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IN THE PAGES THAT FOLLOW.....

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EDITORIAL

NEW PRODUCTS AND A NEW FRAMEWORK

The world's economic crisis should serve in the long term to re-frame the moral and ethical value system of the world's nations. It needs to be different, more humane and sensitive to global needs, more conscious of environmental factors, and the consequences of climate change. The new value system must of necessity be more empathetic with the nations of the developing world which include the majority of the world's population.

As far as product development goes there will be new concepts of consumerism to be catered for, with the emergence of a new environmental and eco-responsive conscience. It is expected that a new generation of consumers will be demanding an ethical approach and respect for social impact, together with the need for effectiveness, efficacy, and satisfaction to match. At the same time there should also emerge adequate recognition of the potential of traditional technologies and the role of heritage and culture. Altogether it has to be a return to fundamental values with science as a dominant monitor.

Falsification of the factual position with the intent of securing advertisement points, and the use of sub-grade and suspect "scientific data" needs to be outlawed, and regulated by authentic science. Authenticity, accuracy, and credibility will have to be maintained with the watchdog role being fortified for the sake of the unsuspecting consumer, often deluged by visual media advertising. For example there is currently a boom in the global market for "anti-ageing" products, both medicinal and cosmetic. In the US alone (where such statistics are kept and play an overpowering role), the market demand has increased by an estimated 450% over the past decade, making a turnover of 7 billion US dollars in 2008.

The EU which represents 30% of a global market share of such products is expected to increase at 12% over the next four years.

This area of the product market is one that is amazingly unaffected by the economic crisis, despite the high costs of the products on offer. The question begs itself: is it the customer demand or a reflection of the power and range of advertising sans constraints? Are the claims made based on fact?

There is opportunity here as well as necessity for product surveillance as well as regulatory measures. Such initiatives are desperately needed for customer safety.

PANCHAKARMA THERAPY

" It is easy to sneer at our ancestors – but it is much more profitable to try to discover why they, who were really not one whit less sensible persons than our own excellent selves, should have been led to entertain views that strike us as absurd "

Thomas Henry Huxley 1881.

By VIKRAMA

Introduction

The western concept of treatment of disease is fast moving in the direction of treating the patient in a holistic manner, as in the case of Ayurveda.

In Ayurveda, the concept of good health is a state where the physical body senses and the psyche are in the original or naturally balanced state, with respect to body and function. Although the genetic constitution of the individual, as is now known, defines the basic body and psychic constitution in respect of the biomaterials or *dosas,* the total health is determined by a combination of these as well as the environmental factors. According to Ayurvedic theory every individual constitution has its own unique balance of *Vata, Pitta,* and *Kapha* (VPK). These are the three "humors" or the three organizations, the *"tridosa"* of the individual body system. This balance of VPK is presumed to be the natural order, the relative proportions of the *tridosas* being determined at the time of fertilization. When this balance is disturbed, there arises sickness. So any ailment is the result of an imbalance in the *tridosa* system. Any cure is aimed to restore the balance, or equilibrium. Ayurveda defines wellness as the restored condition of this balance.

Briefly then a balanced order represents the state of health. This exists when what is called *Agni or* the digestive force, is also similarly in a state of equilibrium or in a balanced condition; the bodily humors VPK are in equilibrium; the three waste products: (urine, faeces, and sweat), are produced and eliminated in normal fashion; the seven bodily tissues, *(rasa, raktha, mamsa, meda, asthi, majja, and shukra/arthava,)* are functioning normally; and the mind, senses, and consciousness are working in unison. So it is a very complex and delicate system of multiple equilibriums, the maintenance of which is crucial to health. Disturbance of the state of equilibriums will result in ailments. The VPK and the external environment are in constant interaction. Ayurveda teaches that incorrect practices in respect of diet, habits, lifestyle, as well as incompatible combinations of foods, seasonal changes, and stress factors can all alter the balance of VPK. According to the nature of the cause V, P, and K, can undergo derangement affecting the *agni* and producing toxins *(ama).* When *ama* enters the blood stream, toxemia will result. This will affect the *prana* (vital life energy), *ojas* (immunity), and *tejas* (cellular metabolic energy). The end result of these disturbances is

disease. So in Ayurveda almost every disease is also seen as some form of a crisis of *ama* (toxicity). So the key to the prevention of disease is to assist the body to eliminate the toxic wastes, and to arrest the further production of *ama*.

Accordingly, Ayurvedic treatment is directed to introduce a proper cleansing routine such as Panchakarma, administer palliative therapy, and to correct faulty life styles and diet.

Procedures of the Panchakarma Therapy

Management of disease in Ayurveda initially includes eliminating toxic waste materials from the patient's body. Panchakarma therapy (PKT), is designed to perform this function; that is to facilitate the exit of toxic material, *(Dosas)*, prior to the administration of a palliative therapy. It is postulated that no palliative therapy is effective without this cleansing procedure. Accordingly, PKT is believed to cleanse the body tissues and bring about the harmonious balance of the three main neuro-humors, the *tridosas*, ie. VPK. to obtain sustainable benefits. It is therefore an important procedure in the Ayurvedic management of disease.

PKT is essentially a five-component system which is carried out in three stages as follows:

1. Preparatory - *Purva karma*
2. Main Cleansing Procedure - *Pradhana karma*
3. Post Procedures - *Paschata karma*

1. Purva Karma

The stage 1 is mainly to facilitate the effectiveness of PKT procedures. This stage includes the following:

* Digestive juice stimulants - *dipana*
* Digestant - *pachana*
* Oleation - *snehana*
* Sudation - *swedana*

Digestive juice stimulants are agents that directly stimulate the *agni* or biofire. These agents will permit undigested or partially digested food in the system to be absorbed even without the digestive enzymes. The preparations are administered for around three to four days along with ghee. There are a variety of digestants and digestive juice stimulants in the Ayurvedic pharmacopoeias, and some of these are in the form of powders or *choornas*, and some are as pills or "*gulis*."

Satisfactory normal digestion is restored when the clinical symptoms such as lightness of bowels, regular evacuation, well formed stools, improved appetite and regular need of drinks, are noted.

The *snehana* or oleation procedure is to enhance the lubrication within the body system. It can be administered externally by rubbing oil preparations on the skin, the scalp, or by oral route, via enemas, or nasally as inhalations, or even as drops put into the ear. Oleation agents may be derived from animal sources such as milk, fish oils, butter, ghee, or from vegetable sources such as sesame and mustard oils. Internal agents include preparations with extracts from plants.

External oleation therapy is generally by whole body massage. Seven different postures are prescribed for the massage, each posture lasting for a few minutes and the massage is carried out for a total of 15-30 minutes depending on the case. It is important that the massage be done in a direction away from the heart over the wider areas and in a circular motion over the joints and lower back. Massage therapy is believed to result in the following benefits:-

* Improvement in sight
* Sound sleep
* Improvement in skin quality
* Inducement of suppleness of the body by softening muscles, ligaments and tendons
* Revival of body weariness
* Retardation of the ageing process

Oil massages also makes the superficial and deep tissues soft and supple facilitating the removal of stress.

Various oil preparations are prescribed in the pharmacopoeias for the purpose of massage. These are essential oils and extracts of plants in carrier oil.

Sudation therapy is the therapeutic induction of sweating. A variety of methods are employed for this. One is the direct application of hot material such as warm towels, use of steam inhalation, medicated vapours, and fomentation. Its purpose is to remove the oily toxic material released by the previous treatment.

Scientific evidence for the effectiveness of these procedures is now available[2]

2. *Pradhana Karma*

These constitute the main group of cleansing procedures which are designated in Ayurveda as **Pradhana Karma.** They constitute the following :-

* Emesis Therapy - *Vamana Karma*
* Purgation Therapy - *Virecana Karma*
* Enema Therapy - *Vasti Karma*
* Errhine Therapy - *Nasya Karma*
* Blood release Therapy - *Raktha Mokshana*

These main cleansing procedures will now be briefly described.

Vamana Karma.

This is the Emesis therapy whereby the toxic contents within the stomach, including *kapha* and *pitta* dosas, are expelled through the mouth. This in modern terms eliminates the mucus. Following the preparatory procedures, this is the first stage of the PKT. At first the patient is administered oily and fatty foods for a 24 hour period after which the emesis is induced. As the initial intake in the morning, gruel mixed with ghee in milk, with a decoction of liquorices or sugar cane juice is administered with plenty of milk. Emesis is affected by administration of a mixture of herbs as a paste in ghee. The emetic is usually a paste made of the seeds of *Randia dumatorum, Acorus calamus,* with rock salt and honey. The physician carefully monitors the emesis so as to be satisfied that complete purification has occurred and that complications do not take place. Possible complications are indicated in the texts which also give indications of the completion of the therapy.

Virecana Karma

When excess bile or *Pitta* is secreted and allowed to accumulate in the gall bladder, liver and small intestine, it tends to result in rashes, skin eruptions, and attacks of biliousness vomiting, nausea and even jaundice. Ayurveda combats these conditions with therapeutic purgation. This is a specific procedure for the elimination of the *pitta dosa,* through the rectal route. There are many constraints and contraindications specified before this procedure could be adopted and the physician is directed as regards its proper usage in the Ayurvedic texts. The dosage and type of drug to be administered is to be predetermined according to the patient's condition and needs. There are procedures prescribed for the conduct of the therapy as well as for the assessment of the successful completion of the treatment. Purgative drugs are grouped according to the mode of action and degree of purgation. The texts advise the physician on their proper administration. Detailed advice is also available with regard to the diet of patients during and after the administration of purgation procedures.

Vasti Karma

Vata is considered as the most active principle in pathogenesis and the main etiological factor in the manifestation of disease. It is the motive force behind the elimination and retention of faeces, urine, bile and other excreta.

The predominant site of *Vata* is the large intestine. The mucous membrane of the colon is related to the outer covering of the bones (periosteum), which nourishes the bones. Therefore any medication introduced rectally goes into the deeper tissues and corrects disorders caused by *vata.*

Ayurvedic enema involves the introduction of herbal preparations in a liquid medium into the rectum. These include medicated oils, decoctions and pastes made of herbs. Oils used are sesame oil, castor and coconut oil.

Vasti which is specific for *vata* disorders is presumed to relieve chronic bowel disorders, gastric disorders, pains in the joints and back, gout, and rheumatic conditions.

Nasya Karma

This is the nasal administration of medication. It serves to eliminate bodily humors accumulated in the sinus, ear, nose, throat, and head areas, via the nose.

There are five basic variations of this technique viz:

1. Inunction or *Navana*
2. Instillation of nasal drops or *Avapeedana*
3. Insufflation or *Dhamapana*
4. Inhalation or *Dhuma nasya*
5. Topical application or *Marsha* and *Pratimarsha*.

This is a kind of gentle massaging of the nose internally as well as externally.

A variety of aromatic medicinal plants are used in this therapy, and the modern version of Aromatherapy may have had a foundation in this methodology.

Raktha Mokshana

This method which appears drastic is skillfully applied from the days of ancient Ayurveda. There are several variations in this technique. One is the bloodletting by the application of leeches. Even the use of leeches, is now being validated with modern science and special leeches are being farmed for the purpose. Hirudin the chemical found in the saliva of a leech has potent anti-coagulant properties.

Blood letting is a carefully practiced art in Ayurvedic medicine. The simple indications are chronic conditions inclusive of hypertension, repeated infections, and circulatory disorders attributable to toxemia. It is also indicated for enlarged liver spleen and gout. It is a result of increased pitta.

Other variations are venesection, or the process of cutting open a vein under the strictest of aseptic conditions, and bloodletting by superficial wounding.

3. Paschata karma

These are the procedures that will follow the main treatment. They are related to lifestyle and diet. They are recommended during and immediately following the various steps of PKT. In brief they are categorized as follows:

* Advise to get adequate rest.
* Avoidance of stressful and strenuous activity.
* Avoidance of chilly conditions
* A mono-diet of ghee and kitchari or gruel
* Resumption of normal food only after the lapse of some time.

The food may not include cold food, drugs and alcohol, flesh and dairy products. Diary products may be resumed after some weeks. During the cleansing process the *agni* takes a rest and the power of digestion is slower as toxins move into the gastrointestinal tract.

Benefits of Panchakarma Therapy

The signal benefit of panchakarma therapy is the cleansing of the body and the removal of toxins which consequently facilitates recovery. The follow-up therapies become more effective as a result. An important issue in the follow up is the management of the patient's diet and lifestyle. In Ayurveda, food habits are part of the therapy itself. Ayurveda claims that it is not just a means of healing but is the science and art of appropriate living and it helps to achieve longevity with a high quality of life. It is claimed that it guides an individual with regard to proper food habits, diet and exercise to maintain the balance of the body's complex systems in harmony with a healthy mind, while preventing disorder and hence disease gaining a foothold in the system.

