiological study.

Mali AM, Behal R, Gilda SS.

(12) To evaluate the antigingivitis and antipalque effect of an Azadirachta indica (neem) mouthrinse on plaque induced gingivitis: A double-blind, randomized, controlled trial.

Chatterjee A, Saluja M, Singh N, Kandwal A.
Department of Periodontics, Institute of Dental Sciences, Bareilly, Uttar Pradesh, India.

(13) J Contemp Dent Pract. 2012 Jan 1;13(1):71-4.
Antimicrobial activity of commercially available essential oils against Streptococcus mutans.

Chaudhari LK, Jawale BA, Sharma S, Sharma H, Kumar CD, Kulkarni PA.

Department of Oral Medicine and Radiology, ACPM Dental College, Dhule, Maharashtra, India.

(14) Int J Dent Hyg. 2009 Aug;7(3):196-203. doi: 10.1111/j.1601-5037.2009.00389.x.
The effect of Mentha spicata and Eucalyptus camaldulensis essential oils on dental biofilm.

Rasooli I, Shayegh S, Astaneh S.
Department of Biology, Shahed University, Tehran, Iran.

(15) Phytother Res. 2008 Sep;22(9):1162-7. doi: 10.1002/ptr.2387.
Phytotherapeutic prevention of dental biofilm formation.

Rasooli I, Shayegh S, Taghizadeh M, Astaneh SD.
Department of Biology, Shahed University, Opposite Imam Khomeini's Shrine, Tehran-Qom Highway, Tehran, Iran.

(16) Acta Biomed. 2011 Dec;82(3):197-9.
Comparative study of cinnamon oil and clove oil on some oral microbiota.

Gupta C, Kumari A, Garg AP, Catanzaro R, Marotta F.
Amity Institute for Herbal Research and Studies, Amity University, Noida, India.