



# LINK *Natural Products* **Digest**

Vol.7, Issue 1, 2011



**The Technology of  
Vanilla Production**

**Pomegranate  
The 'Super Fruit'**



LINK NATURAL PRODUCTS (PVT) LTD

# LINK Natural Products Digest

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IN THE PAGES THAT FOLLOW.....



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## THE CONCEPT OF WELLNESS.

The concept of wellness is one that is quite distinctly recognized in the principal systems of ancient medicine such as Ayurveda and Chinese Traditional Medicine. However it is only recently that main stream society has been able to gain an appreciation of what really is “wellness”. The concept of wellness accommodates several factors which combine to give feelings of good physical, mental and even spiritual well being. It is often defined as: a state of being in perfect health as an actively sought after goal.

The proliferation of health conscious food choices, of Spa products, and herbal products with brand names, displays evidence of this. It is amply clear that modern life styles, and attendant practices are taking toll of the health of people especially those of the younger set. It is also known that rapid changes in weather patterns, for example from hot sunny days, to rain and windy days, with the invariable fluctuations of humidity and temperature, give rise to conditions of unwellness. Modern clinical practitioners are prone to attribute the seasonal fevers and symptoms to “viral infections or just influenza.” Some clinicians may even prescribe antibiotics and warm drinks. The corresponding Ayurvedic treatment may be with a “Rasayana” – an infusion or decoction of several herbs, such as in the reputed “Paspanguwa”.

Now a new paradigm change in approach to therapy that sees a need for a transition to a new kind of multi-target therapy which is directed primarily towards

the activation of defense, protective and repair mechanisms of the body itself, rather than towards the direct destruction of the damage causing agents such as pathogenic microorganisms, is being recognized.

Modern scientific researchers, using clinical studies, now reveal the therapeutic superiority of many herbal extracts over single isolated compounds, as well as the bioequivalence of many herbal pharmaceuticals with synthetic chemotherapeutics. The concept of wellness is now the goal and researchers in the modern world are convinced that modern therapeutics should take a U-turn.

Professor Hildebert Wagner of the Centre of Pharma-Research of the University of Munich, Germany, one of the foremost researchers in the world today on the new concepts of multi-drug and multi-target therapy, concludes thus:

*“Herbal medicine and chemosynthetic pharmaceutical research find themselves in a race to develop new medicines with fewer or no side effects for therapeutic or preventive application in illnesses for which causality based medicines are imperfect or non-existent.”*

There is therefore clear scientific evidence for the theories of the traditional systems which address the problem of wellness with the strengthening of the body’s own mechanism to sustain health. The focus is therefore on research on the traditional systems with a view to bring forth wellness as an objective.

## Pomegranate : The 'Super Fruit'

By *Nirmala M. Pieris* \*

Pomegranate (Delum in Sinhalese) the fruit of the *Punica granatum L* belonging to the family Punicaceae, is one of the earliest cultivated fruits. Although pomegranates grew in the wild before the dawn of agriculture, they were one of the first five domesticated crops along with olives, grapes, figs and dates. However, the first archaeological evidence of domesticated pomegranates isn't until around 3000 B.C. at Jericho. Soon after their appearance at Jericho, they turned up in Mesopotamia and Egypt. Spanish sailors brought pomegranates with them on their exploratory sea voyages to the New World and Spanish missionaries are credited with introducing pomegranates into California in the 1700s. Today most of the North American pomegranate crop is grown in the San Joaquin Valley of California. Throughout the Orient, the pomegranate has since earliest times occupied a position of importance alongside the grape and the fig. Believed to be first domesticated somewhere in northern Iran or Turkey or northern India, its true native range is not accurately known because of its extensive cultivation. Pomegranates still occur in the wild and also cultivated in the Mediterranean, Asia, Africa, and Europe and more than 500 cultivars have been named.



Throughout history, this richly-colored and delicious fruit has been revered as a symbol of health, fertility, and rebirth. Some cultures also believed it held profound and mystical healing powers. Still others chose to use it in more practical ways, as a dye or decoration. The pomegranate has deep roots in both biblical and Judaic history. In fact, many scholars debate whether the apple in the Garden of Eden was in fact a pomegranate! The pomegranate's irresistible appeal and legendary medicinal properties have also made it the subject of countless myths, epics and works of art, from Raphael and Cezanne to Homer and Shakespeare. Many Italian Renaissance fabrics boasted the pattern of cut pomegranates.

Ancient Romans not only enjoyed the succulent flesh of this fruit but also used the skins in the process of tanning leather due to the high amount of tannic acid in the skins. Perhaps due to the fruit's princely blossom crown, it has gained distinction as a royal fruit. Although not documented, the deep red color of the pomegranate pips may have also given rise to the naming of the garnet gemstone.

The fruits are borne on a multi-stemmed shrub or large tree, as high as 20 or 30 feet, that produces suckers from the base. Deciduous shiny green leaves are opposite, or in whorls, approximately 3/8 to 4 inches long. The orangish-red flowers have a red tubular calyx. The fruit has a leathery skin, usually deep pink or red. The inside of the fruit has white spongy tissue that creates spaces filled with sacs or tart pulp and seed. The fruit's thick astringent sour rind was used formerly in medicine and tanning. Crushed together with pomegranate flowers it is made into a beautiful red dye.

In Sri Lanka the trees are cultivated in home gardens especially as a medicinal plant

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and as a fruit tree with no fruit crop having medicinal value as that of pomegranate. The most suitable districts for cultivation are Hambantota, Puttalam, Mannar, Anuradhapura, Jaffna and Moneragala.



A large pomegranate holds about 800 seeds, which are surrounded by scarlet pulp filled with juice. The juice can be very sweet or sour, but most fruits are moderate in taste, with sour notes from the acidic tannins contained in the aril. The jewel-like, glassy red units, called arils, are compartmentalized between cream-colored membrane layers. The membranes are not good to eat, but the seeds won't hurt you. Although some folks think they have to spit out the seeds, it is not necessary.

## Nutrients and Phytochemicals

Pomegranate is one of the most nutritious fruits you can eat. Pomegranate juice is high in fibre, low in calories, high in vitamin C and has substantial amounts of potassium which is important in sending nerve impulses as well as releasing energy from protein, fat, and carbohydrates during metabolism. One pomegranate provides about 40% of the daily requirement of vitamin C. The fruit is also a rich source of folic acid and vitamins A and E. Pomegranate fruits contain high levels of antioxidants in the form of polyphenols, a potent form of antioxidants. The most abundant polyphenols in pomegranate juice are the hydrolyzable tannins called ellagittannins formed when ellagic acid binds with a carbohydrate. Other phytochemicals include polyphenolic catechins, gallocatechins, and anthocyanins. One pomegranate contains three times the antioxidant properties of red wine or green tea and is also higher than in most other fruits. The juice, rind, and oil from seeds also contain isoflavones similar to the ones in soy.



## Volatile Flavor Constituents

The volatile constituents of pomegranate were determined by Yamagami and Umamo by extracting individually the seed and rind of the fruit and submitting to instrumental analyses using GC/MS and multidimensional GC/MS, and to aroma extract dilution analysis (AEDA). The analysis of the extract led to the identification of 75 and 116 compounds for the seed part and the rind part, respectively. (*Z*)-3-Hexenol predominated in the extract of both parts, accounting for approximately half of the total volatiles detected. The components with high flavor dilution factor in AEDA were



(Z)-3-hexenal, (Z)-3-hexenol, 2-aminoacetophenone, BETA.-damascenone, and 3-(methylthio)propanal. The presence of 2-methoxy-3-isopropylpyrazine in the extract of the rind was found to be mainly responsible for the characteristic earthy-note of this part of fruit

### Medicinal Uses and Indications

The fruit has been used as a folk medicine for thousands of years. More recently, it has been promoted as a "superfood" that can relieve symptoms of many diseases. The bark, fruit, root, and rind of the pomegranate tree are used medicinally in Asia and the Middle East, but in the West the fruit and its juice are more often the parts being studied.

In laboratory tests, pomegranate has demonstrated antiviral, antibacterial, and antioxidant properties. But there is not yet strong evidence that it works in humans to treat or prevent any condition. In addition, there is some concern that pomegranate juice might

interact with medications (much like grapefruit juice does), making some less effective. The fruit and seed are used in modern medicinal preparations. In some traditional folk remedies, the rind and root or bark may also have been used, but they contain potentially toxic substances and should be avoided.

Because it is high in antioxidants and other nutrients, some people think that drinking pomegranate juice regularly may help prevent cancer. There is no specific evidence of that, however. In test tubes, pomegranate extracts made from juice, rind, and oil slow down the reproduction of cancer cells and may hasten their death. Some extracts also help reduce blood supply to tumors, starving them and making them smaller. Most studies have focused on breast and prostate cancer cells. In one other study, pomegranate juice extract given to mice slowed down the progression of lung tumors. However, most of these studies have been in test tubes or in animals, not humans.

Pomegranate's high antioxidant content has also made it a contender for treating heart disease, although studies have so far been small and mostly conducted either in test tubes or animals. Pomegranate juice appears to protect LDL ("bad") cholesterol from damage. Some scientists think that damage to LDL cholesterol causes plaque to build up in arteries, so stopping the damage might help keep arteries clear. One study of mice with atherosclerosis found that pomegranate juice slowed the progression of plaque formation and a few small studies in people found that pomegranate juice improved blood flow and kept arteries from becoming thick and stiff. However, more and better studies are needed to determine exactly what benefit pomegranate juice might offer.

Flavonols (a kind of polyphenol) similar to the ones found in pomegranate fruit have been suggested as treatments for osteoarthritis. Osteoarthritis occurs when the cartilage in joints wears down and causes pain and stiffness. Researchers believe flavonols can help block inflammation that contributes to the destruction of cartilage. In test tubes, pomegranate extract blocked the production of an enzyme that destroys cartilage in the body. The results were promising; however, more studies and studies that look at the effects in humans are needed.

This fruit is being touted as a miracle drug for aging, Alzheimer's, cancer, heart disease, arthritis and even protecting unborn babies from brain injuries. It cures about anything that can ail an aging senior citizen. Over the years the health benefits of pomegranates have been reviewed and discussed with both favorable and inconclusive health benefit results. Eating this fruit can be a daunting task when trying to get past the tough skin and hundreds of seeds inside the fruit. Those who do not have the time or patience to deal with eating a pomegranate have turned to drinking its juice to obtain antioxidant benefits.