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Rasakinda *(Tinospora cordifolia)* – An immune boosting Asian Medicinal Plant.

By R.O.B.Wijesekera

Introduction

There are many plant species which are regarded in Ayurveda as increasing the body's immunity to disease, or enhancing resistance to disease itself. "Rasakinda,"-*Tinospora cordifolia* (Willd.) Miers, or Guduchi, or Heartleaf moonseed, is one of the foremost such plants, which are classified in the classical texts of Charaka as: *"Rasayana plants"*, and within this category as the subclass of: *"ek dravya"* or those that may be administered singly in therapy. *Rasayana* in Ayurveda is an interesting concept.

In the text Charaka Samhita it is explained thus: "one obtains longevity, regains youth, gets a sharp memory and intellect and freedom from diseases, gets a luxurious complexion and the strength of a horse…". There are several plants to which "general *rasayana* properties" are ascribed, and there are others described as: "specific *rasayanas*", meaning that they can strengthen specific tissues and organs of the body.

The British Pharmaceutical Codex of 1911 describes the herbal drug thus: (*"Tinospora or Gulancha, consists of the dried stem of Tinospora cordifolia. Myers, (N.O. Menispermaceae), a climbing shrub indigenous to tropical India. The stems are collected during the hot season and dried. The drug occurs in straight or twisted cylindrical pieces and in slices averaging 2cm in diameter, some pieces being much smaller. Externally they are covered with a thin, papery, brown cork, bearing the raised scars of numerous lenticels. The cork readily exfoliates and discloses a greenish cortex longitudinally wrinkled and marked with lenticels. The fracture is fibrous and the transverse section exhibits a yellowish wood with radially arranged wedge-shaped wood bundles, containing large vessels, separated by narrower medullary rays. The odour is not characteristic but the taste is bitter.")*

The Plant *Tinospora cordifolia*

Stems of *Tinospora cordifolia*

Roots of *Tinospora cordifolia*

Leaves of *T. cordifolia*

Ethnomedical Uses of Tinospora

In the Ayurvedic system, this plant is a part of many *Rasayanas*. It has also found uses in modern medicine prior to the advent of synthetic drugs as exemplified by the following:

The United States Dispensatory of 1918, Edited by Joseph Remington, Horatio Wood et. al. states:

Tinospora Br.Add.1900. The dried stem of Tinospora cordifolia Miers, Fam Menispermaceae collected in the hot season has long been used in India as a medicine and in the preparation of a starch "gilacka " or "Palo". It is said to be a tonic, antiperiodic and a diuretic. The Br. Add. 1900 recognised an infusion, viz: Infusum Tinosporae Br.Add. 1900, two ounces to the pint, dose one half to one fluid ounce (15.30ml.) ; a tincture, Tinctura Tinosporae Br. Add 1900, four ounces to the pint, dose one ounce to one fluid drachma, 1.8-3.75 ml. and a concentrated solution Liquor Tinosporae concentratus Br. Add 1900, dose one half to one fluid drachms, dose one half to one fluid drachms, 1.8-3.75 ml.

Tinospora crispa Miers, abundant in the Philippines is similarly used under the name of "makabuhay" which literally means "you may live". It is used as a panacea in cases of general debility, in chronic rheumatism, and in malarial fevers. It is prepared in the same way and given in the same doses as *Tinospora cordifolia*.

The plant drug as well as a tincture prepared from the plant is in the Indian Pharmacopoeia. Much work has been done on the reputed uses of this drug but none have established any relevance to the Ayurvedic uses as the studies have been carried out on the basis of western criteria. The adaptogenic activity of the plant and its effect on the immune system has been established by recent work by Dahnukar and Thatte.

Botany

Tinospora cordifolia is a glabrous, succulent climbing shrub native to India and several countries of the region such as Thailand, Sri Lanka and Burma. It thrives in the region and often attains a great height climbing on the trunks of very large trees such as neem. The bark is grey or creamy white in colour, deeply cleft spirally and longitudinally, with the intermediate space spotted with large, rosette-like lenticels.

The wood is white, soft and porous. When freshly cut the surface slowly assumes a yellowish tinge on aerial oxidation. The branches bear smooth heart-shaped leaves, unisexual greenish flowers which appear in the warm season, followed by berries later. Long threadlike aerial roots arise from branches as well. It releases a viscous sap, yellow in colour with a bitter taste.

Chemistry and Pharmacology

Throughout the twentieth century chemists were interested in the constituents of this plant since its importance in the Ayurvedic system of medicine was recognized. The chemists with access to Indian plants were interested in the isolation of compounds with likely pharmacological interest. Accordingly, several compounds, such as giloin, gilenin, and gilosterol, together with the bitter principles columbin, chasmanthin, and palmarin were isolated in the early 1900's. Following these early chemical studies the more modern methods available enabled the isolation of several other compounds. They included a wide variety of sesquiterpenes and diterpenes, and new norditerpene furan glycosides the Cordiofolisides A, B, and C. In addition recent isolations included the daucane type sesquiterpenes, the furanoid diterpene glycosides, palmatosides S and F, the clerodane diterpenoids, cordioside, tinosponone, and tinocordioside, novel structural compounds such as linosporaside and tinocordiside, several phenylpropene disachcharides, which later were identified as being responsible for the immunomodulatory activities. Several alkaloids related to Berberine have been isolated from the stems and the stem calluses have been shown to be able to synthesize them. There are therefore prospects of obtaining some of the alkaloids by culturing the stem callus. The plant is of so much clinical, chemical and pharmacological interest and is therefore a grave tragedy that by the indiscriminate and non-sustainable use of the plant it is classified as endangered.

Among the pharmacological effects that have been researched, and seems to have been acknowledged as promising from a therapeutic standpoint are the following:

*** Adaptogenic effects**

The aqueous extracts were found to reverse the effects of cisplatin on gastric emptying and normalise the cisplatin induced intestinal hypermotolity. The extracts were also found to normalise the phagocytic function of peritoneal macrophages after exposure of rats to either carbon tetrachloride or horse serum, thus functioning as an adaptogen.

There seem to be no clinical trials yet but the intense research activity on this plant and the improved methodologies of assessment are bound to bear some scientific validation of a plant so well established in Ayurveda over the centuries.

*** Immunologic Effects**

T. cordifolia has been shown to be effective in the treatment of chronic infections and immunological disorders. It appeared to be immunotherapeutic in *Escherichia coli* peritonitis and bacteraemia.

It also improved the surgical outcome in extra hepatic obstructive jaundice by strengthening of the host defenses. The compounds Syringin, cordiol, cordioside, and cordiofolisides A and B were identified as the active principles responsible for anticomplementary and immunomodulatory activities. An Arabinogalactan polysaccharide isolated from the dried stems of the plant showed polyclonal mitogenic activity against B-cells.

*** Anti-diabetic effects**

The stems of this plant find much application in Ayurvedic therapy against diabetes mellitus. Over 30 studies have demonstrated that aqueous, alcoholic and chloroform extracts of the leaves exhibited insulin-like activity. The extracts significantly reduced blood glucose levels in normal and alloxan induced diabetic rabbits. The chloroform extract was the more potent. An aqueous extract of the root too displayed a similar effect. No clinical results are available.

*** Anti-oxidant properties.**

An extract of the root was found to inhibit the lipid peroxidation and superoxide and hydroxyl radicals in vitro.

*** Toxicology**

Several studies have revealed no adverse toxicological effects as a result of administering extracts of the plants to laboratory animals.

*** Hypolipidemic effects.**

Diabetes is often associated with hyperlipidemia. *Tinospora* has been recorded as having hyperglycaemic properties. Evaluation of the plant for hypolipidemic activity on alloxan induced diabetic rats revealed that it reduced serum and tissue cholesterol, phospholipids and free fatty acid levels. Reduction of brain lipids has also been reported from another study.

Plant resources endangered

Tinospora is one of the most utilised plant species in Ayurvedic medicine. It is now considered one of the most endangered species in the Indian region which includes Sri Lanka, Burma, and Thailand as well. Its endangerment is a serious blow to human healthcare especially the poorer people of the region. The IUCN has placed this plant on its endangered list. It is therefore the responsibility of member states of the IUCN to ensure that cultivation of the species on a measured scale is initiated and carried out. Further the indiscriminate and non-sustainable methods of harvesting need to be arrested forthwith so as to save the plant from extinction. Another dangerous feature that has emerged in the supply system of the medicinal plant industry is the mass adulteration of raw material. Producers, industrial and private users should be warned against these malpractices. Whereas producers and processing companies which have access to research and development facilities and modern analytical procedures can identify and battle this scourge, private users are at the mercy of suppliers and supply sources who may indulge in the malpractices. This applies to over a hundred species identified by IUCN as endangered in their "RED LIST" published by the agency.

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A Company Tale of Modern Managerial Efficiency

By Johann de Silva

The New Chairman was a quiet modest guy. Not long after assuming office he sent forth a note to the Personnel Manager which stated quite simply:

"Could you let me know the procedure we follow when recruiting a new temporary employee for our Process Technology Division"

His note coming so soon after he took over as chairman, caused a stir and some consternation. The array of subordinate personnel managers were soon in conference wondering what the new chairman was after? The Personnel manager was unwilling to seek any further clarification, but instead instituted a complete review of the company's current personnel policies and recruitment systems at all levels. Scores of internal memos and reports were written and exchanged.

Finally, a comprehensive report was prepared, complete with computer-generated graphics, bearing an executive summary and recommendations. It was spiral spring bound, with plastic cover and forwarded to the new chairman. It gave details of all the aptitude and intelligence tests applied, all the sources of man-power that were usually tapped, the percentage of applicants that were able to make the grade, the cost of running the personnel department, all illustrated with graphs and modern computer graphics. It also included a complete justification of the practices and policies of human resource management of the company on the basis of good management practices. The new chairman was flabbergasted. He took one look at it and told the Personnel Manager ". Good Heavens! This is a thesis? I note you have recently completed a Ph.D. yourself and the effect it seems is obvious. For me, all I wished to know was to whom I should send the young son of a friend who had just sat the Engineering degree and was awaiting results. He wished to have some hands-on experience. Anyway he is now applying for a variety of other posts but this information will be useful to us. Thank you."

The best time to plant a tree was 20 years ago. The second best time is NOW

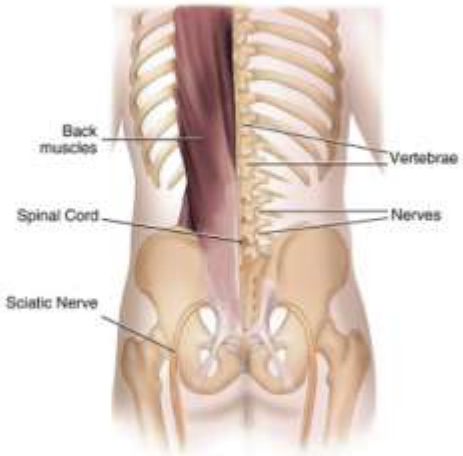
Ancient Chinese Proverb

Lower Back Pain - Lumber Spine Disorders : the Ayurvedic Approach

By VIKRAMA

Introduction

In ordinary medical parlance, Lower Back Pain (LBP), is the common description of lumber spine disorders. LBP can take many forms and may be due to a variety of different causes. Sciatica is one of the severest forms of LBP[1]. Of those visiting hospitals with LBP related complaints, about 50% show signs of sciatica. The symptoms of sciatica are often a radiating pain related to a specific nerve root. It is a neuropathic pain and its response to common analgesics is generally poor. In the US where reliable statistics are available, the cost of treatment of LBP is estimated at between 13-15 billion dollars[2]. Sciatica is by no means a terminal disease but its neglect may, apart from the intense discomfort, lead to immobility. Generally the non-steroidal anti-inflammatory drugs (NSAID) are used in the allopathic treatment of the condition, coupled with doses of Vitamins B and C. Undoubtedly they provide welcome short-term relief to patients, but the disease persists and makes life most uncomfortable. Chiropractics have their special regimen and are effective in many instances, as are methods such as traction, radiation treatment, and acupuncture and exercise regimes.



Sciatica is characterized as a disease of the nerves. The sciatic nerve is the largest nerve in the body and it runs a long course. It is derived from the fourth and fifth lumbar and the first and second sacral roots. It provides motor innervations of the hamstring muscles and all muscles below the knee. It carries sensory impulses from the posterior aspect of the thigh and the posterior as well as lateral aspect of the leg and the sole. Pathological processes that impinge on at this level can bring about the intense pain and tenderness of the nerve that is associated with sciatica.

Ayurvedic Diagnostic features

Many centuries ago the great Ayurvedic Physician Charaka had identified the disease and named it Gridhras, and defined its features in the terms of Ayurvedic concepts. The disease is divided into two categories: *Vataj* and *Vata-kaphaj*.

Vataj is caused by vitiation of the *dosa* called *Vata* alone. It brings into play the needling sensation and renders the body crooked and the knees, thigh, hips, and joints stiff. The *vata-kaphaj* is caused by vitiation of both the dosas: *vata* and *kapha*, in conjunction with each other, and brings about numbness, excruciating pain, restricted movement and muscle spasms. It also brings a feeling of heaviness of the body while patients suffer from dyspepsia, and experience anorexia, lassitude, and excessive salivation[3].

The causes of sciatica are many and the mechanisms beneath the neuropathic pain encountered by the LBP syndrome are as yet obscure. One fact that clinicians recognize is that no two cases of back pain are due to identical causes. Ayurveda discusses the Etiology or *Vyadhi Heitu*, as the result of *vata dosa*, or imbalance of the *vata*. The causes can be interpreted in modern terminology as belonging to two categories namely:

* Pathology based, and
* Injury based.

The pathology based category results from such *vata* aggravating factors.

The ones cited in the Ayurvedic texts are some of the following:

Grief, sickness, and depressing experiences; sitting on uncomfortable chairs, or sleeping on uncomfortable beds; irregular food intake; bowel irregularity; and systemic disorders.

Certain degenerative conditions known in Ayurveda as *Dhatu Sanchayat,* are also responsible for LBP.

Sciatica itself which is due to nerve root compression has been recognized as only a minor proportion of the cases of LBP.

The injury based category is recognized as the result of such factors as sudden and excessive activity of the lower body such as: jumping, sport without adequate training and stretching activities, falling from a height, automobile accidents, and assorted accidents during agricultural or other physical work. Overweight individuals especially women, are recognized in the Ayurvedic system to display the features of LBP recurrently. This is recognized as due to abdominal muscle pressure on the spine. Frequent child bearing has been recognized as a factor too when the mother has had little time to rest and plenty of work to do such as home laundry and the old system of using a stone to dash the clothes on to remove heavy dirt, features frequently encountered in village women.

According to Ayurvedic concepts the vitiated *vata dosa,* by its own aggravating factors, strongly fills up the hollowed channels that produce many kinds of diseases that pertain to either all or a single part of the body system. In this, blood, muscle, bone, ligaments, and tendons are deemed to be involved.

Clinical Observations and Prognosis

In evaluating the causes of LBP in any patient the clinician must eliminate any complicating factors such as possible congenital anomalies, local infections, metastasis, and neoplastic tumors, where the prognosis will be dependent on these. Devoid of these complications, from an Ayurvedic perspective, the prognosis is good in patients with *vitaj sciatica.* Generally about 70% of patients can be relieved of the pain symptoms and can then be recommended to resume normal activity, within three to four weeks. Full recovery can be expected within a six to eight week period for over 90% of the patients in this category.

For those in the category of *vata-kapaj,* the situation is such that recurrence may occur after treatment within periods ranging from six months to even five years for around 8% of patients treated. The patient's history is regarded as crucial in the diagnosis.

A patient with a history of LBP with severe discomfort or even inability when moving the legs suggests either acute lumbar disc herniation or fracture.

The duration, location, and intensity of pain are all governing factors in arriving at a diagnosis. Besides other complications, such factors as occupational, social and psychological factors also enter the equation

Ayurvedic texts give detailed methods of lumbar region and spinal examination which should be meticulously followed before therapy can be prescribed[3].

However as presumed, Ayurveda did not have the benefits of modern methods of laboratory diagnosis involving chemical and instrumental methods. Today modern techniques such as Magnetic Resonance Imaging (MRI), and Computed Tomography (CT) Scan-myelography, are needed to eliminate very serious possibilities.

Ayurvedic therapy may indeed be applied after a complete diagnosis is available and if there are no complications that dictate that conservative treatment is inadequate.

Ayurvedic Therapy. *(Chikitsa)*

In Ayurveda the comprehensive treatment plan is focused on the goal of early return of the patient to routine tasks. Treatment of sciatica is based on a set of principles which include palliative purification, as well as Enema therapy. (Panchakarma)[4].

Various herbal preparations are used in the treatment of LBP and Sciatica. The chief plant species employed in these preparations include the following :-

- *Commiphora mukul* - Guggul
- *Strychnos nuxvomica* - Vistinduk
- *Ricinus communis* - Erandu
- *Allium sativum* - Garlic
- *Vitex negundo* - Nirgundi
- *Pluchea lanceolata*
- *Sida cordifolia*
- *Tinospora cordifolia* - Rasakinda

What is termed *Shaman Shodana* Therapy in Ayurveda involves preparations of *Guggul* and *Vistinduk* administered orally. This is followed by massage and fomentation. Bed rest is recommended. This combination therapy is known to benefit 60-70% of the patients in this category.

There are also recommendations of mixtures of herbs which are extracted in steam, and boiling water, and the resultant *"Kwatha"* or moist solid, is used in a hot fomentation of the effected areas. When the pain is stubborn and relief is not obtained with palliative treatment alone, Ayurveda systems imply that Purification therapy or Panchakarma methods be used prior to the palliative treatment.

Ayurvedic treatment or *Chikitsa* for LBP includes a far greater number of methods and techniques than can be adequately reviewed here. However one important fact is that the treatment includes strategies for the prevention of conditions such as sciatica. It is considered as one of the diseases that result from enforced changes in food habits due to changed living conditions, and the stresses and strains of modern lifestyles. Preventive measures identified are:-

- avoidance of scanty meals (fast foods), hurriedly consumed,
- regularity with the intake of food,
- avoidance of frequent use of cold or iced foods and beverages,
- regular sleep habits,
- avoidance of uncomfortable resting postures,
- appropriate exercise regimen

LBP can also be caused by straining suddenly in lifting weighty materials and poor posture.

Diseases of the spine are generally prolonged and difficult to cure. Yet compared to the modern treatment there seems much to be valued in the Ayurvedic approach. Admittedly diagnostic methods are not anywhere near what is available to any modern physician. However there are advantages in the conservative approach of Ayurveda. The therapies can be applied for prolonged periods of time without the fear of any toxic manifestations. The anti-inflammatory drugs used in modern therapy may indeed have such long term effects. In Ayurveda, oleation is considered the most effective remedy in the treatment of diseases of the vata. Medicated herbal oils either given orally or applied externally or both, support the restoration of muscle strength. Massage therapy with oils from herbs that have been proven by research to contain muscle relaxing secondary metabolites, does help in increasing body fluid circulation, preventing nerve degeneration and enhancing tissue building. Massage therapy is also proven to facilitate the elimination of accumulated waste materials that obstruct the channels and cause vitiation of the *vata*.

Oleation, followed by fomentation or massage therapy, liquefies the *dosas* adhering to the channels, and brings them to the gastrointestinal tract wherefrom they are eliminated by the action of purgation. This is very briefly the rationale for the *Chikitsa*.

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Alligator Weed : An Ecological Time Bomb

By Dr. Lalith Gunasekera -
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Alligator weed is one of the most noxious weeds in the world, and it has been declared so in several countries around the globe. This plant with the botanical name *Alternanthera philoxeriodes* has the potential to become a serious threat to water resources, agriculture and the environment.

Origin and distribution

Alligator weed originated from Parana River system in north-eastern Argentina and Brazil. It has become widespread and a serious weed in 30 countries including USA, Burma, Thailand, Indonesia, India, China, New Zealand, and Australia and recently in Sri Lanka (recorded in 1999). "Alligator weed" is so named due to its creeping and aquatic habit and its association with alligator infested streams of South America.

Description

Alligator weed is a perennial herb which is described as amphibious because it grows in terrestrial and aquatic habitats. It grows in waterways, wetlands, rivers, canals, swampy areas and on dry lands. It grows rapidly in water and can form a dense mat of hollow, interwoven stems. In aquatic situations it can grow as a free floating raft or its roots can attach to the soil. Although alligator weed used to be considered a tropical plant, it can tolerate a wide range of climates and has become a problem in cool and warm temperate regions.

Stems

The stems of alligator weed are hollow when mature and can be single or branched to form dense mats. Stems can lie flat along the ground or grow vertically.

Leaves

Leaves are bright green, long and spear-shaped (pointed at the ends) waxy and glossy with distinct midrib and prominent veins. Leaves are arranged in opposite pairs along the stems, 2-12 cm long and 0.5 – 4 cm wide and sessile (there is no obvious stalk attached to the stem). Size and shape of leaves vary with growth habit and conditions.

Flowers

White papery flowers forms a compact inflorescence on short (1-9 cm) peduncles (stalks) arising from a leaf axil. The flowers are papery to touch and 1.2 – 1.4 cm in diameter. Alligator weed does not produce viable seeds under field conditions.

Roots

Plants produce fibrous roots from nodes in water. On land, an extremely dense, thickened root system is produced. The tap roots penetrate soil to a depth of 50 -90 cm. Root storage tissues in terrestrial and semi aquatic environments allow survival over dry periods and form an extensive underground root system. Herbicides are unable to translocate through the terrestrial root system and, although parts above ground may die, regrowth quickly occurs from

underground materials. A small portion of the root has the ability to produce a plant.

Reproduction and Spread

It is generally accepted that reproduction is entirely vegetative. There are two axil buds, each capable of growth at all stem nodes. Underground rhizome parts can produce new plants.

Alligator weed does not produce viable seeds and is spread mainly by the movement of plant fragments. It is used as a leafy vegetable by man and the accidental occurence of plant fragments on machinery and boats, in soil, mulching materials and the dumping of garden refuse, can easily introduce the plant to new areas with disastrous consequences During wet weather it can spread with floods or when drains overflow. It can also be spread by birds or animals.

Properties

Alligator weed has the ability to tolerate a considerable degree of salinity, growing in nutrient enriched conditions. It needs abundant iron and absorb and accumulate heavy metals including ions. Calcium oxalate crystals also commonly occur in alligator weed tissues and whilst the concentration is usually well below toxic levels, may become a problem when alligator weed is used as human food. But no reports have confirmed any health problem associated with alligator weed in Australia.

Why alligator weed is a problem

Alligator weed is the greatest aquatic weed threat to our fresh water rivers, irrigation systems and wetland habitats. It grows rapidly and its spread could allow it to choke inland river and irrigation systems with disastrous effects on agriculture and the environment. Excessive growth of alligator weed restricts water use, alters aquatic ecology, excludes the growth of other plants, obstructs flows, and causes problems associated with flooding and sedimentation. Alligator weed can also provide favourable conditions for the breeding of insects such as mosquitoes.

Alligator weed can compete with and displace desirable pasture species. It is palatable and will be grazed by cattle and horses. Control and eradication of alligator weed is extremely difficult and is an expensive process. Prevention of the spread as a result of early detection is the key to successful management of this invasive plant.

Vegetable confusion

Alligator weed has a very similar appearance to another plant native to South America in the same family Amaranthaceae: "mukunuwenna" or sessile joyweed *(Alternanthera sessilis)* a leafy vegetable popular in Sri Lanka, India, West tropical Africa. There seems to be confusion amongst the Sri Lankan community over this leafy vegetable and the alligator weed growing in Australia and Sri Lanka. The soft stems and leaves of mukunuwenna are cut into small pieces and coconut, sliced onions and spices are added. The next step is to bake the mixture or fry it using oil to produce the tasty Sri Lankan "mallum". Sri Lankan people in Australia have been cultivating and unknowingly using alligator weed as a leafy vegetable for over 25 years. As a result of the public awareness campaign, the majority of Sri Lankans in Australia now recognise the difference between their real vegetable plant, mukunuwenna and alligator weed and have realized that they have used the wrong plant. How can we identify mukunuwenna from alligator weed?

Flowers: Alligator weed flowers grow in large heads (8-10 mm) carried at the end of a stalk. Flower heads of mukunuwenna are smaller (less than 5 mm) and carried in clusters at leaf joints. Flowers can be seen throughout the year.
Stems: Alligator weed has a soft hollow stem. The stem of mukunuwenna is harder and not hollow.