Pomegranate is very often used in indigenous medicine in Sri Lanka where the rind of the fruit is dried and powdered and given for dysentery and for chronic bowel complaints. The bark of the root of the tree is considered as a specific cure for tapeworms. The leaves boiled with water are commonly used for eye ailments and the flowers are used to relieve sore eyes.

### What's all this Hype about a little known and rarely seen Fruit?

As well as being achingly fashionable, pomegranate martinis were served at the Oscars and Jo Malone's new fragrance is called 'Pomegranate Noir'. While most of the Jo Malone fragrances are based around a single note, Pomegranate Noir comes as a surprise given its relative complexity containing notes of plum, raspberry, pink pepper, patchouli, frankincense and spicy woods. Apple, Pomegranate and Biscotti are three new fragrances by the house of Marc Jacobs announced for 2010 in Splash Collection available in limited number. Pomegranate Splash is characterized by purple nuance, while its composition is characterized with accords of fresh and juicy exotic fruit.

Pomegranate is now a color, there's a band named Pomegranate and even a blog called Pomegranate afternoon. It's now a popular decoration for table displays. In May 2005, President George W. Bush even brought it up in his meeting with Afghanistan President Hamid Karzai, suggesting they grow these trees rather than poppies. In 2001, the San Jose Museum of Art presented a monumental installation entitled Pomegranate Wall as the centerpiece and highlight of a photo exhibit by noted artist Catherine Wagner. The wall, an 8 x 40 foot curved arc dramatically displayed a series of interior images of a pomegranate.



### Pomegranates are in Everything.....

In early days pomegranates were eaten raw or made into a beverage, but these days pomegranates are in everything, from iced tea to breakfast cereal, to jams to cup cakes and sauces. The whole seeds can also be added to soups and stews and it is perfect in stuffing, salads, and great with fruit salad. It has become a popular ingredient for mixed drinks, ice cream, sorbets, punch and even bottled water. The pomegranate fruit, the extract, the powder from the seeds, the oil, and even powder from the skin of the fruit is being used to create a wide range of beneficial cosmetics for women of every skin type and ethnic background. Creams, body butters, body polishes, lotions, fragrance oils, shower gels and makeup are just a few of the products currently available in health food stores. In Sri Lanka, pomegranate body beauty products are available at Odel, Mind, Body and Soul. Pure oil or extract from pomegranate fruit is also available in the market and can be used to hydrate skin and prevent wrinkles. So there's a lot of hype here, but clearly a lot of substance, too as pomegranate is an "Antioxidant superpower".

So, whether you crunch fresh pomegranate seeds or drink the juice, or use it on your body. Feel guilt-free as you enjoy each delicious mouthful or enjoy the products on your body you're doing yourself and your body much more than a favor!



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There is the basic 20th century fact that we live in a world where ignorance of science and its methods is the surest road to national disaster

*(Aldous Huxley (1894-1963))*

POLITICS and RELIGION are obsolete.

They should be replaced with SCIENCE and SPIRITUALITY.

*Jawaharlal Nehru.  
Lecture to SLAAS,  
at University of Ceylon, 1962*



# The Technology of Vanilla Production

By R.O.B.Wijesekera

## INTRODUCTION

Vanilla is derived from the harvested bean of a plant of the orchid family (Orchidaceae). The vanilla vine, (*Vanilla planifolia*), has to be artificially pollinated as the toxic nature of the orchid is inimical to the usual natural live pollinating insects. The bean when raw has no odour or flavour characteristics, and the development of its attractive flavour is totally dependent on its post-harvest technology<sup>1,2</sup>. Thus post-harvest curing is one of the most important aspects of commercial vanilla production<sup>3,4</sup>. The methods of curing used nowadays are variations of the original Bourbon Method. Quite apart from the genetic nature of the cultivated vanilla beans, the curing process is crucial to the eventual quality of the vanilla. It is not only dependent on the efficiency of the conversion of the original content of the precursor of vanillin to vanillin itself, but also on the generation of the many trace compounds which comprise the eventual flavour profile. The science and technology of the production of vanilla is a complex process and recent research has enabled some salient features to be identified.



## STAGES OF THE TECHNOLOGY

There are seven major steps in the processing of vanilla which are identified as the following:

- Harvesting of the Beans
- Sorting/Grading
- Blanching
- Sweating/Fermentation
- Sun drying
- Indoor drying
- Seasoning
- Sorting & Packaging

### • Harvesting of the beans

The vanilla pods are ready for harvesting after approximately 6-9 months – that is after the artificial hand pollination. The beans are harvested manually and singly just as they are deemed to be mature and entering the period prior to ripening. The noticeable feature is that at this stage the beans change in colour from the deep green to a lighter yellowish tinge. If delayed, the beans begin to ripen and split. The fully mature beans are easy to pick, detaching easily from the bunch when lifted in an upward direction. Immature beans are not too easy to pick and pressure on them will cause it to fracture at the stalk. Regular attention will be needed if the picking is to be made when only mature beans are harvested. The green beans have no odour and hence the next stage of the technological process must commence not later than 6-8 days following harvest.

### • Sorting/ Grading

The grading and sorting is of prime importance and the appearance and the size of the beans is the main consideration. As a general pattern in the tropical regions such as Madagascar, where the vanilla production since the days of French colonization had reached high levels, the grading parameters are such as the following:

Beans of around 15 cm in length, which are uniform in girth are of the best grade. Beans between 10-15 cm come next, and anything below that mark are third grade. The beans after grading are washed and cleaned by wiping.



- **The Blanching**

The graded beans are then subjected to blanching which process helps to destroy unwanted organisms. This is carried out by immersing the beans in hot water. (60°-70° Celsius). The beans are generally transferred to a basket made of cane or bamboo and dipped in the bath of hot water for varying periods of time. The best beans are dipped for 4-5 minutes and the lower grades for briefer periods. The periods are determined by trial.



- **Sweating / Fermentation**

The blanched beans are transferred promptly to wooden boxes lined with thick cotton cloth for the sweating stage and allowed to remain thus for 3-4 days. At the commencement of this stage the beans will be at around 50° Celsius or just below. The beans will gradually attain a brown colour and begin to give out the characteristic odour of vanilla.

- **Sun Drying**

Now the beans with the characteristic odour and colour of vanilla are spread out on



clean mats or bamboo or wooden tats over a clean blanket, and placed in the hot drying sun for around 3-4 hours.

The process of sun drying and sweating is alternated. After the first sun drying the beans now in bundles are placed back in the sweating box for further conditioning. Here too, the optimum time period has to be worked out by trials. Generally between 10-12 days are used for the best quality of beans and less for those of sub-quality. By this time the beans would have got to a rich brown colour with wrinkles along their sides as they lose about half their original weight. The aroma would also have reached high proportions indicating the end of the complex curing process.

- **Indoor drying**

This stage, which in reality is an extension of the curing process involves the spreading of the beans detached from their bundles on racks in well ventilated rooms where the temperature is ambient not more than 30°-35° Celsius and the relative humidity around 70%.

The time period of this process of slow drying and conditioning would be around 20-30 days, again the optimum time being worked out by trials.

Following the conditioning, the beans would have developed their attractive brown colour with ribs alongside and with a flexible leathery texture. The aroma would now be at a maximum. The moisture content of the beans are then around 30-35%.

## • Seasoning

The beans are again re-bundled in about 200g per bundle tied with a light string. The bundles are then placed for seasoning inside wooden or plastic boxes lined with wax paper, when in time they will be ready for packaging and release to the markets.

## DEFICIENCIES OF THE TECHNOLOGY

From a purely scientific standpoint this technology is clearly derived from the traditional process. It has had scientific intervention where some improvements have been made over the years, but there are deficiencies which may be enumerated as the following:

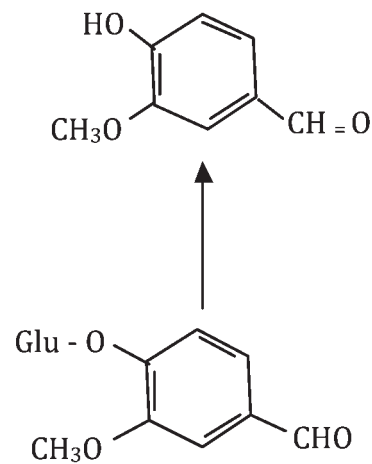
- Component stages of the technology are not clearly understood in terms of their biochemistry, enzymology, and mechanism of flavor formation.
- The process of sun drying is subject to the vicissitudes of the prevailing weather conditions and so is difficult to standardize.
- There are no efficient controls in directing the process of curing and as a result variation in the content of vanillin can be expected.
- The process has the disadvantage of being extremely dependent on skilled labour and problems of unhygienic conditions can add their dimension of complications.

Accordingly a systematic scientific study of the process as has been done recently, brings about an understanding that can greatly improve the currently applied process and add a dimension of consistency.

## THE SCIENCE BEHIND THE CURING

The curing process described above in various stages is able to convert the completely odorless vanilla beans to the commercially known vanilla with its characteristic odour.

The enzymatic conversion of the primary precursor, Glucovanillin, which is the compound present in the raw bean, into glucose and the odourful Vanillin, is the primary stage and the major one in the curing process.



Recent studies<sup>2,3</sup> reveal that the conversion comes about by the action of a single endogenous glucosidase, namely beta-glucosidase. Anatomical studies on the vanilla bean, shows that the bean possesses a triangular cross section with a central cavity which houses the seeds. Each angle surrounding the seeds is lined with tubular papillae or hair cells. The cavity itself is bordered by a placental region or lamellae. Glucovanillin, (which is a sugar molecule attached to the spare phenolic hydrogen on the vanillin molecule), and the enzyme beta-glucosidase are located in the central part of the bean. The transformation of Glucovanillin to Vanillin is dependent on the de-compartmentalisation, or the cellular breakdown that occurs during curing, which enables the enzyme beta-glucosidase to react with the glucovanillin. Varied pretreatments to facilitate this conversion are now the subject of scientific studies.

Several research studies<sup>5</sup>, involve the effects of natural senescence, the effects of pre-freezing of the beans followed by thawing, and the effects of hot water blanching on the cellular disassembly of whole vanilla beans. The focus has been to:

- Evaluate the degree of tissue disruption.
- Evaluate the degree of enzyme driven hydrolysis
- Estimate the activity of the endogenous beta-glucosidase during the various treatments.

The degree of gluco-vanillin hydrolysis was proportional to the extent of cellular disruption. Natural senescence, and the Freeze-Thaw sequence, were found to result in maximum cellular disassembly, while hot water blanching was found to be relatively less effective.

These are leads to technology improvement. Overall, researchers have found that the interventions that precede the stages of fermentation are crucial in order to effect significant disruption of the tissues, and thereby generate a higher yield of vanillin in the bean. The hydrolysis of glucovanillin to vanillin, (which is the key biochemical reaction generating vanillin and hence the rich odour of the bean), is dependent on the pretreatment and the fermentation.

There are also other considerations that complicate the issues. Although scientifically both natural senescence and the freeze drying and thawing interventions are effective in tissue disruption, practical considerations prevent these methods from being of any use in the large scale production. Hence other methods have to be considered if the technology must be improved.

The final vanillin content of processed vanilla beans is dependent on the following factors:

- The initial content of glucovanillin in the mature raw bean. ( This could depend on genetic as well as climatic and agronomic factors)
- The extent of the tissue disruptions engineered by the interventions prior to the fermentation stage.
- The extent of conversion of glucovanillin to vanillin during the fermentation stages.
- The temperature fluctuations during fermentation.
- The biochemical changes that may occur post fermentation.

Using the technique of HPLC, researchers of Firmenich have been able to monitor the conversion of glucovanillin to vanillin under closely controlled conditions. They found the glucovanillin content of mature vanilla beans to be in the range of 35-45 m.Moles per 100g dry weight of tissue. A 98% glucovanillin to Vanillin conversion could be achieved by fermentation under optimum conditions giving a vanillin content of 32-41 m.Moles. This would correspond to a vanillin content of 4.2 to 6.2 g/100g dry weight of bean. It is noted that Vanillin is formed during the early stages of the fermentation process and

accumulates over the time period. There other sugar-bound phenolic constituents of the vanilla bean such a guaiacol and p-cresol and the phenols are released enzymatically in analogous fashion. An N-heterocyclic, namely Indole, appears at the early stages of fermentation and reaches a maximum after an hour, and disappears after 7 hours. The transient formation of indole can be monitored using GC-MS techniques which monitor the formation of vanillin and the changes during the transfer from Glucovanillin to vanillin.

## EXTRACTS OF VANILLA.

The main growing areas for Vanilla are widespread viz: Madagascar, Comores, Uganda,, Mexico, India, Indonesia and Papua New Guinea. Whereas in commerce, Vanilla beans are classified in terms of physical characteristics, such as colour, length, and vanillin content, extracts can be classified in terms of more elaborate chemical characteristics. They are also deemed to possess specific organoleptic properties which are described as creamy, fruity, smoky, and caramelic notes by those in the art of sensory evaluation. There is a wide variation in the parameters concerning the beans from different origins; but the Vanillin content is around 2%.<sup>8</sup>. The extract of vanilla beans lends itself to better quality control. Extracts are made using ethanol and water and continuous circulation of the solvent. Often beans of all grades are used in the extraction process. Analytical control is exercised by the use of HPLC and the ratios of the minor constituents are important in this respect. Despite the importance of vanilla extracts as flavouring ingredients, there is little information on the relationship of commercially available grades with the analytical parameters and the minor constituents. The technology for the commercial production of extracts remains as information which is in the private domain of the major producers.

## CONCLUDING OBSERVATIONS

The flavor of Vanilla is complex as are indeed all flavours and do not depend on just a single compound. Over 250 compounds have been identified in the flavor of vanilla, from a variety of geographical locations, with Vanillin the dominant feature<sup>6,7</sup>. Studies on the biochemical reactions following the stages of curing could give leads that would enable technological

improvements to be made. There are a large number of compounds in trace quantities that contribute to the finer flavor characteristics of a given vanilla, and could account for the geographical variations. The chemical interactions in a complex technological process may have their say in flavor development. For example the Maillard Browning Reaction may give rise to volatiles with flavor characteristics. The technology of vanilla production is largely a field exercise and conducted mostly in developing countries and not in planned factory settings. It bears the characteristics of an Agrotechnology and the attendant drawbacks. The application of process controls, then become sacrificial to the situation. Some precautionary measures to ensure quality have been identified and recommended<sup>4</sup>.

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We are not a superior species because we can make weapons to kill, but because we are permitted the luxury of SCIENCE . It is wisdom that we lack when we use it to wage war.

*John Lenihan*

## Smoking a vicious mass killer – says the WHO.

According to the World Health Organisation, tobacco is the second major cause of death in the world. The WHO contends that tobacco is responsible for the deaths of 5.4 million people annually. If current patterns continue this figure is expected to rise to 8 million by the year 2030. It is now believed that nicotine residues on indoor surfaces can react with gases in the air to give rise to toxic and cancer-causing substances. The current research sheds new light on the dangers to third parties from smokers in closed environments. Hugo Destailhats, of the Lawrence Berkeley National Laboratory in California explains that cigarette smoke residues absorbed on surfaces indoors such as carpets, wall paper etc., react with gases in the air to produce even more dangerous cancer-causing substances. Tobacco specific nitrosamines (TSNA's), originating from tobacco smoke absorbed onto indoor surfaces was known as "third hand" smoke. Now the new research shows for the first time that the nicotine residues absorbed on surfaces can react with atmospheric species such as nitrous acid gas providing yet another source of TSNA's. This fact is of particular concern as children are in special danger in indoor surroundings where smoking is indulged in. Thus the dangers of "third hand smoke" in the case of children exposed to it is put at around twenty times that of adults in view of the habits and practices of children and their intimacy with household carpets and absorbent furniture upholstery.

WHO warns of these dangers and suggests that education be directed to minimize the indulgence in the smoking habit and to reduce it especially in closed environments. This danger impacts on the developed world as well as the overcrowded developing world, and calls for government attention as well as that of social organizations.

# Shilajit : The Ayurvedic Miracle?

By Dilmani Warnasuriya

## Introduction

Shilajit is a commodity not known to most people except perhaps Ayurvedic or traditional medicinal practitioners. It is mainly used in the traditional Indian system of medicine, and is said to be a "rasayana" material (rejuvenative), which could increase longevity and a material that is said to enhance strength, stamina and even provide stress relief, which allows it to be known as an Adaptogen as well. Evidence of its use as a potent drug as far back as during the Indus civilization has been long established. In fact, adherents of Hindu traditional medicine consider it to be a panacea of all ills, a wonder medicine in short. The number of diseases believed to be cured by shilajit, is unimaginable, but traditional uses primarily focus on diabetes and diseases of the urinary tract, with edema, tumors, wasting, epilepsy and even insanity coming a close second. Many of these claims, although generally accepted, have yet to be clinically established, but considering the confidence displayed by its many users on the efficacy of this commodity, surely, this is an area which deserves more research?

## What is Shilajit?

This is a question that has no clear cut definitive answer. Physically it is a gummy, blackish brown, humus rich substance, bituminous in nature, and rich in minerals. It is a mineral pitch exuded from steep mountain crevices of, particularly the Himalayas, extending from Arunachal Pradesh to Kashmir; also in Afghanistan, Nepal, Bhutan, Pakistan, China, Tibet and U.S.S.R., in altitudes from 1000 - 5000 m. The earliest beliefs were that Shilajit was an exudate of mineral rocks. In fact the name Shilajit in Sanskrit means "sweat of the rock", "conqueror of mountains and destroyer of weakness". However, several other schools of thought prevail as to its origin.

Shilajit is also known by several other names, Silajit, Silaras, Silajitu among others. In English, it is known as Vegetable asphalt, Jews pitch, Asphalt or Mineral pitch. Shilajit is exuded from rock crevices due to the action of

strong heat of the sun, and thus, is generally seen during the hot summer months. Folk lore has it that Shilajit was discovered by monkeys, who inhabited the high mountain peaks during the summer months. The longevity, energy and intelligence displayed by monkeys were believed to be due to the ingestion of this substance, and this led to the villages consuming it, and reporting significant improvements in health, which accounted for its widespread use. It seemed to give them more energy, relieve digestive problems, increase sex drive, improve memory and cognition, improve diabetes, reduce allergies and basically improve the quality and quantity of life. In fact, according to some ayurvedic scripts, there is no disease that cannot be cured by it.



Raw Shilajit

## Nature of Shilajit

Wide controversies exist on the nature of Shilajit. It is considered to be both plant and mineral and it is only recently that chemical studies are being conducted on it. One view is that Shilajit is derived from vegetable sources, and the sap of the plants comes out as gummy substance from rocks due to heat.



Natural terrain of shilajit

Others consider it to be composed of humus and organic plant material that has been compressed by layers of rock mixed with microbial metabolites. In the early years, Shilajit was regarded as a bitumen (asphalt) or mineral resin, or as a plant fossil exposed by elevation of the high mountains. Following upon this, and with more research, it is now believed that the latex rich plant *Euphorbia royleana*, Boiss., which grew abundantly in the mountainous region was responsible for much of the organic constituents of Shilajit, which was also gummy in nature. Yet another plant, *Trifolium repens*, (white clover) in the family Leguminosae, grasses, legumes, Bryophytes, and algae growing in the vicinity, was also said to contribute to the organic matter of this substance. What is now apparent is that the vegetation around the area plays a significant role in contributing to the consistency of Shilajit.

Shilajit obtained from different regions have different compositions, depending on the type of rock, altitude, atmospheric conditions, pH and moisture conditions, and most importantly, as reported, the vegetation around the rocks.

## Chemistry of Shilajit

Studies have shown that shilajit has an organic mass of over 80%. Both a humus fraction and non humus fraction have been identified. Chemical investigations have revealed the presence of a number of organic acids like fulvic acid, humic acid, hippuric acid and their salts. Some benzoic acid is also said to be present although there are conflicting results regarding its quantity. Besides these, a special group of compounds known as benzopyrones, triterpenes, phenolic lipids and small tannoids have also been identified, in addition to several minerals, gums, albuminoids and traces of resin.