Mukunuwenna

Alligator Weed

Chemical composition of Alligator weed and Mukunuwenna (dry weight)

Constituent	Alligator weed	Mukunuwenna
Protein (%)	28.00	16.00
Phosphorus (%)	0.74	0.50
Potassium (%)	7.10	4.30
Calcium (%)	0.92	0.57
Sodium (%)	0.47	0.11
Oxalic acid (%)	27.10	4.70
Fibre (%)	11.60	13.40
Iron (mg kg-1)	140.00	110.00
Copper (mg kg-1)	32.00	25.00
Lead (mg kg-1)	0.30	0.30
Cadmium (mg kg-1)	0.12	0.21

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LINK CEO DR. DEVAPRIYA NUGAWELA, APPOINTED HONORARY CONSUL FOR ZAMBIA

The Chairman, and CEO of Link Natural Products Pvt. Ltd, Dr Devapriya Nugawela was recently appointed Honorary Consul in Sri Lanka, of the Republic of Zambia. The appointment was formally made on behalf of the Government of Zambia, by H.E.Keli Walubita, the High Commissioner for Zambia, based in New Delhi, on 17th November 2009.

Dr Nugawela a Chemistry graduate from the University of Peradeniya also holds a Ph.D. from the University of Manchester (UK). He had been the founder CEO of the company Link Natural Products, which is now a member of the CIC Group of companies in Sri Lanka. Dr Nugawela, is nationally acknowledged as a leading entrepreneur and senior corporate manager.

In a brief ceremony H.E.Walubita also declared open the new Consulate at No 56/5, Sarasavi Lane, Castle Street, Colombo 08. He acknowledged that the Zambian Government was proud to have a person of the calibre of Dr. Nugawela as their very first Honorary Consul in Colombo.

At the ceremony the government of Sri Lanka was represented by Mr. W.M.Seneviratne, Director-General (Africa), of the Ministry of Foreign Affairs. The First Secretary/Political to the Zambian Embassy New Delhi , Catherine Chwaya also attended the ceremony. There were many distinguished invitees at the ceremony who were latter hosted by the new Honorary Consul at the Cinnamon Grand

Good Health in your Curry: A Scientific exploration into the health benefits of traditional spices.

A Painting, of the Dutch colonists fighting natives for their spices, to be taken to Europe.

By Gaya Anupama Abeyratne and R. O. B. Wijesekera

Introduction

Hitherto the story of Spices is inextricably linked with the maritime conquests of the seventeenth century. In itself that forms one of the fascinating sequences of history which changed the world order of the sixteenth century. The pursuit of spices resulted in new discoveries of lands never known at the time. The unchallenged value of spices still remains, but now comes another facet and another phase, namely the health value of spices.

Modern science once again comes to our rescue. When many things such as herbal remedies and the value of spices in foods come to be questioned by cynics, modern scientific research unequivocally supports the traditional view. Now it is spices that get under scrutiny. There are views that say that spices endanger good health. That may be the case if there is the question of an excessive usage. Anything that exceeds the reasonable is indeed harmful. But other than that, spices are the flavour giving substances often of plant origin that add piquancy to food to make food attractive and a pleasure to consume.

They are therefore as important as the foods themselves. It is now the view that many of the ingredients that make foods attractive have much more to offer than flavour itself. A growing number of scientific studies continue to establish their many benefits to health. Traditional practices in Asia will consider this as accepted fact, but in other parts of the world where spices are only recently being commonly employed in foods, the scientific evidence of health benefits will add to their popularity.

Let us consider some of the characteristics and benefits associated with fifteen of the commoner spices, which find routine use in the food of Sri Lanka and indeed the south Asian region.

Commonly used spices of Sri Lanka generally employed in curries

1. Cinnamon

Botanical identity : *Cinnamomum verum*

Work on a Cinnamon Plantation

Finished Cinnamon Quills

Cinnamon has a romantic history that goes back into the times of the Roman Emperors.

Cinnamon is the foremost spice in Sri Lanka which produces the world's largest quantity of it. It is the dried stripped bark of the tree, botanically known as: *Cinnamomum verum*, originally C. *zeylanicum*, the true cinnamon of commerce. Cinnamon was first found naturally growing in Sri Lanka and was a very high priced commodity in the days of colonial conquest. The Portuguese, the Dutch and then the British fought for control of the trade in cinnamon. It was the Dutch governor of Ceylon (at the time) who placed cinnamon on a regular cultivation basis, and since then it is no longer collected from the wild as was done in the days of the Sinhala kings.

Today cinnamon estates thrive in the western coast of the island and cinnamon is an important export crop. The cruder form which grows extensively in the Far East is a different species namely: *Cinamomum cassia*, which has a coarser flavour.

Cinnamon is used in flavouring cakes, pies, cookies, and biscuits. It would have never been thought of as a medicinal plant in the societies of Europe to which it was exported for centuries. In Ayurvedic medicine however it is a component of several infusions and decoctions used for fevers and other similar ailments. Ayurvedic experts are familiar with the variety of health benefits that cinnamon possesses. Recent research by the school led by Richard Anderson, at the USDA Beltsville Human Nutrition Research Centre, in Maryland[1], has drawn attention to the fact that extracts of cinnamon are able to overcome diabetes type two by boosting the insulin function. Anderson's group has researched the properties of cinnamon for over a decade and he believes that cinnamon is a more effective medicinal plant than most, even better than garlic. Another scientist J.Henry at the Functional Food Research Centre at Oxford Brookes University in the UK is in accord with the high rating of cinnamon as a medicinal plant. He classifies it at a rank order of three behind garlic and turmeric. The steam volatile essential oil of the cinnamon bark, one of the most valuable of such oils in the international market, is responsible for the aroma of the spice but not the one solely responsible for the health benefits. The water soluble large molecular weight polyphenolic compounds are more important in the health benefits offered by the plant. Some of them have been isolated and characterized before[7] However Anderson claims to have isolated and characterized the potent compounds, using NMR Spectroscopy and Mass spectrometry, and shown that they increase insulin-dependent in-vitro glucose metabolism almost twenty fold. If you can improve the insulin function you can improve weight, he contends. In addition to making insulin more effective, Anderson believes that cinnamon has the additional characteristics of being an antioxidant, an antibacterial, an anti-inflammatory and an anticancer agent. It can reduce cholesterol levels in blood, reduce blood pressure and even body fat content. Anderson further believes and argues so in a recent paper that an extract of cinnamon is an effective agent in the treatment of Alzheimer's disease, on account of its ability to inhibit the formation of some of the toxic protein tangles known to accumulate in the brain that causes the disease. This beneficial effect on the human brain was known to the ancient Ayurvedic physicians as well as to the Chinese. Anderson himself is enthusiastic about cinnamon. He contends that its polyphenols have better anti-oxidant effects than resveratrol in red wines and grapes, and the catechins found in green tea. Anderson practices what he believes in by consuming a daily dose of cinnamon himself. His research observations must give a boost to the cinnamon industry.

2. Cloves

Botanical identity : *Eugenia caryophyllata*

A clove tree in a typical home Garden

Clove buds (immature)

Mature Clove Buds and flower

Dried Clove Buds

Cloves are the dried and cured flower buds from the evergreen medium sized tree known botanically as: *Eugenia caryophyllata, E. aromaticum* or *Syzygium aromaticum.*

When the clove tree is in flower the reddish pink buds make a vibrant and picturesque sight. Cloves were sought out during the Portuguese voyages of the sixteenth century as a valuable spice for preservation of meat during the days before the advent of refrigerators[2]. Its major constituent Eugenol, a phenol, is indeed antibacterial and thus its value in dentistry.

Until recent times cloves were found only in the Maluku Islands, a group of five islands called by Europeans as: Moluccas or the Spice Islands. Cloves were highly prized in Roman times and referred to by Pliny, the Elder. The Arabs traded it with the Roman Empire and afterwards when the Indian Ocean trade was taken over by the Portuguese, they brought large quantities to Europe where it was valued as a kg costing as much as 7g of gold. When Portuguese domination was overcome successively by the Dutch and the French, these colonial powers were instrumental in the clove tree being cultivated thereafter in countries such as: Indonesia, India, Ceylon, Mauritius, Zanzibar Islands, French Guiana, even Brazil and the Caribbean region. Its medicinal properties became well known, and together with its utility as a spice the clove trade was profitable. As in the case of other similar commodities the English were soon to take over when they came to "rule the waves".

Today cloves are cultivated mainly in Indonesia, Madagascar, and the two Tanzanian islands: Ungua (Zanzibar), and Pemba. In Indonesia it is the main component of the "Kretek" brand of cigarettes attributed with properties that cure ailments of the respiratory tract. In modern Sri Lanka clove trees are part of what are known as "Home Gardens" which include other spice crops, like nutmeg, pepper, and even some non-spices such as bananas and, palms such as areca nut, and kitul.

However the curative value of cloves was known many centuries before. The ancient Chinese were believed to have used cloves by chewing the fresh buds to cover bad breath, just prior to an audience with the Emperor. This was around 227BC. Their value in oral health was well recognized in early therapies such as Chinese medicine, Ayurveda and even in European herbal therapy. Its value in oral therapy has had a burgeoning resurgence, There are many types of toothpaste in the supermarkets of today which proudly claim to have in its formulation the essential oil of clove. Some indeed may have the genuine natural oil but the cheaper ones invariably use Eugenol which is the main constituent of the oil of clove. So the use of cloves in dentistry has been well established. Clove oil has many properties including antibacterial, anti-spasmodic and antiseptic, and the masking of pain. Accordingly, clove finds application to overcome such ailments as indigestion, earaches, headaches, and to relieve coughs. Clove oil is used in many topical creams and ointments for sores and ulcers.

3. Turmeric

Botanical identity: *Curcuma longa*

Turmeric plants

Rhizome of Turmeric

Turmeric is a major ingredient in all South Indian and Sri Lankan curries. It is the dried, powdered rhizome of the plant *Curcuma longa*, belonging to the botanical family Zingiberaceae, the same family as Cardamom and Ginger. The rhizome and the plant itself resembles ginger, except that it is intensely reddish orange to yellow in colour, in contrast to the much paler ginger. Turmeric, popularly known in India as *"Haldi"* and in Sri Lanka as *"Kaha"*, is a principle constituent of curry powders. It had been used for centuries in Chinese medicine as well as in Ayurvedic practice as an integral part of their therapies. Its characteristic yellow colour was used to dye cotton, particularly the robes of Buddhist monks. The colour is due to its yellow constituent compound known as curcumin. It was isolated by chemists in the nineteenth century although its chemical structure was determined only in 1973 by Roughly and Whiting. Curcumin is responsible both for the colour as well as for the anti-inflammatory effect. The anti-inflammatory effect of curcumin has been extensively studied in recent times. The essential oil of *Curcuma longa* has also been shown to possess both anti-inflammatory action as well as anti-arthritic activity. Recent work at the University of Michigan as well as the Functional Foods Centre at the Oxford Brookes University in the UK, has confirmed the ethnomedical uses of Curcuma. Originally renowned for its efficacy in the treatment of skin infections, inflammations and ulcers, it has now been found to possess a perplexing variety of functions. Curcumin is now known to have antioxidant, anti-cancer, antibiotic, anti-mutagenic, antiviral, antifungal, anti-amyloidal and anti-diabetic, properties in addition to its well established anti-inflammatory function. Now to add to all of these, scientists are finding that curcumin has beneficial effects on the brain and could serve to thwart Alzheimer's disease. But the evidence for this is at the moment only epidemiological in that it is based on the observation that the occurrence of this disease in South India is far less than in the US. Research is ongoing to find the bioactivity of the other less abundant constituents of Turmeric with hopes that some startling results may arise.

4. Ginger

Botanical identity : *Zingiber officinale*

Ginger plants

Rhizomes

Like turmeric, ginger is an important constituent of curries and an important agent in Ayurvedic therapy as well as Chinese medicine. It too belongs to the Zingiberaceae family, and has been very well researched by modern scientists. Ginger is almost an ubiquitous plant and now grown in all parts of the globe and used in cooking in almost every type of culinary category. Several health properties have been attributed to ginger over the years in both traditional as well as western medicine, among them being: analgesic, sedative, antipyretic, and antibacterial effects. It is also known to remedy feelings of nausea and such stomach ailments like diarrhea and gripe, and in alleviating children's pains due to worm infections. At the Departments of Dermatology and Radiation Oncology of the University of Rochester Medical Center in New York, scientists noted that cancer patients undergoing chemotherapy reported less nausea after being administered ginger. The mechanism of its action is still under investigation. There are in Ginger several categories of main active components such as Gingerols, Zingerones, Paradols and Shogaols. But the realization that is now dawning is that the total extract is the most effective. Studies conducted in cultured cells as well as in experimental animals revealed that these pungent phenolics possess anti-carcinogenic properties. Clinical trial studies conducted in a selected prenatal care clinic of Isfahan City hospitals using 67 pregnant women concludes that ginger is an effective herbal remedy for decreasing nausea and vomiting during pregnancy.

Ginger originated in Southeast Asia, though it has a long history of being cultivated in other countries. At an early date it was exported to Ancient Rome from India. It is only in recent years that ginger has become more valued as a spice than for its medicinal properties. Even so, in western countries it has been used to add taste to buttermilk drinks as far back as the 11th Century AD. Widespread use in foods did not occur until roughly 200 years later when ginger was used in cooking meats and in ginger pastes.