The primary active ingredients in Shilajit have been shown by many researchers to be Fulvic Acids, Dibenzo-Alpha-Pyrones, Humins, Humic Acids and trace minerals, although some maintain that Benzoic acid is the most important constituent. These are produced by microbial action on humus. Fulvic Acid molecules are "carrier" molecules as they carry other nutrients with them. The standardization of Shilajit commercially, is based on the quantity of fulvic acid. The chemical formula, structure and characteristics of fulvic acid have been determined by Nuclear Magnetic Resonance Imaging (NMR). This "carrier" action is responsible for part of Fulvic Acids health benefits. The Fulvic Acids will actually transport the Dibenzo Alpha Pyrones, and trace minerals into the body. The trace minerals are needed as cofactors for enzymes, and play important roles in bodily functions. The Dibenzo Alpha Pyrones are able to pass the blood brain barrier and act as a powerful antioxidant protecting the brain and nerve tissue from free radical damage. It also inhibits the enzyme Acetylcholinesterase, which breaks down Acetylcholine. This will increase the levels of Acetylcholine. Low levels of Acetylcholine are associated with Alzheimers, poor memory and concentration. Shilajit, obtained from different sources, has now been standardized on the basis of its major organic constituents. The authenticity and therapeutic quality of Shilajit is identified by the inclusion of oxygenated dibenzo alpha pyrones.

Shilajit is a clear candidate for modern analytical quality control methodology using techniques such as HPLC/UPLC and the technique of fingerprint assays.

## Pharmacology

Modern clinical research conducted on animals has confirmed some of the claims made by ayurvedic physicians, with regard to the efficacy of Shilajit as an anti diabetic, as having anti stress effects and also its efficacy as an antioxidant and aphrodisiac. However, the claim made by some Ayurvedic practitioners that Shilajit could cure any bodily disorders have yet to be substantiated

*Some of the ailments which have been substantiated through animal studies are as follows.*

- Analgesic activity: Aqueous suspension of an authentic sample of shilajit was found to have significant analgesic activity in albino rats..
- Anti-inflammatory activity: Aqueous suspension of an authentic sample of shilajit was found to have significant anti-inflammatory activity. This research supports the use of shilajit in Ayurvedic medicine for rheumatism.
- Anti-ulcerogenic activity: Shilajit treatment produced decreased ulcerogenicity in rats. This finding supports the use of shilajit for peptic ulcers.
- Anxiolytic activity: (anti-anxiety activity) The results indicate that shilajit has significant anxiolytic activity, comparable qualitatively with that induced by diazepam (valium)
- Nootropic activity: (enhancer of learning acquisition and memory retrieval) Shilajit can be regarded as a nootropic agent in view of its facilitatory effect on retention of acquired learning and is a modern equivalent consistent with its use as a medha rasayana in Ayurveda
- Nutritive Tonic: The body weight of the rats was found to be significantly greater in the rats taking shilajit compared with a control group.

*Some of the ailments which have not been substantiated yet by research*

- Cardiac depressant action:
- Effect on the Cardiovascular system:
- Smooth and Skeletal muscles:
- Effect on Central Nervous System:
- Bronchial asthma:

## Types of Shilajit

Apart from the organic constituents described above, Shilajit also contains several mineral constituents, including gold, copper, silver and iron. In the Ayurvedic text, Charak Samhita, four types of Shilajit have been identified, based on their origins.

Gold Shilajit (red color)
Silver Shilajit (white color)
Copper Shilajit (blue color)
Iron Shilajit (blackish brown color)

Shilajit containing iron is said to be the most effective for most ailments

## Processing of Shilajit

Proper extraction is very important to guarantee a consistent high level of active ingredients, removal of inactive substances, removal of harmful free radicals and mycotoxin producing fungi and fungal toxins. Good quality Shilajit is then standardized to guarantee consistent levels of the active ingredients.

## Conclusions

Shilajit is available in several countries as a stand alone product as well as in ayurvedic formulations, and in patent medicines. However, many extravagant claims are made by unscrupulous traders, and sales are made with products resembling shilajit but adulterated with gums, rock soil and plant debris. Consumers should therefore use their discretion when selecting the product, and ensure that the product is genuine. Labelling of the product should indicate its authenticity.

What is called Science today consists of a haphazard heap of information, united by nothing

*Leo Tolstoy*





Commercial preparation

At the same time, with all the unconfirmed reports of its miraculous curing properties, researchers should conduct investigations into alleged properties, and determine its efficacy, rather than consigning it to obscurity in time to come, as is the case in many ayurvedic preparations .

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Each citizen should play his part in the community according to his individual gifts.

*Plato (437 -347 BC)*

Men do less than they ought, unless they do all they can

*Thomas Carlyle  
(1795 -1884)*

# Piper Betle : A Green Healer From The Backyard

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## INTRODUCTION

*Piper betle* Linn. (S. Bulath, Engl. Betel vine) belongs to the genus *Piper* of the plant family Piperaceae<sup>1</sup>. Over 700 species of plants belonging to the genus *Piper* are distributed in both hemispheres<sup>2</sup>. Of these, about 30 species have been recorded from India<sup>1</sup>. In Sri Lanka, 18 species of genus *Piper* are found and out of them three are endemic<sup>3</sup>.

Betel leaves have been traditionally used for chewing purposes along with other condiments. Colombo, Gampaha, Kalutara, Kurunegala, Kegalle, Ratnapura, Matale and Galle are the main betel cultivating districts in the country. In addition to a wide and well spread domestic market, betel has gained a significant position in the export market since 1974. Betel industry at times faced severe problems of depressed prices and restricted export market. The main cause for this situation was that Pakistan, our major buyer of betel reduced the volume of betel imported from Sri Lanka<sup>4</sup>.

Although betel vine had been cultivated in Sri Lanka for centuries, very few research activities have been carried out on it except studies on antiaphrodisiac activity<sup>5</sup>, antifertility effects of male rats<sup>6</sup> and antimotility effects on washed human spermatozoa<sup>7</sup>. However, *P. betle* grown in other countries have shown to possess antimicrobial<sup>8</sup>, gastroprotective<sup>9</sup>, wound healing<sup>10</sup>, hepatoprotective<sup>11</sup> and antioxidant<sup>12</sup> activities. In order to minimize the negative impact on the betel industry in Sri Lanka and safeguard both growers and economy of the country, there was a necessity to study the chemistry and important bioactivities of Sri Lankan grown betel leaves and develop value added products

based on these activities. For this purpose the current study was undertaken using betel leaves of Sri Lanka. The investigations and their results are summarized below.

## MORPHOLOGICAL AND ANATOMICAL STUDIES OF BETEL <sup>13</sup>

Six cultivars of *P. betle* Linn namely:- Galdalu, Mahamaneru, Kudamaneru, Ratadalu, Nagawalli and Malabulath, were used in the study. The morphological and anatomical features including parameters such as stomatal index, leaf length to width ratio were similar in Kudamaneru, Mahamaneru, Galdalu Ratadalu and Nagawalli, but were different in the cultivar Malabulath.

## CHEMICAL CONSTITUENTS AND PHYSICO-CHEMICAL PROPERTIES OF THE ESSENTIAL OIL <sup>13</sup>

### Chemical composition

According to the chemical constituents present in the essential oil, cultivars of Galdalu, Mahamaneru, Kudamaneru, Ratadalu and Nagawalli were similar and they were categorized under common betel. The volatile oils from the leaves, stalks, stems, fruits and roots of common betel and leaves of Malabulath were also analyzed. The major constituents of the essential oil of common betel were safrole (48.7 %) and chavibitol acetate (12.5%). The major compound in Malabulath oil is allylpyrocatechol diacetate (34.0%) which is the third major compound in common betel oil (11.3%). Further, p-cymene, 4-terpineol, safrole, eugenol,  $\beta$ -caryophellene and chavibitol acetate detected in common betel leaf oil were not detected in Malabulath.

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The GC/MS analysis of the essential oil of different parts of common betel indicated that the composition of the stalk oil was different to that of the other parts, as it did not contain detectable amounts of allylpyrocatechol diacetate. The major compound detected in the oil from the leaf, the stem, the stalk and the root was safrole, but in the fruit oil it was  $\beta$ -phellandrene. This chemical composition of the volatile oil of leaves appears to be closer to the betel cultivar Deshawari in India.

The composition of the betel essential oil changes with the maturity of the leaf. It was observed that the major compounds safrole and chavibitol acetate in the leaf were maximum at harvesting stage. Moreover, eugenol and  $\beta$ -phellandrene content decreased with maturity and  $\beta$ -phellandrene contents remained constant after maturity. Allyl pyrocatechol diacetate content increased up to harvesting stage and remained constant thereafter. The study on the variation of the composition of the essential oil with maturity is useful to decide the maturity stage at which the leaf has to be collected for applications which depend on specific compounds. Further, it justifies why the ayurvedic physicians mention the maturity of the plant in drug preparations.

### Physico-chemical properties

The physico-chemical properties of the essential oil of Kudamaneru, Mahamaneru, Galdalu, Ratadalu and Nagawalli too were similar but were different to those of Malabulath. These studies indicate that physico-chemical properties and chemical constituents of the essential oil of malabulath are different to those of others cultivars.

### ANTIMICROBIAL SCREENING STUDIES<sup>13,14</sup>

#### Antibacterial activity

The MIC values of EO against *Escherichia coli*, *Streptococcus pyogenes* and *Staphylococcus aureus* were  $3.12 \times 10^2$ ,  $2.50 \times 10^3$  and  $5.00 \times 10^3$   $\mu\text{g}/\text{mL}$  respectively. On the other hand, MIC values of betel ethanol extract against *Streptococcus pyogenes*, *Escherichia coli* and *Staphylococcus aureus* were  $1.25 \times 10^3$ ,  $5.00 \times 10^3$  and  $5.00 \times 10^3$   $\mu\text{g}/\text{mL}$  respectively.

#### Antifungal study

EO of *P. betle* contained at least three fungicidal compounds and the ethanol extract contained at least one fungicidal compound active against *Cladosporium* sp. Further, antifungal activity of EO was investigated against *Colletotrichum* sp., *Fusarium oxysporium* sp., *Corynospora cassicola*, *Rigidoporous* sp., and *Phytophthora* sp., using the disc diffusion method. All fungi species other than *Phytophthora* sp., showed significant growth inhibition in EO.