5. Pepper

Botanical identity: *Piper nigrum*

Pepper - *Piper nigrum*, which appears to have originated on the Malabar Coast (Kerala) of India, has been one of the most ancient commodities of the spice trade, dating back to at least 4000 years. Being a valuable commodity it

Pepper vine

Black pepper and white pepper

was often used as a payment and was accepted in lieu of money in dowries, taxes and rents. In 410 A.D. 3000 pounds of pepper was demanded as ransom in Rome. Names given to the pepper such as "The King of the spices" and "Black Gold" bear testimony to the importance attached to this spice. In the middle ages there was a French saying: "as dear as Pepper" which shows how highly this spice was regarded by the people.

Piper nigrum (Sinhala - Gammiris), is a flowering vine in the family Piperaceae cultivated for its fruits which are usually dried and used as a spice and a medicine. The fruit known as a peppercorn when dried is a small drupe about five millimeters in diameter containing a single seed. The Pepper fruit or berry is green and becomes yellow and then dark red when fully ripe.

Black pepper, white pepper, Oleoresin and pepper oil are the major products of pepper. When producing black pepper, unripe green pepper berries are cooked briefly in hot water both to clean and to prepare them for drying. Heat ruptures the cell walls in the fruit and speeds up the activity of the browning enzymes during drying (in the sun or by machine for several days).Skins of the pepper berries are removed by a process known as "retting" to produce white pepper. Here the fully ripe

peppers are soaked in water for about a week, rubbed to remove the skins to obtain naked seeds which are then dried.

Pepper gets its spicy sharp taste mostly from the piperine found in the outer fruit layer and in the seed. The outer fruit layer left on black pepper also contains odour contributing terpenes including pinene, sabinene, limonene, caryophyllene and linalool, which gives its citrusy, woody and floral notes. These aromatic notes are mostly missing in white pepper

Black pepper is used in Ayurveda, Sidda and Unani medicine, as it has carminative, diaphoretic, diuretic and hydrolytic acid production stimulating properties. According to recent researches black pepper has demonstrated impressive antioxidant and antibacterial effects that promote the health of the digestive tract. Piperine can dramatically increase absorption of selenium, vitamin B, beta carotene and curcumin as well as other nutrients.

6. Nutmeg and Mace

Botanical identity : *Myristica fragrans*

Nutmeg and mace

Split fruit of nutmeg

The history of Nutmeg in Europe goes back to the 1st century, as evidenced in writings by Pliny, the Roman writer. In Indian literature nutmeg is recommended for treatment of headaches, fevers and bad breath. Arabian scripts praise its properties as being effective in the treatment of stomach ailments and reveals it as an aphrodisiac. Nutmeg which is native to the Moluccas and the Indonesian archipelago was brought to Europe in the middle ages by the Arabs through the Venetians. Nutmeg was introduced to Sri Lanka in the early part of the nineteenth century. Throughout its history, nutmeg has been quite expensive and very popular. A few hundred years ago a small bag of nutmeg would have brought enough money for the seller to be financially independent for the rest of his life. Today, nutmeg is produced in many countries including India, Malaysia, Caribbean Islands, New Guinea and Sri Lanka. About 10 000 tons per year is produced and is mainly used in the USA, Japan, Europe and India.

Nutmeg, *Myristica fragrans*, is an evergreen, dioecious plant which produces two separate and distinct spices.

1. Mace *(Wasawasi)* -The aril of the fruit.
2. Nutmeg *(Sadikka)* -The seed

Nutmeg is slightly sweeter than mace which has a stronger and more delicate flavour. The nutmeg seed is encased in a mottled yellow edible fruit. The fruit or the pericarp splits in two to reveal a net like or "lacy", bright red covering over the seed. This is the aril which is collected, dried and used as the spice mace. The oval shaped seed which is the nutmeg is inside the dark shiny shell or endocarp. Nutmeg, mace and nutmeg oil have tremendous health benefits in addition to numerous others. The essential oil of nutmeg is obtained by steam distillation of the ground nutmeg, and it is a colourless or light yellow oil which smells and tastes of nutmeg. Nutmeg itself in larger amounts possesses hallucinogenic properties.

Nutmeg is very popular as a spice and is often used for culinary purposes. It is a very popular flavouring agent in making sweets, baked foods, sauce, ice cream, custard etc.

Nutmeg essential oil is mostly used in perfumery, pharmaceutical formulations and in aromatherapy. Due to its refreshing, antibacterial and antiseptic properties, it finds application in antiseptic soaps, bath oils, cosmetics and aftershave creams and lotions. The sedative, relaxing, anti inflammatory, antiseptic and antibacterial properties of nutmeg contribute to its wide usage in industry.

While researchers of London Royal & University College Medical Schools have established that boiled aqueous solutions of turmeric, cumin, ginger, chili and cinnamon displayed bactericidal and anti adhesive effects on *Helicobactor pyroli*, it has also been proven that the extract of *Myristica fragrans* is useful in the treatment of human diarrhea if the etiologic agent is a rota virus. *H. pyroli* is a gram negative bacterium which can cause gastric ulcers and stomach cancer. Another research study concludes that the overall extract of nutmeg shows a substantial anti-diarrhoeal effect with a significant sedative property without affecting the blood pressure. According to the Herb and Drug safety chart of Baby Centre UK, nutmeg and nutmeg oil inhibits prostaglandin production and contains hallucinogens that may affect the fetus; a feature which resulted in nutmeg being once erroneously regarded as an abortifacient, but now it is deemed safe in normal culinary use.

7. Cumin

Botanical identity : *Cuminum cyminum*

Cumin plants

Cumin seeds

Cumin belongs to the family Apiaceae. Its original habitat appears to be in the mid Arabian region but at the present time it is cultivated in the Mediterranean region as well as in Eastern and Central Europe and northern India. Its cultivation and use by man can be traced back to over thousands of years. In India and Sri Lanka it is not only a major ingredient of curries along with coriander, but is a predominant component of many Ayurvedic therapies. It was known to the ancient Egyptians and finds mention in the Bible, as well as in the medical treatises of Dioscorides and Hippocrates. It has been used in the ancient medicinal systems of India as well as in Chinese traditional medicine in addition to the medical systems of southern and eastern Europe. Since it enjoys wide culinary usage it can be deemed as important a spice in foods as it is a medicine. In India it is commonly known as "jeera" and in Sri Lanka as "sooduru."

The health benefits of cumin are well recognized in the Ayurvedic system of medicine. Its main function relates to management of the digestive system. The main chemical constituent of cumin is cuminaldehyde which is now known to stimulate the salivary glands, enabling the primary digestion of food to take place smoothly. Another constituent of cumin is thymol, which also performs an enabling function so that cumin seed extract for instance is capable of promoting digestion and even combating indigestion. This is compatible with the presence of cumin in almost all curry powders including the famed *garam masala*. Cumin is also helpful as a sedative and enables good rest and sleep. Its beneficial effect on the immune system makes it an almost exclusive ingredient of the many Ayurvedic preparations which are reputed to target immune related ailments. The presence of Vitamin E and iron in cumin makes it a valuable component in the daily diet.

8. Garlic

Botanical identity : *Allium sativum*

For over 4000 years Garlic has played many important roles in human life. It was believed to have been used as food flavouring, seasoning and as a medicine. By 3000 B.C. garlic was being used in Egypt. Later it was used in the regions bordering what is presently Pakistan, in Western India and the usage even spread to China. The Spanish, Portuguese and French introduced it to the new world. Today

garlic is grown all over the world. Currently China, South Korea, India, Spain and USA are among the top commercial producers of Garlic. During World War II, garlic was used as an antiseptic to disinfect open wounds and gangrene. The Egyptians fed garlic to slaves, who were building the Pyramids, to increase their stamina. Garlic or in Sinhala "suduloonu", and botanically *Allium sativum*, is a member of the lily or onion family, Alliaceae. It is rich in a variety of powerful sulfur-containing compounds which are responsible for the characteristically pungent odour and the health promoting effects. Due to its strong odor, garlic is sometimes called the "Stinking Rose".

Garlic bulb and cloves

Uprooted garlic plants

When consumed in quantity garlic may be strongly evident in the person's sweat and breath, even on the following day. This is because the strong smelling sulfur compounds present in garlic are metabolized forming allyl methyl sulfide, which is not digested and is passed in to the blood. It is carried to the lungs and the skin where it is excreted. Since digestion takes several hours, the after effects of consuming garlic may leave its odoriferous trail for a long time. When garlic is cut, damaged or crushed, Allin in the garlic is converted into Allicine by the action of the enzyme allinase, which is promptly released. Allicine in turn produces Ajoene which can inhibit the formation of platelets. Allicine together with vitamin C, is known to kill harmful bacteria and viruses, and hence is effective against not only common infections like cold, "flu", stomach viruses but also against tuberculosis and botulism. Animal studies and some early investigational studies in humans have suggested possible cardiovascular benefits of garlic as it has a blood thinning property which may be helpful in preventing heart attacks and strokes. A Czech study found that garlic supplementation reduced accumulation of cholesterol on the vascular walls of animals which helps to reduce blood pressure and cholesterol. Garlic contains vitamins C, A and B and this is said to be responsible for cancer prevention by stimulating the immune system to eliminate toxins and combat genes. People in China with the highest level of dietary garlic have a reduced risk of stomach cancer. Recent research conducted at the National Cancer Institute in Bethesda, Maryland, USA, has shown that regular consumption of garlic is associated with a marked decrease in the incidence of diseases such as breast cancer, cancers of the colon, the prostrate and stomach.

Commercially available Garlic is usually in the form of a head called the "bulb" which is made up of separate cloves. Both the cloves and the entire bulb are encased in paper-like sheathes that can be white, off white or pinkish. Garlic cloves are off-white in colour and used for food as well as medicinal purposes.

9. Chilli

Botanical identity : *Capsicum spp.*

Chilli peppers

Dried Chilli powder

This is known as the spice that puts fire on your tongue and palate, and even a tear or more in your eyes when you eat. Chilli peppers, ("Miris" in Sinhala) belong to the night shade family Solanaceae, and the Capsicum species which, surprisingly, also includes: aubergene or egg plant, tomatoes, bell peppers and paprika. The fruit of the capsicum is a berry. Depending on flavour intensity and fleshiness, their culinary use varies from use as a vegetable to use as a spice. Chilli peppers are used in the flavouring and seasoning of garnishes, pickles, meat, barbecue, sauces, ketchup, snack foods and salads. Indian, Thai and Sri Lankan cuisines have multiple uses for chillies, from simple snacks to complex curries and for sambols which are made from chilli peppers as well as other ingredients such as garlic, onion, salt and coconut. Capsaicin is the substance responsible for the characteristic pungency of chilli. The stem end of the pod and the chord carrying the seeds, have most of the glands that produce the capsaicin. The white flesh surrounding the seeds contains the highest concentration of capsaicin. According to the chemical analyses of bioactive compounds, capsicum is rich in Vitamin A and C. Vitamin A is essential for healthy mucous membranes and vitamin C helps you to reduce the stress level and keeps skin healthy and smooth. Chillies are appetizing, antiseptic and an aid to digestion. Studies also prove that capsaicin stimulates gastric secretion, and that a chilli rich diet can injure the mucous membranes of the mouth and stomach.

The history of Chillies can be traced to the Central and South America regions, where they were used for more than seven thousand years. Until the 16th century chilli peppers were not introduced to the rest of the world until Christopher Columbus who encountered this spice on his explorations of the Caribbean Islands, brought it to Europe. It was a good substitute for black pepper which was very expensive and had to be imported from Asia. Explorer Ferdinand Magellan introduced chilli peppers into Africa and Asia.

China, Turkey, Nigeria, Spain and Mexico are the largest commercial producers of chilli. Chillies have , vermillion to deep red coloring substances mostly of the chemical category of carotenoids, and these are used to render bright colors to very special foods. Capsaicine also finds application in the pharmaceutical industry as a local counter-irritant additive to painkilling topical applications.

10. Coriander

Botanical identity : *Coriandrum sativum*

Coriander seeds

Coriander plant

Coriander, (Sinh. "Koththamalli") , and botanically known as *Coriandrum sativum,* is considered both a herb and a spice. The fruits and leaves of coriander possess very different flavours and hence are used in different ways to flavour food. Coriander provides Calcium, Phosphorus, Iron and some other vitamins such as vitamin B and C. Coriander leaves help to increase appetite and stimulates hunger in anorexic patients. The savoury leaves of

coriander are referred to as Cilantro in America. People enjoy the unique lemony flavour of cilantro sprinkled on cooked dishes and salads or minced in sauces, soups and curries. Leaves are often placed on cooked curries such as lentils or meat to render such effects.