### INSECTICIDAL ACTIVITIES<sup>14</sup>

**Mosquito larvicidal assay :** In this study, 43 and 100% mortality was observed with 100 and 500 ppm of EO against late 3rd instar larvae of *Aedes egyptii* respectively within 1 h. Compared to the control, a significant mortality was observed even at lower concentrations, 25 & 50 ppm after 24 h.

**Bioassay for house fly (*Musca domestica*) :** EO (120  $\mu\text{g}/\text{cm}^3$  in ethanol) showed 100% knock down effect and mortality against *Musca domestica*.

**Bioassay for rice weevil (*Sitophilus oryzae*) :** EO at 1, 0.8 and 0.5% concentrations were used in this study. Mortality (100%) was observed in 1% EO solution within 1½ h against *Sitophilus oryzae*.

**Bioassay for *Chrysomya megacephala* larvae<sup>15</sup> :** The 4% and 3% preparations of EO were effective in killing 100% of the larvae of *C. megacephala* within 3½ h, while betel oil at 2%, killed 97% of *C. megacephala* larvae within 4 h. The positive control, mineral turpentine also killed the larvae within 4 h. This shows that betel oil is effective in the treatment of wound myiasis.

**Bioassay for *Chrysomya bezziana* larva<sup>16</sup> :** Larvae of *C. bezziana* are the commonest cause of wound myiasis in some part of the world. With 4% EO, all 1st instar *C. bezziana* larvae were killed within 2 h and the 2nd instar *C. bezziana* larvae were killed within 4 h. The positive control (Asuntol) showed no mortality until 4 h but all larvae were weak from the first 30 min. In the negative control, larvae were mobile and active. Betel EO at 3% killed all the first instar

*C. bezziana* larvae within 150 min and 74% of the 2nd instar *C. bezziana* within 4 h. These results indicate that betel EO of Sri Lanka is an effective larvicide for *C. bezziana* 1st and 2nd instar larvae in vitro.

#### ANTIOXIDANT ACTIVITY<sup>14,17</sup>

The extracts obtained from the leaves of *P. betle* had profound antioxidant activity as judged by TBARS (thiobarbituric acid reactive substances) and DPPH. (2, 2 - diphenyl - 1 - picrylhydrazyl ) scavenging assays. The scavenging effects of *P. betle* extracts on DPPH. radicals increased in the following order: CEE (cold ethanolic extract) > EO > HWE (hot water extract). Further, free radical scavenging effect of CEE was higher than that of synthetic antioxidant, BHT.

In TBARS assay, the antioxidant potential CEE was the best among the *P. betle* extracts tested and this effect was significantly higher than that of both BHT and green tea. Interestingly, the antioxidant properties of *P. betle* extracts including CEE, EO and HWE remained unaltered up to 12 months at room temperature (as evaluated by DPPH. assay). This indicates the potential use of the betel extracts as a natural antioxidant in food industry. However, when *P. betle* extracts were exposed to the elevated temperature (200 °C), the antioxidant property was significantly reduced (CEE and EO by 4 fold; HWE by 3 fold). Even after exposure to the elevated temperature the antioxidant potential of CEE was higher than that of BHT. In an attempt to introduce betel as a natural antioxidant, the CEE was incorporated into fats (cake margarine) and oils (coconut and palm oil) separately and determined the rancidity in terms of PV (Peroxide Value). The results showed that PV were significantly lower in CEE treated samples than the BHT treated samples.

#### ANTIDIABETIC ACTIVITY<sup>18</sup>

Overall results showed that both HWE and CEE of *P. betle* leaves of Sri Lanka possess marked hypoglycemic activity (when tested in fasted normoglycemic rats) and antihyperglycemic activity (by improvement of glucose tolerance in normoglycemic rats and by lowering the blood glucose levels in STZ - induced diabetic rats). Further, hypoglycemic potential of HWE and CEE were comparable to that of

tolbutamide, the reference hypoglycemic drug of the sulphonylurea type. This ability of lowering the blood glucose levels of STZ - induced diabetic rats also suggests that *P. betle* extracts have insulinomimetic activity. It is possible that HWE may act as a insulin secretagogue and/or sensitize insulin receptors as proposed for some plant extracts. HWE failed to significantly inhibit glucose absorption from the lumen of the intestine. However, HWE provoked accumulation of glycogen in the liver and the skeletal muscle. This is another peripheral mechanism through which HWE exhibits its antidiabetic activity.

#### GASTROPROTECTIVE ACTIVITY<sup>19</sup>

A study to evaluate the gastroprotective activity of HWE and CEE of *P. betle* leaves was carried out. Three doses (200, 300 and 500 mg/kg) of both extracts were evaluated for gastroprotective activity against ethanol induced gastric ulcers in rats. Oral administration of HWE and CEE provided marked dose dependent and significant protection against gastric damage caused by absolute ethanol. The gastroprotective effect of HWE was comparable to that of CEE. Further, the gastroprotective activities of the highest dose of both extracts were significantly greater than that of misoprostol, the reference drug. Gastroprotective effect of *P. betle* was not mediated via inhibition of acid secretion in the gastric mucosa but by increasing its mucus content.

#### ANTINOCICEPTIVE ACTIVITY<sup>20</sup>

The CEE and HWE of betel leaves have antinociceptive activity as evaluated in the hot plate test and in the tail flick test in rats. This indicates centrally mediated antinociceptive activity of the plant extracts against the acute pain. Both 200 and 300 mg/kg doses of *P. betle* extracts markedly reduced the licking time in early and late phases of the formalin test in a bell shaped dose response curve. The betel extracts induced interruptions of both phases of this test suggesting possible impairments of sensory transmission and release of inflammatory mediators. The opioid receptor, antagonist naloxone, blocked the antinociception induced by the CEE suggesting that the antinociception was mediated through opioid mechanisms.

## SAFETY PROFILE<sup>21</sup>

There were no treatment-related deaths or morbidity with CEE (1500 mg/kg/day) and HWE (1500 mg/kg/day) even after following sub-chronic (14 days) and chronic (42 days) oral treatment in rats. Further, CEE and HWE treated rats showed normal food intake, water intake and consistency of faeces and colour of urine of CEE and HWE treated rats were similar to that of the controls. Furthermore, neither extracts of *P. betle* induced any overt signs of toxicity, stress or aversive behaviors. Neither extracts significantly changed any of the renal and hepatic functions or hematological parameters or morphological characters of tested organs in rats. In conclusion, this study shows that both cold ethanolic and hot water extracts of Sri Lankan betel leaves and leaf stalk were safe following sub chronic oral administration to rats.

## DEVELOPMENT OF VALUE ADDED PRODUCTS FROM BETEL

Based on the results of scientific investigations several value added products such as betel toothpaste, mouth wash, face cream, shampoos, instant betel quid, betel pellet, anti-tick lotion, anti-tick powder and a wound healing cream were developed in order to enhance the marketability of betel and improve the industry. Clinical trials conducted using the wound healing cream on dermatitis patients revealed that treatment was significantly effective on skin rashes. At present a clinical study is in progress to evaluate the antidiabetic activity of spray dried powder of betel hot water extract.

## CONCLUSIONS

*P. betle* is a common plant in Sri Lanka and it can be easily cultivated in any part of the country. This scientific study revealed for the first time the chemical constituents and multifaceted activities of betel cultivated in Sri Lanka. The *C. megacephala* and *C. bezziana* larvicidal activities of betel as well as its antidiabetic and antinociceptive activities have been reported for the first time. The fact that betel leaves have multiple activities such as antimicrobial, insecticidal, antioxidant, antinociceptive, gastroprotective and antidiabetic as revealed in this study indicates that *P. betle* is a good candidate for future herbal drug preparation and development. This hitherto untrapped vast potential of betel grown in Sri Lanka, if properly harnessed,

will safeguard the betel industry of Sri Lanka, enhance the livelihood of large number of villagers depending on betel industry and introduce novel herbal products and drug preparations to the market.

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If he had had Rosalind Franklin's excellent X-ray diffraction images, it might have been Linus Pauling not Crick & Watson in the history books.

*E Walker with reference to Linus Pauling, in Chem World Feb.2011, p.38*

#### More Science

The answer to many of the world's most intractable sociological problems is more science not less.

*- Rodney Townsend (EvcheMS)*

## Foods That Can Steer Moods

By Anissa

Consumers of today are a fastidious lot. Surveys reveal that there is now a demand for foods that determine moods. This means that consumption of such foods may trigger off emotions that can cause changes in moods. If the person is stressed the foods and the flavour associated with them, could make the person calmer. There is indeed a yearning for such foods which understandably would be much more welcome than drugs which may have the same effect.

Having endured an extra long spell of cold weather consumers may long for a food with a flavour which may enable them to revive memories of tropical climes. The new twist it appears is for Flavours that can create changes of mood. Moods that are reminiscent of cheerful times of excitement, of relaxation and contentment, can be brought about by special flavours and such flavours in foods are the new trend. Further down this same trend consumers demand, foods effecting health, and those that will give the consumer a distinct feeling of well-being. Accordingly, neurologists and food scientists have been jointly busy researching the relationship between what we eat and how our food intake affects the human psyche. They are not surprised when they reach the conclusion: "You are what you eat".

A combination of hormones determines how good we feel, Serotonin endomorphins are the key substances that generate feelings of happiness, calmness and wellbeing while also inducing healthy sleep. In a sense they act as natural pain-killers or tranquilizers. The human body produces serotonin, and endomorphins and the natural process of their production can be stimulated by materials absorbed from the daily food intake. Tryptophan is an amino acid that is a regular ingredient in foods, which is crucial for the production of serotonin. Foods that contain this amino acid in abundance are the following: - Cheese, Lean Meat, Fish, Pulses of all kinds, and nuts. Tryptophan is absorbed by the brain particularly when the foods that contain it are consumed along with carbohydrates,

as the latter are converted to sugars in the gut. An enhanced blood sugar level stimulates the production of insulin which in turn makes the nerve cells in the brain receptive to Tryptophan. The brain converts this to serotonin the hormone that is responsible for feelings of wellbeing.

If a man would register all his opinions upon LOVE, POLITICS, RELIGION and LEARNING, what a bundle of inconsistencies and contradictions would appear at last.

*Dean Jonathan Swift.*

You bring me the deepest joy that can be felt by a man whose invincible belief is that science and peace will triumph over ignorance and war, that nations will unite, not to destroy, but to build, and the future will belong to those who have done the most for suffering Humanity.