The seeds are used for flavouring foods such as cooked vegetables, soups, breads, cakes and to flavour beverages. In countries like India and Sri Lanka, coriander is the bulkiest component of curry powder. Coriander seeds are allowed to boil in water for a few minutes and the decoction is taken as a coriander tea to combat the effects of common fevers. It is reputed to help cure kidney problems, mouth ulcers and swellings. It also lowers the blood cholesterol level. When coriander is given to rats fed a high fat high cholesterol diet, it lowers the level of total cholesterol and LDL (bad Cholesterol) while increasing HDL (good cholesterol). Coriander, together with cumin are the major constituents of home remedies for fevers and influenza. The juice of coriander is also used as an Ayurvedic medicine for treating nausea and morning sickness. Coriander tea or water also helps to reduce body fever by inducing urination. Seeds used along with other herbs such as dry ginger helps to relieve respiratory tract infections and cough. Even Hippocrates recommended the use of coriander as a medicine. Coriander seed extract is also used in the perfumery industry to provide a pleasant woody fragrance. Linalool a major constituent of coriander, also combats flatulence and in Ayurveda is used to combat attacks of gripe particularly in infants.

11. Fenugreek

Botanical identity : *Trigonella foenum-graecum*

Seeds of Fenugreek

Plant of Fenugreek

Fenugreek or "Uluhaal" scientifically known as *Trigonella foenum-graecum* is an erect hairy annual of the bean family Fabaceae, reaching 30-60 cm. The thin, sword-shaped pods are 10-15 cm, with a curved beak like tip, each carrying 10-20 seeds. The plant radiates a spicy odour which persists on the hands after touching. Plants mature in about four months. The whole plant is uprooted and allowed to dry. The seeds are threshed out and further dried. Seeds are small hard, yellowish brown and cubic with a powerful, aromatic and bittersweet flavour. Fenugreek is used medicinally, as a spice and as a yellow dye stuff. Seeds are used in curries and curry powder. The leaves, both fresh and dried are used in meat curries, dhal, vegetable curries, chutney and confections like halva. Indians infused roasted ground seeds for a coffee substitute or adulterant. Fenugreek is a digestive aid. It stimulates the pancreas to release digestive enzymes. Seeds contain fiber, 4-hydroxyisoleucine, and fenugreekine, the components that have hypoglycemic activity. The mechanism is delaying gastric emptying, slow carbohydrate absorption and inhibition of glucose transport. Sri Lankans use Uluhaal choorna , an Ayurvedic preparation, for treatment of diabetes. Histopathological examination of liver and brain revealed that, aqueous extract of fenugreek seeds offer a significant protection against ethanol toxicity.

Fenugreek boiled in water with lime fruits and Nelli/Amla (*Phyllanthus emblica*) is an effective hair cleanser and used to wash the hair as a cure for dandruff, leaving the hair with an acceptable fragrance in addition.

12. Fennel

Botanical identity : *Foeniculum vulgare*

Fennel Plant with seed s & Flowers

Dried Fennel seed spice

Fennel is generally considered indigenous to the shores of the Mediterranean, but widely naturalized elsewhere and may now be found growing wild in many parts of the world. Fennel known as "Mahaduru" in Sinhala and as *Foeniculum vulgare* botanically, is a hardy perennial herb. It bears feathery, finely divided linear or threadlike leaves. The flowers are produced in terminal compound umbels, each umbel section having 20-50 tiny golden yellow flowers on short pedicels. The fruit is a dry seed, 4-10 mm long, half as wide or less and grooved. Dried fennel seed is an aromatic, anise-flavoured spice, brown or green in colour when fresh, slowly turning a dull grey as the seed ages. The bulb, foliage and seeds of the fennel plant are widely used in many of the culinary traditions of the world. The bulb is a crisp, hardy root vegetable and may be sautéed, stewed, braised, grilled or eaten raw. Fennel seeds are baked into breads, biscuits, sweets and added to sweet pickles. Stems can be grilled with fish, meats, and vegetables, and leaves can be added to salads, fish or used as a garnish. The essential oil from the seeds is added to perfumes, soaps, pharmaceuticals and cosmetics. Fennel oil, seeds or extracts are also used to flavour prepared foods including meats, ice creams, candy, baked goods and condiments as well as non alcoholic beverages and toothpastes. Oil can reportedly cause nausea, vomiting, and other problems and amounts even as small as 1 ml should not be used by home cooks.

Fennel has a long history of use as a carminative and weight loss aid, and seeds have been eaten during Lent and other fasts to stave off hunger. In traditional medicine, fennel was used as an aphrodisiac to encourage menstruation. Oil is reportedly antioxidant, antimicrobial, antispasmodic and stimulates gastrointestinal motility. In the Indian subcontinent, fennel seeds are sometimes eaten raw, or with some sweetener, as it is said to improve eyesight. Ancient Romans regarded fennel as the herb of sight. Root extracts were often used in tonics to clear cloudy eyes. Extracts of fennel seeds have been shown in animal studies to have a potential use in the treatment of glaucoma. Syrian Arab Republic is the leader in production of fennel, followed by India.

13. Garcinia

Botanical identity : *Garcinia gummigutta*

Fresh fruit of Garcinia

Dried fruit of Garcinia

Garcinia gummigutta, is a tree native to Sri Lanka and belongs to the family Clusiaceae. The tree is picturesque, with a glabrous appearance and a rounded crown. The tender leaves bear a reddish shade. The spice is the sour fruit which is commonly called "Goraka" in Sinhala or in the south Indian languages : "Kodampuli", "Gornakkai puli", or "katchapuli". It is found in Tamil Nadu as well, and is also referred to as: Malabar Tamarind. It's highly acidic fruits are round with several deep furrows running vertically, and bear a straw yellow colour. The fruits are dried and they turn a deep brownish-black colour, and it is in this form that it is used as a spice to enrich the flavour as well as to preserve fish and prawns. Many preparations are traditionally flavoured by use of this spice as this forms a method of preservation which comes down the ages. The Sri Lankan preparation of fish known as "ambul thiyal", as well as the method of preserving and curing small fish into a product traditionally known as "jadi", utilizes garcinia as the main component.

In recent times, garcinia has also gained prominence as an effective weight management agent, due to the presence of (-) Hydroxy citric acid, (HCA), which is the main sour principle in the fruit. Derivatives of HCA are also said to have similar properties, and the fruit now has industrial application for the extraction of HCA. More so , since the discovery of HCA as a competitive inhibitor of the enzyme ATP citrate lyase, which catalyses the conversion of citrate and coenzyme A to oxaloacetate and Acetyl coenzyme A, (acetyl CoA), in the cytosol.

Acetyl CoA, participates in the synthesis of fatty acids, cholesterol and triglycerides, and in the synthesis of acetyl choline in the central nervous system of the body.

The rind of the fruit is used extensively in many Ayurvedic preparations. The fruit also contains organic acids and reducing sugars. A decoction of the fruit is used in preparations against rheumatism and arthritis and the fruit juice as an antidote for dysentery.

14. Tamarind.

Botanical identity : *Tamarindus indica*

Tamarind is the fruit of the large tree *Tamarindus indica*, which has a historic role in Indian culture. Alternative names for tamarind include "Imli", "Indian date", "siyambala" and "puli". *Tamarindus indica* is the only species of the genus Tamarindus in the family Fabaceae.

Tamarind fruits on the tree

Tamarind

Its fruits are like elongated pods and when ripe the pulp surrounding the large brown seeds are used on account of their sharp sour and sweet taste. There are selected cultivars which have sweeter pulp. One in Thailand is Makham Waan and the USDA's subtropical horticulture research unit in Miami, Florida has one called Manila Sweet. The tamarind fruit pulp is extensively used to flavour oriental as well as western foods. The fruit pulp is a constituent of celebrated sauces such as Worcestershire sauce and also used in desserts as a jam, blended into juices or sweetened drinks, sorbets, ice-creams and all manner of snacks. Tamarind in Asian cuisine is an important ingredient in curries and chutneys, and makes a delicious sauce for duck, geese and water fowl, and in Western India is used for pickling fish, Tamarind fish being considered a great delicacy. In Jamaica, Dominican Republic and Cuba, candy is made by mixing tamarind pulp with sugar and rolling it into balls or patties. People of Bahamas roast unripe tamarinds in coals until they burst open and then the pulp is eaten hot. Tamarind is also consumed as a natural laxative.

In animal studies, tamarind has been found to lower serum cholesterol and blood

sugar levels. Due to a lack of available human clinical trials, there is insufficient evidence to recommend tamarind for the treatment of hypercholesterolemia (high cholesterol) or diabetes. The fruit of the tamarind is also commonly used throughout South East Asia as a poultice applied to foreheads of fever sufferers. It is used to treat bronchial disorders and gargling with tamarind water is recommended for a sore throat. It is antiseptic, used in eye-baths and for the treatment of ulcers. Being highly acidic, it is a refrigerant (cooling in the heat) and febrifuge (for fighting fevers). The pulp is also beneficial in constipation.

15. Curry Leaf.

Botanical identity : *Murraya koenigii*

Curry leaves

Flowers of M. koenegii

Well ripened fruits

Curry Leaf (Karapincha-Sinh) or *Murraya koenegii* a native of India and Sri Lanka, is a small tree with very pungent aromatic leaves, mostly used in Sri Lanka and Kerala in India to add flavour to a curry or any dish that is tempered with oil, ghee or butter.

The leaves, the bark and the roots of *Murraya koenigii* can be used as a tonic and a stomachic. The bark and the roots are used as a stimulant by physicians. They are also used to cure eruptions and the bites of poisonous animals. The green leaves are said to be most effective when eaten raw for curing dysentery, and the infusion of the washed leaves stops vomiting. A strong odiferous oil occurs in the leaves and the seeds of *Murraya koenigii*. The essential oil exhibits a strong antibacterial and antifungal activity.

Research studies on the chemistry of curry leaves by Tachibama and colleagues in Japan have revealed the presence of several carbazole alkaloids which display anti oxidative and radical scavenging ability, which perhaps explains the reputed cholesterolemic activity. The major part of the fruit is occupied by the seed and the edible portion is only 49.4 per cent of the whole fruit. The fruits are very sweet and are eaten fresh. They have a characteristic odour which makes them slightly unpleasant. The overall fruit quality is fair. The shiny-black fruits are liked both by children and adults, and its chemical composition shows it to be most nutritious. . The leaves are used as a spice in different curries and impart a very good flavour to the preparations. These fruits have also many medicinal properties. The branches of *Murraya koenigii* are very popular for cleaning the teeth as datun and are said to strengthen the gums and the teeth.

Food flavour & Ayurvedic health practice

The foregoing is by no means a complete survey of the health benefits of the spices as known today. It is indicative of the benefits that were long traditionally known which modern scientific investigations confirm and attempt to rationalise.

In the concepts and the therapy of Ayurveda all of the above fifteen commonly used spices find inclusion in therapeutic preparations. Furthermore the same array of spices, are incorporated in the foods that are eaten in the region. Ayurvedic physicians combine their therapy almost invariably with recommendations for food intake, where certain foods are

recommended for particular diseases and the therapy that they prescribe for them. Equally in many instances, certain foods are debarred as they are contraindicated either for the disease or for the method of treatment. The food and therapy interplay in Ayurvedic theory is a complex one but it is significant that spices play an important role in both. If the regular use of spices in the recommended manner is adhered to, there could be nothing other than beneficial effects on the consumer. Most of the effects noted as causing problems such as the effects on the intestinal lining by prolonged use of chilli, is in the instances of over use. In the moderate quantities that are specified either by Ayurvedic therapy or food intake practices, or even in regular cooking practices, spices are valuable and health maintaining, besides adding a welcome piquancy and flavour to our food.