*Louis Pasteur (1822- 1895)*

# Evaluation of Herbal Drugs in Man

By Chandani Rupasinghe

Interest in traditional medicine is increasing in leaps and bounds with the modern trend of 'going natural' in everyday life. This is further strengthened by the growing realization that many modern medicines have troublesome harmful side effects.

WHO defines traditional medicine as the sum total of knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures that are used to maintain health, as well as to prevent, diagnose, improve or treat physical and mental illnesses.

Traditional medicine is a system that is handed down from generation to generation, and enriched by other contemporaneous medical systems. A traditional medical practitioner collects raw materials, processes it, and dispenses it to patients. Personal experiences of several generations are arguably equivalent to the information obtained by scientific studies. The myriad experiences gained by traditional medical practitioners enable them to maintain reliable standards of safety and efficacy. Therefore there is no need for evaluation of traditional medicinal products that have been tested over such a very long period of time.

But today traditional medicine is undergoing a change from personalised treatment given by an individual medical practitioner, to a commercial system of manufacture of large quantities of herbal products, as a result of the recent increase in the popularity of herbal medicines and consumer demand worldwide. Although the safety and efficacy of some herbal products are not well established, the public is often led to believe that, being natural products they are inherently safe and effective. In modern medicine new products are accepted for use by after undergoing clinical trials. This approach can be used also to establish safety and efficacy of herbal medicines. There are several WHO publications available giving guidelines and research methodologies to evaluate the safety and efficacy of herbal medicines.

In this article I wish to discuss some methodologies for evaluation of herbal medicines based on the WHO guidelines.

The purpose of doing a clinical trial is to: establish the safety and efficacy of a medicinal product, to examine a new indication claimed for an existing herbal medicine, a proposed change of dose or formulation; or route of administration.

There are four phases in the evaluation of medicines

- Phase 1 studies are designed to determine the safety of increasing doses of a medicine in healthy volunteers.
- Phase 2 studies evaluate the efficacy of a range of doses of a medicine in patients
- Phase 3 studies are expanded trials of safety and efficacy.
- Phase 4 is the post marketing surveillances.

Unlike modern medicines, which are recent discoveries, herbal medicinal products have been used over period of several centuries. For this reason the point of entry of a herbal medicine into a particular phase in a clinical trial will be determined by the nature and history of the herbal medicine being studied. Pharmacopoeias such as Ayurveda and Sidha, or scientific journals and or research-based articles on traditional medicines provide extensive evidence on safety of herbal products.

According to the WHO guidelines, Phase 1 studies in healthy volunteers are generally unnecessary for herbal traditional medicinal products if they can provide sufficient evidence to prove safety. If there are scientific publications providing validated evidence regarding dosages, Phase 2 can also be omitted for those herbal products. However, going to Phase 3 directly in herbal medicines has the disadvantage that, if a particular tested dose is found to be ineffective, the scientific community may

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*A. D. Chandani Rupasinghe, is a R & D Scientist attached to Link Natural Products*



conclude that all doses of the medicine are ineffective, even though a larger dose may in fact be effective. Consequently, patients may be denied possible benefits of the medicine. Hence determination of an effective dose in a Phase 2 trial is important even with herbal medicine.

In instances where traditional use and the experience of a herbal medicine have not established its safety and efficacy, these criteria need to be determined by Phases 1 and 2 clinical trials. Whether evidence of safety and efficacy are required for a new herbal product formulated using well known herbs will depend on the available scientific publications on the individual plants. However, it is necessary to remember that new preparative methods may alter the chemical, toxicological and pharmacological properties of traditionally used herbal medicines.

Although several designs are available for clinical trials, well-established randomised controlled clinical trials provide the highest level of evidence for efficacy. Controls can be used in clinical trials to answer different questions. The use of a placebo, whenever possible, is desirable, because it generates better quality of evidence. However, the use of a placebo control is not always possible as it involves ethical issues as well as technical problems. Especially in the case of a herbal medicine that has a strong or characteristic smell or taste, as is the case in herbal products containing certain essential oils, placebo control is not practically possible. In addition, patients who have been treated previously with the herbal medicine under investigation that has a characteristic organoleptic property cannot be randomised into a control group because they will instantly identify the medicine. If a herbal medicine in question has a strong flavour, any placebo substance with the same flavour may have similar functions. In such instances, WHO guidelines recommend the use a low dose of the same herbal medicine as a control. Alternatively, a positive control, such as a well established treatment, can be used.

The selection of a control group depends on the objectives of the study. A control group may be a non-treatment group, a group using different doses of the same product, a low dose group, or sham or placebo group. Placebo controlled trials help to distinguish placebo effects from the actual pharmacological effects of

a tested medicine. Even with aromatic herbal medicines placebo controlled trials may be possible with certain formulations, such as tablets and capsules.

Blind assessment is a critical component of the conventional evaluation of therapeutic interventions. For blind assessment to be truly effective, both the active and control formulations must have similar colour, smell, taste, size and weight. Blinding will protect the internal validity of a clinical trial by preventing knowledge of treatment conditions from influencing outcome or its assessment. Blinding is difficult or impossible with certain herbal medicinal products. However, to minimise bias introduced by non-blinded treatment, it is essential that the assessment of the primary outcomes of the study should be blinded.

In view of the foregoing assessment of efficacy, traditional medicines may be substantially different from the efficacy assessment of modern medicine. Widespread acceptance of modern medicinal products by the scientific community as well as the public, is because of their proven safety and efficacy established by controlled clinical trials. Scientifically validated clinical trials of herbal medicines will benefit not only the society at large, but also the herbal medicine industries.

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# Adaptogenic Herbals and A New Research Paradigm

By R.O.B.Wijesekera

## Introduction.

The ability of certain medicinal plants to produce holistic effects of well being has been known to the practitioners of the ancient systems of medicine, in China, India, the Latin American region, Russia, Japan, and even the herbalists of Europe. Records have it that the phenomenon of plants possessing an overall effect of benefiting health was even recognised by the bush medical men of Africa, the "Guerrisers" -- as they are referred to in the Francophone African countries.

It has been well known as a phenomenon in the medicinal practices of the ancient Maya and Inca civilizations of Southern America, and the herbal traditions of northern America.

In all of these traditional methods, the belief existed that the vitality and well being of body and mind was best achieved by maintenance of health, rather than by the treatment of ill health. It is a philosophy that is dominant in our Ayurvedic System of Medicine as well.

Modern medical science only began to identify the concept, in the period that immediately followed the end of the World War II. It was in 1947 that the Russian physician and pharmacologist Nikolai Lazarev and his pupil Israel Brekhman<sup>1</sup>, noted that certain species of plants were helpful in enabling the patient to "adapt" to changes in the surroundings and different forms of stress encountered by the human being. They called these plants "adaptogens."

In 1968 Brekhman and I.V.Dardimov gave a formal definition of "Adaptogens" as follows:

An "adaptogen" should have the properties of :

- Being safe and therefore non-toxic to the recipient.
- Producing a non-specific response in the body, that is, an increase in the power of resistance against multiple stressors including those resulting from physical, chemical and biological agents.

- A normalising influence on physiology, irrespective of the direction of change from physiological norms caused by the stressor.

Accordingly, adaptogenic herbs should be those that would not be toxic in normal doses, produce a defence response against stress, and have a normalising influence on the body.

Today a plethora of scientific studies have demonstrated that the human body is able to survive and adapt to changing conditions with the aid of "adaptogenic herbs".

## Utility & Usage of Herbal Medicines

The World Health Organisation has estimated that 80% of the world's population rely on plant-derived medicines for some aspect of their primary health care. In the United States and in other countries of the industrialised world too, there has been a renewed interest in herbal medicines during the past two decades. This is due to the increased costs of prescriptive drugs, their noted after effects, and the growing popularity of drugs derived from natural sources. Examples of where herbal medicines have led through the agency of modern research, to enhance the armoury of modern medicine are now legion<sup>2</sup>. Plant-derived substances remain the basis of a large proportion of commercial medications employed today for the treatment of diseases such as: heart disease, rheumatoid arthritis, high blood pressure, pain, asthma, and respiratory problems. New medicaments enter the medical armoury each day from the base of herbs used in the traditional systems of the world. For example, today's gold standard for the treatment of malaria comes from a plant used in the Chinese system of medicine called "Quinghasu" or in terms of botany: *Artemisia annua*.

Of the over 750,000 flowering plants of the world only a few, relatively speaking, of those which have been used in traditional medicine have been studied. One drawback has been the approach of modern research, which hitherto has sought to obtain a single active ingredient. The ancient systems however, implicitly bring

out in their theories, that all of the plant ingredients play an operative role in the curative process. The concept of synergistic interactions between the constituents of the plants used has been too much for modern science to investigate up until the present time. Now however, given the dramatic developments in analytical methodology, many of the theories and concepts of the traditional systems are being validated in terms of modern science; although prejudices and scarcity of funding remain inimical to smooth research efforts. Most of the research on the validation of herbal medicines is being carried out in Germany, Japan, Russia, Taiwan, China, the USA, and India. In Germany, which is currently a kind of world leader in phytomedical research, about 600-700 herbal medicines are already available in modernised standardised form and are prescribed by German physicians. Furthermore the German research school of Hildebert Wagner and his colleagues in Munchen, lead the research effort on multi-component drugs from herbal sources, now being recognised as the basis of the oncoming paradigm change in therapy.

In Sri Lanka for example, ignorance of herbal medicines and prejudice among medical practitioners, prevent widespread usage of even established Ayurvedic preparations in particular by western qualified physicians. Thus Sri Lankans are mostly deprived of the wide array of established phytomedicines which are standard therapies available in Europe. One such notable example is the use of the derivatives from the Camomille flower which is a well established remedy in Europe, particularly for inflammatory conditions.

### **Characteristics of Adaptogens and research trends**

Adaptogenic herbs are deemed to have the ability to balance endocrine hormones and the immune system. Recently, Davydov and Krikorian<sup>3</sup>, have attempted to examine the concept of an adaptogen with reference to the plant *Eleutherococcus senticosus*, referred to in common parlance as: Siberian ginseng. In terms simplified for the prospect of understanding, by western medical practitioners, they use the definition of the Russian scientists of an adaptogen, as being any substance which exerts effects on both sick and healthy individuals by remedying any

dysfunctions and without producing any unwanted side effects. These authors conclude that in so far as specific pharmacological activities are concerned, there are valid arguments for equating the actions of Adaptogens to agents: "that have activities as anti-oxidants and/or anti-carcinogenic, immunomodulatory, and hypo-cholesteroletic, as well as hypoglycaemic and choleric agents."