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Xiao Peigen – Authority on Chinese Medicinal Plants

By R.O.B. Wijesekera

Professor Xiao Peigen is credited as the academic leader of modern scientific research on Chinese medicinal plants. His research fields are so varied, that it defies ready description. He began as a biologist graduating in 1953 from Amoy University, and specialised in biology. He first served in the Institute of Materia Medica, of the Chinese Academy of Sciences, and his early work belonged to the disciplines of pharmacognosy and ethno botany. He had also developed a research group which included chemists with ability to study the structures of a range of new compounds isolated from Chinese medicinal plants. The author first met him in 1982 in Beijing during a UNIDO Workshop on Traditional Medicine organised in collaboration with the State Pharmaceutical Administration of China. It was a comprehensive workshop covering a wide range of disciplines related to the industrial utilisation of medicinal plants. His presentation on that occasion was an exhaustive review of the Chinese experience in the utilization of plants used in traditional medicine for modern therapy. He was to make a more extensive review of the field later in 1991 in a Chapter of a book edited by the author. *

In time he was internationally recognised as an authority in this field, and described himself as an ethno pharmacologist. Indeed he handled all questions at international fora, where he spoke of his favourite multidisciplinary researches, in a broad area of disciplines ranging from chemistry to pharmacology. He was in great demand and was often the draw card of the conferences on ethno medicine and herbal therapy. A modest individual he was a very obliging scientist willing always to share his knowledge with others, He participated in UNIDO and WHO programmes as a resource person and interacted in a pleasing fashion with representatives of both developing and developed nations. He remains still an active scientist and now a distinguished Professor, an Academician, of the Division of Medicine & Health of the Chinese Academy of Engineering. In 1994 he was elected as President of the International Society of Ethno pharmacology.

* The Medicinal Plants Industry Ed. Wijesekera (1991) CRC Press Florida.

Ayurveda encompasses not only science but religion and philosophy as well. We use the word religion to denote beliefs and disciplines conducive toward states of being in which the doors of perception open to all aspects of life. In Ayurveda , the whole of lifes journeys is considered to be sacred. The word philosophy refers to love of truth and in Aurvedha truth is Being, Pure Existence. The Source of all life. Ayurveda is a science of truth as it is expressed in life.

Source :
Dr.Vasant Lad, in Ayurveda: the Science of Self Healing Lotus Light Publications, Twin Lakes, USA, 1993

Sourcing of Natural Industrial Raw materials : A new fair – trade partnership approach

By Ayesha Tanya

Industrial companies that are interested in sourcing raw materials would find much to learn from the approach pioneered by Givaudan, a Fragrance company. It is known that the company Givaudan employs a large number of supply chains numbering over 200. Within the framework of its generic program called "Innovative Naturals" the company has formulated and implemented sustainable sourcing programs together with raw material producing countries. The company has classified high risk supply lines for such special attention. The objective is to ensure the safety of long term supplies and allow for future growth. In most of the raw material producing countries the factors that impact the supply lines can be identified as the following:

* The political context
* The environmental risks
* Disasters, natural and man made
* Rural exodus resulting from development
* Capital

Accordingly, establishing relationships to sustain industrial partnerships is a long and arduous process. The companies that have known success warn that it is important not to appear as conquerors or colonials. This is a considered view of Remi Pulverail of Givaudan, which has known success in establishing relationships. He considers it important to go in as a player and not merely a purchaser, and that a great deal of time has to be spent in establishing a lasting partnership.

Givaudan's successful program has been the partnership with Laos for the sustainable procurement of the commodity known as Benzoin resin. Benzoin resin or styrax resin is a balsamic resin obtained from the barks of several species of trees of the genus Styrax. It is widely used in the Perfumery and Fragrance industry as an incense, and in the pharmaceutical industry as well. It has an aroma that resembles that of Vanilla and possesses fixative properties as well. The styrax species are found in the Indonesian archipelago right up to the Far East. Givaudan's special project is centred in Laos, and has the following features:

* It represents a new strategic initiative for the sourcing of natural ingredients.
* It seeks to sign at least one joint partnership agreement every year together with the host country agents.

In Laos, Givaudan's partnership agent is "Agroforex". Agroforex is a well established local producer and exporter of medicinal and aromatic plant species. They have been operating for decades in Laos and have built up good connections with the relevant local communities. Agroforex is able to contribute its own know-how to ensure that its suppliers practice environmentally friendly agriculture. They encourage the extension of bush fallow systems associated with specialised production basins.

Pix ex. Google Images

The production of Benzoin resin from *Styrax tonkinensis* in Laos is a comparatively massive operation. It engages around 40,000 farmers, residing in over 150 villages in the Northern provinces of Phonsaly and to the east in the provinces of Honaphanh, and Xiangkhouang. The plant from which the resin is obtained is not an annual. It grows over a twenty year cycle, with the first harvest coming in seven years. Accordingly in order to enhance the income of the farmers, polyculture has been introduced. This brings in other subsidiary crops which include rice, vegetables, yams, and red ginger. However the styrax resin is the primary source of income.

New Raw Materials

The program had enabled the company to identify a variety of new raw materials and this is an additional spin-off benefit. Examples of such are the following:

Organic Bees Wax.

This in the form of an absolute is employed in fragrances to lend body to the floral notes of a composition. It makes a welcome addition to leather or tobacco or dried fruit or gingerbread chords in a fragrance.

Oil of Organic Red Ginger.

The oil is extracted from the sun-dried rhizomes of the red ginger plant. It brings freshness and colour to woody and floral notes.

Wild Pepper Essence.

Wild pepper is a small red brown berry possessing a fresh and spicy note similar to Szechwan pepper. The essence is similar to mandarins and elemi.

Benzoin Bark

The balsam brings a vanilla-like woody note to a scent.

The Givaudan perspective in searching for new ingredients is expressed By Herve Fratay, Marketing Director (Fragrance Ingredients) of Givaudan as follows:

"The purpose of searching for new botanical varieties not used before in fragrances is to bring to perfumes a range of naturals and not necessarily to recreate a scent discovered in situ. This is what our fair-trade sourcing program is for, but we are also working on new ways of treating existing varieties such as for example : Tonka bean, which we have roasted differently or benzoin resin in which we are able to concentrate the vanillin."

This will result in a number of testing phases:

* The testing of naturals and their behaviour in compounded formulations.
* Olfactory validation by perfumers
* Regulatory tests for toxic indications

The Social Dimension of the Program

There is a laudable social dimension to the program. Givaudan and its local counterpart Agroforex have set up the first High school Honaphanh in North Eastern Laos, within proximity to an important Styrax growing region. A second school, a joint venture with Givaudan has been established in 2008 in another province in the North, Aseuh (Phongsaly). This school has forty pupils and has been placed within the Laotian public school system. Eventually this school is expected to cater for over 100 teenagers from eleven local villages. The training of teachers is seen as an important co-function of the program, and this is planned to include inter alia the following:

* Instruction on the planting aspects of styrax to ensure that knowledge on agricultural aspects can be handed down to students.
* A basic knowledge on aspects of ecology.

The expectation is that locals will remain in their region and participate in the development process without having to seek employment elsewhere for necessity. From the standpoint of the company and the earnings of the country the natural resource base will be ensured together with the marketing aspects.

The Givaudan "Innovative naturals" program had been initially launched in 2007. Its immediate objective was to enrich the range of natural ingredients available to the company's perfumers. In this initiative the principles of sustainability are deemed paramount. Accordingly, every new expedition to a source-nation includes a perfumer to help improve understanding of the raw materials and their usage, as well as to provide a basis for inspiration in the home environment of the strategic ingredient and an atmosphere to imbibe relevant knowledge.

Following on the Australian Sandalwood initiative, and the Venezualan Tonka bean initiative, the Laotian program is Givaudan third such venture.

The Mysterious Mistletoe

By Annissa

Mistletoe is usually associated with a ritual enacted during the Christmas period. The ritual - kissing under the mistletoe - dates back in time to the ancient eras. Mistletoe has been characterized as a "Botanical monster, a mythological dryad, a therapeutic panacea, and a Yuletide perennial".

Botanically, it is indeed a partial parasite or hemi-parasite. It grows as a parasite on large trees, for example oak trees, but has the ability to grow by itself too. There are two types of mistletoe viz: The European variety which was the variety associated with ancient mythology and is botanically identified as : *Viscum album*. The variety known in North America is botanically identified as : *Phoradendron flavescens*. The plant in Europe was venerated by the ancient Celts and Germans. The ancient Greeks had associated it with the ability to banish evil viz Witches.

Kissing under the mistletoe was first associated with the Greek festival Saturnalia. Later it was an integral part of primitive marriage rites. This was based on two beliefs. Firstly, that the plant had the capability to ensure fertility, and secondly that it promoted love and peace among folk. So it was the eighteenth century English who credited the mistletoe with magical powers, which then meant that at yuletide a young lady standing under the decorated overhanging ball of mistletoe should not refuse to be kissed, thus ensuring for herself romance and a prosperous married life.

The medicinal properties of mistletoe too had become legendary and it was a panacea for many ills including cancer. Today extracts of mistletoe have been scientifically established to possess the magical powers earlier attributed to it. Such extracts were used in the past to control conditions such as cancer. It has now become the most widely used complementary cancer treatment in Central Europe. In Germany, preparations of *Viscum album*, are used in various therapeutic systems including Phytotherapy and homeopathy. There are many regulatory options within the European Regulatory framework that govern their use. Depending on the therapeutic system, and the intended use, suitable documentation that demonstrates safety and efficacy of any commercial preparation would be required. Presently the effect of extracts of mistletoe on the immune reactions both in vivo and in vitro is no longer doubted. Different antigens present in the extracts are able to moderate various cell types of the innate and the adaptive immune system. In particular, Lectins in the mistletoe, have been shown to be responsible for a variety of immunological actions. Other constituents of the extracts such as viscotoxins, oligosaccharides, and polysaccharides, are also believed to exert immuno-stimulatory action.

It is presently accepted that lectins and viscotoxins are the main biologically potent constituents of mistletoe extracts. Other classes of compounds present in the extracts, namely polysaccharides, phenylpropanoids, flavanoids and triterpenoids, could also contribute towards the overall pharmacological action.

In Europe mistletoe preparations play an important role in modern multi-modal oncological therapy.

Source : Fourth Mistletoe Symposium, Nonnweiler- Otzenhauser, Germany, November 2007. Phytomedicine Suppl.VII, 2007.

Ayurveda , Yoga and Tantra

Ayurveda, Yoga and Tantra are the ancient life disciplines that have been practiced in India for centuries. Yoga is the science union with the Divine. With Truth. Tantra is the most direct method of controlling the energy that creates the ultimate union with Truth, and Ayurveda is the Science of life.

Source : Dr.Vasant Lad, in Ayurveda: the Science of Self Healing Lotus Light Publications, Twin Lakes, USA, 1993

Science questions the accepted norms of Management

By Djivan Black

Charles Jacobs is the author of a book: Management Reviewed: Why Feedback does not Work, and Other Surprising Lessons from the Latest Brain Science.

This landmark publication by an experienced manager and a partner of over 180 companies brings in a trail blazing view of management. The views are inspired by the new and emerging discipline of "Brain science"

The author opines as follows: The stock-in-trade of management has been the following:

* Performance evaluations
* Goal setting
* Feedback
* Rewards

and, managers in general swear by the effectiveness of these well established management factors. Charles Jacobs believes that these were originally derived from the Greek practices of some centuries ago. Now according to the new brain science it has been conclusively established according to Jacobs, that:

* Feedback does not work
* Money does not invariably motivate
* Employees often ignore the goals set

So, Jacobs is of the view that a great deal of what managers are doing at the present time simply does not work. It may make them feel better. However it is not a help to employees or to progress. Employees complain that managers are not even "on the same planet" with respect to the needs and requirements of their employees. So, Charles Jacobs concludes that:

*** Performance Feedbacks backfire**

Employees are unlikely to change their behavior patterns because they have a deep seated need to hang on to their self image. They are likely to attribute a failure of performance to some other factor, or merely discount the source of the feedback. When the source is one of the superiors or any other person who they do not care for, this would become a preferable option to them.

*** Rewards do not work**

According to the new Brain Science, the brain is apt to generates feelings of pleasure when we are fully engaged on a satisfying task. Financial incentives actually decrease our intrinsic motivation – the need for motivation comes from within us.

*** Goal setting does not produce results**

It is emotion that keeps us focused and committed to a larger mission, and not, the author contends, numerical objectives. Objective goals should be directed to a larger mission, not mere profit.

Brain Science, it is contended, proves that "management practices" meaning "the manner in which things have always been done", simply do not work.

Jacobs says: "it is time companies realize that leaders must learn to manage both mind and behavior. If organizations would learn to channel our innate selfishness rather than attempt to counter it, employees will be more engaged and more motivated and more successful. That translates into bottom line results for the company".

Charles Jacobs gives further advice to managers as follows:

*** Use questions to engage employees**

Managers should cease to worry about the correct incentives to motivate good performance and should instead leverage the universal human desire for meaningful work.

*** Request more employee inputs**

Given the usual constraints, economic, social, even technological, managers should seek the ideas of employees on how to keep the company successful. For example they should be asked for ideas on how to prune expenses. When employees are fearful about what is going to happen, their behavior can change. The brain slows down, and they become less productive. They do not need recognition programs. You need to give as much information as possible and let the employees know where the business stands. They have to be kept really focused when they are scared.