This cumbersome terminology in itself exemplifies the problems of attempting to rationalize the significant concepts of traditional medicine in terms of those of modern medicine. Altogether the dimensions of the framework are a gross misfit. What is lost is the concept of the adaptogenic substance as one that enables the human body itself to rectify any irregularities or imbalances within the body - a concept that is well established for instance in Ayurvedic medicine and Chinese Traditional medicine. These authors also show little understanding of the concept of immune-modulating action of agents used in many established systems that are based on Phytotherapy. The term signifies a concept that clearly exists even though understanding of the mechanism of action is yet to this day not fully clarified. Measuring the pharmacological effects of the secondary metabolites so far isolated from a plant such as *Eleutherococcus* is no satisfactory means of assessment of its total effect as these authors presume. It is a common yet typical error of the western oriented methodology, in attempting to evaluate traditional remedies.

A commendable new and a rigorously scientific approach to evaluate some of the concepts of traditional preparations has been initiated by Wagner and his colleagues<sup>4,5</sup>, who describe the methodology as a two stage process:

1. The gradual withdrawal of the dogma of mono-substance therapy and a transition to what he terms: multi-drug therapy; and;
2. A paradigm shift to a new kind of multi-target therapy which is directed towards the defence, protective, and repair mechanisms of the body, rather than the direct killing of damaging agents, such as a tumour or pathogenic organism.

Wagner and colleagues conclude thus: **“The first results obtained in recent years show the therapeutic superiority of many plant extracts over single isolated constituents.”**

Thus the explanations of complex actions of Adaptogens and their respective mechanisms will be clarified as more scientific research of the type exemplified by Wagner and his group gets underway<sup>6</sup>

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## Chemistry and the origin of life

It was in the year of the Coronation of the present British monarch Queen Elizabeth II, that the New York Times published on its front page the experimental results of a young scientist Stanley Miller. Miller a student of Professor Urey, had published an observation that a mixture of methane, ammonia and water vapour when subjected to an electric discharge gave rise to amino acids, the fundamental building blocks of nature. It was just after this that DNA double helix structure was discovered. The news was enthusiastically applauded as it was felt that a clue to the origins of life was just round the corner. Now over a decade later not much progress in that direction has been made.

The Sri Lankan born celebrated Professor Cyril Ponnampereuma researched at NASA on the same subject and described the formation of a relatively complex amino acid which he thought was guanidine by elaborating the process of Miller on a much more elaborate scale. But time has passed by and there is less and less interest in the subject of the chemical origins of life.

A recent book edited by Piet Herdewijn and M.V.Kisakurek: Origins of the Chemical Approach, Wiley-VCH, 2008, cites several leading authors who discuss the various theories on the subject. The summary of knowledge is expressed thus:

“Every theory on the origins of life has at least as many vehement detractors as fervent supporters”. Evidently the attraction to the subject has waned but could this be the result of the drying up of funds available for conducting esoteric or “blue skies” research?

#### Post Script:

Nonetheless, there recently comes the news that a scientific team in La Jolla California’s Scripps Research Institute has created a test tube based system of chemicals that display life like qualities such as self replication, mutation, and survival of the fittest. The researchers, Gerald Joyce and Tracey Lincoln, believe that their perpetually replicating RNA enzymes take us a step nearer understanding the origins of life on earth and as to how life may one day be synthesized in the laboratory.

Source: J. Urquhart: Chem. World. 2009, 22.

I had a little bird  
Its name was Enza  
I opened up the window  
And in Flu Enza

Clare Sansom in

Chem World 2011 p.45

## Dr. Hildebert Wagner - The European Icon of Herbal Drugs Research

By R. O. B. Wijesekera



Dr Hildebert Wagner is one of the pioneering exponents of modern scientific research into herbal drugs. During the past half a century he has remained a prominent exponent of the worldwide research effort on plant derived medicines and Natural Products. His research publications are phenomenal and his seven major books in the field are recognized by many researchers as landmark contributions to the subject in which he remains to this day a very active research performer and a deep source of knowledge.

Dr Wagner studied pharmacy in the 1950s and researched in the field of pharmacognosy which subject was then in its infancy. His contributions included the pioneering text on the Analysis of Plant Drugs, which is a guiding part of every natural drugs laboratory

worldwide. The author first met Dr Wagner in the charming Italian city of Citta di Castella in 1983 during a Meeting on Medicinal Plants. Then we had the chance to meet again in Vienna when the author was the Special Technical Adviser for UNIDO and invited Dr Wagner to assist in conducting a meeting with African delegates to develop a policy for augmenting research and application of plant medicines in that continent. Dr Wagner was open minded but knew of the obstacles that faced researchers in third world countries. He made the observation that unless the subject of Phytotherapy was taught in a Medical course there was little chance of practitioners using phytomedicines. He, like his American colleague Norman Farnsworth has been very helpful to researchers in third world countries. Together with Farnsworth he initiated the International Journal of Phytomedicine, which is a great step forward in extending the knowledge on herbal drugs. His latest approach is the new paradigm of multi-drug therapy to eventually replace the long standing use of mono-drug therapy - an idea inspired by his own conviction of the efficacy of herbal drugs. He has put it thus: "Phytomedicine research has a good chance of contributing to new strategies (for treatment of disease), through the development of new and better drugs for an evidence based and rational therapy." Dr Wagner is a member of many international bodies and a contributing adviser to almost all prominent journals on Natural Products, Phytochemistry and Ethnopharmacology. His research programmes include many investigations into Ayurvedic and Traditional Chinese Medicine. Dr Wagner presently serves as: Emeritus Professor at the Institute of Pharmacy, at the Ludwig Maximillian Centre for Pharmaceutical Research. Munich, Germany. He was for several decades a Professor of Pharmacognosy and Director of the Institute of Pharmaceutical Biology in Munich.

## Vietnam & the International Pepper Community.



### Source<sup>1</sup>

In recent times Vietnam has become the largest producer as well as the largest exporter of the spice Pepper (*Piper nigrum*.)

It is logical therefore that Vietnam has now joined the International Pepper Community (IPC). The IPC as a body was established under the aegis of UN-ESCAP in 1972. At the beginning it was called the Pepper community and at first its members were India, Indonesia and Malaysia the then leading producers and exporters of the spice. When Brazil joined its membership in 1981 the name was changed to International Pepper Community. Later in 1998 Sri Lanka too was admitted as a full member. Today with Vietnam as its newest full member, the IPC accounts for about 95% of the entire world production and export of the spice.

### GREED ?

We cannot survive as a species if greed is privileged and protected.....

- Vardana Siva

## Standardized Extracts of Wine

Source (ibid)

Standardized extracts of wine are now being presented in a new way. The standardized extracts are especially designed and developed for the Food and Beverages Industry with a strong focus on global reach. The new product is known as: Classico & Contempo. The product is made from natural wine after de-alcoholisation.

The product offers the benefits of standardized features such as consistency of quality and will not be subject to the seasonal and other variations found in wines. For the Food and Beverages Industry the Classico & Contempo range of products offers the possibility of use in a wide range of applications such as soups, sauces, entrees, and dressings; it also offers prospects in the flavouring of desserts and confectionery. Since the product contains no alcohol customers need not have liquor licenses to retail the product range and it can be labeled as a wine extract (de-alcoholised).



<sup>1</sup> Asia & Middle East Food Trade : 2005, vol.22 (111) p.10

## Link Natural Introduces Earth Essence Herbal Cosmetic Range

Earth Essence, the new array of herbal cosmetics manufactured by Link Natural Products, was launched in style during an elegant ceremony held on December 7, 2010 at Galle Face Hotel. The occasion was graced by fashion gurus and leaders in the fashion world, celebrities, media and other well-wishers.

In keeping with the 'going natural' theme, guests obligingly complied with the dress code, and arrived clad in the rich and vibrant combination of earth tones. Soft lights and music, soothing colours and the whiff of a fragrant aroma throughout the hall added to the mystique of the occasion.

The evening commenced with a few words from the Chairman of the company, Dr. Devapriya Nugawela, when he welcomed the guests to this momentous occasion.

Three models, adorned in stylish white, showcased the herbal cosmetic range to the audience following upon a dance act, to herald in the models.

The celebrations continued well into the night, with the guests being given the opportunity to test the efficacy of the products on offer.

Products offered in this range include haircare, bath and body care, skincare and hand and feet care. Special skin care products, effective against ageing, stretch marks and sun burn, as well as an exclusive spa range, which includes body massage oils, essential oils, oil blends and carrier oils are also available. The main ingredients for the earth essence range of products are herbs and plants such as, Gotukola, Turmeric, Sandalwood and Wenivel, which have long been proven to have health giving properties. The products are thus manufactured by combining knowledge derived from traditional Ayurveda systems with modern sciences. Stringent quality control measures are adopted in all stages of manufacturing and production to ensure that customers are provided with the best of the best

in herbal care. The products will be sold at Link Natural's flagship outlet, Soul Centre, located on the ground level at Crescat Boulevard.



Dr. Nugawela giving the welcome address



Ms Nalika Jayasuriya,  
Head Personal Care Products



Launch of Products

# Link Natural Wins Best Corporate Citizens Award



Chairman, Link Natural Products receiving the Award



Senior Staff from Link Natural Products

In recognition of its activities towards the country and society, Link Natural Products clinched the Best Corporate Citizens Award for 2010 for its commitment to improving the educational facilities in schools in the Dompe region. Recognizing the fact that parents would always opt to send their children to either Colombo schools or the bigger schools in the area, Link Natural Products took it upon itself raise the image of Dompe schools by improving its

educational facilities and initiating personality development programmes for students. The main aim of these activities was induce the parents to enrol their children in schools in the area, and to engender the students with positive attitudes and confidence to enable them to compete and survive in modern society. Towards this end, LNP undertook to support seven selected schools in the area which included primary and secondary Vidyalalyas and Siyhane National school.



# New Herbal Products from Link Natural

## Samahan Balm

Balms have long been used as an external palliative for headaches, cold symptoms and upper respiratory ailments, joint and muscle pains, both in the indigenous and modern systems of medicine. Several local and imported balms are available in the market as an over the counter product.

With the rapid growing knowledge of the herbal industry acquired by the research staff of Link Natural, the researchers introduced yet another innovative herbal product, the Samahan Balm. The balm is a special formulation comprising of specially selected aromatic oils and herbal extracts in a suitable base. The constituents used have long been tested and proven in traditional systems of medicine, for their efficacy in alleviating cold related symptoms and in relieving pain in joints and muscles. Using these selected oils in their purest form, Link has come up with a special formulation to give a quick action balm having a soothing effect, and smooth consistency.



The active constituents of the balm are derived from several plants, including *Ocimum sanctum* (Maduruthala), *Alpinia galanga* (Aratta), *Aegle marmelos* (Beli), *Gynandropsis gynandra* (Vela), *Vite negundo* (Nika), *Caesalpinia bonduc* (Kumburu), which have time tested, proven medicinal properties. The essential aromatic oils employed include oils from Wintergreen, Cajuput, Eucalyptus, Pine, Camphor, Citronella, Mint, Clove bud, Black pepper and Pine. These oils are extensively used in other health care

preparations as well for their healing properties and their strong aroma.

The therapeutic effects of the balm are the ability to relieve pain due to the analgesic and counter irritant actions of the constituent ingredients. The balm also acts as a decongestant when used as inhalant after adding to boiling water. Its antiinflammatory action provides relief from joint pains and inflammation, oedema, arthritis and sinusitis. Some constituents of the balm also have anti bacterial properties and can be used for cuts and bruises as well.

Samahan balm is available as an ointment in 3g, 7g 25g and 50 g containers as an over the counter product.

## Link Musclegard

Ailments of muscles and joints is a malady most people are prone to at some time or another in their lives. Aching joints and muscles is a discomfort faced by ordinary folk in particular the ageing. It is also common among active sportsmen and women. Musclegard, a product of Link Natural is specially formulated to address this problem.



Musclegard was first launched by Link Natural in 1998 as an ointment, using known ayurvedic formulations, in consultation with practicing ayurvedic physicians. The Ayurvedic system of medicine is specially renowned for its range of medicinal oils effective against inflammation, fractures, arthritic, rheumatoid and orthopaedic conditions, and the plants used for the oils and 'pattus' had a long history of usage. In the formulation of Musclegard, the dry total extract of around forty plants, used in the preparation of Ayurvedic oils were used with an inert excipient, giving an ointment with an oily texture. It is a topical application and is effective against inflammatory conditions, painful swellings of skin, limbs, muscles and joints. The product was manufactured with strict adherence to quality and consistency, backed by a scientific base. With the advance of science and technology, the R & D team at Link Natural, thought it opportune to reformulate and improve the Musclegard ointment. Thus in 2009, Musclegard was reformulated and launched as a cream, with a change in the consistency. Although the active ingredients remained the same, the cream has the advantage of being less oily than the ointment and is more convenient to use in addition to having better aesthetic appeal to the user.

Link Musclegard is a topical anti-inflammatory cream, having analgesic and muscle relaxing properties, effectively soothing the pain and controlling the conditions that cause the inflammation. Those suffering from muscle and joint ailments will find in the newly re-formulated Musclegard an agent that will give comfort and long lasting relief. The special feature of Link Musclegard is that it strengthens and nourishes the muscles rapidly bringing them back to normalcy.

Link Musclegard is available as an over the counter product, in tubes of 25 g.

#### Tea for Senna.

There was an old man from Vienna who lived upon tincture of Senna. When this did not agree, he took common tea.  
The crafty old man from Vienna

*Edward Leas*

Coming from the Biomedical side of chemistry, my hero is Charles Darwin. With a pair of forceps and a magnifying glass, but with eyes that could see the unseen, a brain that could think the unthinkable, and a heart that gave him courage to fight such fierce enemies as the church, he developed what is probably the most important theory in life sciences - that of natural selection as the driving force in evolution. Darwin could not have foreseen however the endless and huge ramifications of his theory that have revolutionized biomedical research, a revolution that still continues and is as stormy and strong as ever even now, 150 years after his discovery.

*Aaron Ciechanover,  
Chem World Feb 2011 p.39*

It is trite but true that the lessons of History are ambiguous. Nevertheless the history of medicine offers a perspective from which to verify the stubborn survival, through time and change, of the essential attitudes of medicine: a spirit of inquisitiveness into the origins of disease, and a fervent preoccupation with curing or alleviating the suffering disease produces.

*- F. Gonzales-Crussi in A Short History of Medicine.  
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## Oils of Nature, Allured books 2010

Anthony L O'Lenick, Jr., David C Steinberg,  
Kenneth Klein, Carter LaVay

Written by four of the most respected authorities in the industry, this book provides timely and salient information of the composition of the various natural elements available to formulators of personal care products. Oils, waxes and certain esters are included, as well as information on chemical data and other information.

Electronic book available. Instant downloads after purchase

Details on [www.AlluredBooks.com](http://www.AlluredBooks.com)

## Pharmacists Guide to Medicinal Herbs, Smart Publications, 2010

Dr. Arthur M Presser,

In this compendium Dr. Presser discusses the basics of herbal medicine. He looks at the historic and modern day uses of the most widely used medicinal herbs. More technical, phytochemical information is provided for the health professional, or for those more interested in the inner workings of herbs. However, the book is nicely formatted so these sections can be easily passed over. Each section contains a discussion of cautions, where realistic drug interactions, side effects, and possible hypersensitivities are covered.

Dr. Presser's writing style is down to earth and often very entertaining, making his book extremely readable. While this book can be used for reference, it will most likely be read from cover to cover.

### Learning & Teaching

All my courses were devoid of exams. I favored open book or take home exams over standard ones and was not interested in promoting rote learning as rewarding a capacity for memorization.

I wanted students to face the real world fact that time is the most expensive commodity and that to solve difficult problems as quickly as possible one needs to know where to look for the answers

*Carl Djerassi*  
*Professor of Chemistry*  
*Stanford University*  
*(Priestley Medalist)*

There is in truth no such thing as "the man in the street" Each of us is a unique individual with personal traits, habits and characteristics

Life Books.  
Strange but True.

(N.B. Due to an unforeseen technological mix up, the following letters which were received some time ago, are only published now.)

## Extracts from Letter 1

Thank you for another fine looking issue of the LNPD (V.6 Iss 1) . I thought the cover of the issue 5 which was so reminiscent of the old country could not be bettered, but I must say the latest cover comes very close. The very striking red of the nutmeg mace is something one does not forget when one sees it on the tree.

I noticed the correction made to photos of *C. fenestratum* vine. As usual I read the issue from cover to cover and on page 6 the titles of the last photos need to be switched. Am I correct? Also the 2nd photo needs a title.

The mysterious mistletoe brings to mind the work I did in Uppsala Sweden on the toxic proteins from these parasitic plants. When purified, a few micrograms injected into a white mouse kills it in a few minutes due to acute bradycardia.

One interesting point about *Murraya koenigii* is that its dried seed will not sprout if it is just planted in soil. None of the seed I tried sprouted. I am told that fruits have to pass through the gut of birds before they fall to the ground and then sprout with the next rains. Is this factual?

Lakshman Jayawardene

## Extracts from Letter 2

I have great interest for this magazine and like to preserve it in future by binding as a book. Therefore I like to see that nothing is missing in between. Could you please check this for me? The issues I have are as follows:

Vol. 1 Issue 1 , Issue 2 , Vol 2 Issue 1, Vol 3 Issue 1, Vol 4 Issue 1, Vol.5 Issue 1

Ravindra Wijayawardana

## Response

Thank you for your interest in the Link Digest magazine. The missing issues in your set are, Vol. 2, Issue 2 and Vol. 3, Issue 2. We have taken steps to post these copies to you.

You would have already received Vol. 6, Issues 1& 2

## Extracts from Letter 3

(Letter addressed to Dr R O B Wijesekera)

I'm Dr.Kusala Anjana Wijesundera who is currently employed as residential medical officer at AMDA, Ayurvedic Hospital, Boodhgaya in India.

I hope this mail finds you in good health and doing well in your professional field. Actually I got to know about you by going through the Digest of Link Natural Ltd. during last year.

The genuine contribution rendered by you to uplift the quality of Ayurveda created a deeper sense of impression in me about you.

Therefore this special communication is to bring you blessing from sacred land of Lord Buddha to be instrumental in the process of industrial development and continued excellent performance in your esteemed digest.

Dr.Kusala Wijesundara  
Resident Medical Officer  
AMDA Ayurveda Hospital, Bihar, India

# NOTE TO POTENTIAL CONTRIBUTORS

## Link Natural Products Digest

The DIGEST is a popular publication, albeit a scientific one, dedicated to medicinal plants, herbal healthcare and personal care products, essential oils, aromatherapy, herbal therapy and Ayurveda, and related healthcare systems. It is published bi-annually.

The DIGEST welcomes contributions in English in the category of reviews, brief communications, ethno reports in brief, phytomedical and phytochemical communications, book reviews, and reports on safety and efficacy of phytomedicines.

Potential authors may consult the Editor-in-Chief prior to dispatch of communications, reports and reviews.

Authors may submit manuscripts by  
By email to :

**Dr. R. O. B. Wijesekera**  
Editor in Chief  
Link Natural Products Digest  
robw@linknaturalproducts.com

or

**Dilmani Warnasuriya**  
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**By post to:**

Dr R O B Wijesekera

or

Dilmani Warnasuriya  
Link Natural Product (Pvt) Ltd  
P O Box 02  
Kapugoda

Please forward to the editor one original hard copy and a soft copy in the form of a PC compatible diskette (Microsoft Word).

## All manuscripts must include the following :

Title (in brief), author(s), address(es) of affiliated institutions. The authors' names must include initials and/or forenames as required in publication. All papers and submissions are subject to peer review, but the editors reserve the right to regulate the content. No proofs can be sent prior to publication. The decision of the Editor-in-Chief will be final in all matters.

## TEA FOR SENNA

There was an old man of vinna, who lived upon Finecture of Senna when that elide nnot agree, He look common Tea. The crafty old man of Vienna

*Edward Lear*