*** Let employees be their own judge**

Jacobs is of the view that no matter how constructive managers try to make it, feedback

from them is merely perceived to be negative. Therefore it is better to make employees appraise their own performance using whatever hard data is available. They will then have a greater ownership of any shortfalls and it will become in their best interests to remedy them.

*** Relate stories**

Stories are a way in which our brains naturally work. They make sense of the world. BY telling stories to illustrate any issue the mental environment is created that will help them to do what is needed.

The ultimate result will be that people will relish working and hence will do better.

IN MEMORIUM

Govind. D. Kelkar – An Indian Icon of the Fragrance Industry

Govind Kelkar, who left this life in February 2010, was by any measure a most extraordinary personality. He was a gifted perfumer by nature who virtually grew up in an atmosphere of the perfumer's art, when his uncle chose him at a very tender age, to inherit and succeed him in what was then a comparatively modest perfumery in Bombay. The youthful Govind Kelkar, with his gift of foresight, realised early enough that the perfumer's art was inextricably linked with chemistry, for it was chemicals be they natural or synthetic, which were responsible for the delicate odours that touched the senses of smell. Accordingly, he studied chemistry at the University, in preparation for his future task to take charge of his uncle's company. S.H.Kelkar & Co, .was at the time, a small scale manufacturing concern, producing, compounded fragrances in India. It was so in 1977, when the author first met Govind Kelkar, then in his thirties and the heir apparent to leadership of the company. The United Nations Industrial Development Organisation (UNIDO) through its sister organisation ESCAP in Bangkok had determined that a two man team of "experts" should visit several countries of the Asian region and report on the status of the Essential Oils Industry. Thus the author was privileged to join G.D.Kelkar the leader of the team in an exercise that took over six weeks and visits to Afghanistan, Pakistan, India, Sri Lanka and Thailand. It was during this mission that we developed a firm and lasting friendship. We spent happy days in Bangkok writing our report which eventually was printed and published by ESCAP.

In the times that followed this period, we were to meet intermittently at Delhi, in Vienna, when I was at UNIDO, and in Colombo, and Mumbai, and my wife Marina and I came to regard the Kelkar family, Sudha and the daughters Swathi, and Jyothi, their spouses too, as our lasting friends. Govind has written his poigant story in his book entitled: The Fragrance of Success. It depicts his role in the development of the company into a major world class enterprise in the Fragrance Industry, his role in the expansion of its activities which include now Educational and Research Enterprises and a Kelkar College, of University status, at which I was privileged to give a lecture under his chairmanship.

Govind himself remained a man of great charm and engaging manner. His leadership within India and outside was apparent to those who knew the Industry, such as his role in the Flavour and Fragrance Association of India (FAFAI) and his sponsorship of activities within the CSIR institutions such as CIMAP. His interest in Scientific Research as the cornerstone of industrial development motored his success. He possessed the quality of greatness in that he listened and absorbed, thought deeply and acted displaying innovative vision and sound judgement. He was always joyfully pleasant company and was a raconteur who related his stories with gusto. His monument will be the initiatives he made, that will in the future as well, just as at the present, continue to benefit the young. We shall miss him much and his personal friendship and that of the charming members of his immediate family. India will miss him and his unique leadership, and so will the world of Fragrance.

We pray that he will be granted supreme bliss.

By R.O.B. Wijesekera

Corporate Social Responsibility & Employment

"We can", say visually handicapped :

By Janaka Kumarasinghe

In a bid to fulfill the social responsibilities of the company towards the state, the Chairman/Managing Director of Link Natural Dr. Devapriya Nugawela, gave the fullest support to the programme initiated by the Ministry of Labour, to provide employment to differently abled people. Dr; Nugawela says, "We wanted to support the socially responsible initiative by the Ministry of Labour in employing differently abled people which we consider a very good cause. These employees' work on par with others and the rest of the workforce too feels good about the decision to hire them. We should provide opportunities for differently abled people to live with dignity".

As part of this programme, six visually handicapped persons were provided employment by the company. Five of these staff members are employed in the packing section of 'Link Kesha' and their Assistant Production Manager Dhanasiri is satisfied with the contribution of these employees and says, "After completing a task some even ask for more work. Their fingertips are very sensitive and they can detect shape related quality problems better than us. Their productivity is as good as any other competent worker."

Dhanasiri also said, "I understand the sentiments of visually handicapped people better, as my own sister is also totally blind by birth. Differently abled people do expect empathy and not sympathy. Therefore, assisting them should not be overdone. Overdoing will make them feel helpless which damage their self-esteem." Visually challenged Sirikatha Jayaweera of the same department confirms what Dhanasiri said. "It took some time for our co-workers to understand us. Of course, they were kind and supportive. But as human beings we like to feel that we are not totally dependent on others. We too can do certain things on our own which makes us self-confident. I am glad that gradually our friends are understanding it. That makes us feel important and valuable to the organization and society." This is Sirikatha's second job and he had moved to Link Natural since it was closer to his hometown 'Kirindiwela'. He is proud to have represented Sri Lanka in Cricket in the World Cup Tournament for visually handicapped.

His wife, Harshani Opatha is also employed at Link Natural Products and according to her, she had been treated in England for six months at the age of two for blindness which had been cured, but on her return it had become worse. She says, "According to my mother, an instrument had damaged my visual system during the caesarean operation and now I am totally blind. I never gave up, but studied hard and entered the University of Sri Jayawardenapura where I completed a Bachelor of Arts Degree in Buddhist Civilization in 2007".

"These days we get regular inquiries from differently abled persons about vacancies after the current initiative. This initiative has increased our goodwill among the community. Even the company trade union is pleased with it," said the Assistant Human Resource Manager Priyantha Kolonnage.

"Before recruiting them we had to address two main concerns. Where to accommodate such staff and what types of jobs to be assigned to them" said the HR Director Dr. Ananda Jayawardena. "Depending on the functioning of different sensory organs we had to decide where to employ them. Therefore, five visually handicapped persons were placed in the packing section. It is encouraging to see these determined men and women with white canes arriving at the company premises using public transport. Though one of their most important sensory organs is not functioning, their courage is second to none or could even be considered more than the others. They are very concerned about their safety and it is not an issue for the organisation. During leisure times out of office, they play cricket with similar people, work with computers, read and listen to music. They want to live a normal life without being a burden to society."

Challenges

"At a time where mass production is replaced by mass customization, production lines need to change the products, too often necessitating production employees to be flexible and multi-skilled. Since visually handicapped staff members are not that flexible to be transferred from one task to another due to reasons beyond their control, adaptability of such staff into different tasks becomes challenging. Also initially we had to quality check their work 100 percent till they got used to the tasks. It has also been observed that their interactions with other employees is limited. "Production planning needs more efforts when such staff members are around us. Also we cannot expect them to perform quicker than normal workers though they have the ability to do so in certain jobs. Welfare matters such as finding suitable boarding houses for them is difficult. These are some of the challenges we had to overcome when employing such staff" said Senior Production Manager Yamuna Dassanayake. Anyway we are happy that we have overcome many a hurdle and that they are now with us. Also when it comes to things such as hygiene and honesty there are no problems at all' said Yamuna.

Despite these challenges, Link Natural Products (Pvt) Ltd is totally committed to continue its role in providing some measure of relief to those are ridden with disabilities through no fault of their own.

Opening of Link Natural Personal Care Outlet

Thursday,. 25th March heralded a new era for the cosmetics industry in the country, when Link Natural opened its flagship outlet for Personal Care Products at Crescat Boulevard. The Guest of Honour for the occasion was Mrs. Geraldine Bandaranaike, former beauty queen, model and now known as a famous Diva in Sri Lanka.

Located at the ground floor, shop K8, Crescat Boulevard the outlet will be kept open for business everyday (except for Poya days) from 10.30 a.m. to 7 p.m.

The products are based on a unique combination of Ayurvedic wisdom and modern technology, taking cosmetic therapy to new heights with a range of skin & body, hair & mind care products that have been carefully developed over time, combining leading edge technology with the purest resources Mother Nature has to offer contributing to the demands of health, wellness & beauty.

ERRATA

The photograph published as Iriweriya *(Coleus zeylanicus* (Benth) cramer.) in page No: 02 in the LNP Digest Vol. 5 issue 1 should be corrected as the figure No:1 and the photograph published in the page No:16 titled *C. fenestratum* (fam) Menispermaceae should be corrected as figure No : 2 given below.

Iriweriya *C. fenestratum*

We regret the error.
Miss. Gaya Anupama Abeyratne.
R & D Scientist.
Link Natural Products (Pvt) Ltd.

The Handbook of Medicinal Plants.

Yaniv Zohara, Bachrach Uriel (Eds).
The Hawworth Medical Press,
Binghamton, New York, 2005.

The handbook has been reviewed exhaustively in Phytomedicine, 15, 2008, 906 by Sonia Mesia-Vela.. The reviewer underscores the important issue that the medicinal plants industry has now ballooned into a multi-billion dollar industry and that henceforth at least measures to safeguard indigenous traditional knowledge is a matter of supreme importance from the standpoint of the wellbeing of humanity. Scientific research has been able to utilize some of this knowledge to produce a variety of spectacular additions to modern therapy.

This handbook is distributed in content to five main parts constituting 21 Chapters. It deals with the traditional uses as well as modern research in a variety of geographical situations. Part I deals with challenges and issues concerning the production of suitable therapeutic agents based on traditional knowledge and practices. The second part deals with the present and past uses of medicinal plants in separate cultures as represented by Chinese, Africans, Native Americans, Amazonian Indians, Medieval cultures in the Mediterranean region, and Australian Aborigines. The majority of this part is understandably devoted to Chinese Medicine, it being perhaps the most developed and best documented. The next part is devoted to the role played by European colonials in the discovery of medicinal agents from the African region,, followed by the practices within the Amazonian Indian territories. The authors emphasize the role of chemistry in the evaluation of the main chemical entities with therapeutic effect and hence the development of new drug entities from these plants. There is a part devoted to technologies in medicinal plant research which was considered by the reviewer Mesia-Vela as the most valuable section in the handbook. This chapter describes the use of molecular markers to monitor a breeding programme, and the use of genetic engineering been identified as a mechanism to introduce new traits into the plant metabolites. In vitro cultivation has been seen as a useful means to preserve native flora. Examples of the use of medicinal plant derived chemical natural products have been widely given and this includes the validation of some of the original uses by modern scientific means.

The handbook is deemed a valuable collection to a library on the utilization of medicinal plants. www.sciencedirect.com.

High Performance Thin Layer Chromatography (HPTLC) for Medicinal Plants.

Eike Reich & Anne Schibli (eds)
Thieme Medical Publishers Inc.,
New York. 2007

This is an invaluable publication for any R&D Laboratory engaged in work concerning the herbal products industry. TLC is the preferred mode of quality assessment of several herbal products on account of its rapidity, simplicity and the qualitative information it can deliver. Hence HPTLC is a valuable development in QA/QC work and this publication is a most welcome addition to any laboratory. Particularly relevant to manufacturing concerns is that the book addresses the important aspect of quality assessment of medicinal plant raw material as well as finished products. Quantitative aspects such as TLC_densitometry, also finds its place. www.sciencedirect.com

Big Science

Today's Big science is bound to the 5Ms. Money , Manpower, Military , Machines and Media.
Editors Note – the other M is Medicine

Source :
Patricia Fara , in Science: A four thousand year history. Oxford University Press Rev by Jo Marchant in New Scientists 2009 May 23

The Digest Mail Bag

Letter 1

I am deeply touched and feel very humble with your tribute to me in the Link Natural Products Digest.

I am glad you have been able to start this Link magazine, which will highlight the importance and contribution of the subcontinent on phytopharmaceuticals. I would very much like to continue receiving the Digest in the future.

Dr Nitya Anand
Lucknow-226020, INDIA

Letter 2

It is a great pleasure to receive your new volume and issues. This issue I like very much because of 2 articles: First of all the article on Cinnamon updating on the earlier ground breaking publication with GTZ, and secondly the small article on drumstick tree, a tree which is in my observation long undervalued – but important for traditional medicine and perfumery (Ben-oil).

I like to congratulate you for your successful efforts.

Klaus Dürbeck

Letter 3

Many thanks for the sending LINK Natural Production Digest, Vol.5, Iss.1. We would like to continue receiving the Digest in the future please.

Kind regardz
Ewa Kozakiewicz
United Kingdom

Letter 3

I read your journal from the website. It has published very interesting articles with good information. It was pleasure to contribute to the journal.

Regards
Dr. Lalith Gunasekara
Victoria. Australia

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 post or e.mail to :

Dr. R.O.B. Wijesekera,
Editor-in-Chief
Link Natural Products Digest
e.mail : robw@linknaturalproducts.com

Post : **Dr. R.O.B. Wijesekera**
Link Natural Products (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.